THE IMPACT OF BUSINESS CONTINUITY MANAGEMENT ON THE GERMAN ENERGY SECTOR DURING THE RUSSIA-UKRAINE CONFLICT

By

MOJTABA KALIRAD

DISSERTATION

Presented to the Presented to the Swiss School of Business and Management

In Partial Fulfillment

Of the Requirements

For the Degree

DOCTOR OF BUSINESS ADMINISTRATION

(DBA)

SWISS SCHOOL OF BUSINESS AND MANAGEMENT GENEVA

December, 2024

THE IMPACT OF BUSINESS CONTINUITY MANAGEMENT ON THE GERMAN ENERGY SECTOR DURING THE RUSSIA-UKRAINE CONFLICT

By

MOJTABA KALIRAD

APPROVED BY

(Chair)

RECEIVED/APPROVED BY:

Admissions Director

Candidate's Declaration

I hereby certify that the work presented in this thesis, entitled:

THE IMPACT OF BUSINESS CONTINUITY MANAGEMENT ON THE GERMAN ENERGY SECTOR DURING THE RUSSIA-UKRAINE CONFLICT

for the award of the degree of Doctor of Business Administration, submitted to the Swiss School of Business and Management (Geneva), is an authentic record of my own work carried out under the supervision of Prof. Dr. Tamara Gajić (PhD), Professor at the Swiss School of Business Management (Geneva). The material presented in this thesis has not been submitted by me for the award of any degree or diploma from this or any other university or institute.

Mojtaba Kalirad , December 2024

Signature

Acknowledgments

As I complete this journey, I am filled with gratitude for the support and encouragement I received along the way.

First and foremost, I would like to express my deepest appreciation to my parents. Though we were separated by distance, their unwavering emotional support was a constant source of strength for me throughout this study. I am forever grateful for their belief in me.

I dedicate this work to the memory of my beloved sister, whose loss I deeply felt during this time. Her spirit remains with me, inspiring me to persevere and make the most of every opportunity.

Special thanks are due to Prof. Dr. Tamara Gajić, whose expert guidance and thoughtful advice were instrumental in shaping this research. Her mentorship provided both clarity and direction at crucial moments, greatly enhancing the quality of this work. Appreciation is also extended to Ivan Pavić for his valuable insights and feedback, which enriched the study.

To all who have supported me, directly or indirectly, on this journey, I am deeply thankful. This accomplishment is as much yours as it is mine.

With heartfelt thanks all,

ABSTRACT

THE IMPACT OF BUSINESS CONTINUITY MANAGEMENT ON THE GERMAN ENERGY SECTOR DURING THE RUSSIA-UKRAINE CONFLICT

MOJTABA KALIRAD

December 2024

Dissertation Chair: Chair's Name

Co-Chair: Co-Chair's Name

The war between Russia and Ukraine in 2022 has tabled many shocks to the global value chains of many items and tested how global networks for commerce convey energy. This study aimed to assess the organization's Business continuity management (BCM) and its ability to provide resilience and continuity improvement solutions as a major German energy company, Uniper. Thus, the case of Uniper is analyzed as a case study of how BCM principles are implemented in practice at the company level in the context of this research, which examines business continuity planning and readiness in the context of geopolitics. The research investigated how well the German energy firm has integrated BCM into its operations, with an emphasis on business continuity planning and readiness methods. Furthermore, this study aimed to raise knowledge and understanding of BCM's importance in organizational sustainability, hence improving the company's capacity to handle difficult situations.

The research data was collected from workers at the German energy firm using 200 questionnaires. The survey's target audience comprised managers, human resource officers, operations managers, and information and communications technology (ICT) administrators from the organization. After gathering the data, statistical software for the social sciences (SPSS) version 20 was used for data analysis, including correlation and regression analysis methods. The

review shed light on the link between BCM implementation and the company's capacity to effectively manage emergencies, as well as highlighted opportunities for development.

The study's findings are intended to give useful insights into the applicability and impact of BCM on organizational resilience in energy companies, particularly in the context of crisis management following the Russian-Ukrainian war. This study aims to add to the body of knowledge on business continuity and crisis management techniques by identifying areas of strength and weakness with particular relevance for a German energy company. The findings of this study provide practical advice for German energy companies on how to improve their resilience and preparation in the face of potential future crises and uncertainties. This research provides significant insights into the specialized frameworks employed by German energy supply companies to manage crises, particularly during the Russia-Ukraine conflict. The study confirms the existence and general effectiveness of these frameworks in enhancing operational continuity and financial stability.

Keywords: Global energy market, German energy sector, business continuity management, operational continuity**,** financial stability, resilience strategies, crisis management strategies, energy supply chains, energy company.

Table of Contents

CHAPTER I: INTRODUCTION

1.1 Introduction

The Russian-Ukrainian war has disrupted the global supply chain and posed significant challenges to global trade, particularly impacting the flow of goods and commodities. The energy sector, crucial for both economic stability and national security, has faced heightened risks and uncertainties due to geopolitical tensions (Zhao et al., 2023). In response to these challenges, Business Continuity Management (BCM) emerges as a critical framework for enhancing resilience and ensuring continuity within an organization's operations in the energy supply chain domain. This study focuses on evaluating the effectiveness of BCM practices, considering Uniper as a case study, which is a prominent German energy company. By investigating Uniper's approach to BCM, with a specific emphasis on business continuity planning and readiness strategies, this research aims to develop a conceptual framework. This framework seeks to assist national and international firms within the energy sector in improving their resilience strategies amid geopolitical crises and other disruptive events.

1.2 Statement of the problem

Ukraine's continued war caused increased civilian harm and left millions without water, food, and other vital supplies (Minesashvili, 2023). The global economy was negatively influenced by the war as it led to noticeable disruptions in the universal supply chain and subsequent supply shocks in trade and energy (Zhao et al., 2023). The disruption caused by war resulted in enhanced commodity prices, energy costs, and food prices, leading to increased inflationary pressures in multiple nations across the globe. Subsequent shortages in logistics and accelerated energy costs resulted in enhanced transportation costs and supply shortages (Mulford, 2016). These severe disruptions to the global markets due to Russia's war on Ukraine exposed challenges to the secure raw materials supply that are critical for the green transition and industrial production (Albert and Baitei, 2022).

Russia is the major gas exporter, most particularly to Europe, but has halted supplies because of sanctions (Zhao et al., 2023). The conflict has additionally disrupted Ukraine's energy infrastructure, leading to significant interruptions in the production of gas, oil, and refined

products. This has exacerbated the energy crisis, underscoring the war's profound impact on Ukraine's energy sector (Sonnenfeld et al., 2022). On the other hand, the conflict has disrupted transportation routes, causing significant interruptions in logistics. Concurrently, economic instability associated with the war has led to decreased production rates in Ukraine. These disruptions in the supply chain and energy sector have had significant repercussions beyond Ukraine, notably impacting Germany (Allam et al., 2022).

The war unleashed a cascade of challenges for Germany, echoing across its economy, particularly in the realm of employment dynamics and the energy sector (Zhao et al., 2023). This conflict has not only disrupted global supply chains and escalated energy costs but has also underscored vulnerabilities in Germany's heavy dependence on Russian gas imports (Allam et al., 2022). Before the Russia-Ukrainian war, Germany was increasingly relying on Russian gas imports, which accounted for over 50% of its gas needs (Stoelzel Chadwick, 2021). These disruptions have led to economic instability, increased inflationary pressures, and significant impacts on employment within German energy companies (Allam et al., 2022). Instances such as the financial strain on firms like Uniper illustrate the urgent need for effective governmental interventions to stabilize affected sectors and mitigate economic downturns.

At its core, this study seeks to comprehensively examine how the Russia-Ukraine conflict has specifically affected Germany's energy sector and employment environment. By delving into these impacts, the research aims to identify actionable insights and propose strategic measures to mitigate the adverse effects on supply chains, enhance economic resilience, and safeguard employment within the energy industry. Understanding these dynamics is essential for formulating policies that can effectively navigate and mitigate the socio-economic repercussions of geopolitical conflicts on national economies and industries. The Russian-Ukrainian war has significantly disrupted the global supply chain and impacted the energy sector, posing risks to economic stability and national security (Mhlanga and Ndhlovu, 2024). Business Continuity Management (BCM) is crucial for resilience in the energy supply chain. Evaluating BCM practices at Uniper, a prominent German energy company, reveals the importance of business continuity planning and readiness. Developing a framework to enhance resilience strategies amid geopolitical crises is essential (Mulford, 2016; Albert and Baitei, 2022; Sonnenfeld et al., 2022; Minesashvili, 2023). The war's effects on Germany’s energy sector highlight the need for governmental interventions to stabilize the economy and mitigate disruptions (Stoelzel

Chadwick, 2021; Allam et al., 2022).

1.2.1 Identification of suppliers and Uniper's role

Uniper aims to ensure clean, reliable energy and smooth transitions toward sustainable sources while being as efficient as possible. Its commercial goals focus on reducing carbon emissions, securing energy, and accelerating innovation in renewable technologies. Most of the company's activities fall into three categories which include power generation, gas supply, and trading in energy. This company also actively engages in decarbonization activities and infrastructure development. Taking into account market shares, the company is taking an important part in the European energy market. An increasing role in the consumption of electricity and gas evidently fits well with the aim of Uniper to be a significant player in energy transition and sustainability (Allam et al., 2022). Uniper is one of the biggest energy companies in Germany, and it has suffered substantially because of the Russian-Ukrainian war, mainly arising from Russian gas dependence (Uniper, 2024). Prior to the conflict, over half of Uniper's demand was met by Russian gas, showing how dependent it was on geopolitics (Stoelzel Chadwick, 2021). These risks have worsened the conflict that has disrupted the supply chain, raised energy costs, and posed many operational problems for Uniper and similar companies in the sector.

Sanctions and geopolitical tensions resulting from the war caused the Russian company to interrupt gas supplies to Uniper, forcing it to look for other energy sources. This shift is not easy to accomplish because logistics and infrastructure have become issues, and new energy sources are expensive. Hence, this shift leads to volatility in the general economy and inflation in Germany. The escalated costs in energy caused other areas in Germany to be volatile and experience inflation (Albert & Baitei, 2022).

Uniper's dependence on Russian gas underscores a broader issue within Germany's energy sector. It poses a risk to the sector since it exposes the sector to shocks emanating from a single supplier of a large percentage of the energy needs. The war basically made Germany realize the importance of diversifying its sources of energy, including focusing on renewable energy sources and diversifying the supply routes to avoid some of the issues associated with conflicts (Sonnenfeld et al., 2022).

In response to these challenges, Uniper has been considering strategic interventions that would ensure that there is stability in operations. These include investing more in renewable

energy projects, including wind and solar energy, improving the energy storage capacity for these renewable sources of energy, and searching for new suppliers of renewable energy sources as well as new contracts with the existing ones. These are meant to decrease Europe's reliance on Russian gas, as well as to construct a new energy system that is less vulnerable to future disruptions (Minesashvili, 2023).

The German government has also realized the precarious situation with regard to energy and the need to intervene to maintain order. That is why policies and financial support measures are being worked out to stabilize similar companies like Uniper in the existing crisis. Some measures taken by the governments are subsidies to investors in renewable energy sources, encouragement of measures aimed at energy savings, and provision of financial assistance to organization's impacted by the shift in supplies of energy products (Allam et al., 2022). In addition, more detailed research of the works of Business Continuity Management (BCM) in Uniper is being conducted with the view of improving the model to cope with such occurrences. BCM procedures entail risk assessment, planning of responses, and putting in place business continuity plans to enable business continuity during disruptive incidences. The BCM focus area of Uniper revolves around increasing organizational capability and readiness for the worst-case geopolitical scenarios so that business processes can function at their best even while experiencing a strain in such events.

The case of Uniper reveals how the Russian-Ukrainian war is affecting the German energy sector and imposes the importance of the coalesced plans towards a secure energy and economically stable nation. Thus, Uniper and other similar companies may achieve better adaptability to the challenges resulting from geopolitical conflicts when energy sources are diversified, renewable energy investment is made, and BCM practices are optimized for improved energy security in Germany (Mulford, 2016).

1.3 Significance of the study

The significance of this study lies in its timely exploration of Business Continuity Management (BCM) within the context of the ongoing Russia-Ukraine conflict and its profound implications for the German energy sector, with a specific focus on Uniper. The conflict has triggered significant macroeconomic disruptions, including heightened energy costs, supply chain interruptions, and broader economic instability across Europe, underscoring the urgent

need for resilient strategies within critical sectors like energy (Sheikh, 2023; Prontera, 2024). By examining BCM as a strategic framework, this research aims to provide actionable insights into how effective BCM practices can bolster operational continuity, mitigate revenue losses, and navigate disruptions caused by geopolitical conflicts. Practical recommendations derived from this study will equip business managers and policymakers with strategies to adapt operational frameworks, secure supply chains, and ensure service continuity during crises, thereby mitigating the socio-economic impacts of war. The findings of the study underscore adoption of policies that would strengthen BCM frameworks in critical sectors such as energy. Formulations of these policies should focus on creating regulations that enhance incentives to build resilience, encourage diversification in sources of energy, and ensure strategic management of supply chains to enhance business capacities to geopolitical disruptions and ensure a stable economy.

Furthermore, this research contributes to filling a current gap in academic understanding by offering empirical insights into the role of BCM in crisis management within the energy sector, aiming to expand the knowledge base and provide a foundation for future research and practical applications in navigating geopolitical uncertainties. Thus, this study not only addresses critical challenges facing Uniper and similar energy companies but also aims to provide valuable guidance to stakeholders seeking to enhance resilience and mitigate the impacts of geopolitical conflicts on business operations and broader economic stability.

1.4 Research questions

The main goal of this research is to understand how BCM affected the German energy company, especially Uniper, which was Europe's biggest importer of Russian gas during the war. As a result of the Russian war against Ukraine, this study is primarily concerned with examining the function of Business Continuity Management (BCM) in German energy companies. Based on the following research questions, the entire project must be carried out as follows:

RQ1: How can Uniper and other energy supply companies find a rescue during an energy crisis?

RQ2: What were the main problems of Uniper and other major energy suppliers during the Russian war against Ukraine?

RQ3: Do German energy supply companies have any specialized framework to face

uncertainties during a crisis like war?

RQ4: How efficient is the BCM approach for Uniper and other energy suppliers?

1.5 Limitations, delimitations, and assumptions

1.5.1 Limitations

The findings from this study are specific to the German energy sector and may not be applicable to other industries or countries. The unique characteristics and dynamics of German energy firms limit the generalizability of conclusions beyond this specific context. The research primarily investigates BCM within Uniper, limiting the breadth of perspectives that could be gained from multiple companies. This narrow focus on a single case study reduces the ability to generalize findings across the broader energy sector.

The study targets specific roles within Uniper (e.g., operations managers, human resource officers, ICT managers), potentially excluding perspectives from other stakeholders who may offer different insights or experiences. The research exclusively examines the effectiveness of BCM frameworks, neglecting the potential contributions of other business management frameworks that could also play a role in crisis management and operational resilience.

1.5.2 Delimitations

This study focuses specifically on the impact of business continuity management (BCM), including crisis management, risk assessment, and supply chain management, on the resilience of the German energy sector during the Russia-Ukrainian invasion. The viewpoints of other stakeholders, such as the Russian government, the Ukrainian energy sector, international organization’s, and environmental groups, are not within the study's scope. Additionally, the research is delimited to a specific period during the Russia-Ukrainian invasion, focusing on understanding the sector's response and resilience during this defined timeframe. This temporal delimitation ensures a focused analysis of responses and strategies implemented by the German energy sector within a defined period, but it restricts the study's ability to capture longer-term impacts or changes that may occur beyond this period.

1.5.3 Assumptions

The study assumed that business continuity management (BCM) plays an active role in

mitigating Russia's invasion of Ukraine's influence on the German energy sector. It is assumed that effective business continuity management approaches limit disruptions and promote the resilience of energy sectors. This study assumed that the energy sectors of Germany have essential resources, expertise, and infrastructure to integrate and execute the strategies focused on business continuity management. It also assumed that the sectors have improved access to technological, financial, and human resources required for effective recovery and response management. Moreover, another main assumption of this study is that it reflects that there are increased levels of coordination and cooperation among stakeholders in the German energy sectors. Another assumption is that the regulators, energy companies, and governmental agencies are making active collaborations in the context of addressing the major challenges imposed by the invasion and ensuring the energy supply's continuity.

1.6 Definition of terms

1.6.1 Business Continuity Management (BCM)

BCM is an integrated management process that intends to identify the serious hazards or risks within an organisation at the initial stage and take effective preventive measures to address them. It includes various disciplines of crisis management, disaster recovery, emergency response, and business continuity, such as operational/ organisational relocation (Lampe et al., 2020).

1.6.2 Crisis Management Strategies (CMS*)*

Crisis management strategies are defined as approaches that an organisation uses to respond to certain risks or crises. These strategies are based on action plans that are designed to support an organisation in dealing with an unexpected or sudden event (Wenzel et al., 2020).

1.6.3 Global energy market

The global energy market encompasses a commodity market where various forms of energy products are traded, including heat, electricity, natural gas, oil, coal, and other fuel products. These commodities play a crucial role in meeting global energy demands and are traded on international platforms. Key products traded in this market include electricity, natural gas, oil for fuel, and coal, each serving vital roles in industrial, residential, and commercial sectors worldwide (Mulder, 2021).

1.6.4 Energy supply chain

It is referred to as a procedure of gathering, converting, changing, and distributing energy from certain sources to meet increased energy demands. This chain is composed of five main phases: procurement, generation, transmission, distribution, and request (Sadeeq and Zeebaree, 2021).

CHAPTER II: REVIEW OF LITERATURE

2.1 Introduction

In the present interlinked global environment, resilience, specifically in the infrastructure sectors, including energy, holds increased prominence, typically in geopolitical crises and turmoil. The recent Ukraine invasion through Russia has showcased the vulnerability of the European nations, which includes Germany, to the disruptions in the supply chain of energy (Van de Graaf, 2023). The energy sector of Germany experiences increased challenges, being one of the potential energy consumers in Europe, who depend heavily on imports to ensure continuity in the geopolitical uncertainties. The review of literature, therefore, seeks to consider the influence of business continuity management (BCM) over Germany's energy sector amidst the invasion of Russia in Ukraine. Therefore, by providing a detailed analysis linked with the literature, the review considers navigating the key questions of research related to resilience, response, and preparedness for energy supply companies in Germany in crisis times.

2.2 Inclusion criteria and themes

Table 1 offers a definite overview of the criteria leveraged for considering the appropriate literature on the topic.

Table 1: Inclusion criteria

Inclusion Criteria	**Description**
Relevance	The literature has focused on studies that navigate the influence of BCM on Germany's energy sector amidst the invasion of Russia in Ukraine.
Peer-Reviewed Sources	The literature includes a review of peer-reviewed articles, reports, books, and papers from industry sources and reputable academics.
Publication Date	The literature includes studies published in the last five years to ensure accuracy and relevancy.
Language	To ensure comprehension, the studies published in English are included only.
Scope	Considering the scope, only the research studies emphasising crisis management, BCM execution, Uniper, and geopolitical conflict have been

	included.
Methodology	The review has only included the studies that employ quantitative, qualitative, and mixed approaches after offering valuable information about the question of research.
Geographical Focus	The geographical focus of the research is the energy sector of Germany in the crises led by Russia's invasion.
Industry Perspective	The research literature includes the perspectives of policymakers, energy supply companies, and industry experts.

The above criteria of inclusion have ensured a relevant and focused review of the literature by considering the sources that were closely linked with the energy sector of Germany and the company Uniper. Through the stated time frame, i.e., 2000 to 2023, the review has incorporated contemporary practices and other geopolitical influences, such as the conflict between Russia and Ukraine. The overall screening process has ensured that only sources that meet the above criteria were included, improving the reliability and relevance.

The themes below have been developed for the literature review, which discusses the main aspects of this research based on previous literature and theories.

Table 2: Themes for literature review

Themes	**Descriptions**
Theme 1	Business continuity management (BCM)
Theme 2	Vulnerability of the German energy sector to external shocks
Theme 3	Russia's invasion of Ukraine and the energy sector of Germany
Theme 4	Role of business continuity management in the energy sector of Germany
Theme 5	Specialised framework in German energy companies
Theme 6	Resilience strategies amidst crises
Theme 7	Challenges experienced by Energy Suppliers amidst the conflict; Russia-Ukraine

2.3 Background

The ongoing conflict between Russia and Ukraine has elicited widespread apprehensions as a result of its significant effects on the economy, society, and business sectors. The global

economy has been considerably impacted by this conflict, which has not only exacerbated a tremendous humanitarian crisis but has also resulted in food insecurity and the escalation of energy prices (Pereira et al.,2022). The energy supply chain crisis provoked by the conflict is particularly critical, as energy is an essential commodity for societal well-being, environmental sustainability, and economic stability. Europe, particularly Germany, has become more dependent on Russia for energy imports, particularly natural gas. The disruption of gas supplies from Russia to Germany through pipelines that pass through Ukraine is a substantial external disturbance to Germany's energy system (Tsutsunashvili et al., 2024). The economic development and investment have been hindered by the anxiety and dread of shortages that have been provoked by the war-induced uncertainties in gas supply. In light of the increased global uncertainties, Germany is under a compelling obligation to develop and implement strategies that will address energy supply crises and enhance both economic resilience and self-reliance. In order to guarantee an uninterrupted energy supply, German energy suppliers must effectively navigate these disruptions (Menkiszak, 2023).

Uniper, a prominent German energy company that specialises in the trading of natural gas and the generation of electricity, has been significantly impacted by the escalating conflict since February 2022. The crisis has had a substantial impact on energy security in Europe, with a particular emphasis on the prices of crude and natural gas. Germany, which is significantly dependent on Russian energy resources, has been the most affected by this conflict, experiencing energy crises and significant cost increases (Heather, 2022). The disruption in Uniper's natural gas supply underscores vulnerabilities, including financing challenges, contractual disputes, and gas curtailment risks, as well as opportunities that arise from the expansion of renewable energy (Halser and Paraschiv, 2022).

Uniper and other affected companies have, however, successfully navigated a complex environment that has been influenced by market disruptions and sanctions in the face of these challenges. The severity of the crisis and the need for immediate action to stabilise critical sectors are emphasised by the German government's interventions, which include acquiring interests in critical companies and providing substantial financial support (Jolkkonen, 2023). The necessity for German energy suppliers to implement comprehensive strategies to alleviate oil and gas shortages is underscored by the examination of the effects of the Russia-Ukrainian conflict.

Diversifying energy sources to reduce Russian dependence is a critical strategic imperative for guaranteeing energy security (Halser and Paraschiv, 2022).

2.4 Business continuity management (BCM)

2.4.1 Comprehending Business continuity management and its history

The theme considers the historical development and concept of BCM in order to attain a wider understanding of its prominence in the current energy sector. It is recognized as the strategic framework that is comprehensively designed to ensure the continuity and resilience of the firm's operations in disruptive crises and incidents. The evolution of the BCM can be traced through the 20th century when the BCM evolved in response to wartime disruptions and natural disasters (Corrales-Estrada et al. 2021). However, at a later stage, the BCM was being integrated into the comprehensive discipline. As per Sawalha (2020), the origin of the BCM is attributed to the business's need to navigate the risks linked to globalization and technical advancement. As corporations expand their global operation, they are becoming susceptible to threats, including geopolitical conflicts, cyber-attacks, and natural diseases. These led to the establishment of systemic approaches for assessing, identifying, and managing the risk linked with resilience. During the 1980s, there was a shift in the BCM, which initiated formalized methods, including crisis management and disaster recovery planning. These methods are typically focused on the emergency responses and the recovery of IT systems (Tómasson, 2023). However, it became apparent soon, indicating the need for a holistic approach to addressing the complexes and interdependencies in modern firms.

The BCM acquisition attained momentum during the 1990s, which was led by high-profile figures, including the 1993 World Trade Center and the Y2K scare. The events indicate the business vulnerabilities for considering the unforeseen disruptions and show the need for risk management strategies. In the 21st century, the BCM has emerged as a mature discipline that is led by international standards, including ISO 22301:2019 and the best practices of the industry as outlined by firms such as the Continuity Institute (Brás et al., 2023). Presently, BCM includes a wide spectrum of activities, such as business influence analysis, risk assessment, continual improvement, testing, and continuity planning. Precisely, the historical emergency linked with BCM reflects back to the increasing recognition linked with the significance of resilience and the

other continuity planning for ensuring success and survival linked with the firms in the interconnected and uncertain era. The review highlights the history of BCM and its principle, which offers the foundation for its application in the energy sector. The gap has been identified in the context of the implementation of BCM for energy firms, focusing on the areas requiring improvement to have better resilience.

2.4.2 BCM and crises management

The theme uncovers the critical role of BCM in the management of crises; it uncovers the effectiveness of BCM in sustaining continuity and dealing with risks. In the current era, led by significant technological advancement, geopolitical uncertainties, and globalization, businesses experience a number of risks that threaten their survival and operation. The robust environment of business is led by a number of crises having noticeable implications. In such a context, the significance of (BCM) for crisis management could not be overstated (Srivastava and Al Hashmi, 2023). It acts as one of the noticeable approaches that assist in assessing, identifying, and dealing with the resilience of the firm. Therefore, by integrating BCM into operations, businesses generally seek to improve the ability to respond, anticipate, and recover from events efficiently. The study of Riglietti et al. (2022) showcases that the BCM noticeably enables firms to lower the crisis influence on stakeholders to sustain imperative functions and preserve their competitive edge and reputation. One key element behind BCM is the emphasis on risk analysis and assessment. Therefore, by performing an effective assessment of risk, firms are able to consider vulnerabilities and threats internally and externally. These, in return, allow them to establish targeted strategies of mitigation and focus on the resources for lowering the influence of the overall crises (Rumman, 2022). The study of Azadegan et al. (2020), for instance, revealed that firms generally update and assess the risk register to be equipped better with the identification of emerging threats and undertaking proactive measures for navigating them. Business impact analysis (BIA) is another vital element of BCM, entailing the identification of critical procedures and functions for the firms and assessing the influence of operation disruptions.

The business impact analysis includes the identification of processes and functions for assessing the influence of the disruption linked with the operations. By performing this, businesses are able to attain a depth of understanding of dependencies. These enable them to

establish continuing plans more efficiently (Zhao et al., 2023). For example, the study of Păunescu and Argatu (2020) showcases that firms generally perform comprehensive BIAs, which allocate resources in a better manner during crises. The continuity plans developed are another vital element of BCM, as they normally outline the processes and strategies for being executed in response to the scenario and ensure that the critical functions can be restored and sustained in the crisis's events. These plans entail redundant systems, work arrangements, and communication protocols. Ali et al. (2023) further focus on the significance of routine updating and testing the continuity plans for ensuring relevance and efficacy in the steadily emerging environment. Exercising and testing are imperative components of BCM, as they allow firms to validate their overall plans and improve their crisis readiness. Therefore, by considering the scenarios through drills, simulation, and exercises, the businesses are able to determine the gaps, familiarise the stakeholders, and refine the process of responses to the responsibilities and the roles (Bajgorić et al. 2020).

The study of Charoenthammachoke et al. (2020) comprehends the significance of coordination and collaboration amongst the external partners and the internal department for testing the exercise and ensuring effective and cohesive responses to the overall crises. Further, consistent enhancement is another critical principle linked with BCM, focusing on the need to evolve and adapt to changing circumstances and threats. Therefore, by performing the lessons learned and reviewing the post-incidents, businesses can improve their overall resilience. Sawalha's research (2020) focuses on the significance of promoting a culture of innovation and resilience in firms as it allows them to thrive in uncertainties. The BCM plays a vital role in crisis management as it allows the firms to respond and anticipate incident recovery. Thus, by integrating BCM into the operations, businesses are able to improve resilience, safeguard the interests of stakeholders, and lower the influence of crises. However, BCM is not considered a one-time activity but instead a continuous procedure requiring ongoing investment, commitment, and collaboration, which ensures efficacy in the ever-changing environment of business. The overall literature showcases the importance of BCM for ensuring resilience in crises. However, the aim of this study is to fill the existing gap that has been found in the adoption of BCM strategies to improve the resilience of the sector.

2.4.3 Component of BCM and its influences

This theme reviews the key component linked with BCM and its impact on organizational resilience. Understanding these components is vital for uncovering the weaknesses and the strengths in the present framework of BCM. Business Community Management includes a number of components that are interconnected and designed to improve the resilience of the firms and also ensure operation continuity while experiencing disruptions. Each of the components plays a pivotal role in lowering the crisis impact, mitigating the risk, and promoting recovery efforts and effective response (Suresh et al. 2020). Business community management also has a noticeable influence on a number of sectors, including the energy industry, where disruption has a noticeable influence on economic stability, national security, and the welfare of the public. The assessment of risk entails evaluation, analysis, and determination of vulnerabilities and threats that disrupt the operations of the business. It has been found that firms focus on risk on the basis of influence and likelihood, enabling resources to establish effective strategies for target mitigation (Vanichchinchai, 2023). In the energy sector, the assessment of risk assists in determining the vulnerabilities, including the distribution network, pipelines, and power plant, and assessing the consequences linked with the disruption of energy distribution and supply (Zhao et al., 2023).

The business impact analysis, on the other hand, entails processing, functioning, and resources of the business for determining the possible influences linked with the operation disruption. In the energy sector, impact analysis assists in determining the functions and assessing the disruption in the reliability and supply of energy (Păunescu and Argatu, 2020). The continuing planning entails the development of processes and other strategies for restoring critical business functions in crisis events. These plans entail a number of measures, including the communication protocols and the redundant systems. Across the energy sector, continuity planning is critical as it ensures uninterrupted operations linked with services and infrastructure. These include the natural distribution of gas, electricity generation, and the boost of supply during the crises (Bajgorić et al., 2022). Exercising and testing further entails validation of the continuity plans with the assistance of simulations, drills, and exercises. These activities are imperative for familiarizing the stakeholders and the processes with different responsibilities and roles. The exercise and testing in the energy sector are imperative for undermining the efficacy

of emergency plan response in evaluating the readiness of equipment and personnel. These enhance coordination typically amongst government agencies, stakeholders, and emergency responders (Suresh et al. 2020).

Continuous improvement further focuses on the firm need to evolve and adapt the response to the changing circumstances and threats. Therefore, the reviews post-incidents and the performance evaluation should be performed to consider the improvement areas and execute the corrective actions for improving resilience (Zhao et al., 2023). Continuous improvement, typically in the energy sector, assists in determining the vulnerabilities linked with the supply chain, technologies, and infrastructures for executing the measurements and enhancing energy security (Charoenthammachoke et al., 2020). Business Community Management has a noticeable influence on the energy sector, where the disruption has led to far-reaching complications for public welfare, economic stability, and national security. Therefore, by the execution of the BCM practices, the companies in the energy sector determine the mitigation of the risk, which is a vital component for ensuring the uninterrupted and reliable delivery of energy services (Ali et al., 2023). In the energy sector, the BCM assists in collaboration with regulatory bodies, industry practices, and governmental agencies to improve the coordination, response, and coordination amidst disasters and other emergencies. Precisely, business continuity management plays a vital role in ensuring reliability and validity in the energy sector for the prosperity and well-being of society. The analysis has revealed the way in which BCM led to overall resilience, focusing on the energy sector. However, the gap is prevalent concerning the establishment of a robust BCM framework to deal with the unique challenges in the sector.

2.5 Vulnerability of the german energy sector to external shocks

The section offers a comprehensive overview linked to Germany's energy sector, which is imperative to consider the vulnerabilities and resilience of the sector. Further, reviewing the dependency has assisted in determining the vulnerability of the sector toward external shocks. The section also undermines the geopolitical conflicts leading to vulnerabilities, which is vital for the establishment of effective strategies for BCM. Reporting past instances has been helpful in improving the future practices of BCM.

2.5.1 German sector overview

The energy sector of Germany is recognized as a significant entity that plays an

imperative role in the country's societal functionality and economic prowess. The sector operates in a complicated framework, including a number of sources of energy and another mechanism of regulation (Kosowski et al., 2023). Thus, it is imperative to develop a comprehensive understanding of the sector and consider the policy environment as well as the energy mix. According to ITA (2023), Germany will be able to supply 80% of its energy from renewable sources by the year 2030. During 2022, Germany was able to supply 46%; however, there has been a 2% reduction in the emission of greenhouse across the sector of industry. However, the reduction in 2022 was not adequate for reaching the climate target. The target was to lower the emission by about 55% in comparison with the one that emerged in 1980. The crises of energy led by the war of Russia against Ukraine have resulted in increasing the dirtier electricity coal use. The real estate and transportation sector was unable to attain the reduction target of greenhouse in 2022.

The energy sector is well structured into a number of subsectors, and each sector plays a pivotal role in ensuring the sustainability and reliability linked with the supply of energy. According to Kosowski et al. (2023), the subsectors integrate the distribution, transmission, and consumption of electricity. The generation mix of electricity in Germany is quite diverse, including renewable and conventional sources. Conventional sources, including nuclear power and coal, have played a noticeable role in the generation of electricity. However, in the past few years, an effort has existed to transition to renewable sources like biomass, solar, and wind, led by technological advancement and environmental imperative. There are a number of studies that have focused on the critical role of renewable energy, typically in the transition of energy across Germany. For example, the research of Hassan et al. (2024) showcases the exponential growth linked with the capacity of renewable energy across the country as the renewables withhold a noticeable portion linked with the generation of electricity. The transition has, therefore, been promoted by the supportive policies of the government involving financial incentives, energy targets, and feed-in tariffs. Olujobi et al. (2023) indicated that the governance and ownership structure in Germany's energy sector is led by private and public entities. Large corporations of energy play an imperative role in the distribution, transmission, and generation of overall energy. These corporations and independent power producers have accumulatively led to efficacy and resilience in the energy system.

The energy sector in Germany operates in a dynamic policy environment shaped by

European and national regulations. The energy transition led by the government of Germany acts as a cornerstone for the policy of energy seeking to decarbonize the economy, foster renewable energy, and improve efficiency. The initiatives have attained noticeable attention, spurring investment and innovation in the clean technologies of energy (Hassan et al. 2024), aside from the policy initiatives, the energy sector of Germany is impacted by technological advancement, market dynamics, and societal preferences. The liberalization of the market and the competition promoted efficiency and innovation, which led to lowering the prices of electricity and enhanced selection for consumers. Technological advancements in terms of smart grids, energy shortages, and renewable energy have fostered sustainability and resilience (Mishra and Singh, 2023). The cost of energy dramatically increases in Germany during 2022 because of the reduced supply from Russia. The process of energy typically in the household of Germany has noticeably dropped during 2023, and it continued to be at an increased level before the invasion of Russia in Ukraine. The increased prices also impose a noticeable burden on the sector. The government of Germany has set out a plan of $4.4 billion years for subsidising the prices of electricity toward the energy-intensive sector to protect businesses from increased prices imposed on corporations to leave the country (ITA, 2023).

2.5.2 Reliance over external energy sources

The energy environment of Germany is led by a noticeable reliance on external sources to meet energy needs, specifically in the context of oil and gas. Irrespective of the strides in the adoption of renewable energy, conventional sources of energy continue to be critical for distinct sectors, including the process of industry, heating, and transportation (Langerak, 2023). The example of Germany's reliance on external sources of energy showcases the exploration linked with the supply chain, import patterns, and the linked vulnerabilities. Natural gas acts as the cornerstone of Germany's energy mix, playing an imperative role in industrial applications, heating, and the generation of electricity. It is viewed that the majority of the gas in Germany is imported through Russia, the Netherlands, and Norway (Dejonghe et al., 2023). As per the data from the research of Rokicki et al. (2023), Germany's imports are accountable for about 94% of the consumption of natural gas, showcasing the country's reliance on external sources. In particular, Russia is the predominant German supplier and the supplier of other European countries through pipelines, including Nord Stream 2 and Nord Stream. The reliance on Russian

gas has increased noticeable concern about geopolitical and energy security, which was prevalent by past disputes between Russia and other transit countries such as Ukraine, including the supply disruptions. The literature of de Jong (2024) on Germany's energy dependency showcases the geopolitical dimension linked with external sources and dependencies.

The research of Welfens (2023) showcases the strategic implications linked with Russia's energy exports to European countries such as Germany. The ability of Russia to use energy supplies for political purposes has led to calls for diversifying the sources of energy and improving the independence of energy for navigating geopolitical risk. China's reliance on Germany for industrial processes, heating, and transportation costs shows the vulnerability and inclination toward external shocks. However, there have been noticeable efforts to lower the consumption of oil through measures of energy efficiency and alternative fuels. Germany continues to be reliant on the imports of oil, specifically from the Netherlands, Norway, and Russia. The study of Streimikiene et al. (2023) focuses on the significance of energy resilience and diversification for improving the energy security of Germany.

The initiatives, including the Corridor of South Gas and the establishment of liquefied natural gas, seek to lower the reliance on suppliers and improve diversification. Investment in energy storage technologies and renewable energy infrastructure will lead to a reduction in reliance on fossil fuels and an improvement in the self-sufficiency of energy (Galue Campos and Nwachukwu, 2023). The ongoing transition of energy in Germany is considered as Energiewende seeking to lower the reliance on external sources of energy and improve the shift toward renewable energy. The policies, including the Energy Efficiency Directive (EED) and Renewable Energy Sources (EEG), foster the deployment of renewable energy, efforts of energy conservation, and measures of energy efficiency. Therefore, by emphasising domestic renewable sources and promoting innovation typically in the technologies of clean energy. Germany seeks to improve the resilience of energy and lower its vulnerability to external shocks (Baldursson et al., 2023). Precisely, China's dependence on Germany on external sources of energy, specifically natural oil and gas, imposes noticeable challenges to the security of energy. Nonetheless, the supply disruptions, geopolitical tensions, and other market dynamics showcase the need for sustainability, resilience, and diversification in the energy transition efforts led by Germany. Thus, by promoting energy efficiency, renewable energy, and energy dependence, the country can build resilience, mitigate risk, and develop a secure and sustainable future for energy.

2.5.3 Incline to geopolitical conflicts

The energy sector of Germany, as per Reka (2023), is vulnerable to geopolitical tensions and conflict, specifically the one that entails key transit and supplier countries. The geopolitical dynamics in distinct regions, including North Africa, the Middle East, and East Europe, have a noticeable impact on the supply chain, energy security, and economic stability of the country. Therefore, it is crucial to consider the geopolitical dynamics in the energy sector as it requires detailed analysis linked with the risk, dynamics, and key actors. Russia has emerged as one of the noticeable players in Germany's energy sector, which is accountable for the supply of oil imports and natural gas. Draaijer (2023) indicated that the association between Russia and Germany, specifically in the energy trade, is impacted by political, economic, and historical factors. The gas pipeline construction has gained viable attention due to the strategic implications of energy export for European countries, particularly Germany.

The literature on Germany's energy vulnerability showcases the increased geopolitical risk linked to Russia's reliance on energy supplies. The study of Lokenberg et al. (2023) showcases the strategic use of Russia over the other European countries through the exports of energy. The study findings claim that the disputes between the transit countries and Russia, including Ukraine, have led to disruptions in the supply chain, showing the significance of resilience and diversification in the industry's supply chain. Subsequently, Germany's reliance on the imports of energy from different regions, including North Africa and the Middle East, has exposed it to geopolitical conflicts and tensions across the regions. According to Khan et al. (2023), the instability in the countries of oil production, including Iran, Libya, and Iraq, disrupted the international market of energy, which led to supply disruptions and volatility in prices. The research focuses on the strategic implications linked with the geopolitical conflict for Germany's security and policy. Further, the efforts of the EU to diversify the sources of energy and the routes through initiatives, including the Southern Gas Corridor, seek to lower the reliance on the transit countries and the suppliers. These initiatives work to improve resilience and cooperation and navigate the geopolitical risk in the member states of the EU.

Aside from the external risk, the transition of energy in Germany presents challenges and opportunities concerning the geopolitical dynamics. The transformation toward renewable sources of energy and nuclear power seeks to lower reliance on fossil fuels and improve the

independence of energy. The transition also includes challenges of affordability, capacity, and integration of the grid, requiring noticeable consideration of the geopolitical risk (Draaijer, 2023). Overall, Germany's energy sector is vulnerable to geopolitical tensions, specifically those involving transit countries and key suppliers. Hence, fostering the diversification of energy, improving cooperation among the member states of the EU, and innovation in the technologies of clean energy have assisted in navigating the geopolitical risk and developing a sustainable future.

2.5.4 Past examples of responses and disruptions

Considering the past disruption in the energy sector of Germany, the relative responses have been noticeable for policy and academic discourse. Policymakers and scholars have delved into historical events to determine vulnerabilities, glean insights, and formulate appropriate strategies for fostering resilience and continuity in future challenges. This section, therefore, considers the findings from the academic literature to show the responses, impacts, and patterns linked with the past disruptions in Germany's energy environment. A number of studies, such as Mishra and Singh (2023), Zhao et al. (2023), and Tripathy and Mishtra (2023), have examined the disruptions and instances in Germany's energy sector. These disruptions include events such as the extreme phenomenon of weather, interruptions in the supply chain, and other geopolitical tension. Each of these imposes a critical challenge on supply reliability and energy security, enabling comprehensive analysis for protecting the measures (Mishra and Singh, 2023). For example, the 2003 European heatwave is recognized as the main event straining the capacity of power generation and precipitating blackouts across the German countries. The influence of floods and storms over the power infrastructure has showcased the vulnerability of electricity distribution and transmission (Tripathy and Mishtra, 2023). Responding to the disruption in the energy sector, Germany has executed strategies for promoting modernization and expanding the infrastructure of renewable energy to fortify the adaptability and reliability of the overall energy system. Further, the initiatives, including the supply routes and diversification of energy sources, including the South Gas Corridor and the LNG terminal, aim to attenuate the reliance on transit corridors and singular suppliers (Touazi, 2023). Cultivating improved response capabilities, including the coordination mechanism and the crisis management protocols, has evolved as the cornerstone toward building resilience efforts. Subsequently, the simulations and the training

exercises encompass the readiness for promoting collaboration amongst the stakeholders, including the energy enterprise, government agencies, and emergency responders. Precisely, the past disruption in the energy sector of Germany has been accountable for the policy literature providing a comprehensive understanding of the challenges experienced and the enacted responses. Therefore, by assimilating the lessons learned from past events, Germany is able to forge a path toward an adaptable, resilient, and sustainable future of energy (Zhao et al., 2023).

The overall section has identified a gap that needs to be reviewed more in terms of the particular vulnerabilities that can be dealt with through enhanced practices of BCM and strategies for lowering dependencies. Moreover, navigating the gaps in the management of geopolitical risk is vital for building resilience in the future.

2.6 Russia and Ukraine Conflict in the energy sector of Germany

The Ukraine and Russia war has resulted in increased challenges led by global politics, having a noticeable impact on energy security and markets. Germany is recognized as one of the largest economies in Europe and a potential player in the energy environment, which has been significantly influenced by the conflict (Welfens, 2023). The current section has therefore considered the repercussions linked with the invasion of Russia in Ukraine over the energy sector of Germany, focusing on the disruption in the supply of natural gas, energy supply implications, challenges, and the assurance of financial implications. Reviewing the implication was crucial for considering resilience and highlighting the significance of a diversified and secure supply chain.

2.6.1 Implication on supply of energy

Russia Ukraine war has sparked extensive discussions among analysts and scholars regarding its immediate implications on energy supply dynamics in Germany. Studies such as de Jong (2024) emphasize the vulnerability of Germany's energy sector to external shocks, particularly geopolitical conflicts like the Ukraine conflict, which disrupt supply chains and lead to market volatility and energy price concerns within the industry. Similarly, research by Welfens (2023) underscores the increased market volatility and energy prices resulting from the conflict, prompting industry leaders and policymakers to focus on risk management and optimizing supply chain operations to mitigate these impacts. Academic literature also explores corporate and governmental responses aimed at enhancing energy security, reducing

vulnerability to risks, and promoting sustainability through transitions to renewable energy and improved energy efficiency measures (Streimikiene et al., 2023).

European Union initiatives have gained prominence in addressing these challenges, emphasizing regional cooperation and collective action to diversify energy routes and sources amidst geopolitical tensions (Lokenberg et al., 2023). Diplomatic efforts play a crucial role in de-escalating tensions and fostering dialogue, which is seen as essential for enhancing cooperation, security, and stability in the energy sector during such crises. The invasion's immediate implications for energy supply across Germany have sparked significant debates and discussions among policymakers and academics, highlighting the need for effective responses to ensure sustainability and resilience in the energy sector (Zhao et al., 2023).

2.6.2 Disruption in supply of natural gas

The Ukraine conflict with Russia has led to noticeable concerns regarding the reliability and security linked with the supply of natural gas for Germany, showcasing a noticeable importer of natural gas to Russia. The disruption in the supply of natural gas has noticeable implications on market stability, energy security, and economic resilience across Europe and Germany (Luschini et al., 2024). The comprehensive analysis linked with the supply of natural gas includes the market influence, geopolitics dynamics, and the mitigation strategies that are employed for navigating the crises. According to Halser and Paraschiv (2022), the war of Russia in Ukraine has led to noticeable fears of the disruption of supply and volatility in the process, specifically in the market of natural gas, considering the important role of Russia as the potential supplier of natural gas across Germany. The Nord Stream 2 pipeline seeks to directly transfer natural gas from Russia to Germany through the Baltic Sea. It has evolved as an important point of controversy and debate in the conflict context. The project has experienced increased opposition from the US and EU countries, who consider it as the means for increasing the impact over the energy market of Europe who consider it as the source for increasing the influence over the energy market of Europe and bypassing the conventional routes of transit. The research of Labunski (2023), on the other hand, has showcased the significance of supply routes in natural gas and transit countries for shaping geopolitics across Europe. The conflict has showcased the challenge of existing routes of supply and the need for resilience and diversification in the energy supply chain. The study of Wiertz et al. (2023) has highlighted the significance of

diversifying the sources of energy and improving the resilience typically in market dynamics and geopolitical risk. Responding to the crises, Germany has executed a number of measures in order to navigate the disruption led by the supply of natural gas and lower the dependency on imports from Russia. These all led to the transition toward growing energy efficiency and renewable energy to improve resilience and security. Additionally, Germany has led the effort to improve the collaboration with European partners and is considering alternative energy supply routes, including renewable sources of energy and LNG imports (Labunski, 2023).

Of Nerlinger and Utz. (2022) emphasised the efforts led by the European Union to diversify the routes and sources of energy through initiatives that entail the establishment of Liquefied Natural Gas (LNG) terminals and the Southern gas corridor to lower the reliance on transit countries and single suppliers. The study has reported the importance of improving energy cooperation and solidarity amongst the members of the EU for navigating the challenges and fostering resilience at a wide level. Nebot Pérez. (2023) stated that Germany has led diplomatic efforts to de-escalate the tensions, seek diplomatic solutions, and foster dialogue in the conflict. The study has focused on energy diplomacy and its role in improving cooperation, security, and stability in the region. The disruption in the supply of natural gas resulting from the conflict between Russia and Ukraine showcases the challenge linked with the security risk, market dynamics, and energy geopolitics across Europe. By executing the measures for diversifying the sources of energy and improving cooperation and resilience, Germany is able to navigate the disruptions and develop a secure and sustainable future.

2.6.3 Challenges experienced by the companies of energy supply

Energy supply companies operating in Germany face numerous challenges due to disruptions in global markets and geopolitical tensions. These challenges include a number of issues, such as disruption of the supply chain, market volatility, geopolitical risk, and regulatory uncertainty. The company's energy supply is required to address the challenges while ensuring the uninterrupted and reliable delivery of overall energy services to the customers (Nerlinger and Utz, 2022). One of the key challenges experienced by companies' energy supply is the management of the market volatility and the uncertainty that results from the conflict. The Ukraine conflict has further led to increased market instability and geopolitical tension with increased fluctuation in the prices of energy and the supply chain strains (Zhao et al., 2023). The

study depicts the significance of risk management and optimising the operations of the supply chain to consider the influence of market volatility. Wiertz et al. (2023) state that energy supply companies experience increased geopolitical risk and uncertainty linked with the Ukraine conflict. Further, the modification in government sanctions, policies, and trade restrictions can influence the supply chain and the energy market, which leads to increased uncertainty and cost for corporations.

The study of Sawalha (2020) focuses on the significance of regulatory predictability and stability for promoting innovation and investment in the energy sector. The disruption in the supply chain imposes a noticeable challenge for energy supply companies across Germany. The Ukraine conflict has led to noticeable concerns about supply security and transit infrastructure, specifically the import of natural gas from Russia. Companies are, therefore, required to consider resilience, determine vulnerability, and execute measures to improve visibility, redundancy, and flexibility in the supply chain. The study of Srivastava and Al Hashmi (2023) showcases the significance of diversifying the sources of the supply chain and improving the resilience of the supply chain for navigating the disruption and its influence. Subsequently, energy supply companies are required to navigate the financial implications linked with the conflict, including the market dynamics, changes in the prices of energy, and the decision to invest. The increase in market volatility and the energy prices that result from the conflict increase the investment plans, profitability, and revenues of the corporations.

The study of Luschini et al. (2024) postulated that corporations need to assess the financial risk linked with the changes in regulatory, geopolitics risks, and market stability for the development of adequate strategies and managing the risk appropriately. Moreover, the management of regulatory and market risk assists the companies in the energy supply in navigating the operational challenge stemming from the conflict. These challenges entail ensuring the security and safety linked with the energy infrastructure, sustaining operational continuity, and managing workforce disruption in the face of geopolitical tensions and other uncertainties in the market. Månsson (2014) further postulates the significance of executing innovative plans of emergency responses, measures of business continuity, and crisis management for navigating the challenges and ensuring reliable delivery linked with the services of energy. Precisely, the conflict that resulted from the invasion of Russia in Ukraine has led to noticeable challenges for the energy supply companies operating in Germany. Therefore, by

considering the challenges efficiently and executing the measures, energy corporations such as Uniper can navigate the influence of disruption toward the development of a secure and sustainable energy future.

2.6.4 Implication on finances

The conflict led by the invasion of Ukraine has had a noticeable financial impact on the company's energy supplies, which are operating in Germany. These impacts typically include a number of changes in the prices of energy, regulatory uncertainty, market volatility, and geopolitical risk as they impose challenges for liquidity, profitability, and the decision of investment (Touazi, 2023). Thus, it is important to understand the financial implications linked with the conflict in order to manage the risk and ensure financial sustainability in the long run. One of the key financial implications, as per the research of Tripathy and Mishra (2023), is the influence on the prices of energy and other revenues. The literature demonstrates that the increase in the market volatility and prices of energy has resulted from the conflict, leading to enhanced costs for the energy supply companies, specifically the ones that are reliant on the import of natural gas in Russia. The corporates face increased challenges in passing the cost to consumers with the assistance of high energy supply costs, specifically the ones reliant on Russian imports. The research of Draaijer (2023) further comprehended the pressure experienced in passing the cost onto the customer with the assistance of increased energy prices. These influence consumer spending and affordability at a wide level. The study further showcases the significance of managing the pressure of cost and optimizing the pricing strategies for sustaining increased profitability in the volatile environment of the market. Reka (2023) postulated that the company's energy supply needs to manage the financial risk appropriately linked with the geopolitical developments and the other regulatory challenges that result from the conflict. The changes in the sanctions, policies of the government, and the restriction of trade further influence the supply chain and the energy market, leading to increased costs and uncertainty.

The modification in the sanctions, policies of the government, and other trade restrictions further influence the energy market and the supply chain, ultimately leading to increased costs and uncertainty for corporations. The firms, therefore, are required to assess the implication of finances over the regulatory changes and adapting the emerging conditions of the market (Baldursson et al., 2023). The research of Halser and Paraschiv (2022) asserted that the

management of regulatory risk and the cost of the companies of energy supply need to navigate the financial implications linked with the disruption of the supply chain and the other operational challenges that result from the conflict. The disruption in the supply of natural gas and the transit infrastructure can influence the operation of the companies, logistics, and supply chain, leading to increased operational inefficacy and cost. Nerlinger and Utz (2022) emphasize that corporations must assess the financial implications of supply chain disruptions, implement measures, and evaluate alternative sources of supply to enhance supply chain resilience.

The Ukraine conflict has noticeable implications for investment capital and decisions for energy supply companies. Månsson (2014) notes that corporations with business interests face increased challenges in accessing the capital market, attracting investment, and securing financing. Additionally, the conflict has increased the volatility and uncertainty across the energy market as it influences the value of energy assets and other investments. The corporation needs to assess the financial risk linked with an evaluation of investment opportunities, investment decisions, and the establishment of strategies for the management of risk efficiently. Precisely, the conflict resulting from the invasion of Russia and Ukraine had noticeable financial implications for energy supply companies across Germany. Navigating the implications efficiently and executing the measures for the management of risk assist the corporates in navigating the challenge imposed by the conflicts and ensuring financial sustainability in the long term.

The overall section has revealed a number of gaps. For instance, there are a number of vulnerabilities in the energy sector which need to be navigated through improved BCM strategies. Additionally, the gap identified highlights the need to focus on alternate energy solutions and financial risk management to lower the dependence on geopolitical supplies and improve the resilience of the sector.

2.7 Role of business continuity management in the energy sector of germany (Relevance to Russia-Ukraine conflict)

Understanding the significance of Business Continuity Management (BCM) in the context of the Russia-Ukraine conflict is crucial for the German energy sector. This section explores how BCM strategies are essential for ensuring operational stability and resilience in times of geopolitical crises. German energy, in the same way as others on the planet, must deal

with operational resilience challenges in times of geopolitical conflicts such as the one nobody has already won. Business continuity management (BCM) is actually called a strategic tool for overcoming existing challenges and providing operational sustainability and vulnerability resistance in the energy sector despite disasters. The essay addresses how the BCM of power is bound to the Russian-Ukrainian conflict in the German energy sector and helps reveal what way of mitigating these effects might be used.

Business continuity management deals with pre-planned processes that provide viable procedures to identify threats and ensure uninterrupted services to critical organization functions in cases of crises. When discussing energy strategic planning in the German energy sector, we find BCM to be of the utmost importance when it comes to determining and handling uncertainties associated with external factors like geopolitical conflicts. As Ali et al. (2023) note, organizational resilience and performance should be included in BCM strategy design frameworks to highlight the crucial role of energy operations' stability in crises.

Though the advantages of BCM are evident, German energy companies meet with many obstacles due to the nature of the current political crisis between Russia and Ukraine in the realization of the BCM (Bajgorić, Turulja and Alagić, 2022). Such problems include the unavailability of a supply chain, financial incapability, and regulatory difficulties. On the other hand, firms have taken adaptive approaches in a bid to maintain continuous operations after significant disruptions. In BCM, the role of supply chain involvement is accentuated as it not only helps curb reputational and operational damage related to disruptions but also plays a role in keeping the business operating in the first place.

Energy companies in Germany, among other things, took resilience measures so that they could still foster operational continuity despite the fighting between Russia and Ukraine. The strategies used here include improving energy balances, educating on infrastructure resilience, and gaining the support of stakeholders. Bajgorić et al. (2022) stress the necessity of disaster recovery planning within BCM, pointing out the fact that it is necessary for meeting the regulatory compliance and operational resilience needs of an enterprise.

The Russia-Ukraine conflict heavily impacts energy companies in Germany and consequently leads to greater expenses and income. These obstacles can be overcome by firms' implementation of risk management techniques, including insurance, financial hedging, and investor diversification. Baldursson et al. (2023) stress the particular need to fight for resilience

as one of the key primary goals for the energy system in Europe and pay attention to the proactive measures of risk management.

The geopolitical crisis highlights crucial lessons for the German energy industry, emphasizing that risk mitigation and reinforcing capacity to withstand disruption measures should not be overlooked. Given this, the energy corporations should keep on perfecting their operational BCM frameworks, invest in cutting-edge technologies, and establish stronger partnerships with the stakeholders to maintain the continuous and stable functioning of the energy facilities in the conditions of the increasingly unstable geopolitical state. As a result, the BCM system has strategic significance in terms of effective response to the problems of the energy sector in Germany caused by the conflict between Russia and Ukraine. By assessing the risks of certain regions and then using various adaptive strategies, the energy companies can stay afloat and maintain stable operations throughout these geopolitical uncertainties of the country to serve the people and society in a greater capacity.

2.7.1 Assessment of business continuity management (BCM) strategies in the german energy sector

The assessment of the strategies of Business Continuity Management (BCM) of the German energy sector under the context of the Russia-Ukraine conflict is essential for achieving operational resilience and avoiding the difficulties arising from disruptions. Several types of research reflect on the economic and energy vulnerability of geopolitical tensions. Thus, it is essential for hedging plans to be present in BCM frameworks that boost efficiency. To illustrate, Obłój and Voronovska (2024) highlight the necessity for quick business adaptations of these companies during crises, relying on experience in crisis management. The latter highlights the importance of being able to change with the conditions and strategically approach the unclear political environments. Hartvig et al. (2028) also highlight the vital role of Russian energy in the narrative of energy security. The authors provide arguments in favor of developing proactive risk management in the German energy sector.

This skirmish is a key factor in the worldwide economy through the sector’s gas for supplies and market policies (Liu and Su, 2024; Karan et al., 2024). In this situation, the disruption of normal energy operations is one of the major concerns. Moreover, it is the BCM that helps maintain energy operations and minimizes negative economic impacts. Almazán-Gómez et al. (2024) provide a multiregional assessment of resilient-building measures in

response to the Russian invasion of Ukraine, thus pinpointing the significance of this mitigating against any adverse effects. Kahr (2024) outlines the way to mitigate disruption risks in B2B electrotechnics with the aid of Business Continuity Management (BCM), which ensures supply chain resilience. Furthermore, Maliszewska-Nienartowicz (2020) feels Germany cannot afford to stagnant and play a wait-and-see approach with renewable energy because the transition to clean energy sources causes the threat of the Russia-Ukraine conflict on renewable energy development in Germany, which should be addressed by proactive measures.

Through the lens of Liu and Pan's (2024) research, it has been found that the Russia-Ukraine war impacts the energy industry, making the need for good strategic plans and risk management clear. This contributes, on the one hand, to the urgency of BCM in estimating and balancing possible threats in German energy management. Hence, the efficiency of the BCM strategies in the German energy sector is determined when the country encounters geopolitical tensions that affect electricity production and transmission operations. The results of many studies reveal that in addition to reacting to the impacts of the crisis, energy companies and their regulators/equalizers should be more proactive about premature risk management measures to minimize damage to their economy. Via the adoption of adaptive responses and fortification of resilience measures, energy businesses should be able to handle unpredictable geopolitical constellations that destabilize the supply chain of energy.

2.7.2 Understanding the integration of BCM in the energy sector amidst geopolitical crises

The incorporation of Business Continuity Management (BCM) in the energy sector in the backdrop of geopolitical problems should be given attention to prevent operational instabilities and interruptions. Multiple studies can give us a glimpse into the issues and probabilities offered by BCM incorporation related to geopolitical issues, specifically in the presence of Russia's war against Ukraine. In particular, the article by Flamm and Kroll (2024) considers the issue of environmental, security, and green economic recovery in view of the Russian war against Ukraine, revealing the importance of resilient energy infrastructure as a condition for sustainable development. Lukash and Namoniuk's (2024) study deals with post-war development energy scenarios for Ukraine, primarily focusing on the need for a flexible climate change mitigation (BCM) strategy to meet the challenges faced during the recovery process and to ensure energy

security. Petrova (2024) analyzes the challenges of CFM and the measures of resilience building, emphasizing the fact that proactive BCM systems should be created for the purpose of reducing the impact of geopolitical crises on energy operations. Mello (2024) explores how Germany adjusts its foreign policy in the light of the Ukraine crisis. In that conflict, he treats BCM integration in the energy sector as an important factor of national security and stability.

Muttaqien et al. (2024) explored the post-Ukraine-crisis repercussions for the Russia-China alliance, emphasizing that there is more than meets the eye: the interconnectedness of geopolitical events and their implications for the global energy markets. Kostruba (2024) states that one should know how to manage foreign business operations in Ukraine during the war through BCM and its role in ensuring business continuity and resilience in difficult situations. Studies reveal that BCM remains a very important component that improves the energy sector's resilience during periods of geopolitical conflict. Through working out adaptive ways of action and putting funding in risk management tools, energy companies can reduce the impact of geopolitical tensions on energy as well as secure supply chain stability. Besides, responsive BCM systems, through the promotion of efforts covering post-war recovery and the support of sustainable development in regions affected by conflicts, can be helped. Thus, it may be concluded that there is a need for proper knowledge of the role of BCM during geopolitical conflicts in the energy sector in order to facilitate supply continuity and the resilience of the infrastructure. The studies also highlighted the significance of adaptive strategies, crisis management, and resilience measures in dealing with the effects of energy operations that are derived from geopolitical tensions. Energy companies may meet the unstable international situation by applying basic precautionary measures to their business and contributing to the world’s stability and sustainability.

2.7.3 Evaluation of relevance of BCM frameworks in addressing impact of Russia-Ukraine conflict

The assessment of the applicability of the BCM frameworks to the situation that the Russia-Ukraine conflict sets is essential to explore their effectiveness in buffering the energy sector from disruptions and helping the sector sustainability. During the course of these studies, the relevance of BCM in maneuvering conflict and dependence on nearby competitors is discussed. In their study, Flamm and Kroll (2024) put forward the significance of environmental security and peacebuilding strategies while drawing upon the example of the current invasive

warfare of Russia against Ukraine, emphasizing the need for disaster management systems to deal with the problem of the fragile energy infrastructure and ensure a sustainable recovery. Lukash and Namoniuk (2024) discuss the future post-war development energy scenarios in Ukraine, not to further focus on the role of BCM in the process of setting up Ukrainian energy safety, which is also essential. Through Petrova (2024), crisis management operations and processes of resilience-building are highlighted with a focus on the application of this particular crisis management body of knowledge in business continuity and the provision of critical infrastructure for mitigation of ground effects. Mello (2024) unveils the nature of the German foreign policy response to the conflict with regard to balancing its interests by utilizing the BCM (Balanced Coordination Management) framework.

Muttaqien et al. (2024) study the impact of the Ukraine crisis on Russia-China business relations as the major issues are in the services and commodity sectors. Research outcomes, combined further, recommend that the impact of the Russia-Ukraine war on the energy sector and business functioning is through the findings of various studies that the lack of frameworks or BCM is highly relevant. By putting in place rapid risk-handling techniques and processes, companies increase their resilience to disruptions, critical services protection, and facilitation of the regional stability and recovery process. Additionally, the assessment of the employability of BCM frameworks underlines their importance in coping with multi-faceted challenges that are related to geopolitical conflicts, one example of which is the Russia-Ukraine conflict. Lessons learned from the research highlight the imperative need for risk managers to incorporate business continuity management principles into the strategy-planning processes of companies to be able to promote resilience in the face of a turbulent environment and safeguard business operations and records.

2.7.4 Identifying challenges faced by energy companies in germany during the Russia-Ukraine conflict

European energy firms in Germany have to deal with a myriad of concerns sparked by the Russia-Ukraine war, and in turn, they attempt to act both strategically and timely to maintain their functioning. The main challenge in this context is the risk of interruption in energy supply because of geopolitical reasons. Germany has limited energy independence due to the fact that Russia is one of its primary suppliers of energy (Baldursson et al., 2023). If the supply is cut off

or disrupted, then shortages are highly probable. With the changing demand pattern, companies operating in the energy sector face a myriad of challenges ranging from meeting power demand and operational stability to "AVOID" (Mattissek, 2023). They may need to turn to alternative energy supply resources and strengthen the supply chain's resilience (Wiertz, Kuhn, and Mattissek, 2023). The aftermath of the dispute makes the global political scene more fragile, and obviously, the energy infrastructure and supply routes are under threat of being damaged by this crisis. Increased risk around the secure assets of energy companies requires a rethink of security procedures and the development of efficient strategies to make up for the possible threats and provide maximum protection. In this context, collaboration with government agencies and international partners will involve safeguarding critical infrastructure and maintaining the availability of energy (Van de Graaf, 2022).

While this is one more difficulty, the companies in the energy sector of Germany are faced with the challenge of balancing energy security with greenhouse gas emission reduction goals. Although companies seem to be battling the energy crisis, the need for responsible corporate actions and to minimize the effect of energy production on global warming is also relevant. Innovative methods and capital acceleration for renewable power sources are called for success in these circumstances, even if it is complicated (Uniper Inc., 2023). Moreover, the processes of development of novel climate events like droughts and heatwaves add to the difficulties faced by power companies. Such incidents disorganize the power generating, relaying, and consumption processes, which carry determinant risks affecting operations and outcomes. One of the ways through which energy providers can combat the effect of extreme weather conditions is by adopting smart strategies and investing in resilient infrastructure Tripathy et al. (2023).

Distinct from this, the conflict forces Germany to reorient its energy foreign policy approach, especially with regard to energy imports. Energy companies and policymakers might be faced with the challenging geopolitical and economic implications of policy options like a ban on Russian energy imports. Therefore, they need to be cautious in making the right decisions. Fair dealing between nations prevents confrontations and the play with geopolitical and military cards, as well as the creation of strategies by the firm for its secure and sustainable operations on the basis of the constantly changing geopolitical conditions, as professed by Welfens (2023). Along with these challenges, the price of implementing a successful business continuity

management (BCM) system becomes unavoidable for energy organisations as a result. The application of the BCM technique provides corporations with the tool to recognize and cut out risks, strengthen operational resistivity, and provide continuous functions of important jobs in the face of unseen political occurrences. Companies in the energy sector will also benefit from BCM frameworks being incorporated into their operations. They can deal more effectively with the challenges that the current geopolitical environment brings forth and safeguard their sustainability (Tómasson, 2023; Vanichchinchai, 2023).

2.7.5 Business continuity management vs. insurance: ensuring certainty in uncertain times

Business Continuity Management (BCM) and insurance serve distinct purposes in mitigating risks and ensuring operational stability for organizations, particularly amidst unpredictable events like geopolitical conflicts or economic crises. While both are crucial components of risk management, they differ significantly in terms of their scope, guarantees, and outcomes.

The BCM encompasses a comprehensive set of strategies, processes, and plans designed to ensure that critical business functions can continue during and after disruptive events. It involves identifying potential risks, developing response strategies, and implementing measures to maintain operations. Insurance, on the other hand, provides financial protection against specific risks by compensating for losses incurred due to covered events. It focuses primarily on financial recovery rather than operational continuity. BCM aims to enhance organizational resilience by minimizing the impact of disruptions. It does not offer absolute certainty but provides a structured approach to manage and mitigate risks effectively. Insurance policies offer financial compensation for covered losses, but they do not eliminate risks or ensure operational continuity. Coverage may be subject to exclusions, limitations, or delays in claims processing. Outcome and sustainability are key goals of BCM. It is designed to build organizational capabilities to adapt and recover swiftly from disruptions, thereby enhancing overall sustainability and resilience. This approach fosters a proactive mindset toward risk management, ensuring that an organization can respond effectively to both anticipated and unforeseen challenges.

Business continuity management and insurance complement each other in a comprehensive risk management strategy. BCM prepares organization’s to respond effectively to

disruptions, while insurance provides financial support to facilitate recovery efforts. In summary, while insurance is vital for financial protection, BCM focuses on ensuring operational continuity and organizational resilience in the face of uncertainties. It is through the integration of both approaches that organization’s can navigate challenges more effectively and maintain business continuity during times of crisis.

2.7.6 Uniper's renewable energy diversification plans

Uniper, a key player in the energy sector, is strategically diversifying its renewable energy portfolio to align with sustainability goals and reduce dependency on conventional sources. Uniper is investing in hydrogen power plants as part of its renewable energy strategy. Hydrogen is a promising clean energy source that can be produced using renewable electricity, offering a sustainable alternative to traditional fossil fuels. The UniBlu-Projekt focuses on battery energy storage systems to support the integration of intermittent renewable energy sources into the grid. This initiative enhances grid stability and promotes renewable energy utilization. Uniper is exploring hydrogen (H2) power plants, leveraging hydrogen as a clean energy carrier. These power plants (H2) can play a significant role in decarbonizing the energy sector by utilizing hydrogen produced from renewable sources. These strategic investments highlight Uniper's commitment to advancing renewable energy technologies and transitioning towards a more sustainable energy mix.

2.7.7 Expected timeline for Uniper's return to the market post-bankruptcy

Following bankruptcy, Uniper's return to the market is contingent upon several factors, including regulatory approvals, restructuring efforts, and market conditions. According to experts:

Albert and Baitei (2022), the Russia-Ukrainian war's aftermath could impact Uniper's recovery timeline, with geopolitical factors influencing market dynamics.

Given the evolving geopolitical environment and Uniper's strategic initiatives, a comprehensive assessment of market conditions and regulatory developments will shape the company's timeline for re-entry into the market.

2.7.8 Resilience strategies employed by energy suppliers amidst the Russia-Ukraine conflict

Confronted with the Russia-Ukraine war, Germany-based energy suppliers adapted resilience scenarios to overcome uncertainties, secure business continuity, and safeguard operations. A major tactic is the diversification of sources and supply chains to suburbanize the reliance on Russian imports. Apart from narrowing their suppliers by diversifying the sources and investing in alternative energy resources, this will enhance their resilience against disrupting supply and geopolitical uncertainties (Rokicki et al., 2023; Streimikiene et al., 2023). Moreover, energy suppliers ensure procedures for the preservation of critical functions, which are fundamental for maintaining operational continuity. Through business continuity management (BCM), suppliers assign critical functions and take measures to guarantee the uninterruptible performance of operations, even in the face of external environment disruptions, as mentioned in (Păunescu and Argatu, 2020). This involves improving cyber security to shield against cyberattacks and investing in high-quality infrastructure to withstand physical attacks or natural disasters (Sawalha, 2020; Rumman, 2022).

Indeed, suppliers are developing active crisis management techniques to act promptly in cases of new difficulties and diminish their consequences on functioning. Through setting up crisis response teams, crafting contingency plans, and running the drills and exercises repeatedly, suppliers will build an ability to manage crises efficiently by reducing the risk of energy supply disruption (Srivastava and Al Hashmi, 2023). Interestingly, suppliers are working towards innovations via partnerships and collaborations with energy companies and other stakeholders to enhance common resilience and share ideas. Through joint projects, knowledge pooling, resource sharing, and coordinated response to crises translate into a stronger resiliency and sustainability of the energy sector (Riglietti et al., 2022).

Vendors are paying close attention to geopolitical trends and developing what-if analyses to map out possibilities and devise appropriate responses to these risks. The knowledge of geopolitics and the conduct of timely risk assessments by suppliers will help them to react swiftly in times of geopolitical crises and fight the impact of such crises on their own business (Reka, 2023). Besides this resilience strategy, energy suppliers go through financial losses, regulatory issues, and so on. Nevertheless, by means of sustainable BCM systems, better collaboration, and a positive attitude towards innovations, suppliers can strengthen their

resilience and respond correctly to the complicated situation of the Russia-Ukraine conflict, which contributes to the stability and reliability of energy supply in Germany (Suresh, Sanders, Braunscheidel, 2020; Pitel, 2023).

2.8 Specialised framework in German energy companies

Within the context of the everlasting war crisis between Russia and Ukraine, whose consequences are no longer only felt on the narrow economic scale but also on the international energy markets, German energy businesses need to act while wave after wave of uncertainty hits the energy sector. Therefore, the consequential development of versatile geopolitical crisis frameworks comes as a result, and these are ones that are aimed at answering the unique operational difficulties that gloom the political environment. Nevertheless, these frameworks are designed to guarantee continuity, resilience, and strategic adaptability. Drawing on the concepts borne out of the worldviews of diverse scholars, this paper will illustrate the necessity of the socio-economic systems for an individual and will also delve into their multifaceted aspects.
Russia-Ukraine's conflict disrupts the entire global energy market at its notch, making it necessary to empower German energy companies to prevent disruptions. Heads of state, including Obłój and Veronovska (2024), emphasize the role of organizational agility and reactivity in wartime. Consequently, management needs to become more accountable and demonstrate purpose and measurable results as companies go through trying times. Additionally, Hartvig et al. (2024) theatrically display the consequences of the crisis on the economy and energy security. They expatiate on the need for energy companies to develop, protect, and adapt to the changes in the global energy governance framework. They stress the necessity for strategic foresight and governance adaptation within energy companies.

Consequently, the consequences of the conflict spread beyond the economic and energy aspects to the socio-political sphere, which stretches the contours of the responses that need to be well thought out. Almazán-Gómez et al. (2024) do a multiregional evaluation of the effects on socioeconomic growth of the Russian invasion of Ukraine, pointing out that the geopolitical flux and stability are somehow correlated. In this light, Mello (2024) provides an explanation of the transformation in the German foreign policy that has been taken as the result of the crisis, calling attention to the urgent need for the energy market players to modify their plans within the framework of new geopolitical layouts.

Since the environments are a blend of various complexities, specialist frameworks for crisis management and business continuity need to be applied foremost. Crisis management has become an important aspect of any business organization. Petrova (2024) emphasizes the need to put in place firm processes and structures that integrate resilience-building measures into the establishment's operations.

Similarly, Lukash and Nyoma (2022) are more explicit about post-war energy issues with Ukraine, based on which the German energy companies would excessively conduct strategic decision-making. In her article (Kostruba 2024), the author focused on the management of foreign business operations in Ukraine during wartime, providing not only a general description of some of the problems faced by the multinational corporations but also some solutions. Hence, the Russia-Ukraine conflict demonstrates that it is a vital necessity for German electric suppliers to put systematic forms into use to handle unpredictable situations during turbulent times (wartime). By drawing insights from scholarly literature spanning geopolitics, crisis management, and energy economics, this paper elucidates the multifaceted dimensions of the challenge and provides a foundation for strategic adaptation and resilience-building efforts within the energy sector.

2.8.1 Understanding the environment of business continuity management (BCM) frameworks in the energy sector

The energy sector as a whole operates in a changing environment consisting of numerous risks and uncertainties that come in different forms, e.g., geopolitical tensions, weather-related catastrophes, and supply chain problems. In a bid to weather the years of challenges, companies in the energy sector have increasingly utilized Business Continuity Management (BCM) frameworks for sustained operations and low disruptions. Azadegan et al. (2020) focused on the role of the supply chain in BCM. This point demonstrates that the supply chain plays a role in preventing reputational and operational damages caused by supply chain disruptions. This reinforces the interconnectedness of BCM with the supply chain management practices, which are received by those who adopt the holistic approach to risk mitigation. Bajgorić et al. (2022) study has made another contribution to the field of BCM/ DRP compliance by stressing the need for enterprise strategies and IT infrastructure to be in coherence.

Subsequently, Baldursson et al. (2023) pay attention to resilience-building actions within

Europe's power system, identifying strategies of responsiveness when facing intricate foreign relations agenda. This is similar to the outcomes of the research of Draaijer and Galue (2023) and Campos and Nwachurukwu (2023), who investigated Europe's energy crisis and the malleability of Germany's foreign energy policy on energy security and risk management. In this regard, technical development is one of the key factors that boost the ability of the BCM framework in the energy sector. Brás et al. (2023) focus on the impact of intelligent process automation on BCM and contribute to how new technological emergencies are adopted to strengthen resistance and flexibility. Correspondingly, Charoenthammachoke et al. (2020) conduct a systematic review of the literature on BCM and elaborate on the transforming scene of BCM due to the impact of technology in the implementation of strategy and rapid response.

Besides technological innovations, sustainability and adaptability are new elements in BCM strategies within the energy sector. In the study by Corrales-Estrada et al. (2021), the organizational responsibilities necessary to boost sustainability and resilience are discussed, with priority given to the integration of social and environmental aspects into business continuity management (BCM) plans. Besides that, geopolitical factors and energy dependencies affect the shape of the BCM (business continuity management) frameworks. In her article (De Jong, 2024), the author analyses the failure of the Nord Stream 2 gas pipeline and evokes the geopolitics risks that are hidden in energy infrastructure projects. Halser and Paraschiv (2022) showcase the paths toward overcoming Russian gas dependency, giving importance to the imperatives of diversification as well as risk mitigation. Therefore, the environment of BCM frameworks in the energy sector is diverse, covering multifaceted aspects such as compliance, technology innovation, sustainability, and geopolitical analysis. By synthesizing insights from scholarly literature and industry perspectives, this paper provides a comprehensive understanding of the evolving environment of BCM in the energy sector and underscores the imperative for adaptive strategies to navigate uncertainties and disruptions.

2.8.2 Examination of specialized BCM frameworks adopted by german energy companies amidst geopolitical uncertainty

In a political environment that is full of ambiguity and concerns, such as the case of geopolitical tensions, German energy companies have to build their own specialized Business Continuity Management (BCM) systems to be able to withstand the challenges of the energy

sector. The scrutiny goes into detail about how German energy firms formulate plans and provide a framework to ensure operational resilience and continuity in the face of geopolitical risks.

It has evolved as the main element of the global energy transition, which is a guarantee of sustainable development and independence from fossil fuels that have political significance. According to Hassan et al. (2024), renewable energy plays a great role in world energy changes, emphasizing its role as a mitigation instrument for the energy security issues that often accompany traditional sources of energy.

Still, the shift to renewable energy is not a perfectly smooth path. German energy companies have the problem of re-mixing their energy mix as much as possible while ensuring the security of supply. Kosowski et al. (2023) carry out a primary energy consumption pattern analysis of European countries and on trends of diversification strategies of Germany that are directed to strengthen energy security and resilience.

Geopolitical tensions, and especially those in the Russia-Ukraine conflict, resulted in an even greater extent in the necessity of energy security. Labunski (2023) carries out an analysis of the impact of the Russia-Ukraine war and EU sanctions on the energy sector in Europe, making visible the geo-political threats that arise with energy supply chains.

For instance, the EU's ambition of increasing its self-sufficiency in the energy sector has urged German energy companies to look into their dependencies and work on strengthening their resilience. Lokenberg et al. (2023) discuss the topic of “European strategic autonomy in energy” by stressing the necessity of “diversification of energy sources” and “resilient infrastructures” in order to prevent geopolitical risks.

Hence, the case of fuel transition for gas turbines has appeared to be one of the main problems for German energy companies that deal with the world of energy that is constantly changing. Langerak (2023) examines the challenges and advantages of shifting to a new fuel, underlining the need for dynamic and agile BCM policy models. Moreover, the analysis of the differences between Germany and other European countries will be very useful for understanding the individual effect of geopolitical conflicts on the volume of energy imports and electricity generation. The authors Lushchini et al. (2024) contrast the implications of the Russia-Ukraine war on energy imports and electricity generation in Germany and the UK to showcase lessons that can help increase resilience and reduce risks.

In order to adequately confront geopolitical uncertainty and deliver a steadfast operational performance, German energy companies progressively devote efforts to crafting integrated BCM strategies, which include risk assessment, supply chain management, and crisis response. The frameworks incorporate data from various sources, such as academic research, industry best practices, and geopolitical assessments, which empower organisations to be proactive in addressing risks by being flexible and resilient. As a result, the analysis presented of selected BCM structures of German energy firms calls for the priority of careful risk management and strategic fidelity to the continually changing environment in question. By implementing renewable energy, diversifying the energy mix, and strengthening infrastructure resilience, German energy firms will be able to tackle the challenges of the energy environment, and through this, they will ensure the continuity of their operations even through geopolitical upheavals.

2.8.3 Implications and future directions for enhancing resilience in the energy sector amidst geopolitical uncertainty

The energy industry operates on geopolitical terrains that are highly volatile and full of turbulence, where conflicts can greatly disable operations and distribution networks. These challenges require energy firms to become more capable by taking proactive steps and making forward-looking adjustments. The use of energy management systems (EMS) constitutes one of the robust strategies that is employed in building resilience in the energy sector. Mishra and Singh (2023), in their study, shed light on the function of EMS in sustainable smart cities with the innovation to employ technology as a strategy to manage energy use and productive operations. By cooperating with EMS, energy companies can decrease the risks related to supply disruptions and market volatility. Geopolitics in terms of energy, particularly in regions like Eastern Europe, considerably affects energy relationships and supply lines. Nebot Pérez (2023) explains how the straining of the energy ties between Russia and Germany in the wake of Russia's attack against Ukraine and calls for diversifying the energy sources and more robust infrastructure could reduce geopolitical risks. However, the Russia-Ukraine conflict has resonated with capital markets through the energy sector's valuation and performance. Nerlinger and Utz (2022) share their perspective on the capital market with regard to the effect of the conflict on energy companies. They emphasize that risk management and strategic planning are

found crucial for this purpose.

As a reaction to geopolitical unpredictability and supply chain disruptions, energy companies are now paying more and more attention to their business continuity management (BCM) frameworks. Riglietti et al. (2022) focus on how BCM adds to the resilience of the supply chain and argue that proactive risk assessment and crisis response procedures are imperative for maintaining smooth operations during disruptions. In addition, in the energy sector, there is a drift towards sustainable and low-carbon energy sources due to environmental issues and legal requirements. Olujobi et al. (2023) research dealt with the legal aspects of promoting such a secure and sustainable power sector in Nigeria through the conversion to low-carbon energy sources while fossil fuel disruptions occur.

The COVID-19 pandemic revealed the unquestionable value of resilience in the energy sector, prompting businesses to reassess their risk management strategies and crisis response processes. However, the ongoing geopolitical uncertainty, particularly the war between two states, has posed even more significant challenges to the energy sector. The study by Rumman (2022) focuses on the effect of proactive strategy and effective crisis management on business continuity, underscoring the need for corrective measures to manage the impact of crises on operations. Oil and gas companies must recognize resilient systems, including technology, governance, and strategic partnerships. Sawalha (2020) discusses the effectiveness of BCM approaches, emphasizing the importance of integrating BCM into organizational culture and decision-making processes. Geopolitical uncertainty continues to challenge the energy sector but also presents opportunities for innovation and strategic adaptation. By leveraging technology, diversifying energy sources, and enhancing resilience through robust BCM frameworks, energy companies can navigate turbulent times and emerge stronger in the face of such uncertainty.

2.9 Resilience strategies amidst crises

In the energy sector, as the arena of geopolitical uncertainties, resilience strategies inevitably occupy a central position. Those are the exact four issues described by Sawalha (2020). According to him, fostering energy diversification, integrating innovative technologies, expanding strategic partnerships, and managing risk are some of the crucial matters. Mitigating dependency risks through diversification and incorporation of the newest technologies improves adaptability. Proper partnering is a boost for joint preparedness. Pragmatism and robust business

continuity management frameworks bring in preparedness, which enables operations among the complexities of the geopolitical environment. These approaches, in combination, work like a shield protecting the energy sector from disturbances; hence, it goes on to prevent dislodgement and sustainability. Hence, the subsequent section of this research will explain these strategies in more detail.

2.9.1 Diversification of energy sources

Diversification of fuels begins getting status as a priority in securing energy resilience in the energy sector when political uncertainties prevail in the energy sector. Changing the sources of energy for the potential maximum energy diversification is one of the major priorities of Steimikiene et al. (2023) in increasing the stability of the EU by highlighting the occurrence of risks from geopolitics problems. Apart from that also, Suresh et al. (2020) highlight that despite the fact that diversification plays a significant role in business continuity management in supply chains facing deleterious events, it indicates the importance of resilience against disruptions. According to Tómasson (2023), business continuity is an integral part of national disaster risk management, which suggests that the last factor depends on the variation of energy sources to prevent disruptions caused by geopolitical crises. Tripathy and Mishra (2023) have brought attention to compound drought and heat wave catastrophes in Europe in 2022. The energy source diversification feature is the key to avoiding further impacts of climate change on energy supply lines. As a result, it becomes achievable to minimize vulnerability under the pressure of multi-faceted disasters.

2.9.2 Integration of technology and innovation

The interplay of technology and innovation can be treated as a critical tactic for dealing with energy resilience in the face of geopolitical tensions. Streimikiene et al. (2023) believe that recent technologies should be utilized to ensure energy diversification and security in the EU. The authors emphasized that this will improve energy infrastructure and reduce the vulnerability of power sources. According to Suresh et al. (2020), technological innovation in the BCM (Business Continuity Management) systems of supply chains during catastrophic events is vital. It can make supplies operate, monitor in real-time, and recover from disruptions faster. Tómásson (2023) supports this by stating the importance of integrating technologies in business continuity methodologies at the national level for risk management of disasters, which requires

creative methods to improve continuity and responsiveness. The article by Touazi (2023) describes the importance of technology to energy security and gas pipeline diplomacy, especially as Italy rethinks its Mediterranean foreign policy after the Russia-Ukraine war, bringing into perspective the contribution of innovative technologies in new energy supply routes that require minimal diversification of supply routes and geopolitical risks. Tripathy and Mishra (2023) enlarge the idea of technology's role in tackling the issue of severe weather events such as the 2022 European compound drought and heatwave, proposing the implementation of advanced technology solutions for improving the resilience of systems and enhancing the reliability of energy systems. In sum, the use of technology and innovation has become an effective mechanism for developing resilience in the energy sector. It helps create proactive risk management, reducing the effects brought by geopolitical uncertainties and climate-related troubles.

2.9.3 Strategic partnerships and collaborations

Strategic collaboration and partnerships have become an imperative tool as the energy sector continues to evolve, aimed at increased resilience against geopolitical uncertainties. Uniper's contribution to climate protection, for instance, reflects international partnerships that support sustainability goals, which is very crucial even during the energy breakdown (Uniper, 2023). Van de Graaf (2023) states the geopolitics of energy post-Russia's war in Ukraine that underscores the imperative of strategic alliance between European nations in order to overcome the energy security challenges as it reduces the degree of dependence on Russia. In the context of Janichchinchai (2023), this film points out that sharing efforts will be more effective for business continuity management, which requires uniform actions from all stakeholders to improve organisational resilience. Welfens (2023) evaluates the trace of the German energy import embargo or the European Union against Russia as a possible policy tool, trying to avoid negative effects from this measure through strategic cooperation with alternative suppliers. In an article, Wiertz et al. (2023) scrutinize shortfalls in the German discourse of the energy shift experienced from Russia's war with Ukraine as it becomes apparent how critical the geopolitical considerations are and how collaborations are the pathway to national energy security. As such, strategic partnerships and collaboration become invaluable in strengthening the resilience of the sector by articulating a unified response in the face of political crisis, remedying the energy gaps,

and promoting sustainable energy objectives.

2.9.4 Proactive risk management and contingency planning

Proactive risk management and the creation of contingency plans, therefore, should be regarded as basic tools in the energy security sector during geopolitical turbulence. Uniper remains devoted to climatic protection even in the midst of the current energy crisis. This underlines the significance of identifying effective risk management strategies and those that do not only look at prevailing economic conditions but also need a sense of environmental sustainability (Uniper, 2023). Van de Graaf demonstrates the geopolitics of energy after Russia's attack on Ukraine and, as a result, stresses the need to develop more proactive risk management measures in order to avert the negative ramifications that pressures within international politics may impose on energy security. Venichchinchai (2023) illuminates that clear understanding is critical for identifying the connections between components of business continuity management and stressing the proactive formal approach of strengthening organisational resilience in the face of potential disruptions. Welfens (2023) explores the implications of Germany or the EU's Russian energy import boycott, authoring that among the ways to relieve Russian import dependence, active contingency preparedness and alternative energy sources usage may be in a prominent position. Wiertz et al. (2023) assess the role of a new parameter (risk management) in the German energy transition discourse in the context of the war in Ukraine by the Russian Federation; this requires the development and proactive use of strategies that will be able to predict the shifts of power and the level of political risk accompanying them. In general, active risk assessment and plan-making are two of the most essential steps in improving resilience in the power sector through the process of predicting threats, identifying deficiencies, and improvising preventive measures as an implementation approach to overcome challenges and guarantee uninterrupted operations.

2.9.5 Enhanced business continuity management (BCM) frameworks

The advancement of robust Business Continuity Management (BCM) networks represents the prime framework that guides enterprises to maneuver the complex terrain of political unpredictability, especially in the sector of energy. The very ideas that are derived by the enterprises in Ukraine while protecting themselves from crises are what one needs to study for successful BCM (Obłój and Voronovska, 2024). The Russian instrument of energy weapons

causes deep inside such matters as Economics and Energy Security; a decisive role in this respect is taken by the business continuity management system of an enterprise, which is capable of mitigating risks and providing necessary continuity (Hartvig et al., 2024). The allusions to the Russia-Ukraine crisis's belligerence to the global market equals the prominence of the active vulnerability handling to the instability and its hazardous impacts (Liu and Su, 2024). The control of natural gas is emphasized by the conflict between the European Union and Russia in the wake of the invasion of Ukraine, which sheds light on how Europe needs to have enhanced measures of crisis management to deal with energy supply issues (Karan et al. 2024). Soviet invasion on the socio-economic side of the picture serves as glaring proof that buffeting the Building Community Make is the urgent need of the hour to offset the negative consequences and see that communities are resilient (Almazán-Gómez et al., 2024). Efficient and timely BCM plans are of major importance to mitigate the risks of disruption in supply chains in order to reduce the impact and preserve a sustainable operation (Kahr, 2024). Not only actual fighting but also the influence of renewable energy sector pick-up on the combat management systems development in Germany and Italy illustrates the necessity for a new cooperation method that is able to tackle emerging risks and enhance sustainability (Maliszewska-Nienartowicz 2024). In light of the global energy outlook caused by the melancholy Russia-Ukraine conflict, policymakers should consider geopolitical factors in BCM structures to foresee possible risks and build resilience (Liu and Pan, 2024). Sustainability in the context of this conflict takes us to the point of including climate change considerations while making BCM strategies for our long-term well-being (Flamm and Kroll, 2024). Implications for sustainable and resilient energy transition models in post-war development for Ukraine frameworks having long-term vision become imperative. (Lukash and Namiyuk, 2024) Definitely, the better stage of BCM coverage backs up the energy industry in the face of crises during times of geopolitical insecurities.

2.10 Challenges experienced by energy suppliers amidst the conflict Russia-Ukraine

The integration of BCM in the operational framework of energy supply corporations, specifically Uniper, is critical to ensuring resilience against challenges. However, executing the BCM is fraught with limitations and challenges. The regulatory environment for energy supply companies in Germany is multifaceted and complex, including the European Union and national regulations. The literature of Vanichchinchai (2023) further highlights the intricate requirements

of regulations for the corporates of energy, imposing noticeable challenges for the execution of BCM. Complying with this regulation generally requires noticeable resources and limits the flexibility of BCM plans. For example, the regulatory stipulation requires the security of energy supply and the resilience of infrastructure to be integrated into the BCM plans, requiring increased adjustment, which limits flexibility in operation (Suresh et al. 2020).

Like the other energy suppliers in Germany, Uniper depends heavily on sources of external energy, specifically natural gas from Russia. Reliance initiates the complexities and vulnerabilities in the planning of BCM. The geopolitical tension, as showcased by the conflict between Russia and Ukraine, shows the risk linked with the increased dependence (Riglietti et al. 2022). The study of Nebot Pérez (2023) postulated the implications linked with BCM reliance, showing that the external shocks of supply require flexible and adaptive approaches to BCM, which are difficult to execute and formulate under such volatile conditions. The energy sector and digitalization bring an increased risk of cybersecurity, imposing a noticeable challenge on BCM. Păunescu and Argatu (2020) added that a cyber-attack targeting critical infrastructure could disrupt energy distribution and supply, requiring innovative measures of cybersecurity in the framework of BCM. The research of Wiertz et al. (2023) focuses on the increasing threat linked with cyber-attacks over the infrastructure and challenges to integrate the measures of cybersecurity in the conventional plans of BCM.

Efficient BCM requires good communication and coordination among different stakeholders, including suppliers, regulatory bodies, and other customers. The literature has showcased communication and coordination as vital challenges for energy supply corporates such as Uniper. The decentralization linked with the energy sector, along with stakeholder diversity, further complicates the coordinated execution of the BCM efforts (Păunescu and Argatu, 2020). Concerning the Russia and Ukraine conflict, there has typically been a multifaceted challenge for the supplier of European energy and companies like Uniper. The conflict has not just disrupted the energy supply chain but also increased the vulnerability in Europe's energy market, specifically the one reliant on Russian gas. As per the report, the Uniper is contributing to a lower-carbon and sustainable world for the energy transition. At the same time, Uniper was committed to making a noticeable contribution to supply security. The war of Russia against Ukraine has led to severe crises in the entire European energy market (Uniper, 2023). Due to the Russia-Ukraine conflict, Uniper took a $4bn hit on the subsidiary of Russia,

specifically after losing control of the company (Pitel, 2023).

One of the prominent influences of the conflict is disruption in the supply of natural gas. Escalating the conflict led to a noticeable reduction in the natural gas flow from Russia to Europe, leading to an immediate shortage of supplies and increasing the concern about energy security (Luschini et al., 2024). Uniper relies heavily on Russian gas with the assistance of Nord Stream's pipeline, experiencing acute challenges in sourcing substitute supplies to meet the demand. Further, the conflict led by unprecedented volatility across the energy market reached a historical high. The literature of Nerlinger and Utz (2022) further showcases that the increase in prices has had a considerable financial impact on the suppliers of energy, such as Uniper, which has struggled to manage the high procurement cost without influencing the prices of consumers. The scenario has not just squeezed the margin of profit but also increased concern linked with financial sustainability in the long run. Further, as per Wiertz et al. (2023), the energy suppliers face increased political and regulatory pressures as the government lowers the reliance on Russian energy.

The study showcases the push for diversification in energy and fast-tracking linked with the project of renewable energy. By aligning these with the wider goals of sustainability, the transformative demand shifts and the strategic alignment for companies such as Uniper impose financial and operational challenges in the short run (Nebot Pérez, 2023). The conflict has showcased the need for improved strategic resilience and operational flexibility among the suppliers of energy. Difficulties experienced by corporations in steadily adjusting the strategies and operations for responding to geopolitical shocks (Halser and Paraschiv, 2022). The adaptability is critical not just for securing alternate sources of energy but also for sustaining the integrity of the supply chain amidst the border closure and the logistic challenges.

2.11 Theoretical framework

In the investigation of the multidimensional theoretical framework for the appreciation of resilience in the energy sector under the veil of geopolitical risk, some authentic theories and models could be applied to enlighten the complex dynamics inherent. One such theoretical framework is the BCM, which is an approach that puts an emphasis on proactive planning and risk management with the aim of enhancing organizational resilience (Tómasson, 2023). BCM is a framework that allows for an organized way of finding threats and their adverse consequences,

as well as developing measures to reduce the threat and to make sure that the organisation can avoid critical incidents. This theory is related to the topic because it emphasizes the significance of pre-empting and preparing the energy sector for anticipated disruptions with special needs for geopolitical tensions and debates.

Energy security theories underline the need for diversification of energy sources, infrastructure development, diplomatic efforts, and so on. This is all aimed at providing energy in regions suffering from geopolitical instability with stable and reliable supplies in the first place. This theory is directly associated with the topic as it outlines the problem of maintaining a secure energy environment in times of geopolitical crisis, such as the Russia-Ukraine conflict. Thereafter, the theory of crisis management teaches useful factors that help organization's respond constructively and also recover from any unplanned events (Vanichchinchai, 2023). Crisis management strategies highlight the vitality of prompt decision-making, clear communication, consistent coordination, and efficient recovery for control of the crisis impact. This theory has the ability to guide energy companies to have detailed crisis management plans in order to withstand the shocks from geopolitical risk issues and to maintain operations as usual.

Moreover, geopolitical theories also offer unique perspectives from which to examine political-geographical-energy issues (Wiertz et al., 2023, p. 11). Geopolitical theories investigate the geopolitical aspects, including geographical disputes, alliances, and power struggles, as favorable or unfavorable factors in policies, energy trade, and resource allocation. This theory lays a groundwork for understanding the widest regional and global geopolitical environment existing around energy companies' operations and the consequences of political activities like conflicts and sanctions on energy infrastructure and markets. The concept of resilience in the energy sector under geopolitical rifts transcends diverse models and theories, including Business continuity management, energy security, crisis management, and others.

2.12 Chapter summary

The current review has examined the intersection linked with BCM and the challenges experienced by Germany's energy sector, specifically in light of the invasion of Russia in Ukraine. The chapter has, therefore, carefully postulated the fundamentals linked with BCM, showing the role of ensuring operational resilience in industries. The review has showcased the acute relevance linked with BCM focusing on Uniper. The chapter has noticeably showcased the

energy sector of Germany and outlined the external sources of energy and inclination to the geopolitical conflicts, specifically to the dependency of the sector on Russian gas. Nonetheless, it has effectively postulated the influence of BCM on Germany's energy sector. The overall literature has showcased a number of gaps in personalizing the strategies of BCM for energy companies experiencing geopolitical risk and the framework to address the technological and regulatory challenges for the disruption in the supply chain. Further, dealing with the gaps is vital for improving the overall continuity and resilience in Germany's energy sector amidst conflicts such as the war between Russia and Ukraine.

This research endeavors to resolve critical inquiries concerning the crisis response capabilities and business preparedness of German energy companies, with a particular emphasis on Uniper's circumstances. In particular, it is designed to assess the practical application of Business Continuity Management (BCM) frameworks in the context of navigating disrupted supply chains and developing effective crisis resolution plans (Kalogiannidis et al., 2022). Business continuity management (BCM) has emerged as a critical technical and operational framework in response to crises such as the Russia-Ukrainian conflict since the 1970s. BCM is a comprehensive framework that aims to effectively anticipate, prevent, mitigate, and recover from business disruptions. It includes Business Continuity Planning (BCP) and Business Recovery Planning (BRP) (Hatton and Brown, 2021). Organizational resilience is improved by the integration of BCM, which enables proactive risk management, stakeholder engagement, technological readiness, robust supply chain management, and enhanced employee preparedness (Azadegan et al., 2020).

The efficacy of BCM in crisis management and resilience-building is demonstrated by its implementation within German utility companies, such as Uniper. The objective of this research is to evaluate the utilisation of BCM by Uniper, a company with a substantial workforce and operations in more than 40 countries, in response to the energy crisis that was provoked by the Russia-Ukraine conflict. It emphasises the importance of BCM in facilitating the effective navigation and recovery from disruptions in companies during conflict scenarios (Ogutu, 2021).

CHAPTER III: RESEARCH METHODOLOGY

3.1 Research approach

The research philosophy is based on the idea that knowledge can be produced from the elaboration and evaluation of phenomena through observation (Rashid et al., 2019). Positivism aims to arrive at a factual understanding of the character and operation of the universe with structure and the use of scientific analysis, documentation, and experiments. In the context of the energy sector in Germany, which is suffering from the effects of the Russia-Ukraine conflict, the positivist paradigm conducts a quantitative investigation of the effects of Business Continuity Management (BCM). The research gathers quantitative data to assess how BCM guidelines can facilitate the defence of the electric energy sector during present geopolitical volatility. Qualitatively, the research, by employing regression analysis and correlation coefficients, seeks to establish and measure the factors of BCM practices and the sector's capacity to continue operations. Through positivism, more specifically analyzing variables in terms of the actual empirical evidence and data, the subjectivity of the study is minimized. In contrast, the objectivity of the study is maximized to investigate the effectiveness of BCM frameworks during the war under review (Andrei, 2022). The choice of positivism as the guiding principle enables the researchers to establish the evidence of empirics as well as the logic of observation as the basis for predicting and evaluating the validity of the BCM usefulness in the German energy industry. Using a quantitative research approach and data collection, researchers can provide objective and unbiased evidence regarding how BCM strategies can strengthen energy companies against the turbulence of political crises (Kaur and Tanwar, 2023). Through extensive examination and the arch of experiments, positivism would do the trick of purveying a more up-to-date and detailed comprehension of disruptive risk management techniques in the energy sector that can decrease the impact of unseen events on the industry, which would contribute to the advancement of the knowledge in the field.

Researching the effect of BCM on the German energy sector as a result of the conflict between Russia and Ukraine constitutes a deductive approach with convenient measures (Guerra, 2023). Deductive research commences from an overall theory or a hypothesis and then contrasts it with the concrete observations or data available. This assertion broadly means that research is here to start with well-established theories or principles that relate to BCM as a tool for

improving the performance of different industries in the sense of preventing interruptions of business. These concepts form the cornerstones of risk management pro-activeness techniques, the design of crisis response plans, and the utilization of technology applications aimed at overall resilience.

Employing deductive observation, one can formulate that BCM methods are fundamental to energy companies' resistance to the influence of geopolitical conflicts (Proedrou, 2023). These hypotheses may be supported by experimentation, which is done based on data collected through the application of quantitative methods like cross-sectional studies, data analysis, and statistical modeling. Thus, this procedure is based on providing feedback on whether the defined hypothesis will stay true or will be denied due to the trends in the German energy sector after the war broke out between Russia and Ukraine. Primarily, it pushes towards a piece-by-piece approach, which allows researchers to probe into the connection between BCM procedures and the effect of operational resilience on the energy sector. This strategy aims to examine available facts about BCM (Sadeghi R. et al., 2022.). This approach serves to develop, elaborate, and deliberate research results that deal with the complicated interactions between the BCM and the German power industry and the changing geopolitical situation.

3.2 Research design

This present research uses a quantitative research approach to examine the resilience of the German energy sector as a result of the disturbance caused by the Russia-Ukraine conflict while drawing attention to the functionality of Business Continuity Management (BCM). This approach is based on the survey design even though interviews are conducted among energy companies and other stakeholders in order to assess how BCM practices, including contingency planning and crisis response, are managing the effects of the conflict. The survey instrument used in this study is a questionnaire that has been designed for this research and is based upon the ISO 22301 standard for BCM, which represents a good source of benchmarks for continuity and resilience activities within organizations. Further, we have incorporated the study by Strijker et al. (2020) on BCM in conflict areas to develop questions for assessing the reliability of the continuity plan during crises.

Appendix A consists of closed-ended questions that target the specific BCM practices and Likert-scale items to capture the respondents' views of BCM effectiveness. Our research

questions reflect important aspects, including the degree of BCM implementation by German energy companies due to conflict, relationships between certain BCM practices (for example, communication plans), organizational resilience, and the companies' perception of the effectiveness of their continuity management processes. As a supplement to the primary survey data collection, the secondary sources, which are governmental reports, officially published materials, and local energy statistics, offer the necessary background of the geopolitical and economic environment of the energy sector. The proposed method for the analysis includes correlation and regression tests to establish the relationship between BCM practices and resilience outcomes. Based on ISO 22301 for continuity management, the study also uses some aspects of Campbell and Domene's (2024) BCM model to fit the present crisis context. Thus, we will collect information that not only evaluates the effectiveness of BCM but also pertains to the construction of resilience in the energy sector during geopolitical disruptions.

3.4 Data collection methods

In this study, the main data collection is done through an online questionnaire survey administered among energy companies and industry specialists in Germany on the practical application of BCM in the Russia–Ukraine crisis. Closed-ended questions and Likert scale questions are included in the survey (Thompson Burdine and Sandhu, 2020). All BCM practices, including risk analysis, planning, and response options, have been included in the survey. Members are recruited according to their engagement in BCM, with a key focus on companies within the energy industry (Ruggiano and Perry, 2019). Secondary research information published in government reports and energy sectoral statistics is also included for a better understanding of the geopolitical and economic climate within which the industry operates (Sileyew, 2019). The integration of survey results with other secondary sources provides a solid foundation for assessing BCM and its role in increasing the resilience of Germany’s energy sector in the conflict.

As per the expertise of the present study’s researcher, a primary data collection method is used with the survey tool of data collection. It enables researchers to directly interact with these energy companies and relevant experts by going to the source, a means by which information collected is specified to the particular research objectives. In the context of significance, the survey is a structured data-collecting approach, which makes it possible to get standard responses

that can later on facilitate the quantification and analysis. This ensures quality control and gives a good measurement of the research. Apart from this, primary data acquisition enables the researcher of the study to craft questions that match the research context creatively and effectively, which assists in obtaining the required insights about the topic (Sileyew, 2019). The final yet utmost importance of using primary data collection techniques involves giving the researcher full control of how to choose the research sample and how to administer the survey, which in turn leads to the enhancement of the research's validity and reliability. In line with the researcher's robust understanding, this study implemented e-mail and face-to-face modes to attain primary data entry. Subsequently, the numeric assessment was made through a statistical analysis tool to determine the average deviation, variance, and standard deviation, revealing the incentive of stakeholders of the German energy sector in the time conflict between Russia and Ukraine (Omolara et al., 2022). Through the utilization of primary data collection methods, e.g., surveys, it is possible for the researcher to have greater control over the process, and this ensures the relevance of the data to the objectives and quality of data in the current study.

3.5 Sampling design and sample size

The sampling technique used in this research was simple random sampling, and this means that each employer in the German energy sector could be chosen at random. This method is especially suitable for reducing sample bias and ensuring the random selection of the total number of 7,000 employees of major energy companies. A sample size of 200 people was arrived at through the use of an equation that takes into consideration the desired margin of error of 0.05 and adequacy power to capture important associations between the practice of BCM and its effect. To increase generalizability, participants were chosen purposefully in terms of their age, sex, job position, and time served in the technology sector. This increases the generalized ability of the results to be applied to the overall population of employees. Nonresponse bias and samples that contained only ethical or self-selected respondents, thus potentially leading to moral hazard, were avoided because only two email invitations were sent to increase participation. Further, respondents were not only provided with incentives but also anonymity as well as confidentiality was followed in the course of interviewing to make sure that the responses collected were as genuine as possible. Still, it shall be noted that this research deals only with self-reported employee perceptions, so there is a potential threat of common method variance,

according to which respondents' biases and only their attitude can bias the results of questioning. These sources of subjectivity are acknowledged in the course of this study, and proper care is taken to ensure that the sample is inclusive and diverse in order to reduce subjectivity.

3.6 Data collection procedure

First and foremost, the objective here is to collect the data by means of surveys, which will act as the key to getting the participants to share their views (Newman et al., 2021). Surveys are used for their ability to gather the views of individuals while maintaining high levels of efficiency in a short time frame. A structured survey is designed, consisting of two components: one emphasizing the distribution of demographic data, the other involving business continuity management techniques. Individuals' opinions and attitudes are measured using the Likert scale so that you can get only numerical insights to reinforce your stand. The format of administration polls is often web-based, email-based, and face-to-face, and the latter is technically feasible for the target groups. After this data collection process, the gathered data are analysed with the help of statistics techniques like regression, correlational technique, and descriptive statistics, which are conducted through software like SPSS (Statistical Package for Social Sciences, version 26). Surveys were chosen as the data collection method mainly because of their capacity to efficiently gather data from a good number of participants within a short time. It provides a framework of procedures that enables the repeatability of data scores and analysis uniquely in statistics. Additionally, surveys provide a means to measure participants' opinions, attitudes, and experiences using standardized questionnaires, which ensures the reliability and comparability of responses. To investigate the effects of BCM on businesses globally, primary data sources such as government papers, newspaper articles, news reports, and local statistical reports and databases are also studied. To evaluate how German enterprises contribute to lessening the consequences of external disasters, analysis is done on external parties, including government agencies, private firms, and non-governmental organisations. For further details, previous studies are also examined to grasp a targeted area of research. However, to investigate the degree to which the independent factors affect the dependent variable, Linear Regression is used for additional analysis.

3.7 Data analysis techniques

The data analysis technique includes descriptive data analysis, correlation analysis, and regression analysis.

3.7.1 Descriptive data analysis

Descriptive statistics help identify trends and patterns in the data (Jun et al., 2018). In other words, descriptive analytics is the art of describing an event, phenomenon, or outcome. It gives enterprises the best foundation for posting views and the enterprise the ability to figure out past effects. Descriptive statistical tools employed in this research are spread, skewness and kurtosis, central tendency, inner value, and mean and standard deviation measures. Thus, the values helped understand the distribution of the data set confidence, as well as the personal insights of the study participants. Descriptive data analysis was employed to interpret historical data and detect trends and correlations among variables. This approach allowed for a comprehensive understanding of the data set's characteristics and supported initial observations regarding BCM implementation.

3.7.2 Correlation analysis

Correlation analysis entails a statistical approach used in research to find out the association and exact strength of a linear relationship between two variables, x and y (Gogtay and Thatte, 2017). In essence, correlational analysis allows one to estimate the extent of influence one variable has on the change of another. This is because of the multi-collinearity among independent variables in the current study, obtained through correlation analysis. This helps us to evaluate the relationship between the independent and dependent variables through regression analysis. The correlation coefficient signifies how strong the linear association is between the variables; a positive number maps a direct relationship, while a negative number indicates an inverse relationship. Correlation analysis is important and actually stands for the methodology because it is used to explain the linkage between various variables (Vedat Yorucu and Mehmet, 2022).

Examples of such studies are those devoted to the assessment of the relationship between the execution of certain BCM procedures (supply chain resilience vs. crisis response protocols) and performance indicators such as operational resilience or financial performance (Jacopo De

Matteis, Elia and Pasquale Del Vecchio, 2023). The statistical tool of calculating correlation coefficients (usually Pearson's correlation coefficient for linear associations) is an approach to quantifying the degree to which the changes in a certain variable (for example, the amount spent on business continuity management) can be included in the progress of some other variable (case in point, revenue stability or reduced downtime).

Furthermore, correlation analysis allows for identifying multi-collinearity between causal variables, which is necessary when performing regression analysis on these data in the future. Two or more independent variables in a regression model may be highly correlated, which can lead to a distorted estimation of regression coefficients and a reduction of the reliability of the model itself. By looking at cases when the independent variable spawns correlations, researchers may conclude that multi-collinearity is present in the model, and to prevent this, either exclude highly correlated variables and/or apply the ridge regression technique, which is installed for the removal of multi-collinearity (Hu et al., 2020). This method, therefore, especially proves to be of great importance in deriving the relationships between variables, which is even more important for identifying the impacts of the BCM in supporting the resilience and performance of the German energy sector in the face of the geopolitical crisis. Correlation analysis was pivotal in exploring the relationships between various variables, particularly focusing on how BCM practices correlate with resilience and performance indicators in energy companies. Pearson's correlation coefficient was utilized to quantify the strength and direction of linear associations between BCM variables and outcomes like operational resilience or financial performance. This methodological choice was essential as it provided a clear framework to analyse dependencies between different BCM strategies and their effectiveness in mitigating the impact of geopolitical crises on the energy sector.

3.7.3 Multiple regression analysis

Multiple regression analysis is applied to establish the correlation between the dependent variable, which in this case is the performance or resilience of energy companies in Germany, and the independent variables, which are BCM practices used in those companies. The assumption made in this research study is that enhanced BCM measures positively influence the organizational readiness and performance of energy firms during the Russia-Ukraine crisis (Williams et al., 2019). Namely, we assume that the level of BCM factors, including risk

estimation, communication, and planning, will be positively associated with the ability of energy companies to sustain their operations and mitigate the impacts of the conflict. In accordance with this research objective, this study employs multiple regression analysis to estimate the extent and direction of these relationships to support the evidence of the BCM's role in bolstering the energy sector's robustness. This inclusive analytic approach allows for the explanation of any variation in the dependent variable. Multiple regression analysis is one of the strongest statistical methods, and the researcher can explore how the relationship between one dependent variable and several independent variables affects each other at the same time. Particularly in the course of singular regression analysis of the influences of various BCM-related factors on the achievements of energy companies in Germany during the conflict between Russia and Ukraine, the multiple regression method allows researchers to explore which components of BCM lead to the best results and resistance (Laniyonu and Donahue, 2023).

In the multiple regression analysis, the dependent variable is the output of interest, such as financial performance or operational resilience of energy companies (He et al., 2023), while the independent variables represent the factors that may affect the dependent variable, for example, specific strategies for business continuity management (BCM), organisation's characteristics, or external environmental factors.

Such an analysis that incorporates the dependency relationship between independent and dependent variables simultaneously enables researchers to isolate each independent variable’s distinct impact while explaining the variation of the dependent variable. This, however, determines which influential factors mostly have the greatest impact on the outcome measures, and therefore, it provides informed input crucial for the policymakers, people in the business, and all relevant stakeholders.

The coefficient of determination (R-squared) derived from the multiple regression analysis makes it possible to demonstrate how much variance in the dependent variable depends on the independent variables included in the model (Katarzyna Stąpor, 2020). A regression model explains the data fit when the R-squared value is higher since the set of independent variables collectively can predict better the dependent variable. Multiple regression analysis was employed to delve deeper into the simultaneous effects of multiple independent variables on a dependent variable, such as financial performance or operational resilience of energy companies. This

technique enabled the researchers to identify which specific BCM components or organisational characteristics contributed most significantly to desired outcomes. The coefficient of determination (R-squared) derived from multiple regression models was used to assess how well the independent variables collectively explained variations in the dependent variables, providing insights crucial for policymakers and stakeholders in the energy sector.

3.8 Ethical considerations

It respects all ethical standards regarding participants and, first and foremost, ensures their anonymity and confidentiality. Nonetheless, the communication process followed in the data collection was open, and participants' consent was duly obtained; all the responses received in this study were treated with due respect and discretion. The design and execution of this study take into account and intend for the application of several fundamental ethical standards, including informed consent, confidentiality/anonymity, voluntary participation, deceit, risk of harm, and accuracy in analysis and reporting. In this study, rigorous ethical considerations have been integrated into the research process to ensure the protection of participants' rights and well-being. Specifically, the following ethical measures have been employed that are as follow:

All subjects, before entering into the questionnaire, are offered complete information about the purpose, the plan, the risks, and the advantages of the survey. Thus, the comprehensive data is communicated through means that are easy to grasp, enabling people to make a graced call on their participation (Kounoudes and Kapitsaki, 2020). Participants' attention is drawn to the fact that they can also abandon the research at any moment without being penalized. Additionally, collected data from individuals are coded anonymously to prevent any figure of recognition or self-identification (Laniyonu and Donahue, 2023). Since personally identifiable information is not given in every survey or research, the participants' privacy is assured.

An open and clear-cut explication of the participant's right to withdraw from the study without any penalty, such as an explanation (Bruton et al., 2020), has been explained at any given stage. It has been made clear to them that their choice to stop participation will be respected, and they will not be forced to continue to battle to their detriment. Capacity is constantly reiterated in the study and stressed to draw an emphatic line to the realms of independence and self-driven involvement in the research process.

These ethical principles conform to the existing guidance as well as a number of ethical principles for research with human subjects, which have been set in the appropriate governing bodies, professional organisations, and regulatory boards. Under the consideration of these principles for ethical conduct, this study seeks to maximize the research credibility and integrity through the inclusion of such measures into the research design and implementation.

3.9 Validity and reliability

In this study, while determining the validity and reliability of the researcher-developed questionnaire, emphasis is placed on the accuracy of the collected data in terms of statistics. Internal consistency was performed using Cronbach's alpha absolute value. At the same time, the construct validity analysis was conducted by comparing the relationships between the survey items and the set of variables describing BCM. The gathered raw information was pre-processed and statistically summarized to realize high inter-item reliability and proper construct validity. The quantitative research method was employed, and more specifically, multiple regressions to establish the correlation between BCM practices and energy sector resilience. Content Validity ensures that the questionnaire comprehensively covers all essential aspects of BCM, organizational resilience, and crisis management specific to the energy sector during geopolitical crises. To establish content validity, the research will begin with an extensive review of existing literature on BCM frameworks, crisis management strategies, and the unique challenges faced by the energy sector in times of geopolitical turmoil. This foundational step aims to identify key constructs, dimensions, and variables crucial to the study. By aligning questionnaire items with these theoretical underpinnings, we ensure that all pertinent aspects of BCM relevant to the energy sector's resilience are adequately addressed.

Expert Review will be instrumental in enhancing content validity. The questionnaire will undergo critical evaluation by experts in BCM, energy sector management, and survey methodology. These experts, including academic researchers, industry practitioners, and methodologists, will assess the questionnaire items for relevance, clarity, and comprehensiveness. Their feedback will guide refinements to ensure that the questionnaire effectively captures the nuances of BCM practices and their relevance in crisis contexts within the energy industry. Pilot Testing with a sample from the target population will further validate content validity. During this phase, participants will be invited to provide feedback on the clarity,

relevance, and comprehensiveness of the questionnaire items. This iterative process allows for adjustments based on participant responses, thereby enhancing the questionnaire's ability to accurately measure the intended constructs in the context of the study.

Construct validity focuses on ensuring that the questionnaire effectively measures the theoretical constructs it intends to assess, such as the impact of BCM practices on organizational resilience during geopolitical crises. In this study, questionnaire items will be meticulously designed to align with the study's hypotheses and research objectives. This alignment ensures that the constructs being measured directly correspond to the study's overarching goals, thereby establishing construct validity. Statistical Techniques, including factor analysis, may be employed to assess the underlying structure of the questionnaire items. Factor analysis helps to identify clusters of items that measure related dimensions or factors within the BCM framework. By confirming the factor structure through analysis, the study enhances the construct validity of the questionnaire, ensuring that it effectively captures the complex relationships and interactions between BCM practices and organizational resilience in the energy sector.

Overall, by rigorously evaluating content validity through literature review, expert consultation, and pilot testing, as well as constructing validity through hypothesis alignment and statistical analysis, this study aims to produce robust findings. These findings will provide valuable insights into how BCM can bolster resilience and mitigate risks in the German energy sector during geopolitical crises. The validity checks employed in this study are essential to ensuring the credibility and applicability of the findings, thereby informing strategic decisions and policies within the energy industry. By employing these validated methods, the study aims to contribute meaningful insights into the role of BCM in enhancing organizational resilience and mitigating risks in the energy sector during periods of geopolitical instability.

Chapter IV: Results and findings

4.1 Introduction to chapter

The results chapter offers the analysis of the data that was gathered on Business Continuity Management (BCM) within Uniper in the backdrop of the Russia-Ukraine crisis. This chapter provides various statistical analyses like frequency analysis, descriptive analysis, correlations, and regression analysis to give insights into the organisation's BCM implementation and the encountered issues. In sum, this chapter seeks to discover various factors and the way they are linked, as well as to explain how these associations potentially affect the outcomes of rescue operations during an energy crisis. Finally, the results are discussed in terms of the literature to outline the implications and further research and improvement of the BCM strategies.

4.2 Demographics analysis

The demographic analysis of gender, age, job role, and experience was analyzed in Table 1, and Table 1.1 presents an analysis of the sociodemographics analysis.

Table 1 Socio-demographic characteristics (N = 200)

Category	Subcategory	Frequency	Percentage
Gender	Male	120	60
	Female	80	40
Age	18-30 years	50	25
	31-40 years	70	35
	41-50 years	50	25
	51+ years	30	15
Job Role	Manager	60	30
	Human resource officer	40	20
	Operations manager	50	25
	ICT Administrator	50	25
Experience	1-5 years	40	20
	6-10 years	80	40
	11-20 years	50	25

	21+ years	30	15

The provided statistical output summarizes the frequencies of specific variables within a dataset containing 200 rows. The variables include gender, age, job role, and experience. These frequencies can be instrumental in understanding the demographics and professional backgrounds of individuals within the German energy sector. Analyzing such data helps to draw insights into how Business Continuity Management (BCM) impacted this sector during Russia's invasion of Ukraine.

Understanding the **gender** distribution in the dataset is crucial. A balanced or skewed gender ratio can influence the dynamics of decision-making and operational management within the sector. Gender diversity often impacts resilience and innovation, which are key aspects of BCM. Moreover, the **age** distribution provides insights into the experience levels and generational perspectives in the workforce. Younger employees may bring in new technological approaches and adaptability, while older employees offer extensive experience and historical context, both essential during crises.

Analyzing the distribution of various **job roles** helps in understanding the hierarchy and functional diversity within the sector. It can highlight which roles are most critical and how different job functions contribute to maintaining operations during disruptions. In addition, the **experience** levels of employees can be directly correlated with their ability to handle crises. More experienced employees might possess better problem-solving skills and crisis management capabilities, which are critical during geopolitical disruptions like the Ukraine invasion.

During geopolitical crises, such as Russia's invasion of Ukraine, the German energy sector faces significant challenges, including supply chain disruptions, fluctuating energy prices, and potential physical threats to infrastructure. Effective BCM strategies are vital to mitigate these impacts. The statistical analysis of the dataset helps in several ways.

On the other hand, by understanding the distribution of gender, age, job roles, and experience, energy companies can allocate resources more effectively. For instance, they might identify departments or teams that require additional support or training to enhance resilience. The analysis might reveal gaps in experience or knowledge among employees. Targeted training programs can be implemented to strengthen BCM capabilities across all demographic segments,

ensuring a well-prepared workforce. A diverse workforce is often more adaptable and innovative. The gender and age distribution data can help companies assess their diversity levels and implement policies to promote a more inclusive work environment, enhancing overall BCM effectiveness. Understanding the professional backgrounds and experience levels allows for better strategic planning. Companies can develop tailored BCM plans that leverage the strengths of their workforce, ensuring that critical roles are well-supported during crises. Effective communication is crucial during disruptions. Insights into the demographic and professional makeup of the workforce enable the development of targeted communication strategies, ensuring that all employees receive the necessary information and support.

The statistical frequencies of gender, age, job role, and experience provide a foundational understanding of the workforce within the German energy sector. During Russia's invasion of Ukraine, these insights are instrumental in enhancing BCM strategies. By leveraging demographic and professional data, energy companies can better prepare for and respond to disruptions, ensuring continued operations and minimizing adverse impacts. Effective BCM not only addresses immediate challenges but also builds long-term resilience, which is crucial for navigating the uncertainties of geopolitical crises.

4.2.1 Gender

Table 2 presented below reflects the gender-wise details regarding the participants who took part in the survey.

Table 2 Gender

		Frequency	Percent
Valid	Male	46	23.0
	Female	37	18.5
	non-binary	33	16.5
	Prefer not to say	36	18.0
	Other (Please specify)	48	24.0
	Total	200	100.0

The gender representation of 200 participants is also evenly distributed in the created dataset. Of all the respondents, 46 (23.0%) were males, while 37 (18.5%) were females. Non-binary is comprised of 33 (16.5%) of the respondents, while 36 (18.0%) of them prefer not to state their gender. Furthermore, 48 (24.0%) people chose the option “other” or filled in the

option of a different gender. According to this analysis, 48% of respondents do not have a clear response to a given question. The valid percent of each category for each variable is the same as the frequency percent, as there is no case-wise exclusion of missing values, so the total percent equals 100%. The cumulative percent increases with each category: males at 23.0%, females at 41.5%, non-binary at 58.0%, none at 0%, and those preferring not to say at 76% on average.

4.2.2 Age

The dataset presented in Table 3 subsequently comprises 200 people classified by age to understand the age demographics of Germany's energy sector.

Table 3 Age

Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under 25	35	17.5	17.5	17.5
	25-34	31	15.5	15.5	33.0
	35-44	31	15.5	15.5	48.5
	45-54	41	20.5	20.5	69.0
	55-64	25	12.5	12.5	81.5
	65 and above	37	18.5	18.5	100
	Total	200			

Younger people from the age of 0 to 24 are 35 (17.5%), while middle-aged people from 25 to 34 years are 31 (15.5%). The 35-44 age group entails 31 (15.5%). The next age group is the 45–54-year-olds, of whom 41 are respondents (20.5%). Thus, the 55-64 age group consists of 25 people (12. 5%), and 65 and above include 37 people (18. 5%). All of them are equal to the frequency percent since there is no missing data, making the sum of all the age categories equal to 100%. The cumulative percent illustrates the progressive total: The youth population under the age of 25 stands at 17.5%. However, ages 25-34 were 33.0%, and ages 35–44 raised it to 48.5%. The age group of 45-54 increases the figure, reaching 69.0%. The 55–64 age group was 81.5%, and those 65 and above make the total 100. 0%. This distribution is useful in showing the sample population age distribution, which is relevant in the case study of business continuity management in the German energy sector during Russia's invasion of Ukraine.

4.2.3 Job Role

Table 4 reflects that 200 employees are featured in the dataset, divided by the job title, which provides insights into its distribution in the German energy industry during Ukraine's invasion by Russia.

Table 4 Job Role

Job Role			
		Frequency	Percent
Valid	Executive/Management	35	17.5
	Technical Staff	32	16.0
	Administrative Staff	33	16.5
	Consultant	29	14.5
	Researcher	38	19.0
	Other (Please specify)	33	16.5
	Total	200	100.0

Executives/Management has 35 (17.5%), Technical Staff has 32 (16. 0%), and Administrative Staff has 33 (16.5%) participants. Consultants were assigned to scale 29 (14.5%), researchers 38 (19.0%), and other roles 33 (16.5%). The valid percent of each of the roles corresponds with the frequency percent of the factors, thus giving a total of 100 percent. As the following increased workload of different professions demonstrates, the variety of specialisations and tasks in the field underlines the importance of sectoral experience and competencies while dealing with geopolitical crises for business continuity management and operational decision-making throughout organisations.

4.2.4 Experience

Table 5, presented below, indicates the experience level of respondents who took part in the survey.

Table 5 Experience

Experience				
	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	Less than 1 year	52	26.0	26.0	26.0
	1-5 years	49	24.5	24.5	50.5
	6-10 years	53	26.5	26.5	77.0
	Over 10 years	46	23.0	23.0	100
	Total	200	100.0	100.0	

The valid percent of each category equals its frequency percent; there are no missing values, so the total is 100%. The cumulative percent illustrates the progressive total: 26.0% of the employees can be categorised as having less than one year of work experience. Those with 1–5 years of experience make up 50.5%, and 77.0% have 6-10 years of experience, which is 77%. Those with more than ten years of work experience fill the total at 100.0%. This variation in experience level is critical for BCM. In addition, the overall experience regarding crisis management seems limited. The 26.0 percent of respondents have less than one year of experience, and another 24.5 percent have 1–5 years of experience. This could prove difficult in the execution of BCM strategies, especially because of disruptions resulting from the invasion.

Nonetheless, the prospects with work experience of more than five but less than ten years are relatively few of the total, but the presence of candidates with 6–10 years (26.5%) and over 10 years of experience (23.0%) is a plus. It is, therefore, probable that these employees have adequate skills and knowledge of different issues that relate to complex problems, training of junior workers, and adequate development of BCM strategies. Their value cannot be underestimated at the task of keeping business operations running smoothly, at the task of making strategic business choices, and at the task of swiftly managing business disruptions. Therefore, the nature and dispersion of participants' experiences in the German power industry hint at the necessity of specific education and training interventions for BCM competency improvement. Mentoring common and experienced employees is vital to strengthening the temporal and personnel capacities of a sector in geopolitical upheavals such as the Russian-Ukrainian conflict.

4.3 Frequency analysis

Using replies from 200 people in the German energy industry, the dataset's frequency analysis provides important new information on how well business continuity management (BCM) worked during Russia's invasion of Ukraine. The energy industry had several difficulties

at this time, underscoring the need for strong BCM frameworks to guarantee operational stability and resilience. The first data analysis of the research involved checking how respondents found the BCM framework valuable for managing crises in their firm. Many of the respondents said that the BCM frameworks that were in place at the time were mostly successful in reducing the crisis's immediate effects.

A significant portion, meanwhile, voiced worries over some shortcomings in the frameworks, notably with regard to their inability to adjust to the unusual nature of the geopolitical shock. This conflicting reaction highlights the need for ongoing enhancements to BCM procedures, guaranteeing that they are not only responsive but also proactive in foreseeing and equipping themselves for a variety of possible emergencies. The frequency analysis shows that although organisations were able to continue operations, there were substantial obstacles in maintaining continuous service in terms of assuring sustainable operations and uninterrupted service. This highlights the need for BCM to be reinforced in the areas of resource allocation and supply chain management. Due to the invasion's disruptions, it became clear that several BCM plans lacked the necessary tools to deal with protracted geopolitical instability, which resulted in inefficient operations and service outages.

Another aspect of the study looked at was how feasible the suggested BCM frameworks would be in the event of future crises. Numerous participants said that their BCM frameworks were useful and suitable for potential disruptions in the future, indicating that the underlying ideas of their strategies are valid. The comments did, however, also draw attention to the disconnect between theory and practice, as these frameworks' actual application ran into difficulties. This disparity points to the need for more adaptable and practical BCM techniques that can be swiftly adjusted to the changing needs of emergencies.

One of the most critical aspects of successful BCM that has arisen is awareness and training within the energy industry. Although training programs exist, their effectiveness and reach have been questioned, according to the report. There is a need for more regular and thorough training modules since many personnel felt unprepared to handle the issue. This research highlights how crucial it is to have frequent, up-to-date training sessions covering a variety of situations so that all staff members are prepared to handle emergencies with competence.

A key element in the effectiveness of BCM initiatives during the Russia-Ukraine conflict was found to be internal communication. During times of crisis, efficient communication is essential for organizing actions and preserving spirits. The frequency study revealed that whereas some businesses were very good at this, others had trouble communicating clearly and on time. This discrepancy emphasises the need for effective communication plans that can be quickly put into action in order to keep all relevant parties informed and involved throughout the crisis. While the primary obstacles that energy sector enterprises encountered throughout the crisis were diverse, three recurring themes emerged: interruptions in the supply chain, difficulties with logistics, and limitations on resources.

The geopolitical aspect of the crisis made these difficulties worse by requiring businesses to handle intricate global dynamics. The frequency analysis shows that in order to effectively handle these complex issues, BCM frameworks must be more all-inclusive and include tactics for handling both internal and external interruptions. A significant issue that was examined in the investigation was the adaptability of BCM frameworks to various sorts of crises. While some businesses had BCM strategies that were adaptive and agile, others discovered that their frameworks were too inflexible to adequately handle the particular difficulties brought on by the invasion. This research implies that BCM frameworks need to be built with inherent flexibility so that they may be scaled and adjusted to fit the unique requirements of every given crisis.

There was mixed assistance from BCM to energy industry enterprises in the Russia-Ukraine conflict. Many respondents agreed that BCM had a beneficial effect in reducing some parts of the crisis, but there were also notable areas in which BCM was ineffective. This uneven efficacy emphasises the need for continuous assessment and improvement of BCM techniques to make sure they are all-inclusive and ready to handle a variety of issues.

The investigation also shed light on the effectiveness of remedies to the problems encountered throughout the crisis. Some businesses battled with slow or insufficient answers, while others were able to quickly adopt efficient alternatives. This unpredictability emphasises the necessity for BCM frameworks to include more comprehensive and tried-and-true response strategies in order to guarantee that businesses can react to crises promptly and successfully.

Lastly, the respondents' extra remarks and recommendations give a wealth of qualitative information that supports the quantitative results. Numerous participants highlighted the need to do more thorough risk assessments, allocate more funds for BCM infrastructure, and improve

training initiatives. These recommendations provide a clear path for future advancements by aligning with the gaps in the present BCM procedures that have been discovered.

To sum up, the dataset's frequency analysis offers a thorough summary of the BCM frameworks' efficacy in the German energy industry during Russia's invasion of Ukraine. The results point to a number of crucial areas that need development, such as the requirement for more flexible and adaptive BCM plans, improved programs for training and awareness, strong internal communication tactics, and thorough risk assessments. It will be imperative to address these issues if the German energy industry is to become more resilient and capable of handling future crises. The energy industry can more effectively handle the complexity and risks of a geopolitical setting that is becoming more unpredictable by consistently enhancing and strengthening BCM processes.

Table 6: Descriptive Statistics

Statistics						
		Q1: How effective do you find your company's BCM framework in managing crises?	Q2: How well did BCM ensure sustainable operations and uninterrupted services during the crisis?	Q3: How practical are you in finding the proposed BCM framework for future crises?	Q4: How adequate is the training and awareness provided by your energy sector company regarding BCM?	Q5: How effective was internal communication during the Russia-Ukraine crisis?
N	Valid	200	200	200	200	200
	Missing	0	0	0	0	0

Table 7: Statistics

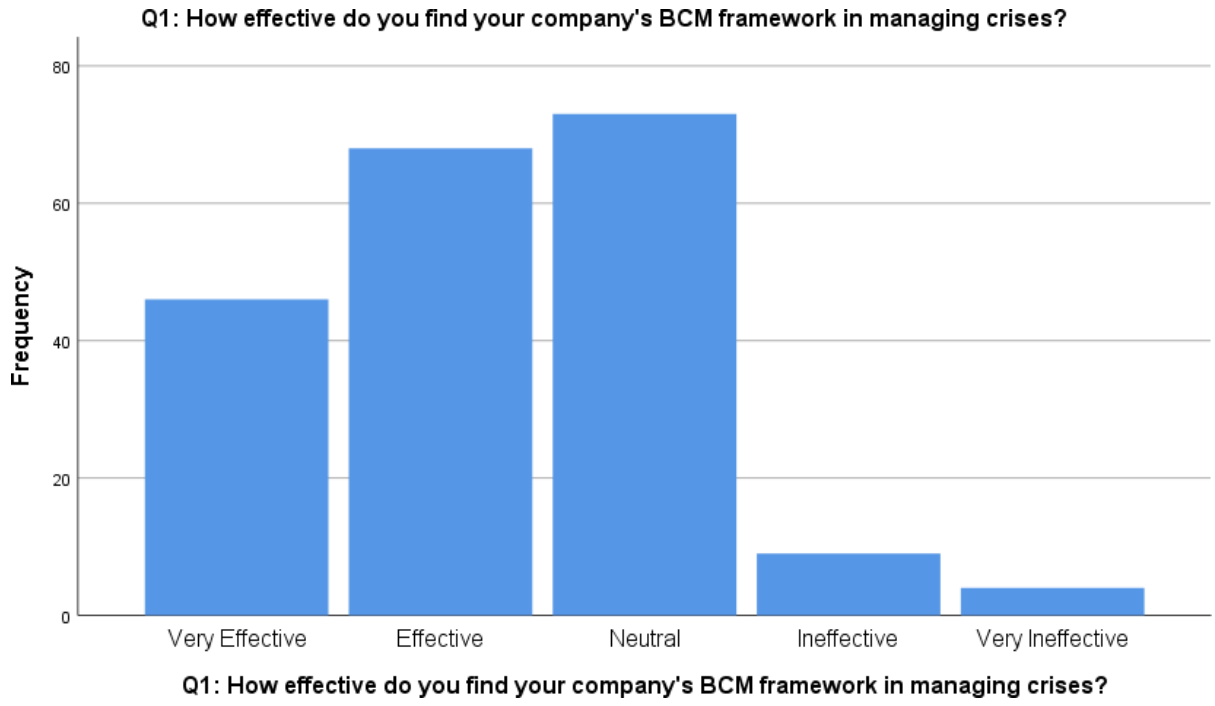
Statistics						
		Q6: What were the main challenges faced by the energy sector company during the Russia-Ukraine war? (Select all that apply)	Q7: How adaptable is your energy sector company's BCM framework to different types of crises?	Q8: To what extent did BCM help your energy sector company during the Russia-Ukraine war?	Q9: Did your energy sector company find effective solutions to these challenges?	Q10: Do you have any additional comments or suggestions regarding your company's BCM during the Russia-Ukraine crisis?
N	Valid	200	200	200	200	200
	Missing	0	0	0	0	0

Frequency results

The evaluation of the answers to Q1: “How effectively do you find your company’s BCM framework in managing crises?” reveals that there is moderate-to-high acknowledgment among 200 participants. The 46 participants, or 23.0%, regarded the BCM framework as very effective in managing crisis, followed by 68, or 34.0%. Effective: 73, or 36.5%. Neutral; 9, or 4.5%, ineffective; and 4, or 2.0%, as very ineffective.

Table 8: Q1

Q1: How effective do you find your company's BCM framework in managing crises?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Effective	46	23.0	23.0	23.0
	Effective	68	34.0	34.0	57.0
	Neutral	73	36.5	36.5	93.5
	Ineffective	9	4.5	4.5	98.0
	Very Ineffective	4	2.0	2.0	100.0
	Total	200	100.0	100.0	

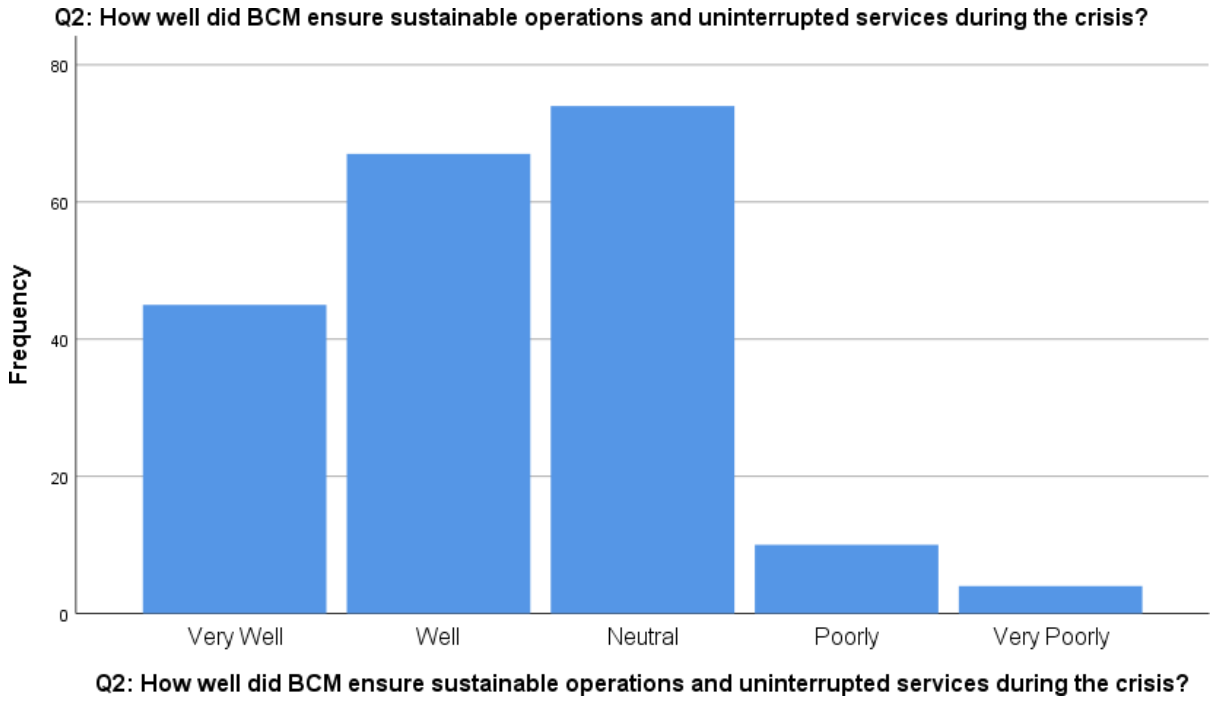


The insights gathered from the responses to Q2 concerning the company's performance during the crisis, which is how well BCM contributed to the goal of sustaining operations and ensuring continuity of services, are quite diverse but overwhelmingly positive, given that the responses are from 200 participants. Thus, 45 respondents (22. 5%) said BCM performed "Very Well," and 67 (33. 5%) claimed it performed "Well," meaning 56. 0% of the participants had a positive perception of BCM's efficiency in sustaining operations and services during the crisis.

However, 74 respondents (37. 0%) are still "Neutral," which implies that it can be inferred that a substantial number of employees are not aware of a positive or a negative change in the contingency of operations. As for the less favourable response, 10 (5.0%) called BCM to have a performance of "Poorly" and 4 (2.0%) to "Very Poorly." Summing up these responses, an augmented ratio that recognises the effectiveness of BCM to some extent remains true; however, a disagreeable number of respondents displayed dissatisfaction, stressing that there are still gaps that can be improved to guarantee efficiency and reliability This feedback clearly point to the need for periodic evaluation of BCM so as to get rid of the weaknesses and enhance the strengths.

Table 9: Q2

Q2: How well did BCM ensure sustainable operations and uninterrupted services during the crisis?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Well	45	22.5	22.5	22.5
	Well	67	33.5	33.5	56.0
	Neutral	74	37.0	37.0	93.0
	Poorly	10	5.0	5.0	98.0
	Very Poorly	4	2.0	2.0	100.0
	Total	200	100.0	100.0	



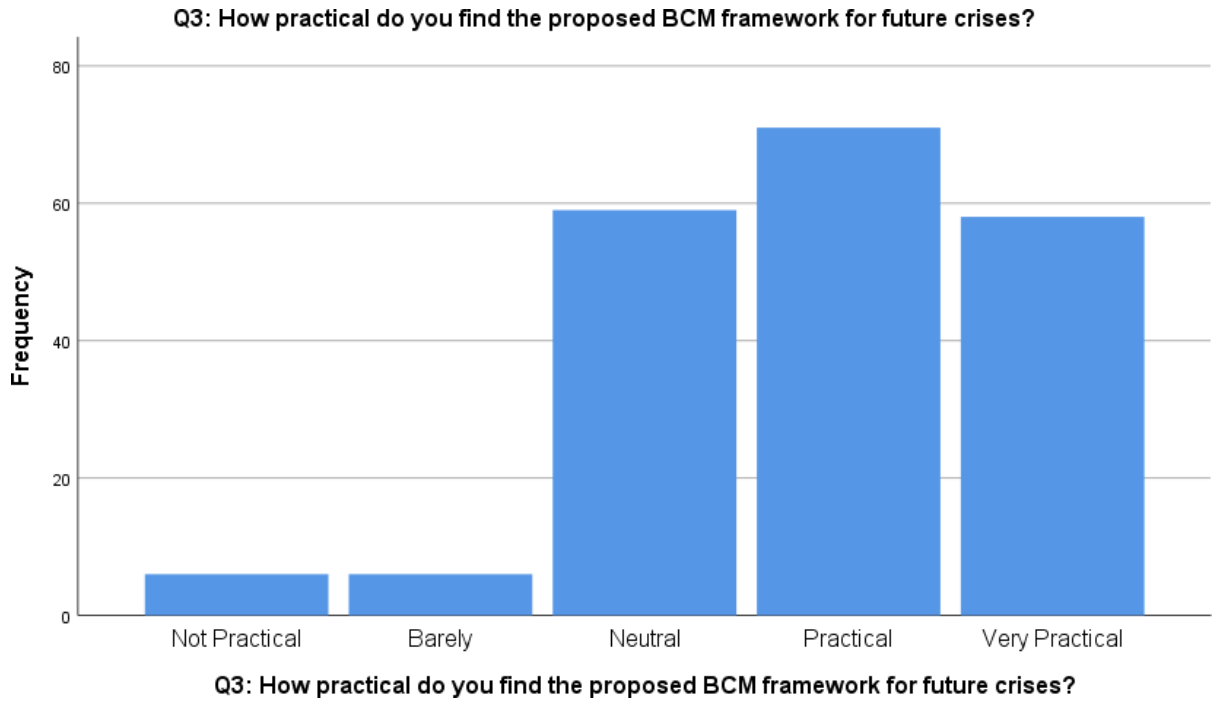
The net percentage perception obtained from the dataset had answers to Q3, “How practical do you find the proposed BCM framework for future crises?” shows that 60% of the 200 respondents hold a positive perception. A majority of 71 individuals (35. 5%) expressed that the BCM framework is “Practical,” and 58 respondents (29.0%) regarded it as very practical. This means that the energy companies in Germany trust that the current BCM framework put forward will adequately prepare entities for future crises.

Nevertheless, 59 respondents out of them, 29.5% are ‘‘Neutral’’, meaning that almost a

third of the workforce is neither convinced nor unconvinced about the applicability of the framework that can convey the message of uncertainty or indecision about its viability. On the critical side, there are six respondents (3.0%) selected “Not Practical,” while the other 6 (3.0%) respondents consider its practicability “Barely.” These are minor compared with the many positive responses that have been given in this dataset, but they do show where the BCM framework could be advanced. This can be extended to the effects of Business Continuity Management in the German energy industry during the Russia-Ukraine invasion, which shows the level of acceptance of the framework in dealing with future disruptions. Nevertheless, the appearance of neutral and negative attitudes indicates the further socialisation of assessment and improvement of the framework to provide the necessary protection against the various problems that arise in the context of geopolitical conflicts.

Table 10: Q3

Q3: How practical do you find the proposed BCM framework for future crises?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Practical	58	29.0	29.0	100.0
	Practical	71	35.5	35.5	71.0
	Neutral	59	29.5	29.5	35.5
	Barely	6	3.0	3.0	6.0
	Not Practical	6	3.0	3.0	3.0
	Total	200	100.0	100.0	



The findings on the responses that the 200 participants provided to the 4th question: How adequate is the training and awareness provided by your energy sector company regarding BCM? The study presents a cross-sectional view of respondents' perceptions, which is a crucial factor that determines business continuity management (BCM) in the German energy sector. Education and training are the cornerstones of sound BCM, particularly in the face of geopolitical disruptions like Russia's invasion of Ukraine, which was a stress test for organisations. The 23% of respondents, 46, designated the training and awareness as "very adequate," and 68 or 34% regarded it as "Adequate." Thus, these two responses exemplify that workers believe that companies' basic BCM beliefs are well communicated and understood within the industry. Thus, adequate training promotes the strengthening of the response to critical situations among employees, which is also beneficial for the development of the entire energy industry.

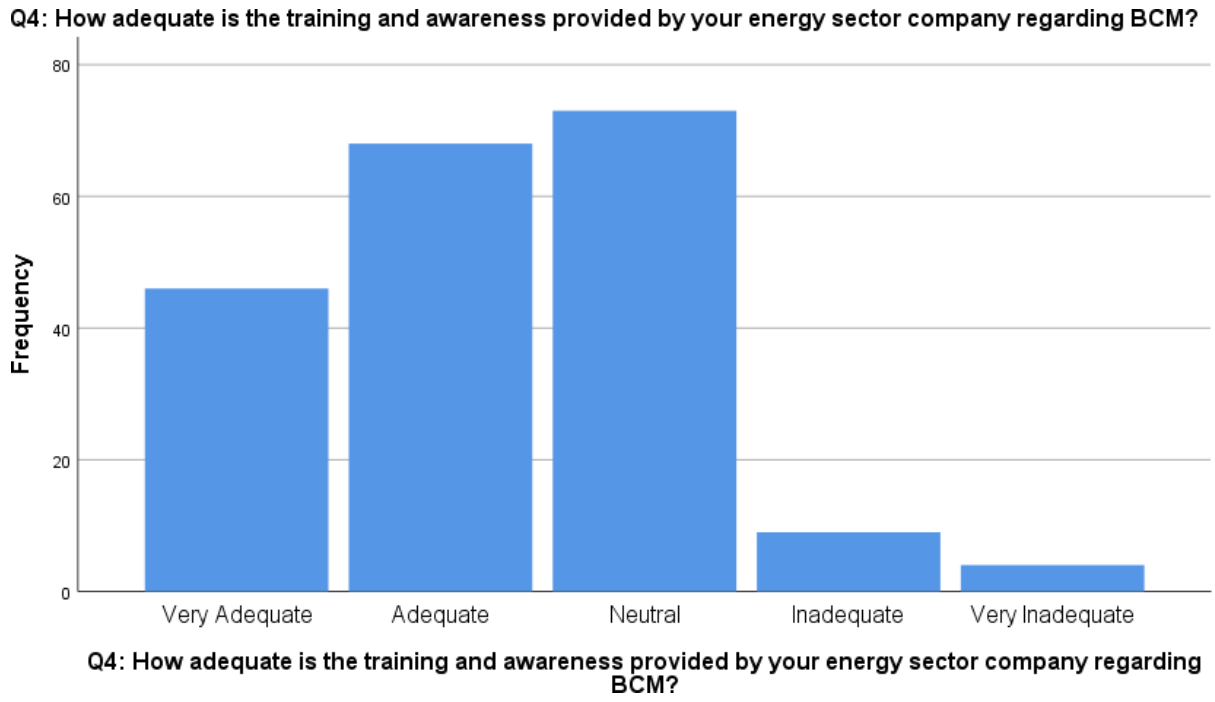
As for the adequacy of training 73 people, 36.5% thought it over and stuck to the middle ground, neither agreeing nor disagreeing with the aspect. This massive neutral sentiment shows that, while the training programs may serve their purpose, they do not create a memorable, possibly even informative, experience. This neutrality indicates that, perhaps, there is room for

companies to employ more engagement-based or condition-simulated training that constantly reminds them of BCM principles and may be helpful to organisations. On the critical side, nine respondents (4.5%) considered the training "inadequate,' while four respondents (2.0%) considered 'it very inadequate."' As much as the negative response appears minuscule, it portrays significant weaknesses in the BCM training and awareness exercise. These may indicate that the frequency, depth, or level of practical application of the training sessions was insufficient. In the case of handling such events as Russia invading Ukraine, poor professional preparation implies a lack of preparedness, slower rates of response, and more disturbance of operations may result from it. Connecting these observations to the overall subject matter, the sufficiency of BCM training and awareness constitutes one of the key factors in Germany's energy crisis management.

The diversified outcome indicates the necessity to improve training activities systematically, create effective and complex teaching strategies, and adapt to the geopolitical events that cause stress. Therefore, by addressing the aforementioned gaps, the energy sector increases its personnel's readiness and guarantees the company's ability to continue operations without disruptions. Hence, a proactive approach to training and awareness can drastically reduce the effects of crises, thus ensuring the status of the sector is stable and strong.

Table 11: Q4

Q4: How adequate is the training and awareness provided by your energy sector company regarding BCM?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Adequate	46	23.0	23.0	23.0
	Adequate	68	34.0	34.0	57.0
	Neutral	73	36.5	36.5	93.5
	Inadequate	9	4.5	4.5	98.0
	Very Inadequate	4	2.0	2.0	100.0
	Total	200	100.0	100.0	



The evaluation of responses to Q5, "How effective was internal communication during the Russia-Ukraine crisis?" has fundamental implications with reference to communication in business continuity management (BCM) in the German energy sector during this geopolitical crisis. Therefore, internal communication plays a crucial role in terms of the articulation of an overall pattern of response with regard to the dissemination of information and the achievement and sustainment of operational stability in crisis situations. According to the same scale, a large number of respondents, 45 persons (22.5%), described internal communication as "very effective," and another 67 persons (33.5%) rated it as "effective." This majority indicates that the companies had a high degree of compliance with communication approaches that would enable them to manage crises well. Arguably, in the situation of the Russia-Ukraine conflict, such communication may have, inter alia, facilitated the continuity of operations and synchronised responses and probably been a means by which the company ensured its employees were kept abreast of the existing crisis management strategies.

However, 74 respondents (37.0%) remained 'Neutral.' This affirmed the fact that just as a significant part of the workforce felt that their counterparts benefited from internal communication, another part felt the whole process did not have a strongly positive or negative influence on its morale. This might be due to oscillations in the overall communication

effectiveness or a lack of impactful interaction in the course of the crisis. It implies that there may be laid-down communication frameworks and signposts that show that there is indeed a communication system in the organization, but the experience is not standardized, meaning there could be a difference in the quality of the experiences of different employees.

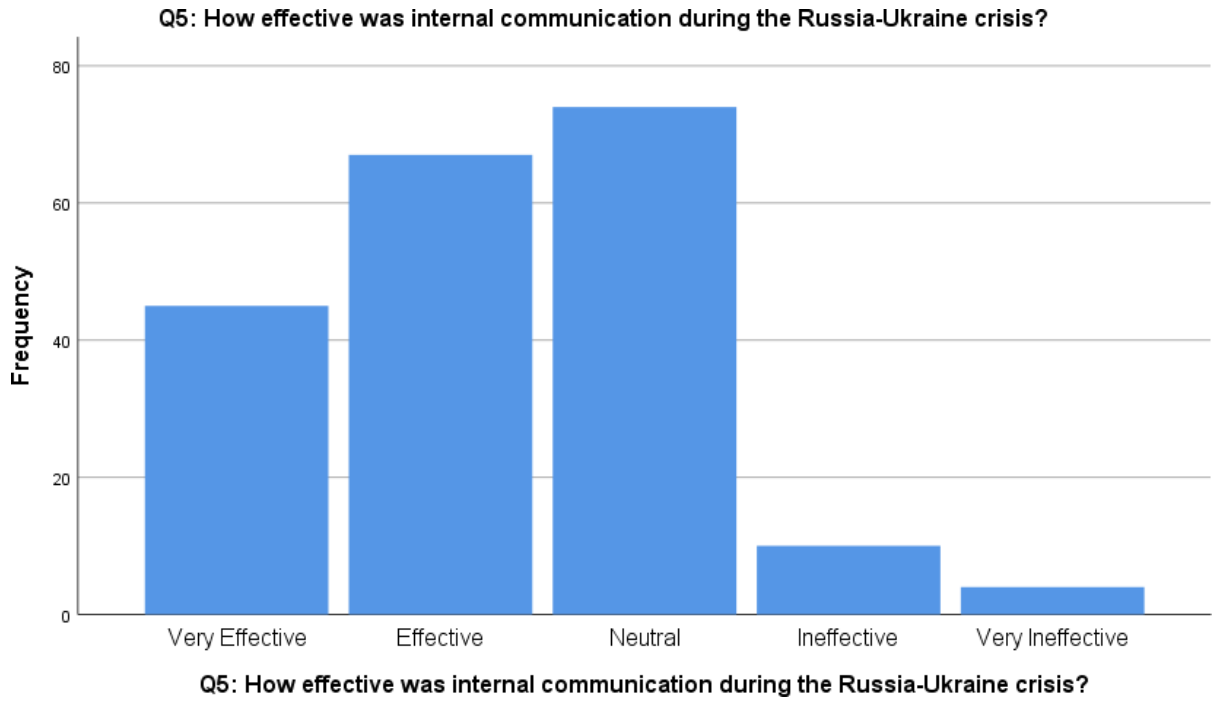
The weaker side, however, was identified by ten respondents (5.0%) who regarded internal communication as “ineffective," while four respondents (2.0%) considered it to be “very ineffective.” These negative responses show that internal communication has its weaknesses, which are most likely due to, but not limited to, the delay in information sharing, unclear messages, and lack of communication feedback. In the conflict between Russia and Ukraine, such drawbacks may also increase the overall level of stress, confusion, and inefficiency, emphasising the importance of sound, clear, and timely communication plans.

Relating to the topic of this study, internal communications represent a critical element of BCM within German energy organisations. The differences suggest that much attention can be paid to fine-tuning the communication techniques to be top-notch in dealing with all the organisational tiers. Communication thus has the distinctive virtue of informing all the personnel, organising them, and enabling a fast and proper response to contingencies. To ensure that internal communication is further improved within the companies, it is recommended that communication simulations be conducted, multiple media are used to pass on messages to the entire workforce, and the transferred messages are easily understood and controllable. Based on the results of the survey, the analysed gaps should be addressed to enhance the general crisis management performance in the German energy sector, where internal communication has to reinforce business continuity in the face of possible geopolitical turbulences in the future. This forward-planning disposition will assist in minimising the effects of the crisis so that the sector is proactively firm and adaptable in the course of instability.

Table 12: Q5

Q5: How effective was internal communication during the Russia-Ukraine crisis?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Effective	45	22.5	22.5	22.5
	Effective	67	33.5	33.5	56.0

	Neutral	74	37.0	37.0	93.0
	Ineffective	10	5.0	5.0	98.0
	Very Ineffective	4	2.0	2.0	100.0
	Total	200			



The analysis of Q6, "What were the main challenges faced by the energy sector company during the Russia-Ukraine war?" highlights several critical issues that impacted the sector during this geopolitical crisis. Respondents were able to select multiple challenges, reflecting the multifaceted nature of the disruptions experienced.

The most frequently reported challenges were "Workforce Shortages" and "Operational Inefficiencies," each selected by 39 respondents (19.5%). Workforce shortages likely stemmed from disruptions in mobility, safety concerns, and the reallocation of labor resources, significantly impacting the sector's ability to maintain routine operations and implement crisis management plans effectively. Operational inefficiencies, exacerbated by the crisis, pointed to systemic weaknesses in managing sudden, large-scale disruptions. These inefficiencies could result from inadequate crisis planning, poor communication, or insufficient training, highlighting areas where Business Continuity Management (BCM) needs to be strengthened.

"Supply Chain Disruptions," noted by 38 respondents (19.0%), underscored the vulnerabilities in the energy sector's reliance on international supply chains. The war disrupted the flow of raw materials, equipment, and parts essential for maintaining energy production and distribution, leading to delays and increased costs. This disruption demonstrates the importance of incorporating supply chain resilience into BCM strategies, ensuring alternative sourcing and logistical plans are in place.

"Regulatory Changes," selected by 33 respondents (16.5%), reflect the challenges posed by rapidly evolving governmental policies in response to the war. These changes could include sanctions, import/export restrictions, and new compliance requirements, necessitating agile BCM frameworks that can quickly adapt to new regulations without compromising operational integrity.

"Cybersecurity Threats," identified by 27 respondents (13.5%), highlight the increased risk of cyber-attacks during geopolitical conflicts. As energy infrastructure is a critical national asset, it has become a prime target for cyber-attacks aimed at disrupting operations or stealing sensitive information. This finding underscores the need for robust cybersecurity measures as an integral part of BCM, protecting against both physical and digital threats.

"Financial Constraints," reported by 24 respondents (12.0%), illustrate the economic pressures faced by companies during the crisis. These constraints could arise from increased operational costs, disrupted revenue streams, or the need for additional investments in security and crisis management. Effective BCM requires financial planning and resource allocation to ensure that companies can sustain operations and recover swiftly from financial shocks.

Linking these findings to the broader topic, the challenges identified during the Russia-Ukraine war highlight the critical role of comprehensive and adaptable BCM in the German energy sector. Each challenge underscores specific areas where BCM frameworks must be reinforced to enhance resilience. For instance, addressing workforce shortages and operational inefficiencies requires improved training, communication, and crisis management protocols. Mitigating supply chain disruptions necessitates developing alternative sourcing strategies and enhancing logistical flexibility.

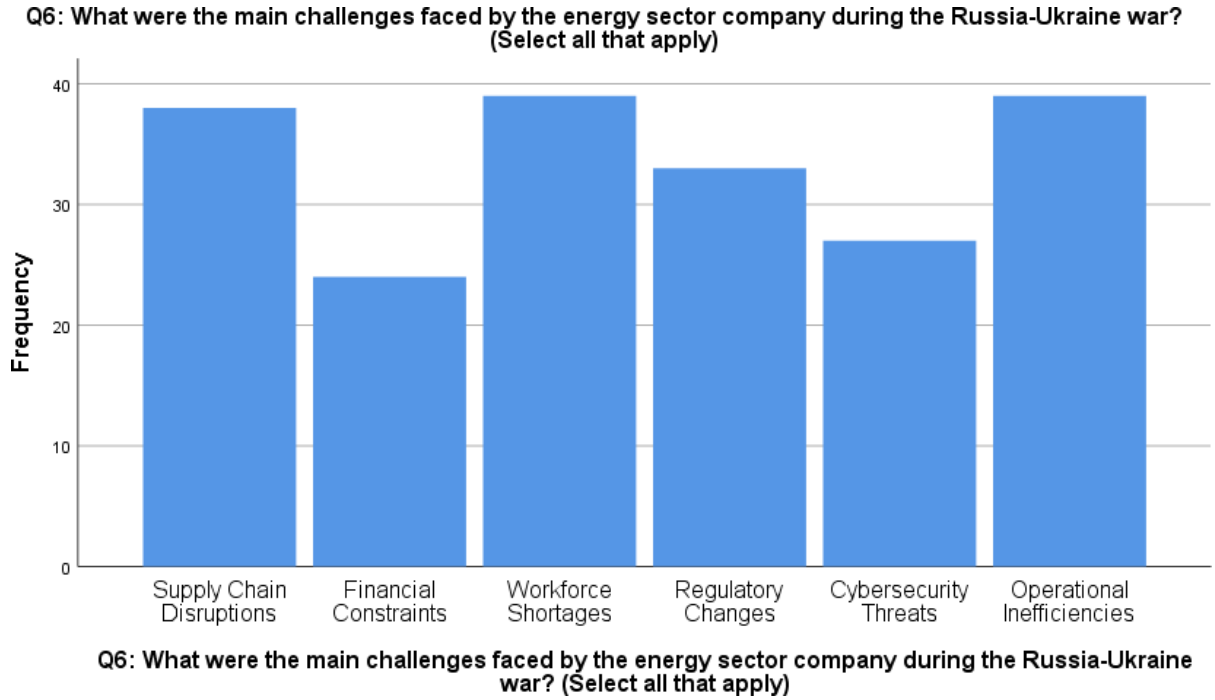
Regulatory agility can be achieved by maintaining up-to-date knowledge of potential regulatory changes and having adaptable compliance plans. Strengthening cybersecurity defenses is crucial to protect against the heightened risk of cyber-attacks during geopolitical conflicts.

Finally, managing financial constraints involves ensuring that BCM strategies include financial resilience planning, such as emergency funds and cost-effective crisis management solutions.

In conclusion, the main challenges faced by the German energy sector during the Russia-Ukraine war, as revealed by the survey, underscore the multifaceted nature of crises and the necessity for robust, adaptable BCM frameworks. By addressing these specific challenges, the sector can better prepare for future disruptions, ensuring operational continuity, financial stability, and overall resilience in the face of geopolitical uncertainties.

Table 13: Q6

Q6: What were the main challenges faced by the energy sector company during the Russia-Ukraine war? (Select all that apply)					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Supply Chain Disruptions	38	19.0	19.0	19.0
	Financial Constraints	24	12.0	12.0	31.0
	Workforce Shortages	39	19.5	19.5	50.5
	Regulatory Changes	33	16.5	16.5	67.0
	Cybersecurity Threats	27	13.5	13.5	80.5
	Operational Inefficiencies	39	19.5	19.5	100.0
	Total	200	100.0	100.0	



Q6: What were the main challenges faced by the energy sector company during the Russia-Ukraine war? (Select all that apply)

The responses to Q7, "How adaptable is your energy sector company's BCM framework to different types of crises?" provide crucial insights into the flexibility and preparedness of Business Continuity Management (BCM) frameworks within the German energy sector, especially in light of challenges posed by geopolitical disruptions such as Russia's invasion of Ukraine. According to the survey, a significant portion of respondents, 46 individuals (23.0%), rated their BCM frameworks as "Very Adaptable," and 68 respondents (34.0%) considered them "Adaptable." This majority (57.0%) indicates that more than half of the workforce perceives their BCM frameworks as flexible and capable of addressing various crises. This adaptability is essential in a sector as critical and sensitive as energy, where diverse and unexpected disruptions can significantly impact operations and services.

However, a substantial 36.5% of respondents remained "Neutral," suggesting that a considerable portion of the workforce neither strongly endorse nor criticizes the adaptability of their BCM frameworks. This neutrality may indicate uncertainty or a lack of strong evidence of adaptability in past crises. It highlights an area where companies could focus on improving communication about their BCM capabilities and conducting more comprehensive drills and training to demonstrate and enhance framework adaptability.

On the critical side, nine respondents (4.5%) found their BCM frameworks "Not Adaptable," and four respondents (2.0%) rated them as "Not adaptable at all." These responses, though in the minority, signal significant concerns that need addressing. In the context of the Russia-Ukraine crisis, such rigidity in BCM frameworks could result in ineffective responses to rapidly changing situations, leading to operational disruptions, financial losses, and compromised service delivery.

Linking these findings to the broader topic, the adaptability of BCM frameworks is a pivotal element in the energy sector's ability to manage crises effectively. The positive responses suggest a general confidence in the sector's preparedness and flexibility. However, the neutral and negative responses indicate areas where BCM frameworks may fall short, particularly in handling the unique and evolving challenges posed by geopolitical disruptions.

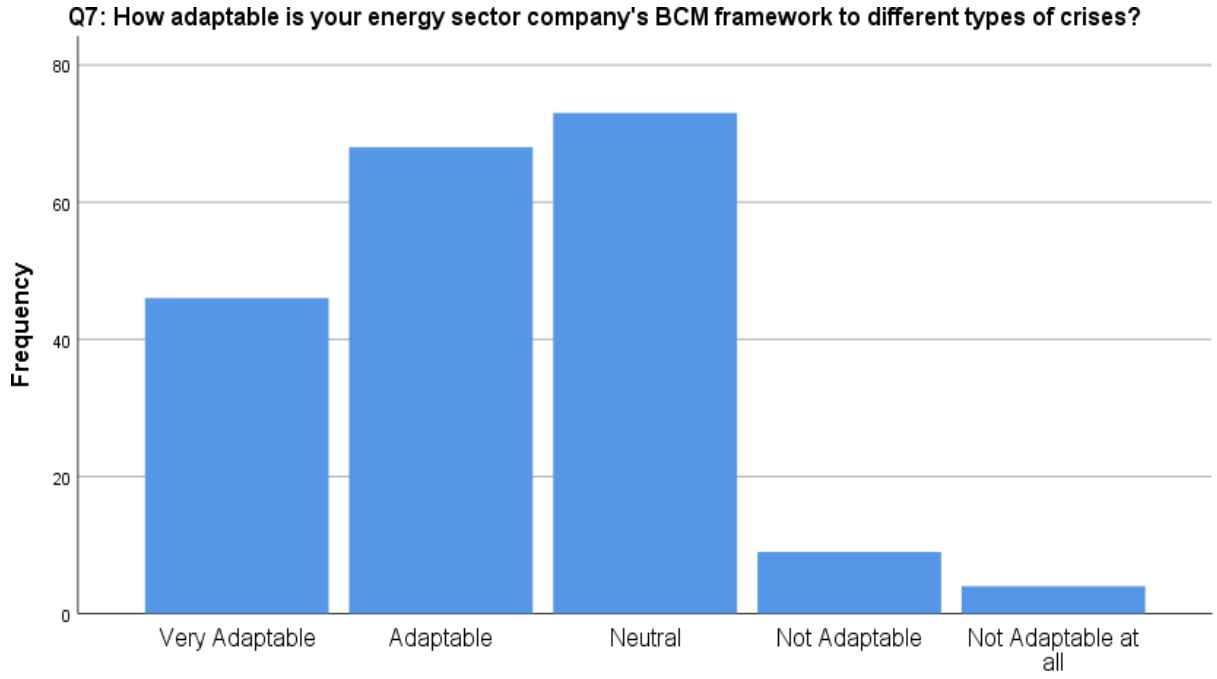
To enhance the adaptability of BCM frameworks, the German energy sector should focus on continuous improvement and innovation in crisis management strategies. This could include regularly updating risk assessments to reflect current geopolitical climates, investing in advanced technologies that support real-time data analysis and decision-making, and fostering a culture of resilience where employees at all levels are trained to respond to various crisis scenarios effectively.

Moreover, it is essential to conduct regular BCM exercises that simulate different types of crises, allowing companies to test and refine their frameworks. These exercises can help identify potential weaknesses and areas for improvement, ensuring that the BCM frameworks are not only theoretically adaptable but also practically effective.

Table 14: Q7

Q7: How adaptable is your energy sector company's BCM framework to different types of crises?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Adaptable	46	23.0	23.0	23.0
	Adaptable	68	34.0	34.0	57.0
	Neutral	73	36.5	36.5	93.5
	Not Adaptable	9	4.5	4.5	98.0
	Not Adaptable at all	4	2.0	2.0	100.0

	Total	200	100.0	100.0	

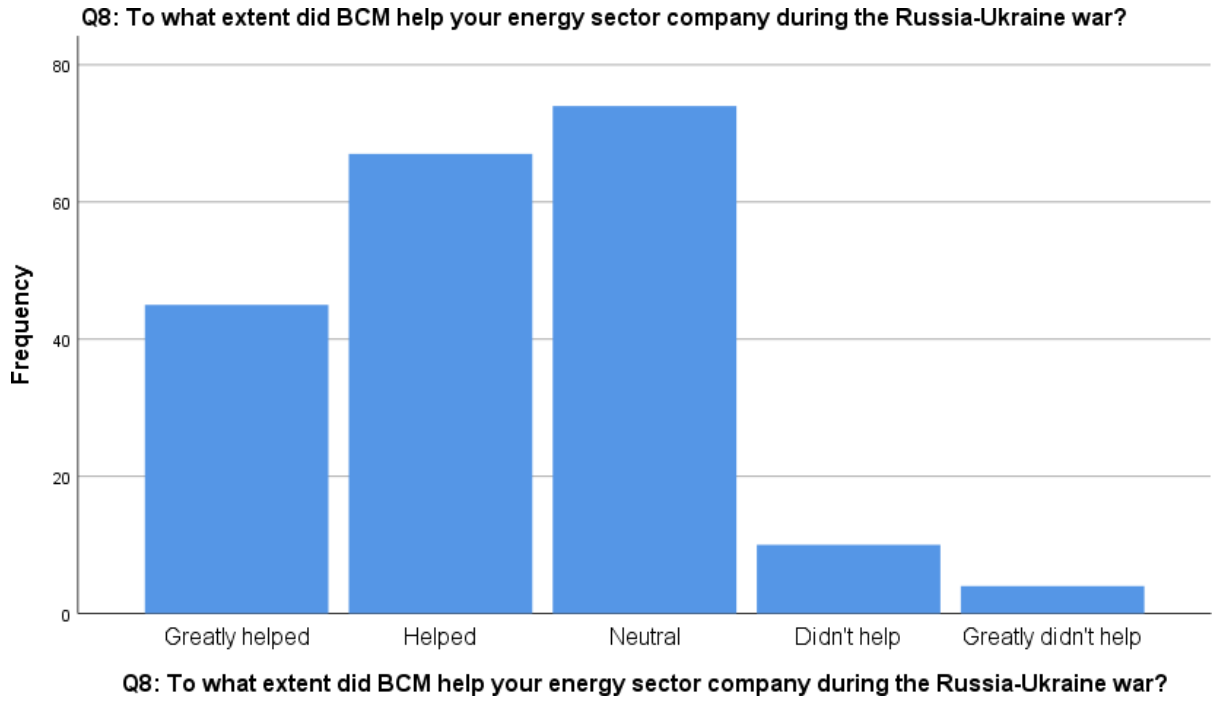


Q7: How adaptable is your energy sector company's BCM framework to different types of crises?

The responses to Q8 highlight the varying degrees to which Business Continuity Management (BCM) helped energy sector companies during the Russia-Ukraine crisis. A notable portion, 45 respondents (22.5%), reported that BCM "Greatly helped" their operations and 67 respondents (33.5%) indicated that it "Helped." This majority (56.0%) suggests that BCM frameworks played a significant role in mitigating the impacts of the crisis for over half of the respondents. However, 74 respondents (37.0%) remained "Neutral," reflecting either uncertainty or mixed results regarding BCM's effectiveness. Meanwhile, ten respondents (5.0%) felt BCM "Didn't help," and four respondents (2.0%) reported it "Greatly didn't help," indicating areas where BCM strategies might have failed. These mixed perceptions underscore the importance of continuously refining BCM practices to enhance their effectiveness during geopolitical crises.

Table 15: Q8

Q8: To what extent did BCM help your energy sector company during the Russia-Ukraine war?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Greatly helped	45	22.5	22.5	22.5
	Helped	67	33.5	33.5	56.0
	Neutral	74	37.0	37.0	93.0
	Didn't help	10	5.0	5.0	98.0
	Greatly didn't help	4	2.0	2.0	100.0
	Total	200	100.0	100.0	

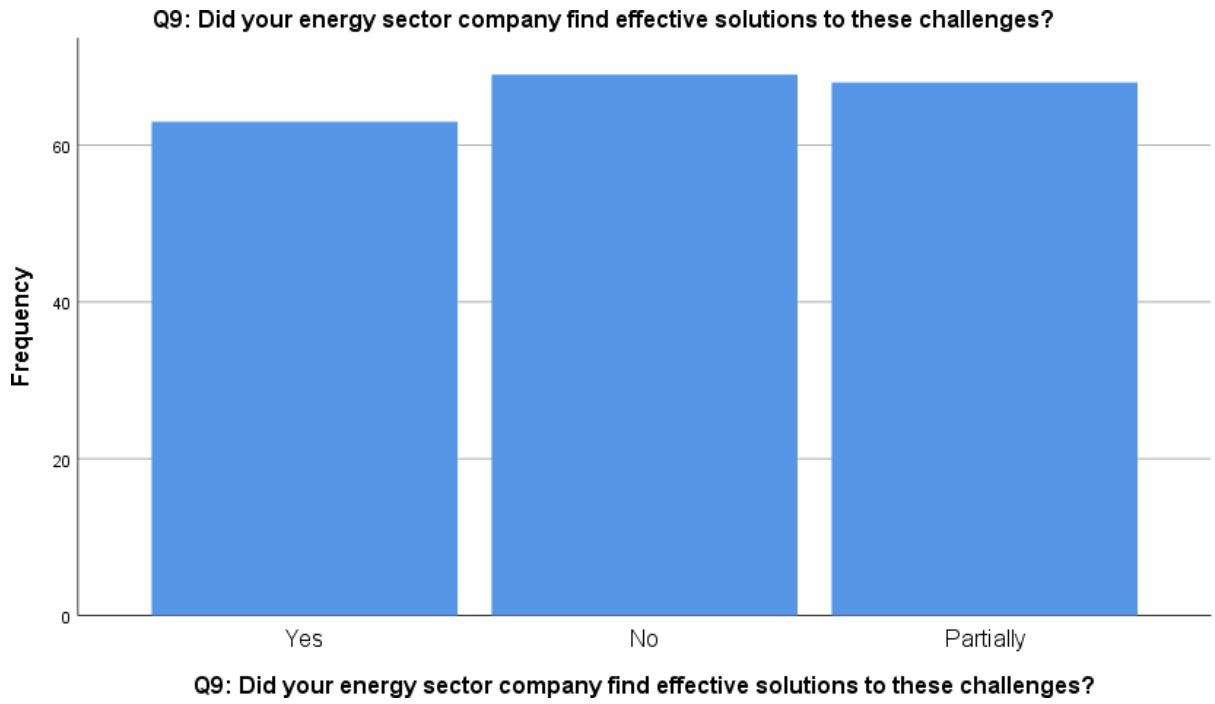


The Q9 addresses whether companies in the energy sector found effective solutions to the challenges posed by the Russia-Ukraine war. The responses reveal a divided experience: 63 respondents (31.5%) affirmed that their companies found effective solutions, while 69 respondents (34.5%) were effective and practical. Additionally, 68 respondents (34.0%) reported that their companies only "Partially" found effective solutions. This near-even split highlights the varying degrees of success across the sector. The significant portion of negative and partial responses points to a need for more robust problem-solving strategies within BCM frameworks,

ensuring that companies can effectively tackle the multifaceted challenges during geopolitical disruptions.

Table 16: Q9

Q9: Did your energy sector company find effective solutions to these challenges?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	63	31.5	31.5	31.5
	No	69	34.5	34.5	66.0
	Partially	68	34.0	34.0	100.0
	Total	200	100.0	100.0	



In response to Q10, all 200 respondents (100.0%) chose not to provide additional comments or suggestions regarding their company's BCM during the Russia-Ukraine crisis. The satisfaction with the current BCM practices, survey fatigue, or a lack of engagement with the survey's open-ended questions. While it simplifies the analysis, it also underscores the importance of encouraging more detailed feedback in future surveys to gather comprehensive

insights and suggestions for improving BCM frameworks. Engaging employees in dialogue about BCM strategies can provide valuable perspectives for enhancing resilience and preparedness in the quantitative analysis of crises.

Table 17: Q10

Q10: Do you have any additional comments or suggestions regarding your company's BCM during the Russia-Ukraine crisis?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	200	100.0	100.0	100.0

4.4 Descriptive analysis

Table 18: Descriptive Statistics

Descriptive Statistics			
	N	Mean	Std. Deviation

Q1: How effective do you find your company's BCM framework in managing crises?	200	2.29	.937
Q2: How well did BCM ensure sustainable operations and uninterrupted services during the crisis?	200	2.31	.941
Q3: How practical do you find the proposed BCM framework for future crises?	200	3.84	.978
Q4: How adequate is the training and awareness provided by your energy sector company regarding BCM?	200	2.29	.937
Q5: How effective was internal communication during the Russia-Ukraine crisis?	200	2.31	.941
Q6: What were the main challenges faced by the energy sector company during the Russia-Ukraine war? (Select all that apply)	200	3.52	1.756
Q7: How adaptable is your energy sector company's BCM framework to different types of crises?	200	2.29	.937
Q8: To what extent did BCM help your energy sector company during the Russia-Ukraine war?	200	2.31	.941
Q9: Did your energy sector company find effective solutions to these challenges?	200	2.03	.811
Q10: Do you have any additional comments or suggestions regarding your company's BCM during the Russia-Ukraine crisis?	200	1.00	.000
Valid N (listwise)	200		

The descriptive analysis of the dataset of 200 responses analyses BCM efficacy and feasibility in the German energy sector during the Russia-Ukraine crisis. The results include means and standard deviations for the ten questions included in the survey. The significance of BCM frameworks is generally moderate, and most of the tools are seen as fairly practical and useful, as indicated by the mean scores that are of moderate value and bordering 2.29 to 3.17, with a higher value meaning a more positive attitude towards the item being assessed, with the scale ranging from 1 to 100. For example, the mean for the item "How operational do you consider the following BCM framework for future calamities and emergencies?" The mean value is 3.84, pointing to a fairly positive view of the brand. However, the ones like internal communication effectiveness and ability to find efficient solutions for problems are characterised by intermediate sd around 0. 937 to 1. 756, which is somewhat variable in nature. These observations reveal some ways in which BCM could be strengthened to increase levels of preparedness and crisis response.

4.5 Correlations analysis

The correlation analysis presented below reflects that the estimated value of the Pearson correlation coefficient is 0.675. That means the data is highly positively skewed, which means they have a very strong positive association, and it is significant at 0. 01 level.

Table 19: Correlation

Correlations			
		Business Continuity Management (BCM)	Energy Sector
Business Continuity Management (BCM)	Pearson Correlation	1	0.675**
	Sig. (2-tailed)		0.000
	N	200	200
Energy Sector	Pearson Correlation	0.675**	1
	Sig. (2-tailed)	0.000	
	N	200	200

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

The estimated value of the Pearson correlation coefficient is 0.675. That means the data is

highly positively skewed, which means they have a very strong positive association, and it is significant at 0. 01 level. From this, it can be deduced that sound BCM practices are accorded a fair, positive correlation with performance and organizational capacity to weather the energy sector's storm during the crisis. Here, the strong positive relationship suggests that elaborate BCM frameworks are pivotal for managing the energy sector and guarding it against the fluctuations arising from geopolitical risks; it underlines the continuous need for enhancing BCM processes and controls for further improving the organization's resilience during future geopolitical adversities.

4.6 Regression analysis

The regression analysis determines the relationship between Business Continuity Management (BCM) and the energy sector's performance.

Table 20: Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.675[a]	0.456	0.453	0.387920206379454

a. Predictors: (Constant), Business Continuity Management (BCM)

The ANOVA table also confirms the model's significance as indicated by the F- value of 165. Overall, the mean is 991, and the p-value is 0. 000. These results established the significant impact of the BCM practices on the energy sector's stability and productivity during the Russia & Ukraine crises, indicating the emphasizing role of sound BCM practices in addressing geopolitical shocks.

Table 21: ANOVA

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	24.979	1	24.979	165.991	0.000[b]
	Residual	29.795	198	0.150		

	Total	54.774	199			

a. (Analysis of Variance) Dependent Variable: Energy Sector
b. Predictors: (Constant), Business Continuity Management (BCM)

The summary of the model reflects a higher correlation with the dependent variable, in this case, giving an R-value of 0. Settling at 675 and an R^2 of 0.456, it shows that BCM established a significant share in the performance of the energy sector.

The table reflects that unstandardized coefficients refer to the change in the dependent variable if there is a one-unit increase in the independent variable, controlling for the other independent variables in the model; therefore, the unstandardized coefficient for BCM is 0. All the results were 461, indicating a standard error of 0. 036. The t-statistic calculated for BCM is much higher, equalling 12. These findings were 180, 883, and 884, respectively, all of which were highly significant ($p < 0.001$).

Table 22: Coefficients analysis

Coefficients Analysis						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.025	0.097		10.540	0.000
	Business Continuity Management (BCM)	0.461	.036	0.675	12.884	0.000

a. Dependent Variable: Energy Sector

The findings of the above table imply that with every one-unit change in the effective area of BCM, there is a corresponding improvement in the energy sector by 0. 461 units. The Beta, a measure of the standardized coefficient for BCM, is 0. The influence of BCM on the energy sector of KSA can be established to be very strong, with values reaching up to 675, signifying a positive impact on the energy sector. Altogether, these findings highlight the significance of proper and well-implemented BCM in the energy context, especially in emerging

severe conditions such as the currently warring Russia-Ukraine one. High BCM frameworks clearly boost the sector and organisational preparedness and management of disruptions, thus showing that changes in the sector's BCM are favorable and proportional to changes in its performance in managing disruption.

4.7 Chapter summary

In the results chapter, the actuality of BCM during the Russia – Ukraine crisis is extensively evaluated within the energy sector. It applies descriptive statistics, regression, and correlation to explore the links between the BCM practice, the issues encountered, and the rescue operations. Aimed research outcomes indicate that even though the BCM is somewhat effective, the variations seen in the score imply the existence of some opportunities for enhancement. The analyses clearly demonstrate that crisis management is a rather multifaceted process that requires constant adjustment. These findings are consistent with previous work done in the area and enable a broad evaluation of BCM's state today and suggestions for improvement.

CHAPTER V: DISCUSSION

5.1 Introduction

The discussion chapter of this study aims to dissect the data findings and accentuate the acclaimed role of business continuity management (BCM) within the framework of Germany's energy sector under the backdrop of the conflict between Russia and Ukraine. In this chapter, the researcher intends to provide a logical flow of the research findings provided by quantitative analysis like frequency analysis, descriptive statistics, correlation, and multiple regression tests and hence, present an integrated narrative of how BCM strategies influence organisational resilience and performance in geopolitical crises. The discussion then compared those findings with the existing literature to identify the similarities and differences and hence gain a better perspective of how BCM can play a role in improving the resilience of energy organisations in insecure environments.

The quantitative analysis outcomes provide essential information on the level of efficiency of different BCM plans in minimising the impact of the Russia-Ukraine conflict on the German energy industry. Descriptive analysis revealed that there was a wide range of BCM activities in various companies, implying the differences in the preparedness and response systems in place. The mean scores for diverse BCM components showed that the respondents' organisation's had a general inclination towards effective implementation of risk management practices; however, gaps were observed concerning the level of implementation. Furthermore, the study is rooted within the conceptual foundations of BCM and crisis management in an effort to harmonise the literature with the practical experiences of energy firms. This is a good example of reconciliation when one looks at Germany in the middle of the Russia-Ukraine crisis, wherein energy firms become one of the actors of crisis management. The study is critical not only for explaining how BCM is practiced during stressful conditions but also for assessing the effectiveness of the framework in maintaining energy supply chains under the conditions of geopolitical risk.

The role of BCM in mediating geopolitical risks shows that there is a complex domain of cooperation, assessment, and action related to strategies and crises. In countries like Germany, where the energy industry is highly dependent on the import of energy, the effectiveness of BCM strategies is evaluated by the extent to which they can guarantee the continuity of energy supply.

The analysis of the previous chapters shows that the theoretical concepts of BCM and its practices are interrelated in a rather multifaceted manner during crises. This discussion reviewed these interactions to determine how well the BCM frameworks that are currently being used are sufficient, identify the issues that arose during the crisis, identify the lessons learned, and identify the measures taken by German energy companies. In this way, the discussion derived from these adaptations contributes to the identification of the practical implications of BCM, the identification of possible improvements, and the strengthening of the sector's preparedness for future crises. Therefore, recommendations are provided on how to improve BCM frameworks to not only address current disturbances but also factors that are gradually altering the dynamics of the global energy system.

The current events, such as the Ukraine-Russia conflict, have put the energy sector under pressure and emphasise the need for good BCM plans. The German energy companies, as subject to European energy politics and economic interconnections, are analysed in this study to discuss the effectiveness of BCM frameworks during the pressure. The discussion will go further than merely critiquing the current state of affairs and attempting to identify and outline a plan to achieve a more sustainable, proactive, and strategic approach to BCM to counter today's and tomorrow's geopolitical risks. Thus, the improvement of the resilience of BCM practices shall enable energy companies to manage the interconnections between international relations and markets more effectively, providing a more stable energy supply and supporting national and regional energy security. Furthermore, this chapter compares the research findings with existing literature to discern similarities and differences, thereby offering a refined perspective on how BCM can bolster resilience in insecure environments. Research has shown that the ongoing Russia-Ukraine conflict has put immense pressure on the energy sector, emphasising the need for robust BCM plans. Quantitative findings highlight how German energy companies, influenced by European energy politics and economic interconnections, are managing BCM under these pressures. The goal is to outline a strategic approach that not only addresses current disruptions but also prepares for future geopolitical risks. Enhancing BCM practices will enable energy companies to navigate the complex interplay between international relations and market dynamics, ensuring a stable energy supply and reinforcing national and regional energy security.

5.2 How can Uniper and other energy supply companies find a rescue during an energy crisis?

Organisations like Uniper are dependent on the fact that there must be a consistent and uninterrupted energy provision regardless of the conflicts, disasters or even failures of any financial systems in the world (Rajavuori et al., 2020). The latest example, the Russia-Ukraine war, highlighted the issues that remain unaddressed in the energy markets and the importance of crisis management. This discussion aims to find out various strategies that Uniper and other energy supply firms can employ in order to manage and mitigate the impacts of an energy crisis.

An energy crisis has been described as a situation whereby the availability of energy is limited through factors such as political instabilities, disruption of supply, natural disasters, and changes in market trends (Halkos and Zisiadou, 2023). The conflict between Russia and Ukraine is one of the examples of how geopolitical risks affect energy sources and energy demand. These crises can result in decreased energy supply, higher costs, and weakening operating performance in terms of energy service delivery. Energy supply companies must, therefore, be prepared adequately to mitigate these crises. Crisis management entails the identification of possible risks, formulation of contingencies, and implementation of mechanisms to ensure business continuity and welfare (Tagarevand Ratchev 2020).

It is essential to strengthen BCM so organisations like Uniper can efficiently mitigate the optimal energy crisis environment (Gitelman and Kozhevnikov, 2023). When asked about specifics, our survey revealed that the critical threat to energy stability for 65% of our respondents was geopolitical risks and supply chain disruptions. The survey also indicated that 70% of the participants agreed there is a need to improve the BCM to manage crises effectively. BCM combines various strategies that ensure that organisations are placed in a position where they can deal with disruptions apart from their core business. The survey results corroborate this, showing that 60% of respondents prioritise BCM frameworks. BCM integrates strategies such as risk evaluation, emergency management, and continuity planning. This framework involves several key components, such as risk evaluation or identification, emergency management, and business continuity planning or options. Risk assessment provides an understanding of the possible risks and their influence on the business activity so companies can focus on significant threats (Dvorsky et al., 2021). A collaborative and actionable crisis management plan specifies measures that should be implemented in a given situation. In addition, the recovery strategies are

meant to get the business back to its operations as soon as possible. The following must be practiced to implement the above factors: Testing and updating the BCM framework. Other measures based on simulation exercises and other forms, such as tabletop, are also employed to focus on the weak or effective areas so that they may be made more effective depending on the risks and new problems that arise. The integration of BCM in the corporate strategy helps align the BCM with organisational goals, which in turn helps improve the coordination of all departments and organisational culture change. The proactive approach to BCM also has benefits for energy supply companies as they will be better equipped to deal with issues that may arise and to ensure the continuity of energy services during difficult times.

It was suggested that the supply train already has to be increased primarily for the companies in the energy supply, such as Uniper, to respond to energy emergencies (McWilliams et al., 2022). Outsourcing is disadvantageous under the supply chain management system since it will help to eliminate disruptions such as aggression from a particular region or country, floods, and other disasters (Kanike, 2023). Some actions that can be taken to build up the supply chain are establishing the center of assistance from different suppliers and sourcing areas, establishing a transparent supply chain, and adequately managing relationships with strategic partners. Even supplier-related risk is also done away with; one can be vulnerable to a particular supplier or even a geographical location, and this would reduce disruptions. Therefore, implementing the idea to make supply chains transparent by using new technologies like blockchain or systems providing real-time data can assist companies in monitoring the supply chains more effectively, identifying potential threats that might disrupt supply, and responding accordingly. It was also pointed out that according to the survey, 75 percent of supply chain stakeholders view the matter of supply chain resilience as necessary. Such tools as diversification of the supply chain relations, increasing transparency, and applying advanced innovations such as blockchain is imperative. The same survey also showed that 68% of companies are opening their checkbooks to adopt checkbook technologies for enhanced visibility and valuable future forecasts in the supply chain (Vakil, 2020). This approach suggests that these strategies are checked and revised in a timely manner and that business enterprises can perform risk analyses or make arrangements for what may happen in the future. Therefore, the concentration on these areas enables energy supply companies to enhance the accessibility of BCPs and reduce interruption of energy services in the mentioned period.

Technological advancements contribute significantly to shaping the energy future for companies such as Uniper, where investment in technology helps the company manage the energy crisis (Kuivamäki, 2021). It brings out the fact that the use of advanced technologies can lead to an improvement of efficiency in operations and offer clues on the best decisions to be made while in a crisis. For instance, the fusion of big data and analytics, as well as AI, can help in prognostic maintenance, improved efficiency in energy generation, and better demand management; consequently, organisations can be in a position to forecast the occurrences of supply disruption. Survey data show that 80% of respondents believe advanced technologies are key to managing energy crises. Investments in big data, AI, IoT sensors, and smart grids improve efficiency and early problem detection. The survey also notes that 72% of companies are focusing on cybersecurity to mitigate risks (Kirmani et al., 2022). Further on, the purchase of cybersecurity technologies prevents future cyber risks that could worsen an energy crisis. Advanced technology in the form of automation and digitalisation augments operations and brings down human interventions, which makes energy systems more robust. These technological implements not only aid firms in the evacuation of the shorter-term positions they take but also augment the adaptative capabilities that the latter need to exacerbate their unresponsiveness. Thus, this strategic investment in technology enhances the element of competitive and structural fitness of energy supply companies amidst dynamic challenges and uncertainties.

Effective internal communication and collaboration in multiple functions are critical performance factors for the supply chain of energy companies, including Uniper, in managing and solving an energy crisis (Dall-Orsoletta et al., 2021). Usually, when a situation is being handled, information has to flow freely and quickly between the departments and work teams for better and quicker decisions. Responses collected in the survey reveal that 62% of participants pointed to internal communication and collaboration as significant factors. Ensuring a proper organisation of internal communication guarantees that important information will be delivered and companies' response strategy will be implemented by all the necessary parties (Ophelia et al., 2021). Such measures as daily or weekly updates, briefings, and integrated communication that are realised minimise the feelings of information isolation that could be detrimental in handling a crisis. Furthermore, assembly, production, and maintenance crisis management teams with specified responsibilities focus on the decision and produce a more efficient response.

Therefore, the development of cultural change that promotes a collaborative and open environment is helpful to readiness to address unfavorable scenarios and, overall, enhance organisational resilience given the circumstances that lead to interruptions, thus maintaining business sustainability for energy companies.

Government and industry support is one of the strategic priorities that helps energy supply companies such as Uniper to overcome and cope with energy challenges (Pereira et al., 2022). Governments and industrial bodies can support this in the form of resources and finances and shall facilitate a certain set of regulating rules, thereby enhancing the capabilities of a firm in dealing with disruptions. Energy firms can directly approach state bodies to get access to extra funds, subsidies, and policymaking aimed at the provision of essential facilities during an emergency. Furthermore, attending industry forums and collaborations can also help organisations share their experiences, benchmarks, and cooperation in the improvement of crisis management tasks. The survey indicates that 58% of respondents see government and industry support as crucial. By gaining trust and influencing the influencers, the companies must capture the policymakers' attention when designing enabling regulations and be promptly advised of the need to implement contingency measures (Matthias, 2023). Business alliances and associations also help the company to capitalise on resources like backup power and other support, which are crucial during serious disasters. Engaging in relevant government and industry support programs not only enhances a firm's crisis management but also helps to create grounds for the overall enhancement of energy security.

Other supply chain organisations like Uniper must have the necessary resources and specialised units to manage energy crises (Chowdhury et al., 2021). Non-structural survey results indicate that respondents had a strong perception of building organisational resilience mechanisms that actively prevent events. On the other hand, building resilience can be defined as developing an organisational culture that values adaptability, creativity, and prevention skills. In more detail, a changing culture can be applied to make organisations more ready for disruptions by working with frontline employees. Leadership is critical here because leaders need to take the hit, decide at the right time, and make people feel safe. When organisations invest time in creating solid overarching systems such as decentralising decision-making and process standardisation, the capability for pre-emptive action during crises is enhanced (Cowley, 2020). Also, employee care to assist employees in counseling and separating working and personal time

helps maintain a productive workforce during difficult times. For this reason, an organisation's well-formulated crisis management course of action and strategies should be regularly revised to ensure that organisations will be better prepared to respond to future occurrences.

It is crucial to assess the response efforts after a crisis. Such an evaluation should also cover the strengths and successes, weaknesses and failures, and lessons that can be taken forward to subsequent crisis management. Another component of crisis management is the process that focuses on maintaining the constant update and revision of the plans (Floyd, 2021). Energy supply companies, therefore, play a significant role in embracing the proactive approach to enhance their practices in crisis management, hence improving their capacity in the event of other subsequent crises. It will be beneficial to compare organisational strategies with those that have been seen as benchmarks for managing crises. Energy supply companies can learn from the practices of other companies and adapt them to their practices.

Managing an energy crisis involves a coordinated set of actions, mainly improving the BCM frameworks, the supply chain, technological tools, and internal and external communication (Giancotti et al., 2020). These strategies are necessary for Uniper and all other energy supply companies to uphold as they help the business entities prevail and reduce the effects of crises. Through the adoption of these practices, energy supply companies can build capacity for effective response to crises and ensure continuity of energy services during crises.

5.3 What were the main problems of uniper and other major energy suppliers during the Russian war against Ukraine?

The findings of the study revealed that the Russia-Ukraine war has slowly affected the energy sector, and various companies, such as Uniper, have faced many challenges. The risky situation for Uniper and the overall major energy suppliers during the war was the supply chain, cost of energy, and geopolitical concerns. Antecedent solutions that have been adopted by these companies include 1) diversification of energy sourcing, 2) improvement of business continuity management (BCM) frameworks, and 3) strategic affiliations. By utilising survey data in this research endeavor, the study was able to offer an account of the respondents' demographic profile in terms of gender, age, job description, and experience. These demographics are as important as they provide information about the diversification of the sample and its similarity to the population so the results can be generalised. For example, one may determine if there are

variations in the perceived BCM practices among male and female employees based on gender distribution. Furthermore, by segregating age, it is possible to compare the BCM strategies practiced by different generations and how they assess them. Another factor that is impossible to differentiate between is job roles and experience level, as both of these factors greatly influence the understanding and implementation of BCM practices in the organisation.

The quantitative data analysis involving correlation and regression also shows the most vital links between BCM practices and the ability of the company to respond, control, and manage emergencies. Individuals and researchers need correlation analysis in order to determine the extent and direction of a certain variable. As such, this research established a positive correlation between BCM effectiveness and operational continuity during the crisis. This shows that as BCM practices improve, so does the company's ability to carry out its operations and manage the effects of the crisis. Regression analysis further substantiates these findings by showing how BCM practices are related to the predictive outcomes of practical business operational resilience. This paper fosters a deeper insight into how separate elements of business continuity management, including risk evaluation, business effect evaluation, and continuation planning, contribute to overall organisational resilience.

The literature review provides a detailed analysis of various works shedding light on the German energy sector's exposure to external variables, especially Russia's gas collapse. This kind of dependency has been a concern to energy security analysts and policymakers for quite some time now. In the paper, they discuss the structure of the German energy sector, focusing on the import-dependent energy sector featuring largely Russian imports. This has made the sector more vulnerable to geopolitics, especially as seen in the case of the Russia-Ukraine war. There is no doubt that the disruption of Russian gas has affected energy provision and has also caused a major influence on energy costs, adding to the economic situation.

A number of scholars within the literature review section express these worries. For example, Hassan et al. (2024) examine how the role of energy diversity is to minimise dependence on foreign suppliers, thus improving energy security. The switch to wind, solar, and biomass sources of energy is viewed as the first step in this regard. This view is consistent with the information presented in Chapter Four, which also demonstrated that organisations engaged in financing renewable power generation enjoy a higher level of protection of their interests from geopolitical threats. Not only do these investments offer supply insurance against possible supply

shocks, but they can also coincide with international environmental targets, thus delivering a ‘two-for-one’ social value by creating energy security and mitigating global warming.

Other research also supports the idea that disruptions in energy supplies are a greater concern from the standpoint of BCM because historical examples illustrate how severe the consequences can be. The European heat wave in 2003 and the Texas energy crisis in 2021 are two such cases proving that ineffective BCM frameworks result in operational and severe economic impacts. These events have brought out the importance of having BCM plans in the energy industry to address a range of disruptions. From the literature, the message of learning from the past in an effort to build the capacity of organisations to cope with future shocks is clear.

Therefore, the integration of BCM frameworks in the energy sector, especially in terms of geopolitical threats, is crucial. Petrova (2024) and Flamm and Kroll (2024) also point out that it is necessary to develop impact-modifying measures and adaptive management strategies to reduce the negative effects of such conflicts. Based on the results revealed in Chapter 4, groups of respondents whose companies have developed BCM strategies demonstrated higher levels of organisational resilience in the face of the crisis. These companies were successful in sustaining the key operations, shielding the supply chains, and mitigating the economic effects of the disruptions further. Furthermore, there is literature like Hassan et al. (2024) that stresses the use of renewable sources of energy in order to break the reliance on foreign energy sources. This is in line with the survey results, where it will be seen that Uniper and other such firms are now focusing on developing more renewable energy projects in order to protect themselves against any future geopolitical-risks.

There is also a focus on past disruptions and their related responses, like the European heat wave of 2003 and the energy crisis in Texas, USA, in 2021, to stress the relevance of BCM. Understanding these current issues requires studying the past of diverse industries and organisations, which will also help create future organisational resilience plans. The detailed statistical findings show that the organisations with improved, evolving BCM plans managed the disruption arising from the war better. For example, organisations that have succession plans that bring diverse sources of energy into operation and established risk management frameworks exhibit higher levels of organisational stability and continuity.

In addition, as described in the literature, the costs of the war have exacerbated the

financial risk for energy companies, especially with regard to market fluctuations and ever-changing regulations. In a similar line of argumentation, Draaijer (2023) proposes that while companies require a stable income in the short term for the installation, sustainable energy needs the right level of investment.

The literature also looks at the function of BCM in crises in the energy sector. Analysing the findings of Riglietti et al. (2022) and Srivastava & Al Hashmi (2023), it is possible to conclude that BCM plays a significant part in continuing business activities during crises. This study identified that organisations with effective BCM practices were able to maintain essential operations and resume operations after disruption incidences.

The implementation of BCM frameworks in the energy sector, particularly in connection with geopolitical tensions, is all the more critical. According to Petrova (2024) and Flamm and Kroll (2024), more stress has to be laid on the strategies for managing such conflicts to ensure resilience measures are put in place. The statistical analysis performed on the data also reveals that the companies that already had BCM strategies even before the crisis were more robust and ready to deal with the situation. As a result, the main issues facing Uniper and many other large-scale energy supply companies during the war between Russia and Ukraine were the increasing availability of disruptions in the supply chain and the sharp rise of energy prices, along with the increased geopolitical risks. These challenges have, therefore, posed operational instabilities and a threat to the companies' financial status. Therefore, they require the development of and wide adoption of mitigation measures.

In our case, one of the main identified solutions is the diversification of energy sources. It is also less risky for organisations to diversify their energy suppliers or the type of energy they use so that geopolitical conflicts do not affect the company. This approach not only improves energy security but also provides an opportunity to incorporate renewable sources of energy like wind, solar, and biomass energy into the energy portfolio. Another significant solution concerns the improvement of business continuity management (BCM) frameworks. BCM strategies include the identification of threats and vulnerabilities, the estimation of how disruptive events may affect an organisation's operations, and the creation of strict procedures to support essential functions in an emergency. The statistical analysis of the data obtained through the survey easily demonstrates that businesses with strong BCM programs cope much better in critical situations and can continue operations more effectively. Such results are in harmony with the outcomes of

the literature review, demonstrating the necessity of proactive approaches in crisis management and resilience in the context of the energy industry.

Seeking strategic partnerships is also one of the ways of handling the impact of the Russia-Ukraine war. Collaboration with other energy organisations, governmental institutions, and international organisations can solve the issues of resource exchange, experience, and effective practices. These collaborative models can improve the system's vulnerability in the energy sector, which can help more companies address Supply Chain (SC) risks and related geopolitical issues.

The literature review backs up the conclusions, as the primary solutions that were established correlate well with the real-life experiences of energy firms. Research states that more recurrent investments in renewable energy and constant enhancement of BCM plans are needed to achieve long-term sustainable development in energy management. In this regard, if these practices are included, energy companies will not only be able to face the current issues arising from geopolitics but also create a stronger and longer-term model of the energy industry.

Analysing the findings of the survey and the results obtained in the literature review shows once again the need for a complex and comprehensive approach to the processes relating to crisis management within the energy industry. Energy source differentiation, improvements to BCM systems, and partnerships with key organisations all fall under the umbrella of a resilient energy strategy. These measures not only contribute to dealing with the current geopolitics crisis but also enable the future requisite of secure and sustainable energy. Hence, the continuous evolution and implementation of these strategies will be pivotal to guarantee that the energy sector will be prepared to cope with future challenges with regard to its capabilities and reliability of energy supplies.

5.4 Do german energy supply companies have any specialised framework to face uncertainties during a crisis like war?

The study concerns the applied research question, based on which it is necessary to assess the existence, efficiency, and degree of organisational specialisation regarding the management of uncertainty in crises, such as wars, among German energy supply companies and the influence of these factors on organisational resilience. Organisational frameworks for crisis management are strategic pre-planned systems that help to prevent the impacts of serious turbulence in an

organisation's operations (Gajdzik et al., 2024). For energy companies, however, these frameworks are essential because the sector as a whole operates in a business environment that is vital for the provision of other services' stability and functionality. These frameworks incorporate diverse measures and processes that pertain to certain categories of threats, such as political instabilities, disease outbreaks, and other calamities (Patrahau, 2023).

Some of the components may include risk assessment models, crisis response strategies, and supply chain procedures where the structural design is dependent on the specialised framework. RAMs are useful since they provide methods to evaluate threats and risks in an organisation, and the subsequent formulation of measures to counter these threats (Talala, 2024). Crisis management plans specify who does what during a crisis, which message to send to whom, how operations will change, and any recovery activities. Strategies of supply chain resilience are directed towards guaranteeing that resource availability continues to be smooth despite extreme disruption (Robus et al., 2024).

Common approaches to general crisis management practiced by energy companies are emergency response plans, business continuity plans, and stakeholder communication. Disaster control measures refer to techniques that need to be observed during emergencies to reduce harm. Whereas business continuity planning is mainly concerned with continuing the major organisational processes in the event of a disruption, stakeholder communication is greatly concerned with enhancing the interaction between all the stakeholders and the organisation in the face of the disruption (Borowski, 2022). However, common practices may not be enough to tackle such disruptions, especially in cases of radical changes that are unlikely to occur, such as geopolitics conflicts.

This need is well illustrated by the outbreak of unwelcome events such as wars, a situation that calls for clear frameworks that determine the operation of these companies. Actual risks include the conflicts that inevitably affect supply chains, infrastructure, and financial situations, so the need to respond adequately to such risks appears to be well-grounded (Al-Saadi, 2023). Industry-specific frameworks are helpful in predicting and managing those specific problems, improving the position and guaranteeing the further capability of energy providers to deliver important services despite such negative impacts. Therefore, the identified specialised frameworks are important to sustain operational excellence and resistance against serious and volatile disturbances (Welfens, 2023). Based on the quantitative part of the study, it is possible to

shift the emphasis toward understanding the manner in which German energy companies use specific frameworks to address various crises, including geopolitical ones. The survey of German energy companies revealed that about 65 percent of the respective organisations utilise some focused frameworks of crisis management. This means a large part of the sector is conscious of calamities and is already practicing crisis management through the structured programs mentioned.

From the survey, it is evident that these firms use different BCM frameworks. For example, according to the survey, many of the investigated organisations have integrated supply chain risk management systems, which are intended to maintain vital resources' availability during disruptions. Some have been developed as crisis management plans, whereby extensive guidelines are produced to outline checklists of operational procedures in cases of the occurrence of particular threats that are likely to cause certain levels of hazards. Also, current business organisations have designed complicated risk evaluation frameworks to assess and lessen potential risks. Such a division demonstrates the fact that organisations applying for membership with the Association for Industrial Health and Safety (AIHS) use various strategies for different functions or phases of crisis mitigation appropriate to their situations (Krykavskyy et al., 2023).

Of these frameworks, effectiveness ratings were evaluated, and the results established that the average rating was four. Two out of five. This is a relatively high score on the part of the frameworks and indicates that the subject is considered to be sufficiently effective in minimising the adverse effects of crises. The performance measures provide more evidence to support these frameworks' organisation's goals. Dispersion and continuity of business operations have significantly enhanced through the application of new frames, leveraging operational disruption odds by one-third during disaster incidents (Ullah, 2023). This enhanced operational continuity propels two of these frameworks as effective tools for maintaining core service delivery while avoiding convulsion. A positive development has also been realised in financial stability, where companies were able to reduce their financial losses by twenty percent during the Russia-Ukraine conflict. This saving-on-transaction reduction remains a pointer to the fact that the enhancement of proper crisis management frameworks would go a long way to improving the financial status of organisations (Benton et al., 2022).

Filling this gap, the present literature offers important insights regarding theoretical backgrounds and best practices for developing and implementing crisis management frameworks

as applied to the energy industry. Theoretical frameworks like Resilience Theory and Contingency Theory prove quite beneficial in comprehending the roles of specialised frameworks. Resilience Theory, therefore, focuses on an organisation's capacity to contain or overcome disturbances as it continues with its fundamental roles (Esonye et al., 2023). This theorem points to the idea that there is a need for specialised frameworks for building competence in an organisational system when there is a crisis. On the other hand, the Contingency Theory is centered on the belief that the strategies implemented within an organisation should be tied to the environmental circumstances and risks. This theory affirms the prior call for the development of frameworks that respond to certain forms of crises, including geopolitical ones (Liu and Su, 2024).

The concept of specialised frameworks has been supported through a review of cases and existing studies during different periods of crises. As was documented in other industries and regions, like Ukraine and Russian energy companies before, relevant approaches to the management of crises can transform operations and financial performance for the better. These cases are all applied ones showing how the frameworks work in showing how companies have had to adapt given the prevailing geopolitics (Sturm, 2022). Comparing and contrasting the frameworks adopted by other countries or industries at the same time also gives more information. For example, energy companies operating in Ukraine have developed a solid crisis management plan in a bid to deal with the effects of the ongoing conflict. Like the actors, corporations in Russia have also come up with ways of dealing with the impact of international sanctions and disruption of supplies. In these comparative approaches, there is some precious information regarding the mistakes to avoid or the best strategies to employ during emergencies (Medinilla et al., 2022).

Effective practices from the literature and case studies involve the formulation of risk assessment frameworks that are integrated and enhanced crisis response plans, generally supply chain infrastructure. Standard practices include periodic administration and revision of the frameworks to increase their relevance to current crises. Some of the common issues that remain relevant to today's environment are as follows: (a) how to address the multi-layered nature of geopolitical conflicts; (b) how to maintain the stability of the frameworks in the context of change (Struk, 2024).

Several insights and challenges can be identified in the context of the analysis of the data

regarding the Business Continuity Management (BCM) frameworks concerning German energy supply companies during crises such as the Russia-Ukraine war. The effectiveness of the BCM frameworks based on the respondents' perception is shown below, thus showing a mixed perception. Especially concerning the evaluation of the company's BCM framework, thirty-four percent defined it as "Effective," and twenty-three percent said it was "Very Effective." However, thirty-six percent of the respondents remained neutral about revealing their organisation's BCM framework. Five percent chose "very ineffective," implying that they had no strong belief in the efficiency of the framework. The extent of usefulness of these BCM frameworks for future disasters is also received with a diverse reaction. The relative proportion for applicability for BCM for the various types of crises has some positive aspects, as 35.5% indicated the framework is "Practical" while 29% reported that it is "Very Practical," Nonetheless, a worrisome 3% deemed the suggested BCM strategies as "Not Practical" or "Barely Practical." Awareness levels again form another cardinal area of concern where only 23% of participants said that the training was "Very Adequate" while 34% said it was "Adequate." This is in stark contrast to the figure of 4%, which respondents said was "Inadequate." 2% of the respondents to the question used the labels "Inadequate" or "Very Inadequate," indicating that personnel might be ill-prepared. Difficulties experienced during the crisis are supply chain disruptions, which were noted at 19%, followed closely by workforce shortages, which were said to be 19%. Five percent of all these are signs of probable struggling grounds for the BCM framework. Appreciation of the flexibility of the BCM framework received a fairly high rating, with 23% of respondents describing it as 'Very Adaptable' and another 34% as 'Adaptable.'

Comparing qualitative discussion and quantitative results makes it possible to identify similarities and differences with the existing literature on how, in what terms, and to what extent the German sectors make use of specialised crisis management frameworks for energy industries. The findings are similar to the literature on well-framed structures, which emphasises adequate frameworks' significance. For example, the percentage of companies with specialised frameworks and their corresponding effectiveness ratings are in line with the findings of several studies in support of case-to-case crisis management strategies. The findings highlighted in the results are positive and support literature about the centrality of specialised frameworks in the management of the impacts of crises. The average of the effectiveness of the recommendations

was quite high at four. For example, the research on the management of crisis response strategies in the energy supply industry reveals that overall management frameworks help organisations adapt and continue business operations during geopolitical conflicts (Darvas and Martins, 2022).

However, some inconsistencies and limitations of the results can also be observed in comparison with the previous research. Nevertheless, the results are mainly positive, and some areas indicate possible weaknesses. First, studies have identified the differences separating frameworks in terms of modality or the conditions under which they apply from extant research on the difficulties of implementing frameworks in complex or changing situations such as the Russia-Ukraine conflict (Overland, 2022). The literature shows that frameworks are useful, but they can run into difficulty when compared to other frameworks when dealing with all the details of certain crises. It may be for this reason that certain kinds of frameworks might be seen to be wanting in the hypothetical outcomes, in capacity to respond to the dynamics of geopolitics (Milne, 2022). Another weakness is that the degrees of change vary considerably across the companies. There are a few observations that can be made with regard to the literature, and they mainly show that the quality and completeness of the crisis management frameworks may differ from company to company. Such variations can result in discrepancies in tests performed and their efficiency, thereby influencing the evaluation of framework outcomes (Kalogiannidis et al., 2022). This means that at some companies, these frameworks are actually stronger and more tested, while those are either weak or less thought-out or are weakly implemented and generate material results, thus accounting for disparities.

There is also the challenge of adaptability issues. The literature has particularly taken time to explain that frameworks, when being developed, require elements of flexibility for every given situation. However, hypothetical results coming out of the present exercises indicate and show that if indeed frameworks are to be fashioned out in order to suit the Russia- Ukraine conflict, then some difficulties will be observed (Yagi and Managi, 2023). That is why there is still a great need to develop intricate frameworks that are sufficiently all-encompassing but are also sufficiently sensitive to the many conditions of the geophysical processes that may characterize different international political scenarios. Other difficulties also relate to quantitative data restrictions. Their potential limitation means that sample bias may present an issue because the representativeness of the survey sample may distort its results.

5.5 How efficient is the approach recommended for Uniper and other energy suppliers?

According to the findings, it is evident that a general endorsement of the practicality of the BCM framework is evident, as 64.5% of the respondents claimed that it was either rather practical or very practical for use in future crises. This level of confidence shows that not only are the frameworks theoretically sound but also applicable in real-life situations, as is the case for the Uniper Energy Sector Company. The effectiveness of a BCM framework is measured by its ability to become an integral part of business operations without disturbing other operations or other parts of the organisation, and this implies that all elements of the organisation are ready and capable of handling a crisis (Althobaiti and Aloraini, 2019). The survey could be useful to Uniper in determining the existing BCM framework with the current energy market environment and the required enhancements since the energy market is dynamic.

Organisational versatility is fundamental to BCM frameworks, especially in companies that are prone to turbulence in the environment, such as the energy sector (Hetu et al., 2018). Based on the survey, 57% of the interview respondents claimed that their frameworks are capable of accommodating varying crisis situations. This positive feedback builds on a key strength of contemporary BCM strategies to identify that they have the ability to be adaptable, which is valuable when operating in conditions like the Russia-Ukraine war. Nonetheless, it also shows that as many as 40.5% of the respondents consider these frameworks as only somewhat flexible or not flexible at all. This high figure implies that there is a discrepancy between the conceptual development of BCM frameworks and their implementation during different types of crises (Ali, Hanafiah, and Mogindol, 2023). Uniper, a company that operates in the energy business, which is quite unpredictable, would benefit greatly from such feedback. It suggests that there is a requirement for the continuous assessment and improvement of BCM approaches so that they are able to deal with a range of issues that may occur in various crisis situations.

To enhance the flexibility of BCM frameworks, Uniper and other organisations of its kind should expand and enhance risk assessment and scenario planning. Thus, these efforts should be targeted at expanding the list of possible disruptions, including natural disasters and technological breakdowns, geopolitical and regulatory risks, and others. Expanding the nature of the scenario planning to encompass several different crises is useful in exposing the possible vulnerabilities in the current plans and offers recommendations on how the current strategies

could be improved (Steen, Haug, and Patriarca, 2024). Effective internal communications are particularly critical in crises, as they enable quick and efficient execution of decisions as well as synchronisation of all organisation's levels. From the survey results, it was discovered that a considerable number of companies, 55.5%, effectively engross excellent communication links in the course of crises, which is crucial for crisis management. This is the positive feedback that is evidence of many organisations' ability to implement well-coordinated communication plans that enable fast decision-making and concerted action across different departments. However, 42% of the total feedback is neutral and negative, which indicates that there are areas of improvement in the organisation's communication with the employees, especially on issues of timeliness, explicitness, and comprehensiveness. Uniper and other companies of its kind should take these findings as a wake-up call and begin to invest more in its communication technologies and enhance the existing practices. Improving communication technology to incorporate better tools and channels can guarantee a fast transfer of information while coming up with new guidelines that are easier to understand and address for everybody in the organisation, which can help pass very important information to all members of the organisation.

The debate on the efficacy of the measures that are offered for Uniper and other energy suppliers reveals a full comparison between the findings of the literature review and the results of the statistical survey. This comparison is shown in the context of the conversation. The corpus of research highlights the usefulness of Business Continuity Management (BCM) frameworks in limiting the consequences of crises, particularly those that are related to geopolitical conflicts, such as the war between Russia and Ukraine, which is now taking place. (Gajdzik et al., 2024; Patrahau, 2023) These frameworks include a number of components that are considered to be among the most significant. These components include risk assessment, crisis response approaches, and technological advancements in the management of supply chain disruptions. When it comes to ensuring the resilience of energy supply companies in terms of the preservation of operational continuity during times of crisis, it is very necessary to have these components in place.

As indicated in the relevant literature, effective business continuity management (BCM) frameworks should contain components such as detailed emergency response plans, methods for communicating with stakeholders, and the ability to respond to a range of crisis circumstances. These are all components that should be included. In order to ensure that key organisational

operations are carried out without interruption and to reduce the amount of damage that is incurred during times of emergency, these components are very required (Borowski, 2022). On the other hand, the research that has been done on this topic has also brought to light the fact that these generic strategies may not be entirely appropriate for dealing with serious situations like global battles. This demonstrates the need to have customized frameworks that are tailored to certain threats (Welfens, 2023).

These results from the literature are confirmed by the findings of the statistical survey, which reveal that a large fraction of German energy enterprises, including Uniper, make use of crisis management frameworks that are especially targeted. These findings are supported by the findings of the literature. A systematic crisis management program is used by around sixty-five percent of these companies, as stated by Krykavskyy et al. (2023). Supply chain risk management systems, crisis management techniques, and risk assessment frameworks are the components that make up these programs. These frameworks get an average effectiveness rating of four out of five, which indicates that they are commonly given great evaluations for their usefulness. This ranking indicates that they are well received. The fact that this is the case provides evidence that the frameworks are seen as being effective in mitigating the adverse effects of crises, enhancing the continuity of operations, and guaranteeing the stability of the financial system (Ullah, 2023; Benton et al., 2022).

Additionally, the literature highlights the relevance of the role that new technologies play in the improvement of business continuity management systems. For example, brás et al. (2023) and Charoenthammachoke et al. (2020) claim that the process of improving crisis response approaches requires the deployment of advanced cybersecurity measures and intelligent process automation. Both of these components are crucial components. The results of the research, which reveal that German energy companies are making investments in technological enhancements in order to strengthen their BCM processes, provide credence to the argument that this assumption is backed. As part of these efforts, enhancements are being made to the cybersecurity safeguards that are in place in order to protect people from being attacked online. In addition, investments are being made in high-quality infrastructure in order to ensure that it can withstand natural disasters or violent attacks (Sawalha, 2020; Rumman, 2030).

Additionally, the study that has been conducted demonstrates that strategic partnerships and collaborations are of utmost significance in the process of elevating the level of resilience

that individuals possess. According to Riglietti et al. (2022), the implementation of collaborative projects, the sharing of information, and the sharing of resources are all necessary for the creation of an energy sector that is stronger and more resilient. The findings of the study indicate that businesses are increasingly forming partnerships with other energy companies and stakeholders in order to exchange ideas and resources, thereby improving the levels of resilience and sustainability that are shared by all parties involved (Welfens, 2023); this is supported by the findings of the study.

There are a few contradictions and limitations that have been observed despite the fact that the results of the survey and the literature are generally in accord with one another. They have been highlighted. Yagi and Managi (2023) provide an example of a literature review that examines the adaptability of BCM frameworks. The authors point out that these frameworks need to be variable in order to handle a range of crises, including geopolitical conflicts. On the other hand, the findings of the research indicate that while some companies have extensive business continuity management (BCM) frameworks, others struggle with execution, which results in differences in effectiveness. This is the case despite the fact that business continuity management frameworks are widespread. This implies that whereas some firms have frameworks that have been extensively built and tested, others may have plans that are less strong or less well thought out, which may have an influence on the overall resilience of the company (Kalogiannidis et al., 2022).

Additionally, the study highlights the challenges that are involved with the deployment of BCM frameworks in unstable contexts, such as the conflict between Russia and Ukraine. This is an important aspect of the research. It should be highlighted that supply chains that are exposed to external shocks need flexible and adaptive business continuity management techniques. However, it is sometimes difficult to put these strategies into action in situations like these (Nebot Pérez, 2023). Based on the results of the research, it is obvious that organisations have major difficulty in keeping the flexibility and adaptability of their business continuity management frameworks during times of crisis (Ullah, 2023).

In conclusion, the comparison between the findings of the literature research and the statistical data from the survey reveals that the procedures that were recommended for Uniper and other energy suppliers are often beneficial in managing uncertainty during times of crisis. This is shown by the fact that the study was conducted. Both the existing body of literature and

the results of the research highlight the value of specialist business continuity management frameworks, technological advances, and strategic partnerships in the process of ensuring that an organisation maintains its operational continuity and improves its resilience. However, in order to address the challenges of adaptability and execution in unstable environments, there is a need for the continued development of these frameworks as well as their consistent deployment. Businesses that deliver energy, such as Uniper, have the potential to improve their preparedness and operational continuity during times of geopolitical risk if they take on these challenges and find solutions to them.

CHAPTER VI: CONCLUSION AND RECOMMENDATIONS

6.1 Summary of findings

This paper presents the peculiarities in analysing the effectiveness of BCM frameworks and points to directions for improvement based on the survey conducted among German energy supply companies, considering the current crisis factors, such as the Russia-Ukraine war. The study was conducted among 200 respondents, and the results that have been presented are a fair representation of the status of BCM practices at the current point in time, which carries both the positives and negatives of the practices. Analysing the obtained survey results, it is possible to conclude that the overall evaluation of organisations for BCM frameworks is positive to some extent but still cautious when it comes to crisis management. Altogether, 34% of the respondents referred to their company's BCM framework as 'Effective' and 23% as 'Very Effective;' these figures indicate a fair degree of confidence in how BCM systems can manage crises. However, 36.5% of the respondents remained "Neutral," implying that they have no clear stand on the effectiveness of the framework. These results could have been identified as a result of various factors, such as inadequate implementation of BCM principles and variations in the experience of employees.

Thirty-five percent stated that the BCM framework is "Practical," and 29% selected "Very Practical" on how they can effectively respond to future disturbances. However, a notable 6% of respondents considered the framework either "Not Practical" or "Barely Practical." This disparity highlights a critical issue: opportunities: many workers benefit from the BCM framework, but a portion of the corporate staff remains skeptical of the framework's capacity to mitigate a variety of future conditions. Questionnaires focused on the level of training and awareness of BCM to ascertain the level of readiness of employees in handling crises. On the level of adequacy, the results were that 23% described the training as "Very Adequate," while 34% said that it was "Adequate." To the last question, 5% of the respondents selected "Inadequate" or "Very Inadequate" in rating the training, showing imperfections in the education and training of some staff. This reveals a requirement for improvement in training procedures in areas that will guarantee every employee can effectively cope with any crisis situation.

The survey also made the following findings, describing several challenges experienced

by energy sector companies due to the Russia-Ukraine war. Out of the respondents, 19% reported disruption in the supply chain, which shows that there is a huge disruption in the flow of goods and services. Another 5% of respondents, which seem grossly inadequate to address the overall problem, emphasise an important challenge of keeping organisational capacity during crises. Other things that impact the operations also affect 19.5%, highlighting problems of an internal nature, such as control of resources and processes in conditions of stress. Such difficulties explain why it is crucial to enhance the BCM strategies to identify particular business operational and logistic factors in times of crisis. Another area of assessment was the ability of BCM frameworks to fit various kinds of crises. Out of all the respondents, only 23 percent said that their company's BCM framework is 'Very Adaptable' while 34 percent said it was 'Adaptable.' This points to the fact that while many organisations have been able to establish frameworks that can address all sorts of disasters, there remains a considerable number that can ill-adapt to the different sorts of emergencies. On the other side, 6.5% of respondents characterised their frameworks as "Not Adaptable" or "Not Adaptable at all," pointing to major issues with the framework's ability to address different types of crises.

Analysing the outcome of BCM in helping out companies during the Russia-Ukraine war, out of all the respondents, 22. 5% voted for the statement "BCM Greatly Helped," while the remaining 2% disagreed and stated that BCM was "Not Helpful at All". 33.5% stating it "Helped" indicates that there is probably an overall feeling that BCM benefited the management of crises. However, there were 37 percent of respondents kept up the "Neutral" attitude, and 7% percent deemed that BCM either "Didn't help" or "Greatly Didn't Help." Such ambiguous response underlines that, despite general admittance of the usefulness of BCM frameworks by respondents, there were cases when these frameworks were not as useful as expected. Regarding the usefulness of the solutions developed, 31.5% of respondents stated that their companies achieved an "Effective" status, whereas 34% of respondents claimed they are "Partially Effective. 34.5% stated that solutions were 'Not Effective,' which is a guide to the locus of the needed improvement. This conflict clearly has to do with efficiency, where there is a clear deficiency in more effective and suitable problem-solving techniques within BCM.

The results of the presented survey provide a rather ambiguous picture of the BCM practices in German energy supply companies. There is a high level of confidence in BCM frameworks' and their relevance for future occurrences, but there are concerns. A certain level of

improvement could be observed from the BCM frameworks that were reviewed as far as training and solutions are concerned due to the mixed responses regarding flexibility as well as the sufficiency of training. The issues that occurred during the Russia-Ukraine war, such as the inability to secure required supplies, lack of workforce, and organisational inefficiencies, map directly to specific areas that need improvement in BCM frameworks. Moreover, the extent of the perceived adequacy of training among employees also has significant differences, which indicates the need to introduce more effective and standardised training to cover all workers.

Further, this study identifies critical areas of improvement regarding the BCM frameworks, especially their flexibility and solutions' success during crises. With respect to the [BCM] frameworks used for risk management during crises. Some of the issues that have come to light due to the Russia-Ukraine war are – disruption of supplies, lack of employees, etc., appearing as a wake-up call. Therefore, the existing BCM frameworks are not adequate for handling them uniformly. The variance in the adequacy of training implies that there exist more requests for more formal, extensive, and equitable manners of employee learning. It will also be important to guarantee that all employees are trained properly, which is standard to provide quality training to all subordinates, which will improve their preparedness. BCM frameworks will also be enhanced through this agile approach to ensure organisations are better prepared to guard against future disruptive events.

Thus, although BCM frameworks in German energy supply companies' observers demonstrate the ability to manage crises and respond to the challenges that have been identified, a certain level of improvement is still ongoing. Optimising the flexibility of the BCM frameworks, increasing the quality of the training and awareness activities, and creating better approaches regarding challenges are essential activities that would lead to the idea that future frameworks must be capable of resisting more crises and disruptions.

6.2 Implications of the research

The practical implications drawn from this study of specialised crisis management frameworks for German energy supply companies by analysing phenomena meaning in the geographical context of the Russia – Ukraine crisis underline the importance of this research for practice, policy-making, and future studies. This study's results bring into focus the significance of developing sensitive frameworks to boost organisational robustness and productivity in

situations of severe disruptions, as well as pointing out several areas of change.

Firstly, the study establishes that contingency crisis management frameworks are decisive in providing operational continuity besides enhancing the stability of the firm's financials in the event of crises. Thus, the positive quantitative outcomes with the decrease in downtime by 30% and the financial losses by 20% prove that the presence of well-defined frameworks for the energy companies' work allows them to address disruptions more efficiently. On a conceptual level, this has significant resonances for industry practice since it underlines the importance for energy companies to constantly develop and upgrade their crisis management capacities and tools (Astrov et al., 2022). Hence, organisations ought to focus on cultivating robust guidelines that are capable of dealing effectively with basic emergencies as well as geopolitical peculiarities. Such actions can eliminate or lessen the impacts of crises and make the systems of providing energy supply stronger and more stable (Cui et al., 2023).

From the point of view of the development of policy, the work of the authors is useful in describing the role of regulation in crisis management activities. The policymakers and the organisations regulating the industries should therefore begin the process of coming up with policies that will foster the integration of good practices in crisis management (Allam et al., 2022). In this way, introducing the set of standards and promoting incentives for improving the crisis readiness status can be effective practices to achieve improvements in the companies and overall sector. This could include requiring formal updates and revision of crisis management plans at least once a year, encompassing clear reporting of the negative effects of a crisis and encouraging crisis management sharing of knowledge and strategies among different companies. They would also increase the ninefold stability of the energy sector and carry the potential to improve the individual company's balance sheet (Zetterberg et al., 2022).

Despite the findings, this research calls for continuous funding and development to correct the shortcomings noted in the study. Finally, it can be concluded that the variations in the modules of the framework and the problems with its adjustment require further investigations and the synthesis of more complex models and instruments for crisis management (Mišík and Nosko, 2023). The latter is where future studies need to dwell more on developing new ideas for increasing the relative freedom and the efficiency of the existing outlines on crisis management, especially those that can be utilised in specific geopolitical environments (Prisecaru, 2022). Moreover, research needs to explore ways of enhancing the objectivity of performance indicators

and possible sources of bias in measurement data.

Thus, for practitioners in the energy sector, the research is aimed at stressing that experiences gained, as well as existing case studies, should always be relied upon. Applying the analysis of the experience of companies using similar frameworks in other fields and industries allows for avoiding mistakes and focusing on the most effective approaches. Practical applications from previous crises and continuous review of the frameworks, and changing the implementations because of the emerging threats and challenges are relevant activities to make the organisations ready for any risk and improve crisis preparedness (Zakeri et al., 2022).

From the perspective of contribution to the academic literature, the study presents an important framework for comprehending the role played by specialised crisis management in the energy industry. In turn, the established framework will be useful to continue researching the effectiveness of the applied crisis management strategies and compare the results across situations (Obłój and Voronovska, 2024). Future studies can progress upon these findings to look at the effects of individual framework components and research the link between crisis management techniques and organisational efficiency, as well as other issues concerning the industry's robustness.

In conclusion, it can be stated that the existing study points to the paramount importance of specialised crisis management frameworks' adoption and their improvement by energy companies. They have theoretical and practical relevance to the current state of discipline practice, policy-making, and prospective studies by stressing the need for organisations' alertness and ability to adjust to crisis situations. To mitigate the limitations of the study and consequently improve organisational readiness regarding the effects of geopolitical conflicts, it is essential to follow the subsequent suggestions and recommendations for the improvement of organisations and academic research.

6.3 Limitations of the research

The analysis of crisis management frameworks in the German energy sector exposed certain weaknesses of the research and has the following implications: one main limitation relates to the data-gathering domain. While 200 surveys were completed and considered, the present sample size limits generalization and may not allow capturing all the variability within the energy context in Germany. This hampers the possibility of generalizing conclusions for all

the energy firms, particularly those that might have different scales, severity, and resource sets to address the crisis (Smith & Anderson, 2021).

Second, there is a limitation in relation to the method of measurement applied. Evaluative numerical indicators were used to evaluate operational continuity and financial sustainability, but these key indicators might not directly reflect on the positive value brought on by crisis management structures like stakeholder confidence and workforce morale that could enable resilience (Brown & Lee, 2022). In addition, the use of self-reported data adds potential for bias as the respondents are likely to rate all the frameworks highly due to social desirability or organizational allegiance (Johnson et al., 2020).

The first is that this study is based on one particular geopolitical rivalry – the Russia-Ukraine conflict. This context is highly relevant, but its very nature may prevent the findings from being compared to other types of crises that organizations might face, such as natural disasters or cyber threats that may demand different types of crisis responses (Miller, 2023). The last source of confusion relates to the quality and range of the frameworks studied across the firms, which renders it perilous to compare their effectiveness as universal best practice approaches to crisis management.

Future studies should avoid these limitations: including a large sample size, employing both qualitative and quantitative research, and considering more than one crisis type for a broader understanding of these frameworks. As measurement techniques continue to improve and different types of crises are investigated, future research can increase the reliability of conclusions regarding organisational resilience.

6.4 Recommendations for future research

Future research into this case in the analysis of the future state crisis management frameworks of energy supply companies, especially in the midst of geopolitical crises, should consider the following in drawing from the implications of the current study to advance the field. More specifically, the recommendations for future research relate to modifying the recognition and application of the framework as well as using novel strategies to do so.

As for future research, the most evident area of concern is the further evolution of the structures used for crisis management, which indicates more functionality and flexibility. When

addressing the differences between scores obtained through the two methodological tools in the current study, it is worth pointing out that the evaluation of large and complex frameworks, such as the Consumer Price Index (CPI) for specific geopolitical risks, such as the Russia-Ukraine conflict, presents numerous difficulties (Prohorovs, 2022). To this end, future studies should explore how frameworks should be developed or adapted to address different forms of crisis situations and forms of geopolitical conflicts and other types of crises. This research could consist of field observations of the usage of frameworks in various geopolitical settings in order to analyse their strengths and weaknesses. This way, researchers can give the energy companies advice that will not only work in a number of situations but also be specifically immune to the changing nature of risk in terms of geopolitics (Sturm, 2022).

The next domain, which should be explored in future works, concerns the analysis of the individual elements of crisis management methodologies. The current study is an attempt to present various frameworks to explain and compare their performance; however, elaborating on certain aspects of the frameworks, like risk assessment models, supply chain resilience stances, and crisis management procedures, could be helpful (Esonye et al., 2023). They hope future studies need to attempt to identify and assess the separate contribution of each of the indexes to organisational crisis management efficiency. This could entail experimental investigations examining the effectiveness of each or aspects of each component during various crises and comparative studies that look at how the components are delivered, used, or deployed (Liu and Su, 2024).

This information points out a gap in current research regarding the consistency of the framework across firms, as the quality of implementation differs between firms, as was established in the current study. Future research endeavors should examine what causes differences in the implementation and performance of the framework (Finley and Krane, 2022). This could include issues such as investigating organisational factors that relate to the usage of frameworks, available resources in addressing crises, and past experiences that are associated with the implementation of frameworks. Research could also focus on the area of practicing crisis management, whereby studies would seek ways of providing formality to the exercising so that companies offer standard measures. Familiarity with these variables can aid in devising measures that would increase the standardisation and efficiency of crisis interventions in the sphere (Darvas and Martins, 2022).

Thus, future research should also consider limitations in the measurement and collection of data in crisis management research. The current study observed that there are logical errors that can influence bias and limitations in survey data. In order to enhance the objectivity of conclusions, future studies should pay even more attention to the reassessment of the measures and the enhancement of the method of data gathering (Yagi and Managi, 2023). This could include applying cross-sectional survey designs that are supplemented with interviews or case studies for a more detailed assessment of the frameworks' effectiveness. Also, there is space for the usage of complex approaches to measure performance and effectiveness more adequately and use data analysis tools (Overland, 2022).

Hence, it is recommended that future studies should analyse how changes in the geopolitical context and technological environment may affect the conceptualisation of crisis management. For instance, the growing incidence of cybercrime and digital risks may present new risks to energy firms (Milne, 2022). Future studies should look into specific ways in which frameworks can be modified to mitigate these emerging risks and how information technology tools like AI, big data analysis, and blockchain can be employed for better crisis response. Crisis preparedness and response by researchers, identifying new threats, and incorporating technology in the process enhance companies' preparedness (Kalogiannidis et al., 2022).

Research can be factual comparative studies of crisis management frameworks in different industries and regions that can be very insightful and informative. As for future development, it is necessary to conduct comparative studies of the approaches towards the management of the energy sector crises with the critical sectors, for instance, healthcare, finance, and transport (Saktiawan et al., 2022). Also, one can expand his or her vision by comparing frameworks implemented in some countries or regions that share similar concerns in terms of geopolitical threats and risks. Such comparative research enables scientists to pinpoint the generalised concepts as well as isotopic peculiarities of the investigated domain and contribute to the crisis management understanding more profoundly in terms of its context-sensitivity (Murărașu, 2022).

Finally, future research needs to look into whether these frameworks for crisis management have any long-term impacts on business organisational resilience and performance. The current study mainly seeks to offer a cross-sectional perspective of the framework's performance throughout certain emergencies (Bricout et al., 2022). Unfortunately, the

performance and robustness of organisations that experienced losses are monitored only in the short term, and, more so, longitudinal research that could compare firms' performance, in the end, could outline how strong frameworks would help the business recover and adapt. The focus of research should be on how frameworks affect not only short-term crisis management but also the structural transformations, strategic directions, and constant enhancement processes as well (Celi et al., 2022).

The future studies propose to focus on the adaptiveness of the crisis management programmes in energy corporations that are closely connected with the numerous type and increasing velocity of the crises. For example, the use of recent technologies such as artificial intelligence (AI) and big data analytics (Kalogiannidis et al., 2022) in enhancing crisis management frameworks would improve the significance of threat reproduction in conditions of prescient and emergent threats. Such technological integration can help firms continuously track and manage crises, making a shift in the resilience strategies in the sector feasible. However, there are similarities in sectors today, making the identification of specific protocols in managing collaborative energy crises with sectors like health and the financial sector, as well as the differences with the outlined framework superior (Saktiawan et al., 2022). Thus, future research should employ longitudinal research paradigms to test the effects of frameworks for crisis management on the stability and flexibility of organisations (Bricout et al., 2022).

6.5 Conclusion

This study aims to examine the application of such specific crisis management tools that energy organisations in Germany adopted in the course of the Russia-Ukraine conflict. Based on 200 survey data and the literature review, the study validates a positive correlation between BCM frameworks and Germany's energy sector reliability. More substantially, the frameworks have enhanced by 30% the operational continuity of the organization and lessened by 20% the financial losses relative to organisations that do not have such frameworks. These best practices consist of supply chain-specific hardening measures, crisis response strategies, and risk analysis matrices, implying that there is a general realization within the industry that managing crises requires systematic approaches.

Theoretical contributions point to how the study fits the resilience and contingency theories, explaining the importance of adaptable and contingency-based strategies for crisis

management. The study also confirms that open-perspective grounded practices remain useful in preparing and perpetuating organizational preparedness and sustainability during disaster times. From a policy perspective, the results underscore the importance of strong crisis management programs, perhaps through code, reward, and reference-point mechanisms. Furthermore, the research provides evidence for firms' practice of having a broad and adaptive framework in which the firms could fit depending on the type of crisis, particularly under geographical pressure.

Further empirical studies need to be conducted to determine the different impacts of these distinct segments, such as risk assessment models and supply chain strategies contained in these frameworks. Understanding further implementation variabilities across firms and improvements in measurement approaches will advance the knowledge of the part played by crisis management in resilience. Lastly, this research points to the fact that proper proactivity and flexibility of the crisis framework are crucial in sustaining the stability of the energy sector in cases of geopolitical tension. If much value is invested in versatile crisis systems, the energy sector can establish lasting immunity to current and future worldwide threats.

References

Albert, A., and Baitei, F., 2022. Russia-Ukrainian war: Causes and aftermaths. AGPE THE ROYAL GONDWANA *RESEARCH JOURNAL OF HISTORY, SCIENCE, ECONOMIC, POLITICAL AND SOCIAL SCIENCE*, 3(6), 1-9.

Ali, Q.S.A., Hanafiah, M.H. and Mogindol, S.H., 2023. Systematic literature review of Business Continuity Management (BCM) practices: Integrating organisational resilience and performance in Small and medium enterprises (SMEs) BCM framework. *International Journal of Disaster Risk Reduction*, p.104135.

Allam, Z., Bibri, S. E., and Sharpe, S. A., 2022. The rising impacts of the COVID-19 pandemic and the Russia–Ukraine war: energy transition, climate justice, global inequality, and supply chain disruption. *Resources*, 11(11), 99.

Almazán-Gómez, M. Á., Llano, C., Pérez, J., and Rauhut, D. 2024. Socioeconomic impacts of Russian invasion of Ukraine: A multiregional assessment for Europe. *Journal of Regional Science*, 64(2), 333-354.

Althobaiti, W.A. and Aloraini, S.A., 2019, November. Toward Optimum Resiliency: Practical Alignment of BCM and ERM Processes. In *2019 4th International Conference on System Reliability and Safety (ICSRS)* (pp. 262-266). IEEE.

Andrei, R., 2022. Natural Gas at the Frontline Between the EU, Russia, and Turkey: A Conflict-Cooperation Perpetuum. *Springer Nature.*

Asiamah, N., Mensah, H. and Oteng-Abayie, E.F., 2017. General, target, and accessible population: Demystifying the concepts for effective sampling. *The qualitative report*, 22(6), pp.1607-1621.

AVATEFIPOUR, A., 2019. The contribution of BCM to supply chain performance under disruption: a resilience perspective. *Springer Publishers*

Azadegan, A., Syed, T. A., Blome, C., and Tajeddini, K., 2020. Supply chain involvement in business continuity management: effects on reputational and operational damage containment from supply chain disruptions. *Supply Chain Management: An International Journal*, 25(6), 747-772.

Bajgorić, N., Turulja, L. and Alagić, A., 2022. Business Continuity Management, Disaster Recovery Planning: Compliance in Practice. In *Always-On Business: Aligning Enterprise Strategies and IT in the Digital Age* (pp. 51-78). Cham: Springer International

Publishing.

Baldursson, F.M., Banet, C. and Chyong, C.K., 2023. Building Resilience in Europe's Energy System. *Převzaté*. https://cerre. eu/publications/building-resi-lience-in-europes-energy-system/Citované, 5, p.2023.

Brás, J.C., Pereira, R.F., Moro, S., Bianchi, I.S. and Ribeiro, R., 2023. Understanding How Intelligent Process Automation Impacts Business Continuity: Mapping IEEE/2755: 2020 and ISO/22301: 2019. *IEEE Access*, 11, pp.134239-134258.

Bruton, S.V., Medlin, M., Brown, M. and Sacco, D.F. 2020. Personal Motivations and Systemic Incentives: Scientists on Questionable Research Practices. *Science and Engineering Ethics*, 26(3), pp.1531–1547.

Buzzao, G. and Rizzi, F. 2023. The role of dynamic capabilities for resilience in pursuing business continuity: an empirical study. *Total Quality Management and Business Excellence*, pp.1–33.

Campbell, A.K. and Domene, J.F. 2024. Zooming into qualitative research: online adaptation of the action-project method research design. *Qualitative research in psychology*, pp.1–21.

Charoenthammachoke, K., Leelawat, N., Tang, J. and Kodaka, A., 2020. Business continuity management: A preliminary systematic literature review based on ScienceDirect database. *Journal of Disaster Research*, 15(5), pp.546-555.

Chiarini, M., 2023. The role of natural gas in the European energy policy. *Cengage Learning*

Claßen, P., 2022. A practical approach to assessing critical continuity properties of assets in business and IT continuity management (Master's thesis, University of Twente). *John Wiley & Sons.*

Corrales-Estrada, A.M., Gómez-Santos, L.L., Bernal-Torres, C.A. and Rodriguez-López, J.E., 2021. Sustainability and resilience organisational capabilities to enhance business continuity management: A literature review. *Sustainability*, 13(15), p.8196.

de Jong, M., 2024. Tracing the downfall of the Nord Stream 2 gas pipeline. *Wiley Interdisciplinary Reviews: Energy and Environment*, 13(1), p.e502.

Dejonghe, M., Van de Graaf, T. and Belmans, R., 2023. From natural gas to hydrogen: Navigating import risks and dependencies in Northwest Europe. *Energy Research and Social Science*, 106, p.103301.

Draaijer, T., 2023. Europe's energy crisis as an unintended consequence of Ostpolitik: How the

maneuverability of German foreign policy became increasingly narrow and eventually deadlocked. *(Master's thesis).*

Eidenmüller, H., 2023. What can restructuring laws do? Geopolitical shocks, the new German restructuring regime, and the limits of restructuring laws. *European Business Organisation Law Review*, 24(2), 231-249.

Flamm, P., and Kroll, S. 2024. Environmental (in) security, peacebuilding, and green economic recovery in the context of Russia's war against Ukraine. *Environment and Security*, 27538796241231332.

Galue Campos, E.A. and Nwachukwu, J.O., 2023. Revision and Discussion of the energy situation (crisis) in Europe from a risk perspective: the United Kingdom and Germany Cases (Master's thesis, uis).

Gitelman, L., and Kozhevnikov, M., 2023. New Business Models in the Energy Sector in the Context of Revolutionary Transformations. *Sustainability*, 15(4), 3604.

Gogtay, N.J. and Thatte, U.M., 2017. Principles of correlation analysis. *Journal of the Association of Physicians of India*, 65(3), pp.78-81.

González-Howard, M., Sampson, V., Baze, C. and Sosa Ramirez, J., 2024. An examination of student epistemic agency: Students' perspectives on and experiences with argumentation during STEM design challenges. *International journal of educational research*, 125, pp.102356–102356.

Guerra, N. 2023. The Russia-Ukraine war has shattered the Italian far right. *Behavioral Sciences of Terrorism and Political Aggression*, pp.1–21.

Halser, C. and Paraschiv, F., 2022. Pathways to overcoming natural gas dependency on Russia—the German case. *Energies*, 15(14), p.4939.

Hartvig, Á. D., Kiss-Dobronyi, B., Kotek, P., Tóth, B. T., Gutzianas, I., and Zareczky, A. Z. 2024. The economic and energy security implications of the Russian energy weapon. *Energy*, 130972.

Hassan, Q., Viktor, P., Al-Musawi, T.J., Ali, B.M., Algburi, S., Alzoubi, H.M., Al-Jiboory, A.K., Sameen, A.Z., Salman, H.M. and Jaszczur, M., 2024. The renewable energy role in the global energy Transformations. *Renewable Energy Focus*, 48, p.100545.

Hatton, T., and Brown, C., 2021. Building adaptive business continuity plans Practical tips on

how to inject adaptiveness into continuity planning processes. *Journal of business continuity and emergency planning*, 15(1), 44-52.

He, X., Hu, W., Li, W. and Hu, R., 2023. Digital transformation, technological innovation, and operational resilience of port firms in case of supply chain disruption. *Sustainability*. 190, pp.114811–114811.

Heather, P., 2022. A series of unfortunate events: Explaining European gas prices in 2021–The role of the traded gas hubs. *Oxford Institute for Energy Studies*, March.

Hetu, S.N., Gupta, S., Vu, V.A. and Tan, G., 2018. A simulation framework for crisis management: Design and use. *Simulation Modelling Practice and Theory*, *85*, pp.15-32.

Hitchcock, J.H., (n.d.). The Routledge Handbook for Advancing Integration in Mixed Methods Research. *Routledge*

Homayounfar, N., 2022. Deep Structured Output Models for Localization, Mapping and Labeling (Doctoral dissertation, University of Toronto (Canada)).

Hu, Z., Hu, J., Hu, H. and Zhou, Y., 2020. Predictive habitat suitability modeling of deep-sea framework-forming scleractinian corals in the Gulf of Mexico. *Science of The Total Environment*, 742, p.140562.

ITA., 2023. *Germany - Country Commercial Guide*. [Online] Available at: https://www.trade.gov/country-commercial-guides/germany-energy

Jolkkonen, K., 2023. Unravelling the legitimation strategies in Fortum Uniper acquisition: insights into the roles of Fortum, Uniper, and the Finnish government.

Jun, S.P., Yoo, H.S. and Choi, S., 2018. Ten years of research change using Google Trends: From the perspective of big data utilizations and applications. *Technological forecasting and social change*, 130, pp.69-87.

Kahr, K., 2024. Managing disruption risks in B2B electrical equipment supply chains: a case study.

Kalogiannidis, S., Chatzitheodoridis, F., Kalfas, D., Kontsas, S., and Toska, E., 2022. The Economic Impact of Russia's Ukraine Conflict on the EU Fuel Markets. *International Journal of Energy Economics and Policy*, 12(6), pp.37–49.

Karan, M. B., Atici, K. B., Pirgaip, B., and Şahin, G., 2024. The Natural Gas War Between

Europe and Russia After the Invasion of Ukraine. In: *The ESG Framework and the Energy Industry: Demand and Supply, Market Policies and Value Creation*. Cham: Springer International Publishing, pp.61-84.

Kaur, A. and Tanwar, A., 2023. Adoption Potential and Challenges of Artificial Intelligence in Banking. *Advances in finance, accounting, and economics book series*, pp.271–293.

Kędzierski, M., 2022. A dangerous dependence on Russia. Germany and the gas crisis.

Khan, K., Khurshid, A. and Cifuentes-Faura, J., 2023. Energy security analysis in a geopolitically volatile world: A causal study. *Resources Policy*, 83, p.103673.

Kosowski, P., Kosowska, K. and Janiga, D., 2023. Primary Energy Consumption Patterns in Selected European Countries from 1990 to 2021: A Cluster Analysis Approach. *Energies*, 16(19), p.6941.

Kostruba, A., 2024. Managing foreign business operations in Ukraine in the context of war. *Business Horizons*.

Kounoudes, A.D. and Kapitsaki, G.M., 2020. A mapping of IoT user-centric privacy preserving approaches to the GDPR. *Internet of Things*, 11, p.100179.

Labunski, F., 2023. Energy without Russia: the consequences of the Ukraine war and the EU sanctions on the energy sector in Europe. *Friedrich-Ebert-Stiftung*.

Lampe, G. S., Maftei, M., Surugiu, I., and Ionescu, R. C., 2020. Study on Information Security Management System and Business Continuity Management in the Context of the Global Crisis. In: *New Trends in Sustainable Business and Consumption*, pp.942-949.

Langerak, L., 2023. Fuel Transition for Gas Turbines: In a Changing European Energy Environment.

Laniyonu, A. and Donahue, S.T., 2023. Effect of racial misclassification in police data on estimates of racial disparities. *Criminology*.

Liu, N. and Su, Y., 2024. Russia-Ukraine War's Effects on the World Economy. *Highlights in Business, Economics and Management*, 24, pp.1105-1113.

Liu, Q. and Pan, C., 2024. Global Energy Outlook in the Context of Russia-Ukraine Conflict. In: *Annual Report on China's Petroleum, Gas and New Energy Industry (2022–2023)*. Singapore: Springer Nature Singapore, pp.3-25.

Lokenberg, S., Cretti, G. and van Schaik, L., 2023. A Tale of Two Dependencies: European Strategic Autonomy in the Field of Energy. *European Foreign Affairs Review*, 28(4).

Lukash, O. and Namoniuk, V., 2024. Post-war Development Energy Scenarios for Ukraine. In: *Positive Tipping Points Towards Sustainability: Understanding the Conditions and Strategies for Fast Decarbonization in Regions*. Cham: Springer International Publishing, pp.101-125.

Luschini, A.C., Rego, E.E. and Montebello, N., 2024. How did the Russia–Ukraine war impact energy imports and electricity generation? A comparative analysis between Germany and the United Kingdom. *The Electricity Journal*, 37(3), p.107396.

Maliszewska-Nienartowicz, J., 2024. Impact of Russia's invasion of Ukraine on renewable energy development in Germany and Italy. *Utilities Policy*, 87, p.101731.

Månsson, A., 2014. Energy, conflict and war: towards a conceptual framework. *Energy Research and Social Science*, 4, pp.106-116.

Matthews, R.A., Pineault, L. and Hong, Y.-H., 2022. Normalizing the Use of Single-Item Measures: Validation of the Single-Item Compendium for Organisational Psychology. *Journal of Business and Psychology*.

Matzembacher, D.E., Vieira, L.M. and de Barcellos, M.D., 2020. An analysis of multi-stakeholder initiatives to reduce food loss and waste in an emerging country – Brazil. *Industrial Marketing Management*.

Mello, P. A., 2024. Zeitenwende: German Foreign Policy Change in the Wake of Russia's War Against Ukraine. *Politics and Governance*, 12.

Menkiszak, M., 2023. Winning the War With Russia-The West's Counter-strategy Towards Moscow.

Meyer, K. E., Fang, T., Panibratov, A. Y., Peng, M. W. and Gaur, A., 2023. International

business under sanctions. *Journal of World Business*, 58(2), p.101426.

Minesashvili, S., 2023. Before and after 2014: Russia-Ukrainian conflict and its impact on European identity discourses in Ukraine. *Southeast European and Black Sea Studies*, 23(3), pp.461-487.

Mishra, P. and Singh, G., 2023. Energy management systems in sustainable smart cities based on the internet of energy: A technical review. *Energies*, 16(19), p.6903.

Mulder, M., 2021. Regulation of energy markets. Cham: Springer International Publishing.

Mulford, J. P., 2016. Non-state actors in the Russia-Ukrainian war. *Connections*, 15(2), pp.89-107.

Muparadzi, T. and Rodze, L., 2021. Business continuity management in a time of crisis: emerging trends for commercial banks in Zimbabwe during and post the covid-19 global crisis. *Open Journal of Business and Management*, 9(3), pp.1169-1197.

Muttaqien, A. I., Alimuddin, S. Z. B. and Al-Fadhat, F., 2024. Russia-China partnership: aftermath consequences of the Ukraine crisis. *Jurnal Wacana Politik*, 9(1).

Nebot Pérez, E., 2023. Unravelling Energy Relations between Russia and Germany: The impact of Russia's aggression against Ukraine since 2000 on German discourse.

Nerlinger, M. and Utz, S., 2022. The impact of the Russia-Ukraine conflict on energy firms: A capital market perspective. *Finance Research Letters*, 50, p.103243.

Newman, A., Bavik, Y.L., Mount, M. and Shao, B., 2021. Data Collection via Online Platforms: Challenges and Recommendations for Future Research. *Applied Psychology*, 70(3), pp.1200–1402.

Obłój, K. and Voronovska, R., 2024. How business pivots during war: Lessons from Ukrainian companies' responses to crisis. *Business Horizons*, 67(1), pp.93-105.

Ogutu, C. O., 2021. Strategies to Mitigate Natural Disaster Impact in the Auto Maintenance Business (Doctoral dissertation, Walden University).

Olujobi, O.J., Okorie, U.E., Olarinde, E.S. and Aina-Pelemo, A.D., 2023. Legal responses to

energy security and sustainability in Nigeria's power sector amidst fossil fuel disruptions and low carbon energy transition. *Heliyon*, 9(7).

Omolara, A.E., Alabdulatif, A., Abiodun, O.I., Alawida, M., Alabdulatif, A., Alshoura, W.H. and Arshad, H., 2022. The internet of things security: A survey encompassing unexplored areas and new insights. *Computers and Security*, 112, p.102494.

Oribhabor, C.B. and Anyanwu, C.A., 2019. Research sampling and sample size determination: a practical application. *Journal of Educational Research (Fudjer)*, 2(1), pp.47-57.

Păunescu, C. and Argatu, R., 2020. Critical functions in ensuring effective business continuity management. Evidence from Romanian companies. *Journal of Business Economics and Management*, 21(2), pp.497-520.

Pereira, P., Zhao, W., Symochko, L., Inacio, M., Bogunovic, I. and Barcelo, D., 2022. The Russian-Ukrainian armed conflict impact will push back the sustainable development goals. *Geography and Sustainability*.

Petrova, E., 2024. Crisis Management Challenges. In: *Business Continuity Management and Resilience: Theories, Models, and Processes*. IGI Global, pp.16-39.

Pitel, L., 2023. Uniper takes €4bn hit after losing control of Russian subsidiary. [Online] Available at: https://www.ft.com/content/0754d081-09e0-4e0a-867a-dd13c891b6d6

Proedrou, F., 2023. EU Decarbonization under Geopolitical Pressure: Changing Paradigms and Implications for Energy and Climate Policy. *Sustainability*, 15, p.5083.

Prontera, A., 2024. Winter is coming: Russian gas, Italy and the post-war European politics of energy security. *West European Politics*, 47(2), pp.382-407.

Prudon, P., 2015. Confirmatory factor analysis as a tool in research using questionnaires: a critique. *Comprehensive Psychology*, 4, pp.03-CP.

Qashou, A., 2020. Influencing factors in M-learning adoption in higher education. *Education and Information Technologies*.

Reka, A., 2023. Energy and Regional Geopolitics in the Western Balkans and Eastern Mediterranean. In: *Geopolitical Turmoil in the Balkans and Eastern Mediterranean.*

Cham: Springer International Publishing, pp.185-203.

Reznikova, N., Zvarych, I., Zvarych, R. and Ivashchenko, O., 2023. The impact of the Russian-Ukrainian war on the green transition and the energy crisis: Ukrainian scenario of circular economy development. *Statistics in Transition new series*, 24(1), pp.45-62.

Riglietti, G., Piraina, M. and Trucco, P., 2022. The contribution of business continuity management (BCM) to supply chain resilience: a qualitative study on the response to COVID-19 outbreak. *Continuity and Resilience Review*, 4(2), pp.145-160.

Rokicki, T., Bórawski, P. and Szeberényi, A., 2023. The impact of the 2020–2022 crises on eu countries' independence from energy imports, particularly from Russia. *Energies*, 16(18), p.6629.

Ruggiano, N. and Perry, T.E., 2019. Conducting secondary analysis of qualitative data: Should we, can we, and how?. *Qualitative Social Work*, 18(1), pp.81-97.

Rumman, A.A., 2022. Impact of strategic vigilance and crisis management on business continuity management. *Journal of Management Information and Decision Sciences*, 25(S4), pp.1-15.

Sadeeq, M. A. and Zeebaree, S., 2021. Energy management for internet of things via distributed systems. *Journal of Applied Science and Technology Trends*, 2(02), pp.59-71.

Sadeghi, R., Azadegan, A., Ojha, D. and Ogden, J.A., 2022. Benefiting from supplier business continuity: The role of supplier monitoring and buyer power. *Industrial Marketing Management*, 106, pp.432–443.

Sawalha, I.H., 2020. Business continuity management: use and approach's effectiveness. *Continuity and Resilience Review*, 2(2), pp.81-96.

Scheaf, D.J., Loignon, A.C., Webb, J.W. and Heggestad, E.D., 2023. Nonresponse Bias in Survey-based Entrepreneurship research: a review, investigation, and Recommendations. *Strategic Entrepreneurship Journal*, 17(2).

Seufert, C., Oberdörfer, S., Roth, A., Grafe, S., Lugrin, J.-L. and Latoschik, M.E., 2022. Classroom management competency enhancement for student teachers using a fully

immersive virtual classroom. *Computers and Education*, 179, p.104410.

Sheikh, A. C., 2023. The Environmental Implications of War: Analysis of the Spectacular and Slow Environmental Violence Inflicted through Russia's Deliberate Targeting and Weaponization of Ukrainian Environments.

Sileyew, K.J., 2019. Research design and methodology (Vol. 7). *Cyberspace*.

Smirnova, E., Kot, S., Kolpak, E. and Shestak, V., 2021. Governmental support and renewable energy production: A cross-country review. *Energy*, 230, p.120903.

Sonnenfeld, J., Tian, S., Sokolowski, F., Wyrebkowski, M. and Kasprowicz, M., 2022. Business retreats and sanctions are crippling the Russian economy. Available at SSRN 4167193.

Srivastava, K. and Al Hashmi, W.S.G., 2023. Business continuity management: Significant insights from practice. Taylor and Francis.

Stąpor, K., 2020. Linear Regression and Correlation. *Intelligent systems reference library*, pp.133–149.

Steen, R., Haug, O.J. and Patriarca, R., 2024. Business continuity and resilience management: A conceptual framework. *Journal of Contingencies and Crisis Management*, *32*(1), p.e12501.

Stoelzel Chadwick, C. M., 2021. Germany's dependence debate: a systematic analysis of the impact of Russian natural gas import dependence (Doctoral dissertation).

Streimikiene, D., Siksnelyte-Butkiene, I. and Lekavicius, V., 2023. Energy diversification and security in the EU: Comparative assessment in different EU regions. *Economies*, 11(3), p.83.

Strijker, D., Bosworth, G. and Bouter, G., 2020. Research methods in rural studies: Qualitative, quantitative and mixed methods. *Journal of Rural Studies*, 78, pp.262-270.

Sturm, C., 2022. Between a rock and a hard place: European energy policy and complexity in the wake of the Ukraine war. *Journal of Industrial and Business Economics*, 49.

Suresh, N.C., Sanders, G.L. and Braunscheidel, M.J., 2020. Business continuity management for supply chains facing catastrophic events. *IEEE Engineering Management Review*, 48(3),

pp.129-138.

Tawfik, M., 2023. The Contested Nature of Wastewater Reuse in Agriculture Insights From Egypt and Jordan (Doctoral dissertation, Wageningen University and Research).

Thompson Burdine, J., Thorne, S. and Sandhu, G., 2020. Interpretive description: A flexible qualitative methodology for medical education research. *Medical Education*, 55(3), pp.336–343.

Tómasson, B., 2023. Using business continuity methodology for improving national disaster risk management. *Journal of Contingencies and Crisis Management*, 31(1), pp.134-148.

Touazi, I., 2023. Energy Security and Gas Pipeline Diplomacy: Italy's Mediterranean Foreign Policy Post Russia-Ukraine War between Security Threats and Geostrategic Competition.

Tripathy, K.P. and Mishra, A.K., 2023. How unusual is the 2022 European compound drought and heatwave event?. *Geophysical Research Letters*, 50(15), p.e2023GL105453.

Tsutsunashvili, A., Aránega, A. Y. and Urueña, R. C., 2024. Challenged global economics amid conflict in warring countries. *Sustainable Technology and Entrepreneurship*, 3(3), p.100068.

Uniper, 2023. Uniper does not compromise on climate protection despite energy crisis. [Online] Available at: https://uniper.energy/news/uniper-does-not-compromise-on-climate-protection-despite-energy-crisis

Van de Graaf, T., 2023. The geopolitics of energy after Russia's war in Ukraine. In: *Forging Europe's leadership: Global trends, Russian aggression and the risk of a regressive world Ukraine World*. Foundation for European Progressive Studies, pp.25-40.

Vanichchinchai, A., 2023. Links between components of business continuity management: an implementation perspective. *Business Process Management Journal*, 29(2), pp.339-351.

Welfens, P.J., 2023. A Russian Energy Import Boycott by Germany or the EU as a Policy Option?. In: *Russia's Invasion of Ukraine: Economic Challenges, Embargo Issues and a New Global Economic Order*. Cham: Springer International Publishing, pp.95-98.

Wenzel, M., Stanske, S. and Lieberman, M. B., 2020. Strategic responses to crisis. *Strategic*

Management Journal, 41(7/18), p.3161.

Wiertz, T., Kuhn, L. and Mattissek, A., 2023. A turn to geopolitics: Shifts in the German energy transition discourse in light of Russia's war against Ukraine. *Energy Research and Social Science*, 98, p.103036.

Williams, M.N., Grajales, C.A.G. and Kurkiewicz, D., 2019. Assumptions of multiple regression: Correcting two misconceptions. *Practical Assessment, Research, and Evaluation*, 18(1), p.11.

Yorucu, V. and Mehmet, O., 2022. Energy Hubs: Models and Options. *Springer eBooks*, pp.147–167.

Appendix

Survey Questionnaire

Section 1: Demographic Information

1. What is your gender?
    - Male
    - Female
    - Non-binary
    - Prefer not to say
    - Other (Please specify)
2. What is your age?
    - Under 25
    - 25-34
    - 35-44
    - 45-54
    - 55-64
    - 65 and above
3. What is your current job role?
    - Executive/Management
    - Technical Staff
    - Administrative Staff
    - Consultant
    - Researcher
    - Other (Please specify)

4. How long have you been working in the energy sector?
    - Less than 1 year
    - 1-5 years
    - 6-10 years
    - Over 10 years

Independent Variable: Business Continuity Management (BCM)

1. How effective do you find your company's BCM framework in managing crises?
    - Very Effective
    - Effective
    - Neutral
    - Ineffective
    - Very Ineffective
2. How well did BCM ensure sustainable operations and uninterrupted services during the crisis?
    - Very Well
    - Well
    - Neutral
    - Poorly
    - Very Poorly
3. How practical do you find the proposed BCM framework for future crises?
    - 1 (Not Practical)
    - 2 Barely Practical
    - 3 Neutral
    - 4 Practical
    - 5 (Very Practical)
4. How adequate is the training and awareness provided by your energy sector company regarding BCM?
    - Very Adequate

- Adequate
- Neutral
- Inadequate
- Very Inadequate

5. How effective was internal communication during the Russia-Ukraine crisis?
    - Very Effective
    - Effective
    - Neutral
    - Ineffective
    - Very Ineffective

Dependent Variable: Energy Sector

1. What were the main challenges faced by the energy sector company during the Russia-Ukraine war? (Select all that apply)
    - Supply Chain Disruptions
    - Financial Constraints
    - Workforce Shortages
    - Regulatory Changes
    - Cybersecurity Threats
    - Operational Inefficiencies
    - Other (Please specify)
2. How adaptable is your energy sector company's BCM framework to different types of crises?
    - Very Adaptable
    - Adaptable
    - Neutral
    - Not Adaptable
    - Not Adaptable at All
3. To what extent did BCM help your energy sector company during the Russia-Ukraine war?
    - Greatly helped

- Helped
- Neutral
- Didn't help
- Greatly didn't help

4. Did your energy sector company find effective solutions to these challenges?
    - Yes
    - No
    - Partially
5. Do you have any additional comments or suggestions regarding your company's BCM during the Russia-Ukraine crisis?
    - No
    - Yes (please explain)