The Role of National Culture in Supply Chain Disruptions Through its Impact on Supplier Relationships and Supply Chain Disruption Orientation

By

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1. Introduction

This thesis investigates the role of national culture in supply chain disruptions by determining the correlation between supplier relationships, supply chain disruption orientation (SCDO) and supply chain disruptions. Chapter 1 serves as an introduction to the thesis and its contents. This chapter presents the motivation for and the background of the study, which provides insight into why the research was undertaken. The section on the study background offers a broader understanding of the research and how it is linked to national culture and supply chain disruption. The research problem, rationale and scope are outlined and the research question, objectives and aims stated. The research contributions are then discussed, and an overview of the thesis structure is provided. By addressing this important research problem, this thesis will contribute to the existing literature on national culture and supply chain management and provide valuable insights for practitioners and scholars alike.

1.1 Research Motivation

This study was motivated by the researcher's interest in two principal areas—national culture and supply chain management. The researcher was born and raised in the eastern province of the Kingdom of Saudi Arabia, where two of the world's largest companies, ARAMCO (www.aramco.com), the largest petroleum company, and SABIC (www.sabic.com), one of the largest petrochemical manufacturers, are headquartered. Growing up in such an environment exposed the researcher to the complex relationships that exist between companies from different parts of the world. These two corporations have hundreds of suppliers and partners with thousands of employees from various countries worldwide who are based and work in the region. Living in such an international environment in the midst of Arabic culture made the researcher acutely aware at an early age of the diversity that characterizes different societies and countries and of the advantages and disadvantages of such differences in various contexts. This lifelong interest was reinforced by a deep interest in supply chain management and supply chain disruptions, which prompted the researcher to undertake the study.

1.2 Background to the Research

The globalized and connected modern world has transformed supply chains, resulting in considerable benefits and challenges in terms of their operation. In this globalized context, supply chains can reach new customers in different areas and expand their sourcing and resources to maximize profits and minimize costs (Naor, Linderman, & Schroeder, 2010). However, global expansion has created sprawling supply chains, thereby exposing organizations to unprecedented challenges and making them vulnerable to external risks and disruptions (Xu, Zhang, Feng, & Yang, 2020). Evidence has shown that disruptions of international supply chains increased by more than 39% in 2019 alone (Burnson, 2019), causing significant revenue losses.

The COVID-19 pandemic triggered massive international disruptions in the supply chains of many industries. For example, the oil and gas industry, which trades approximately 70% of its products and services globally (BP, 2018) and has one of the largest international supply chains, has been severely impacted by this international disruptive event. The disruption began with a steep decline in the demand for oil and gas, which led to decreases in prices; losses were expected to reach $1 trillion in 2020 (Turak, 2020). These considerable losses are inherent to the nature of the oil and gas supply chain, as the oil and gas industry affects the supply chains of many other industries, such as the food, iron, steel, clay and stone industries (Kitamura & Managi, 2017; Yuan et al., 2020). The oil and gas industry supply chain is characterized by its reliance on tightly coupled systems for expanding suppliers' networks abroad. A disruption in one of the interconnected and foreign firms' chains might impact all partners in the chain.

Each supply chain firm has its own unique background and national culture, which must be taken into consideration. Understanding how national culture influences the operation of individual firms might improve the ability to manage the risks associated with supply chain operations. This follows the understanding that the chains involve multiple firms from different countries. The impact of culture on management practices in general has been discussed by Geert Hofstede (1994a). Several subsequent studies highlighted the critical impact of national culture on supply chain management practices, including the effects on quality management practices, communication, knowledge management, delivery times and risk management (Durach & Wiengarten, 2017; Kull & Wacker, 2010). Consequently, the cultural differences between the firms in a chain influence the behaviour of the people

involved and the choice of strategies and actions in supply chain management operations (Durach, Glasen, & Straube, 2017). This poses considerable risks to time-critical and fast-paced supply chain operations, including miscommunication, misunderstanding and colliding decision preferences among the chain partners (Lee, Ribbink, & Eckerd, 2018). For instance, some studies (e.g. Duong and Chong (2020); Durach et al. (2017) have stated that culture is a critical factor that can significantly influence firms' reactions to supply chain disruptions.

However, few studies have focused on the specific extent of the impact of national culture on supply chain disruptions. Therefore, this exploratory research aims to empirically investigate the impact of national culture on supply chain disruptions by examining supplier relationships and SCDO in the oil and gas industry. By employing a mixed-methods approach, the study focuses on evaluating the impact of culture on the dynamics of supplier relationships and SCDO amid supply chain disruptions. As highlighted above, addressing the social aspect of supply chain management presents an opportunity to understand the role of national culture in supply chain disruption. There is a 'social aspect' in supply chain operations in that the people involved in supply chain activity and how their ability to relate with others from partner firms impact the overall efficiency of supply chain operations, including risk management. Supplier relationships have been the subject of previous disruption research, including that investigating the cultural impact on certain supplier relationship elements, such as trust and commitment (Gupta & Gupta, 2019). However, these studies did not include all the components that are likely to be affected by culture, such as relational norms, communication and conflict resolution. Other studies have found such relationship factors to be financially and strategically critical to successful supplier relationships (e.g. Sheffi (2005); Whitney, Luo, and Heller (2014); Wagner and Bode (2008). However, these studies do not capture the holistic impact of culture on the factors. They do not explain how the effect of national culture on supplier relationship elements affects supply chain disruptions.

The ability to manage supply chain risks and disruption coincides with the ability to transform experiences into actionable strategies for future risk management practices (Yu, Jacobs, Chavez, & Yang, 2019). Such is the general context implied by SCDO. SCDO refers to a firm's awareness, preparedness and ability to learn from previous disruptions (Bode, Wagner, Petersen, & Ellram, 2011). SCDO has become increasingly relevant in current supply chain management, risk management and resilience research (Queiroz, Fosso Wamba, De Bourmont, & Telles, 2021; Yang, Xie, Yu, & Liu, 2021; Yu et al., 2019). Further, research shows that activities that comprise SCDO, such as knowledge transfer and

management, communication and risk management planning can be subject to cultural impacts (Yang et al., 2021). This necessitated the inclusion and evaluation of this relationship in the present study to address the impact on supply chain disruption in the oil and gas industry. The study delves into this factor's impact on the response of organizations to supply chain disruptions and how it is affected by different cultures. Most studies in the field have only focused on the effect of SCDO on disruptions (e.g. Bode et al. (2011); Ellinger, Chen, Tian, and Armstrong (2015); Revilla and Sáenz (2014), neglecting the influence of external factors such as national culture on SCDO. The desire to examine SCDO results from evidence showing the impact of national culture on workplace learning (Felstead, Fuller, Jewson, & Unwin, 2009; Marquardt, Berger, & Loan, 2004), posing possible impacts on the ability to learn from previous disruption experiences.

By investigating the impact of national culture on supplier relationships and SCDO, this study makes considerable contributions to the supply chain disruption literature. A comprehensive understanding of the cultural impact is particularly important in crisis and risk management, where limited and outdated knowledge can cause response strategies to fail. Clear comprehension of the cultural backgrounds of chain partners and how those backgrounds might impact processes and facilitate supply chain/risk management will help firms evaluate and improve their practices. Gaining such cultural insights will also provide firms with additional information when evaluating and selecting international partners and suppliers. This research will advance the supply chain management literature in general by providing additional perspectives to evaluate suppliers and relationships based on the factor of national culture.

1.3 Research Problem

The literature on supply chain disruptions in the previous two decades has focused extensively on the operational aspects of supply chains in terms of sustainability, supply chain strategies, resilience, design and the locations of chains during the disruptions (Xu et al., 2020; Wagner & Bode, 2006). There is also significant research on how disruptions occur and how to identify them to plan recovery and mitigation (e.g. Tomlin (2006); Craighead, Blackhurst, Rungtusanatham, and Handfield (2007). However, after systematically reviewing the literature, several issues concerning the quality of related studies are apparent. First, little attention has been paid to understanding the nature of disruptions and their social aspects. Several studies have investigated the social role of supply chain management during

disruptions, but they implicitly identified its significance without detailed evaluation or description (e.g. Beaudet & Nishiguchi, 1999; Sheffi & Rice Jr., 2005; Sheffi, 2005; Zsidisin & Wagner, 2010; Revilla & Saenz, 2017).

Second, culture plays a significant role in how people view, respond to and deal with actions that involve some uncertainty or risk (Driouchi, Trigeorgis, & So, 2020). The trait represents the cultural principles that are learned by individuals in their specific social milieus. However, to the best of our knowledge, the literature on supply chain disruption lacks an examination of the cultural impact on supplier relationships during supply chain disruptions. Although national culture has been identified in the literature as a factor that influences supplier relationships in supply chains in general (e.g. Cannon et al., 2010; Gupta & Gupta, 2019; Ketkar, Kock, Parente, and Verville (2012), this influence of culture has not been considered when faced with pressing events, such as chain disruptions and risks. Therefore, in addition to adding context to the existing literature on the impact of national culture on supplier relationships during disruptions, this research provides the required comprehensive understanding of the impact of a firm's national culture and the national culture of the individuals within a firm on supplier relationships; this is the ultimate social focus of the study. The study aims to fill the research gaps and contribute to the literature by responding to several calls for more research on supplier relationship aspects in disruption scenarios and whether they vary across countries (Patrucco, Moretto, Luzzini, & Glas, 2020).

Third, another critical factor that directly impacts a firm's response to supply chain disruptions is SCDO. The connection between this factor and a firm's response to supply chain disruption has been recognized in the literature by emphasizing the essential role of SCDO in minimizing the impact of a disruption by preparing the organization for future disruptions. This research also investigates the cultural influence on SCDO, as no previous study has linked national culture with this factor. This research investigates the impact of a firm's national culture and the national culture of the individuals within a firm on SCDO, based on several indications. For example, workplace learning is impacted by culture, and a firm learning from previous disruptions is considered a form of workplace learning. Fellows and Liu (2020) state that national culture is an essential element that influences all aspects of life, which implies that a firm's way of learning from previous disruptions is also impacted by national culture. Therefore, the objective of this study is to investigate the impact of national culture on supply chain disruptions. Specifically, this research aims to empirically examine the influence of culture on a firm's ability to learn from previous disruptions, with the ultimate goal of achieving a better understanding of this relationship. It is worth noting

that this topic has not been extensively explored in the existing literature on supply chain disruption and cross-cultural studies, as pointed out by Sheffi (2005), Zsidisin and Wagner (2010) and Revilla and Saenz (2017).

This study aims to address the research gaps by examining the impact of national culture on supply chain disruptions in the oil and petrochemical industry. By conducting a comprehensive empirical investigation, the researcher focuses on two factors that motivate companies to act during disruptions—supplier relationships and SCDO. The findings of this study will provide decision makers with important insights about responding to unexpected situations, such as supply chain disruptions, and will form a solid basis for understanding the factors that influence a firm's response to disruptions. This, in turn, will enable firms to implement more related and suitable strategies that are refined based on cultural differences, leading to improved responses to disruptions. Ultimately, this research aims to provide a clear view of the impact of national culture on the supply chain, enhancing our understanding of this critical area.

1.4 Research Aim and Objectives

This exploratory research investigates the impact of national culture on supply chain disruptions by examining the role of national culture in supplier relationships, SCDO and supply chain disruptions in the oil and petrochemical industry. The following research objectives are key in achieving this aim:

- To explore the influence of national culture on the management of supply chain disruptions in the oil and petrochemical industry
- To investigate the effect of national culture on the relationships among the dimensions of supplier relationships, SCDO and supply chain disruption in the oil and petrochemical industry
- To empirically examine the impact of national culture on the relationships among supplier relationships, SCDO and supply chain disruptions in the oil and petrochemical industry
- To identify the most impactful national cultural dimensions in the management of supply chain disruptions in the oil and petrochemical industry

1.5 Research Questions

- What is the influence of national culture in the management of supply chain disruptions in the oil and petrochemical industry?
- How does national culture influence the connection among supplier relationships, disruption orientation and supply chain disruptions in the management of supply chain disruptions in the oil and petrochemical industry?
- What cultural dimension is the most influential in the management of disruptions in supply chains?

1.6 Research Scope

The thesis focuses on examining the impact of national culture on supply chain disruptions by examining supplier relationships and SCDO in the oil and petrochemical industry. The aim is to conduct a comprehensive empirical investigation of two critical factors that motivate companies to act during disruptions—supplier relationships and SCDO. In addition, this research focuses on commitment, communication, trust, relational norms and conflict resolution as aspects of supplier relationships. Human elements such as these are probably the ones that are most influenced by national culture when it comes to supplier relationships. Despite the extensive global reach of this industry, its expansion and increasing energy needs, companies in the sector face numerous risks, such as terrorist attacks (Lambrechts & Blomquist, 2017) and environmental events (Urciuoli, Mohanty, Hintsa, & Gerine Boekesteijn, 2014). In contrast to prior research that predominantly focuses on singular cultural contexts, this study uniquely explores the perspectives of participants hailing from diverse national cultures within companies of varying nationalities. The petrochemical industry's intense competition prompts companies to guard closely their operational intricacies, as sharing sensitive details could prove detrimental. Recognizing the significance of confidentiality and anonymity, participants, who were instrumental in facilitating data collection, insisted on the assurance of discretion. Consequently, in alignment with the agreed terms with participating companies and to uphold the ethical standards of this study, the specific names of these companies remain confidential.

The study purposefully engages individuals from different nationalities, specifically those possessing an in-depth understanding of the oil and petrochemical supply chain, including industry managers and decision-makers. Their valuable insights contribute significantly to the comprehensive data collection process.

1.7 Contributions of the Study

The main contribution of this study is that it empirically investigates the influence of national culture on managing supply chain disruptions. The study examines the impact of national culture on the connections among supplier relationships, SCDO and supply chain disruptions. Specifically, this study:

- Builds on existing research by synthesizing four critical constructs—national culture, supplier relationships, SCDO and supply chain disruption—that have not been examined in combination before.
- Examines, evaluates and discusses the crucial role of national culture in supply chain disruptions. This is accomplished by exposing its crucial role in supplier relationships, SCDO and supply chain disruptions in general and in the oil and petrochemical industry in particular.
- Examines the influence of national culture on the connection between supplier relationships and supply chain disruptions. It considers Hofstede's five dimensions and the aspects of supplier relationships that are influenced by national culture.
- Brings new insight into supply chain managerial practices by presenting new significant relational aspects that could possibly affect a firm's behaviour in managing potential disruptions. The findings of this research can be utilized by the firms in the oil and petrochemical industry and by the firms that operate in the international supply chain in general.
- Advances scientific knowledge by investigating the role of national culture in supply chain disruptions by identifying important cultural dimensions that influence the connection between supplier relationships, SCDO and the impact of supply chain disruptions.

1.8 Structure of the Thesis

Chapter 1 – Introduction: This chapter introduces and provides context for the present study. It begins by outlining the motivations and background that inspired the research problem. It then defines the research aim, objectives and questions, which are designed to address the identified research gaps. Next, the research scope is narrowed through the presentation of contextual information that establishes the study's focus. The main

contributions of this thesis are also highlighted, offering insight into the potential impact of the research findings. Finally, an overview of the thesis structure is presented to provide readers with a clear understanding of the content and organization of the subsequent chapters.

Chapter 2 – Literature Review: This chapter provides a comprehensive review of the main constructs and their interrelationships in the research. The chapter begins with an overview of national culture definitions and dimensions, followed by a discussion of supplier relationships. The concept of the supply chain is introduced, and then the focus narrows to the dimensions of supplier relationships. The next section presents a detailed description of supply chain disruptions, including a definition, and discusses the link between supply chain disruption, supplier relationship dimensions and national culture. Additionally, SCDO is presented as one of the key motivations to act during disruptions. The final section of the chapter summarizes the previous sections and emphasizes the associations between all the concepts in the current research, providing essential background information for the study.

Chapter 3 – In this chapter, the research methodology chosen to address the research questions is presented. The section commences by clarifying the philosophical standpoint of the research, followed by the adopted research approach. Subsequently, I describe the methodological position, delineating the techniques employed for data collection. Additionally, I provide an explanation of the research process. The chapter smoothly transitions into a discourse on the two-phase mixed-methods approach applied in the study. The initial phase, qualitative in nature, is thoroughly expounded, covering the sampling process and data collection procedures. Subsequent to this, the second phase, quantitative in nature, is investigated, commencing with a depiction of the instrument design and testing, the sampling method employed, and the data collection process. The chapter concludes by delineating the ethical considerations for both phases of the research.

Chapter 4 – Qualitative Research Findings: This chapter focuses on the first phase of the mixed-methods approach, which involved analysing the qualitative data obtained from interviews. This information provides a deeper understanding of the role of national culture in supply chain disruptions. The chapter starts with a brief summary of the demographic information of the interview participants. It then discusses the thematic analysis that was conducted, which revealed some significant themes related to the impact of national culture on supply chain disruptions. These themes were identified through a thorough analysis of the interview transcripts.

Chapter 5 – Quantitative Research Findings: This chapter presents the second phase of the study. The chapter starts by providing descriptive statistics of the sample, followed by a discussion of the statistical techniques used to test the study hypotheses. The reliability of the constructs was measured using Cronbach's alpha coefficient, and the validity was assessed using the Pearson correlation coefficient. Frequencies and percentages were used to summarize the demographic data, while descriptive statistics such as mean and standard deviation were used to summarize the study items. Structural equation modelling (SEM) was employed to examine the mediation and moderation effects of the study variables on dependent variables. These statistical analyses were conducted using IBM's SPSS (version 26) and Smart PLS 3 Software (version 3).

Chapter 6 – Discussion: This chapter discusses the results of the two phases of the mixed-methods approach and how they contribute to answering the three main research questions. The focus is on the combination of the qualitative and quantitative data.

Chapter 7 – Conclusions and Recommendations: In this chapter, a summary of the primary research findings and their contributions is presented, including theoretical, empirical, methodological and practical implications. The chapter also discusses the limitations of the study from a theoretical, practical and methodological perspective.

2. Literature Review

In this chapter, an in-depth exploration of the literature pertaining to the influence of national culture on supply chain disruption, specifically within the context of its impact on supplier relationships and Supply Chain Disruption Outcomes (SCDO), is presented. The literature review in this study adopts a two-stage methodology. The process of selecting papers for the literature review involved a thorough evaluation based on criteria encompassing quality, popularity, noteworthy authors in the field, and relevance to the research subject. In this process, keywords such as "supply chain disruption," "supplier relationship," and "national culture" were employed to refine the search and ensure alignment with the study's objectives. The search spanned various databases, including ProQuest, Google Scholar, and Emerald, to gather a comprehensive and diverse compilation of scholarly works. This multi-faceted approach aimed to curate a selection that not only met the academic standards but also provided a nuanced and well-rounded perspective on the subject of inquiry.

In the subsequent stage, a more targeted narrative review unfolded. During this phase, the focus shifted towards a nuanced exploration driven by the dissertation's thematic emphasis and guided by the research question. This involved scrutinizing the references of identified papers and seeking out additional articles that resonated with the central themes of the dissertation. The iterative process allowed for a refined selection of papers that contributed substantively to the depth and coherence of the literature review

The chapter is structured into four distinct sections, aligning with the key concepts under scrutiny in this study. Commencing with a meticulous definition of culture, the literature review critically evaluates various national culture theories and dimensions, including an in-depth analysis of Hofstede's cultural dimensions. Subsequently, the chapter delves into supplier relationships, beginning with comprehensive definitions, and extends into a literature review of supplier relationships within the broader domain of supply chain management and its intersection with national culture. The exploration then shifts to the domain of supply chain management disruption, providing a detailed definition before establishing its connections with supplier relationships, national culture, and SCDO. This section scrutinizes the concept of SCDO, encompassing its definition and associations with national culture and supply chain disruption. Through a comprehensive and critical

integration of empirical evidence from past research, the section aims to elucidate the intricate relationships between national culture, supplier relationships, and SCDO, particularly within the oil, gas, and petrochemical industry.

Concluding this chapter is an extensive discussion of research gaps, coupled with the presentation of a conceptual framework strategically positioned at the chapter's conclusion. This framework serves to provide a cohesive structure for the reader, summarizing the nuanced interplay between national culture, supplier relationships, SCDO, and their collective impact on supply chain disruption in the specified industry.

2.1 National Culture

This section explores the various definitions and dimensions of culture and national culture discussed in the existing literature.

2.1.1 National Culture Definition

The concept of national culture is a multifaceted and debated subject across various academic disciplines such as psychology and sociology. Scholars like Tylor (1871) have defined national culture broadly, encapsulating both tangible and intangible elements acquired by members of a society, including customs, art, morals, beliefs, knowledge, law, and habits. In contrast, others, including C. Hill (1999) and Geert Hofstede (1994b), have narrowed the definition to intangible aspects like ideas and beliefs. Namenwirth and Weber (2016) characterize national culture as a system of ideas shaping an individual's dynamic of actions, excluding tangible aspects like behaviour.

Best and Williams (1993) propose a three-level framework for culture: macro-level, describing intellectual, spiritual, and aesthetic development; intermediate level, indicating a particular way of life; and micro-level, describing works and practices of intellectual and artistic activity. At the micro-level, culture is further broken down into folk culture, high culture, mass culture, and popular culture. Geertz (1973) conceptualizes culture as an historically transmitted pattern of meanings embodied in symbols, emphasizing culture as a symbolic system embedded in people's practices and artifacts.

According to Fiske (1991), culture comprises shared emotional, cognitive, and behavioural tendencies within a specific group, encompassing institutions, social practices, technology, relationships, standards, objectives, and definitions of social agents. Culture, in this context, is viewed as the act of making meaning. Bonvillain (2019) suggests that culture

involves dissolving boundaries between oneself, society, and the environment, focusing on how individuals give meaning to various constructs. Shared cultural understanding exists when individuals share meaning systems for constructs like family, mind, emotions, morality, self, culture, and evil.

Adams and Markus (2003) assert that for a shared culture to exist, there must be substantial overlap in behaviour and meaning systems. Culture, therefore, consists of common meaning systems, both personal and in relation to the outside world, and is dynamic rather than static. It is emphasized that culture doesn't belong to a particular group, and its analysis should consider overt and covert patterns of beliefs and actions.

Scholars, such as C. Hill (1999) and Geert Hofstede (1994b), tie culture to shared values and norms shaping the lifestyle of a group. Hofstede defines culture as "the collective programming of the mind that distinguishes the members of one group or category of people from another" (p. 9). While Hill's definition confines culture to values and norms, excluding other shared meanings, Hofstede's definition encompasses all aspects of culture and suggests that culture influences individuals' behaviour and can be transmitted through generations.

In the present study, the definition of culture aligns with Hofstede's comprehensive perspective, which includes all aspects of culture and acknowledges its influence on individuals' behaviour. Fellows and Liu (2020) propose that cultural replication, or the copying and responding to behaviours, may be an inherited trait. The adoption of Hofstede's definition in this study is deemed most relevant to its aims, providing a comprehensive understanding of the multifaceted nature of national culture and its potential impact on supply chain disruption through its influence on supplier relationships and SCDO.

2.1.2 Culture Dimensions

The exploration of cultural dimensions within the literature draws upon both theoretical frameworks and empirical studies to elucidate the intricacies of national cultures. Inkeles and Levinson (1969) identified three primary components of cultural dimensions based on personality traits: self-conceptions, primary dilemmas, and relations to authority. While theoretical studies provide a strong foundation, some argue that their findings lack empirical implications (Peterson, 2007).

Empirical studies on culture have gained prominence, with works by Hall (1976), Geert Hofstede (1980, 1983, 1993, 1994b) being particularly influential. Hall categorizes culture into high-context (HC) and low-context (LC) communication based on society's method of

communication. However, criticism arises due to the simplicity of this model, prompting further studies to address gaps in Hall's classification (Cardon, 2008).

Hofstede's seminal studies (1980, 1983, 1993, 1994b) classify culture based on empirical data from 50 countries, presenting five dimensions: power distance, individualism, long-term orientation, uncertainty avoidance, and masculinity. These dimensions have found application in various management fields. Despite their widespread use, Hofstede's dimensions face criticism for being based on data from a single company (IBM) and for the specificity of the surveys used (McSweeney, 2002).

Ronen and Shenkar (1985) propose a cultural classification model based on similarities between countries, aiming to assist international companies in understanding and communicating effectively in different cultural contexts. Trompenaars (1994) identifies dimensions such as neutral vs. emotional, individualism vs. communitarianism, and achievement vs. ascription through empirical research in 50 countries. However, Geert Hofstede (1996) criticizes Trompenaars' work for methodological deficiencies and the number of dimensions.

The GLOBE model, focusing on culture and leadership, introduces nine cultural dimensions, including power distance, uncertainty avoidance, and gender egalitarianism (House, Javidan, Hanges, & Dorfman, 2002). Despite being an updated version of Hofstede's cultural classifications, GLOBE faces criticism for the number of dimensions and conceptual similarities to other models (McSweeney, 2002).

However, despite the existence of various cultural frameworks, the study opts for Hofstede's dimensions due to their longstanding relevance, wide recognition, and robust nature. Gong, Li, and Stump (2007) highlight the wide acknowledgment and usage of Hofstede's five dimensions in academic research for over 40 years. The choice is justified by the conceptual and statistical independence of Hofstede's dimensions and their comprehensive nature supported by systematic data collection (Minkov & Hofstede, 2011). The literature underscores that, to date, Hofstede's work on cultural differences remains the most relevant and comprehensive.

In conclusion, the exploration of cultural dimensions reveals a rich tapestry of theories and empirical studies, each contributing to our understanding of how culture shapes societies. While various frameworks exist, Hofstede's dimensions emerge as a longstanding and robust tool for comprehending cultural nuances, despite criticisms and the availability of alternative models. This chapter sets the stage for a deeper examination of how these cultural dimensions

intersect with supplier relationships and SCDO, shedding light on their potential impact on supply chain disruption in the oil, gas, and petrochemical industry.

Table 1 Hofstede's cultural dimensions

Author(s)	Study Dimensions
Inkeles and Levinson (1969)	Conceptions of self Relation to authority Primary conflict/dilemmas and solutions
Hall (1976)	Low-context communication High-context communication
Hofstede (1980, 2010)	Uncertainty avoidance Power distance Masculinity/femininity Indulgence and restraint Long-term orientation Individualism
Ronen and Shenkar (1985)	Grouping the world into eight clusters: Arab, Anglo, Far Eastern, Germanic, Near Eastern, Nordic, Latin American and Latin European
Trompenaars (1998)	Universalism vs. particularism Neutral vs. emotional Individualism vs. communitarianism Specific vs. diffuse Achievement vs. ascription Attitude to time Attitude to environment
GLOBE (2004)	Power distance Institutional collectivism Uncertainty avoidance In-group collectivism Assertiveness Gender egalitarianism Future orientation

	Humane orientation Performance orientation

2.1.3 Hofstede's National Culture Dimensions

Hofstede's national culture framework stands as one of the most influential and extensively studied cultural models in the academic landscape (Minkov & Hofstede, 2011). Initially presenting four dimensions—power distance, individualism vs. collectivism, uncertainty avoidance, and masculinity/femininity—Hofstede expanded his framework based on an extensive study involving IBM branches in over 50 countries. This expansion introduced two additional dimensions—indulgence vs. restraint and long-term orientation.

Power Distance: Power distance signifies the expected and accepted uneven distribution of power in organizations or families within specific cultures (Geert Hofstede, Hofstede, & Minkov, 2005). High power distance societies accept hierarchical power distribution, while low power distance societies reject unequal power structures. In high power distance societies, authority figures wield substantial power, while in low power distance societies, leaders are perceived not to need excessive control.

Individualism vs. Collectivism: This dimension assesses the extent to which societies organize into groups and perceive obligations and dependence on these groups. Individualism characterizes societies where members prioritize personal interests, while collectivism describes societies where individuals belong to and are loyal to specific groups, providing support and care (Geert Hofstede & Bond, 1984).

Uncertainty Avoidance: Uncertainty avoidance measures a society's comfort level with risk, uncertainty, and unpredictability. High uncertainty avoidance societies prefer stability and formulate rules to mitigate ambiguity, while low uncertainty avoidance societies are more accepting of risk and uncertainty, demonstrating a greater tolerance for ambiguity (Beugelsdijk & Frijns, 2010)

Long-Term Orientation: Introduced later, long-term orientation focuses on fostering virtues oriented towards future rewards, such as perseverance and thrift. Societies emphasizing long-term orientation value honesty, accountability, adaptability, self-discipline, and learning. This dimension is associated with business harmony and collaboration in supply chain relationships (G Hofstede, Hofstede, & Minkov, 1991; Ryu, Han, & Frank, 2006).

Masculinity vs. Femininity: This dimension explores the separation of societal roles based on gender. Masculine societies prioritize competition, achievement, and performance,

while feminine societies concentrate on improving the quality of life and building social relationships (Geert Hofstede & Bond, 1984).

The interconnectedness of these dimensions is evident across various contexts. High power distance tends to align with collectivism, whereas low power distance often correlates with individualistic tendencies. Additionally, high power distance is associated with low long-term orientation and high indulgence. These interrelations provide a nuanced understanding of how cultures manifest across multiple dimensions (Basabe & Ros, 2005; Ghosh, 2011; Guo, Liu, Li, & Qiao, 2018).

Despite being one of the most utilized cultural frameworks, Hofstede's dimensions have faced criticism. Scholars question the relevance of the initial four dimensions, suggesting that cultural changes post-1973 might not be adequately reflected. However, proponents argue that national cultures change at a slow pace, justifying the continued relevance of the model (Ghemawat & Reiche, 2011; Nakata & Sivakumar, 1996).

An essential critique revolves around the original dataset's source—IBM—and the assumption that a small subset of its members can represent an entire national culture. However, subsequent replications and extensive studies, such as the GLOBE study, have validated Hofstede's dimensions, reinforcing their practical and research relevance (Minkov & Hofstede, 2011; Signorini, Wiesemes, & Murphy, 2009).

Hofstede's cultural dimensions offer a comprehensive and versatile framework that extends beyond mere theoretical constructs. By incorporating economic, demographic, geographic, and political elements, Hofstede's model surpasses the scope of many other cultural frameworks, making it particularly valuable in cross-national and comparative studies in areas such as marketing and management (Blodgett, Bakir, & Rose, 2008; Soares, Farhangmehr, & Shoham, 2007).

In summary, Hofstede's national culture dimensions provide a robust tool for understanding the intricacies of diverse cultures. Despite criticisms, the model's continued relevance and widespread application attest to its enduring significance in academic research and practical contexts, making it a cornerstone in the exploration of the impact of national culture on supply chain disruption in the oil, gas, and petrochemical industry.

2.2 Supplier Relationships

Research shows a significant impact of national culture on supplier relationships via its influence on social preferences and behaviours, such as risk perception, dialogue and communication styles (e.g. Cannon, Doney, Mullen, and Petersen (2010); Y.-S. Chen, Su,

and Ro (2017). This section introduces supply chain management, its key terms, and its components examined, but first it starts by explaining mediation and moderation definitions. Supply chain evolution is also explained. Supplier relationships and their dimensions are then discussed vis-à-vis supply chain management to lay a foundation for the subsequent correlation between national culture and supply chain disruption.

2.2.1 Mediation and Moderation Definition

The exploration of mediation and moderation within the context of national culture's impact on supply chain disruption is vital for elucidating the intricate relationships between these variables. Mediation, as a concept, is fundamental in understanding the underlying mechanisms through which national culture may influence supplier relationships, subsequently affecting SCD. The study integrates the work of Baron and Kenny (1986), who defined mediation as a process wherein one variable transmits or explains the effect of another variable on an outcome. In this context, mediation helps identify intermediate variables within supplier relationships that serve as conduits for the impact of national culture on SCD. Through sequential analyses, the study aims to establish a comprehensive understanding of the mediating factors involved, providing insights into the "how" and "why" behind observed relationships.

Moreover, moderation plays a crucial role in the investigation, acknowledging the nuanced conditions under which the influence of national culture on supplier relationships and SCD may vary. Building upon the work of Baron and Kenny (1986), moderation explores the "when" and "for whom" of a relationship, considering contextual factors that may amplify or attenuate these influences. The study incorporates statistical methods to identify interaction effects and stratified analyses to probe moderation effects within the oil, gas, and petrochemical industry. By doing so, the research aims to uncover the specific conditions or contextual factors under which national culture's impact on supplier relationships is heightened or diminished, consequently influencing SCD.

Within the literature review, the study draws on Muller, Judd, and Yzerbyt (2005) to emphasize the integration and synergy of mediation and moderation. The intertwined nature of these concepts offers a more nuanced and contextually rich understanding of the relationships between national culture, supplier relationships, and SCD. As the study

navigates through the complexities of real-world scenarios, the examination of mediation and moderation becomes essential to paint a comprehensive picture of the intricate dynamics within the specified industry. The synergistic approach allows for a holistic examination of how specific variables operate, when their effects are heightened or diminished, and the underlying mechanisms at play.

Mediation and moderation emerge as crucial analytical tools in the study's exploration of the influence of national culture on supply chain disruption. Through a meticulous literature review, the study integrates these concepts to unravel the complexities within supplier relationships and SCD. Mediation aids in identifying intermediate variables, elucidating the "how" and "why" behind relationships, while moderation considers the contextual nuances that shape these influences. The integration and synergy of these concepts contribute to a more comprehensive understanding, providing a solid foundation for the conceptual framework presented in the study's conclusion.

2.2.2 Supply Chain Management

In our exploration of the influence of national culture on supply chain disruptions in the oil and petrochemical industry, the foundational understanding of supply chain management becomes paramount. The contemporary global landscape dictates that companies leverage internationalization for survival and success, emphasizing the integral role of international supply chains in their operations (Kandil, Battaïa, & Hammami, 2020).

Supply chain management encompasses overseeing the intricate flow of goods and services across borders, with organizations engaging in extensive partnerships and material exchanges on a global scale. The term "supply chain" gained prominence in the early 1990s, aligning with increased global competitiveness that underscores the advantages of supply chain expansion (M. C. Cooper, Lambert, & Pagh, 1997). Companies now collaborate with manufacturers from diverse countries to ensure efficient, high-quality production, meeting market demands for quality and timely delivery (Mentzer et al., 2001).

Numerous studies underscore the pivotal role of supply chains in today's market, emphasizing the manifold advantages reaped by companies engaged in supply chain activities (Fawcett, Magnan, & McCarter, 2008). These advantages include reduced logistics costs, increased inventory turnover, heightened responsiveness, decreased time to market, and augmented total economic value (Agrawal & Pak, 2001; Cooke, 1997; Daugherty, Richey, Genchev, & Chen, 2005; Jayaram*, Kannan, & Tan, 2004; Mentzer et al., 2001; Prasanna &

Haavisto, 2018). Supplier relationships, recognized as a critical factor in supply chain management, play a significant role in realizing these benefits (Mentzer et al., 2001; Paulraj, Lado, & Chen, 2008).

Suppliers' role extends across all supply chain management components—network structure, processes, and management components (Lambert & Cooper, 2000). Supplier relationship management, highlighted by Chow et al. (2008), stands out as a fundamental process within supply chain management. Lambert and Cooper (2000) categorize supply chain management into physical, technical, and behavioural component management. The latter involves managing behavioural interactions among a company's workers, groups, partners, and suppliers.

Understanding supplier relationships in the broader context of supply chain management is crucial for ensuring the continuous flow of goods and services within the supply chain processes. This discussion, emphasizing the pivotal role of supply chain management and supplier relationships, seamlessly aligns with the research aim and objectives, setting the stage for a comprehensive exploration of national culture's influence on these dynamics in the oil and petrochemical industry.

2.2.3 Supplier Relationships

Effective supply chain management relies heavily on robust relationships between firms to ensure the smooth flow of goods and services. Such relationships become crucial, especially when implementing supply chain concepts like the Just-In-Time inventory system, which demands close ties with suppliers. Research suggests that refining relationships with suppliers is not only essential in regular supply chain scenarios but also plays a vital role in mitigating risks, even during disruptions (Ellis, Henry, & Shockley, 2010).

Numerous studies have attempted to characterize the dimensions of supplier relationships, highlighting attributes such as communication, coordination, dependence, trust, commitment, flexibility, and collaboration. However, consensus on specific constructs remains elusive (Kannan & Choon Tan, 2006). Cannon and Perreault Jr (1999) identified six common attributes—cooperative norms, operational linkages, legal bonds, information exchange, adaptations by buyers, and adaptations by sellers.

While many studies focus on integration, critical collaboration components like collaborative communication and shared knowledge creation have often been overlooked (Cao, Vonderembse, Zhang, & Ragu-Nathan, 2010). Collaborative communication and

information sharing are vital elements in managing expected risks and reducing supply chain complexity (Christopher & Peck, 2004; Revilla & Saenz, 2017). Cao et al. (2010) emphasize the importance of shared knowledge resources, listing seven elements to facilitate collaboration—goal congruence, information sharing, decision synchronization, resource sharing, combined knowledge creation, collaborative communication, and incentive alignment.

Social capital, defined as the sum of resources embedded within a network of relationships, has gained attention in supply chain relationships. It includes relational capital, cognitive capital, and structural capital (Nahapiet & Ghoshal, 1998). Relational capital represents the quality of relationships, cognitive capital involves understanding and shared goals, and structural capital is tied to interaction configuration (Caragliu & Nijkamp, 2014). Cognitive capital, including language, codes, goals, and shared interpretations, helps limit misinterpretations and align activities toward common goals (Parra-Requena, Molina-Morales, & García-Villaverde, 2010).

The literature acknowledges the significance of social capital in supply chain relationships, enhancing competitive advantage, efficiency, cooperative behaviour, and minimizing opportunism. Internal social capital within organizations aids recovery after disruptions, and relational competencies like cooperation and communication are crucial for supply chain resilience (Cui, Jin, & Lee, 2020; Gligor & Holcomb, 2012; Wieland & Wallenburg, 2013).

However, the impact of social capital on supplier relationships isn't unilaterally positive. While some studies affirm its positive influence, others caution that it may increase risks. The social and operational aspects of supplier relationships proposed by Y. Kim and Choi (2015) categorize relationships into deep, sticky, transient, and gracious based on relational posture and intensity.

The relational posture focuses on social aspects like commitment, trust, information sharing, conflict resolution, and relational norms. Commitment, according to Y. Kim and Choi (2015), involves parties' determination to make sacrifices to maintain the relationship. Trust, per Ganesan (1994), is a party's reliability and faith in another. Information sharing is the flow of valuable information between partners, and relational norms encompass expectations regarding understanding, partnership goals, and expectations (Cannon & Perreault Jr, 1999). Conflict resolution deals with how disagreements are managed within organizations.

The dimensions of supplier relationships are multifaceted, encompassing both operational and social aspects. Effective collaboration, information sharing, and shared knowledge resources are crucial for successful relationships. Social capital, with its relational, cognitive, and structural dimensions, adds another layer of complexity to supplier relationships, influencing competitive advantage and resilience. However, the impact of social capital is not uniformly positive, and its dynamics must be carefully considered, especially in diverse national cultural contexts. Understanding these dimensions is essential for the successful navigation of disruptions and building resilient and adaptive supply chains.

2.2.4 Dimensions of Supplier Relationships, Supply Chain Management and National Culture

Communication, a vital element in supply chain relationships, is pivotal in maintaining the flow of goods and services (Prahinski & Benton, 2004). Effective information sharing is crucial for optimal firm performance, impacting product availability, order cycle, capital utilization, time efficiency, and economic value (Randy & Mukeri, 2015). However, a noteworthy point is that communication success is intricately linked to cultural sensitivity, defined as an organization's understanding and adaptation to the partner's domestic business practices by (LaBahn & Harich, 1997). Sensitivity to national culture in the supply chain can significantly reduce conflicts, improve communication, and minimise disruptions.

Trust, another critical factor in supplier relationships, is influenced by national culture and can be a determining factor in supply chain disruptions (Qu & Yang, 2015). Social trust, reflecting the average level of generalized trust in a country, is shaped by the institutions within that country. In regions with high social trust, individuals may avoid committed business relationships, fearing opportunistic behaviours, while in low trust regions, committed relationships are preferred to mitigate risks (Yamagishi, Cook, & Watabe, 1998; Yamagishi & Yamagishi, 1994). This trust dynamic directly impacts the success of supply chain management, as committed relationships are essential for effective supply chain operations (Klein, Rai, & Straub, 2007).

Commitment, defined as an attitude reflecting feelings of loyalty, attachment, and identification (A. Cohen, 2003), varies across national cultures and has a significant effect on supply chain management (Fischer & Mansell, 2009). Fischer and Mansell (2009) study, encompassing individualism–collectivism and power distance values, identifies the impact of commitment on supply chain dynamics. The findings reveal that power distance is associated

with higher normative and continuance commitment, while collectivism is linked to higher normative commitment.

Relational norms, crucial in mitigating opportunism, vary across national cultures, influencing the behavioural forms of opportunism in supply chain relationships (Conner & Prahalad, 1996; Tangpong, Hung, & Ro, 2010). Understanding these relational norms is essential for developing effective mitigation strategies for buyer–supplier relationships.

Conflict resolution, an inevitable aspect of any supply chain, requires immediate and joint settlement to achieve superior performance (Carter & Rogers, 2008). Conflict management is crucial for maintaining the flow of products, information, and finances in the supply chain. Information sharing, akin to communication, is imperative in resolving conflicts within supply chain relationships.

2.3 Disruption in Supply Chain Management

This section defines disruption and supply chain disruptions and explains the factors that impact them. The researcher then analyses the process of learning from experience in supply chain disruptions.

2.3.1 Disruption Definition

In the contemporary landscape of global supply chains, the expansion of operations across diverse countries exposes firms to heightened vulnerability regarding risks and disruptions (Christopher & Lee, 2004). Risks, stemming from uncertain systemic environments, pose threats to the seamless flow of goods and services (Ivanov et al., 2021). Supply chain risks, encompassing factors like terrorism, piracy, technological failure, human error, financial crises, political crises, and natural disasters, are defined by Harland, Brenchley, and Walker (2003) as the probability of exposure to various undesired consequences. Disturbances within the supply chain can escalate into disruptions, and the efficacy of supply chains to accommodate changes determines the impact on the flow of goods and services.

Disruptions are characterized as unforeseen and unplanned situations, distinct from anticipated supply and demand risks (Kleindorfer & Saad, 2005; Wagner & Bode, 2006). The response to disruptions involves eight stages: preparation for disruption, occurrence of the disruptive event, first response, immediate impact, full immediate and delayed impact, recovery preparation, recovery, and long-term impact (Sheffi, 2005). These stages can be

grouped into three phases—before, during, and after disruption. Disruptions expose supply chain companies to significant financial and operational risks, and their occurrence can be particularly damaging.

The COVID-19 pandemic serves as a contemporary example of a 'black swan' event—an unforeseen occurrence despite a lack of planning (Brown & Kline, 2020; Taleb, 2007). This global crisis has significantly disrupted supply chains, affecting major companies such as Apple and Nintendo. The pandemic has highlighted the interconnectedness of the global economy and the need for resilient supply chains. Various documented instances illustrate the physical losses incurred due to disruptions. For instance, the aftermath of 9/11 resulted in substantial profit loss as the U.S. shut down critical sectors, directly impacting production, notably affecting Ford Motor Co. (Sheffi & Rice Jr, 2005). Similarly, a fire at one of Ericsson's suppliers cost the company 400 million euros, and Hurricane Sandy on the American East Coast caused losses ranging from 30 to 50 billion US dollars (Sarabacha, 2012; Tang, 2006).

Understanding the phases and dimensions of disruption management is crucial for effective response and recovery. The three key phases—preparation, occurrence, and recovery—guide firms in navigating disruptions. A robust preparation involves anticipating potential disruptions, while the occurrence phase demands swift and efficient responses to mitigate immediate impacts. Recovery involves a strategic rebound to minimize long-term consequences.

In the face of disruptions, firms must adapt swiftly. The timely response involves preparing for the unexpected, managing the occurrence of disruptive events, and mitigating their immediate and delayed impacts. A proactive approach to recovery and strategic planning is essential for minimizing long-term consequences. This adaptability is vital, especially in today's fast-paced and interconnected global supply chain landscape.

In conclusion, disruptions in global supply chains are inevitable, and their impact can be profound. Risks and disturbances, ranging from natural disasters to unforeseen global events like the COVID-19 pandemic, pose challenges to supply chain resilience. The ability to navigate disruptions effectively involves strategic preparation, swift responses during occurrences, and robust recovery planning. As global supply chains continue to evolve, the importance of understanding and managing disruptions becomes paramount for businesses to thrive in an unpredictable and interconnected world.

2.3.2 Motivations to Act During Supply Chain Disruptions

The significance of supplier relationships in mitigating supply chain disruptions is well-documented in the literature. Bode et al. (2011) emphasize the pivotal role of supplier relations during disruptive events, highlighting the dependency between the focal company and its suppliers. The company's reliance on these relationships is crucial for achieving its objectives, underscoring the overall importance of supplier relations (Bode et al., 2011; Emerson, 1962). This interdependence is a strong motivator for companies to take proactive measures during disruptive situations, emphasizing the need to preserve and strengthen supplier relationships. The literature concurs that the stability and resilience of the supply chain hinge on the quality and robustness of these relationships, making them instrumental not only in normal operational conditions but especially vital in times of disruption. The literature underscores that the depth and strategic management of supplier relationships play a critical and beneficial role in navigating and mitigating the impact of supply chain disruptions.

In supply chain disruptions, the motivation for companies to take action is influenced by various factors. One such determinant is the perceived impact of disruptions, where the company's motivation to act increases proportionally with the escalation of expected losses (A. D. Meyer, 1982). Expecting risks in disruptive scenarios often compels companies to reassess and adapt their practices and regulations to enhance resilience and responsiveness (Zakay, Ellis, & Shevalsky, 2004). This proactive adjustment manifests the company's motivation to navigate and mitigate the potential consequences of disruptions.

Additionally, the concept of Supply Chain Disruption Orientation (SCDO) is crucial in influencing motivation. Bode et al. (2011) define SCDO as a firm's overall awareness, consciousness, concerns, and recognition of the opportunities to learn from supply chain disruptions. According to the authors, a positive relationship exists between an organization's heightened orientation toward supply chain disruptions and its motivation to respond, prevent, mitigate, and recover from such disruptions (Bode et al., 2011, p. 9). This underscores the importance of an organization's proactive stance and preparedness in the face of disruptions, driven by an acute awareness of the potential risks and a commitment to learning and improvement.

By analysing critical elements that motivate organizations to act during disruptions, the researcher can differentiate them. A disruption’s impact depends on its nature and strength and how it affects a firm; therefore, the possibility of controlling disruptions is low. This

factor is compared with the other two factors—a firm's dependency on supply chain partners and SCDO—that can be influenced and changed by national culture. The nature of these two elements is more related to a firm, its workers, its strategies and its decisions than the nature of disruption itself.

2.3.3 Supply Chain Disruptions and Supplier Relationships

The literature on supply chain disruptions and supplier relationships provides valuable insights into the challenges posed by natural and man-made threats and the strategies employed to mitigate their impact. Natural disasters such as earthquakes, floods, and pandemics, as well as man-made threats like fires, terrorism, and strikes, can trigger disruptions in supply chains (Ivanov, 2017). The effects of these disruptions can extend beyond the immediate supply chain structures, causing a ripple effect in wider supply chain networks (Dolgui, Ivanov, & Rozhkov, 2020; Levner & Ptuskin, 2018).

To mitigate the impact of disruptions, Dolgui, Ivanov, and Sokolov (2018) identify four key elements—redundancy, resilience, flexibility, and robustness. Resilience, defined as the ability to adjust to disruptions and risks, forms the foundation for building a resilient supply chain, often involving redundancy, flexibility, and robustness. Proactive planning and execution in the design and planning stages are recommended to ensure robustness in the supply chain (Dolgui et al., 2018).

Strategic information acquisition and sharing are proposed as solutions to supply chain disruptions related to costs and risks (Wakolbinger & Cruz, 2011). Wakolbinger and Cruz (2011) focus on the effectiveness of supply chain risk-sharing contracts, analysing supply chain performance using a three-row model. Information sharing is identified as a critical antecedent in managing supplier relationships during supply chain disruptions. However, the benefits of information-sharing activities may depend on the negotiation power of participants and the nature of risk-sharing contracts.

Ivanov and Dolgui (2019) suggest a new approach to supply chain disruptions, emphasizing reduced dependence on certainty of knowledge about environmental changes. The unpredictability of disruptions calls for designing supply chains with a low need for certainty. Integrating the concepts of resilience and efficiency is recommended to enhance each other's effects, moving away from solely relying on prediction and reaction perspectives.

The literature includes a case study on Aisin Seiki, a Japanese company that successfully navigated a disruption in February 1997. Aisin Seiki's main factory caught fire, disrupting service for Toyota, its primary client, and its suppliers. Despite theoretical expectations of a prolonged recovery, collaboration among 62 companies, including competitors, facilitated a remarkable recovery within nine days (Beaudet & Nishiguchi, 1999). This case underscores the significance of relationships between firms and their suppliers in overcoming disruptions, emphasizing the unique links that can enhance an organization's ability to manage disruptions effectively.

Successful cases of overcoming disruptions are attributed to critical elements, including strong relationships between firms and their suppliers (Sheffi, 2005; Whitney et al., 2014). Unique links between focal companies and suppliers are considered crucial strengths, enabling organizations to navigate disruptions with minimal losses (Sheffi & Rice Jr, 2005). However, supplier relationships are also identified as primary sources of risk in supply chain discontinuity, alongside transportation, manufacturing, and product quality (Kleindorfer & Saad, 2005). Disruption risks from suppliers encompass communication issues and financial instability, which can lead to severe disruptions unless addressed promptly (Wagner & Bode, 2008). The literature presents divergent opinions, with some studies advocating for close and deep relationships with suppliers, while others recommend less connected relationships to minimize expected risks (Christopher, Mena, Khan, & Yurt, 2011; Zsidisin & Wagner, 2010).

2.3.4 Learning from Previous Experience and Supply Chain Disruption Orientation

Organizational learning and information sharing are fundamental elements that sustain an organization’s supply chains (Cheng, 2011). These critical aspects include internal and cross-organizational processes (Bode et al., 2011). Learning, particularly from experience, has been identified as essential in business continuity planning (BCP) systems (Chapman, Christopher, Jüttner, Peck, & Wilding, 2002). Considering how experience increases the information and awareness of an organization during times of disruption, the role of learning from previous experience has become more crucial for planning and mitigating disruptions. Moreover, an organization’s ability to learn reflects its ability to support effective planning and mitigation strategies in supply chain disruptions (Ellinger et al., 2015). Therefore, it is a critical element in BCP logistics (Ojha & Gokhale, 2009).

Learning is also an essential element in many other disruption studies, such as that by Revilla and Sáenz (2014), who contributed to one of the most cited frameworks for supply chain disruption management; it was presented by Kleindorfer and Saad (2005), where they suggested adding learning from experience loop as an additional stage called 'learning feedback' to the model. 's (2014) suggestion was the result of several criticisms. While the framework has better-enabled firms to manage disruptive situations, it does not consider a firm's preparations for future disruptions. Thus, the authors verified the importance of the learning feedback stage by explaining that it benefits a firm and supports its supply chain partners in managing and preparing for future disruptions. Learning from experience, represented by the feedback stage, also allows for understanding corrective processes in disruption management.

Supply Chain Disruption Orientation. The supply chain disruption literature also emphasizes learning from experience as an essential element of SCDO, which is described by Bode et al. (2011) as 'a firm's general awareness and consciousness of, concerns about, seriousness towards, and recognition of the opportunity to learn from supply chain disruptions' (pp. 9). SCDO aids in developing supply chain resilience, as organizations with this orientation will be more informed about disruptions based on previous experience. The authors state that this knowledge serves as motivation to act during disruptions. However, they also prove that SCDO affects the selection of mitigation strategies during disruptions.

In the literature on SCDO, some authors have explored the role of learning mechanisms in building supply chain resilience. For example, Scholten, Sharkey Scott, and Fynes (2019) study how firms can adapt their routines and learning mechanisms to build resilience. This study relies on in-depth qualitative case studies of five companies and 28 interviews. The findings reveal six learning mechanisms (preparation learning, anticipative learning, situational learning, collaborative learning and experience learning) and their antecedents that firms can use to improve their supply chain resilience. These learning mechanisms cover three main phases of supply chain disruption—preparation, response and recovery. Scholten et al. (2019) show that intentional and unintentional learning in the three phases of disruption can reduce the impact. Learning brings awareness, which facilitates the adaptation of firm routines to deal with changes. This study highlights earlier assertions that attention to knowledge transfer, especially in vicarious and collaborative learning across supply chains, is an effective response to disruptions (Chowdhury & Quaddus, 2016).

Crises are some of the key causes of delays in supply chain management that result in changes to the internal structure of organizations. Torgaloz, Acar, and Kuzey (2022) discuss how the COVID-19 pandemic had a negative impact on the global supply chain and, thus, the inherent organizational structure of firms. The authors investigate the likely impact of organizational learning culture and decentralization on supply chain collaboration post-COVID-19. Data collected from questionnaires distributed to 245 respondents was analysed using SEM. The study focuses on how organizational learning capabilities influence supply chain collaboration in the context of the COVID-19 pandemic. The results show that culture has a major impact on supply chain collaboration. Unlike previous literature, this study explores how intangible organizational resources help improve the relationships between a firm and its suppliers.

Furthermore, considerable research has suggested that organizational learning is generally affected by its culture. The cultural context influences workplace learning development, evaluation and implementation (Felstead et al., 2009; Marquardt et al., 2004). As affirmed by Dodgson (1993) and as cited in Torgaloz et al. (2022), organizational learning is a critical tool for larger organizations as they try to develop systems to make them adaptable to change. Indeed, a learning culture is a turning point that creates awareness concerning the need for change, thus creating the capability for collaboration with key suppliers in the supply chain. Moreover, a learning culture is vital in enabling organizations to remain competitive and in itself is a source of competitive advantage. Hence, it is assumed that learning from disruption experience is part of organizational learning that is suggested to be influenced by culture. However, there is no indication in the literature that national culture influences learning from experience as a part of SCDO. Therefore, this research investigates the effect of national culture on this factor, which is considered influential in the disruption mitigation process (e.g. Ellinger et al. (2015); Revilla and Sáenz (2014); Bode et al. (2011)). As the value of learning and approaches such as SCDO is increasing, the following section attempts to establish their conceptualization in past research within the broader context of the role of national culture in supply chain disruptions.

2.4 Relationship Between Culture, Supplier Relationships, Disruption Orientation and Supply Chain Disruption

2.4.1 Culture and Supply Chain Operations

During the past few decades, a large and growing body of literature has investigated culture and how it can influence operations management. Some of the most recent studies have focused on the relationship between national culture and supply chain management, investigating areas such as collaboration (Boscari, Bortolotti, Netland, & Rich, 2018), supply chain performance (Han, Huang, & Macbeth, 2018), strategy (Lee Park & Paiva, 2018), integration (C. W. Wong, Sancha, & Thomsen, 2017), contracts among a chain's partners (Lee et al., 2018) and disruptions (Durach & Wiengarten, 2017). The effect of culture on quality management (QM) within supply chain management is reflected in approaches such as Total Quality Management and ISO 9001 (Kull & Wacker, 2010; Wiengarten, Fynes, Pagell, & de Búrca, 2011).

Kull and Wacker (2010) confirm how QM is influenced by aspects of national culture, while Durach and Wiengarten (2017) investigate the role played by national culture in on-time deliveries and late delivery risk. Lee Park and Paiva (2018) highlight that operations strategy (OS) and operations management (OM) processes differ based on the culture within which the business is located. National culture is a crucial aspect of OS processes, contradictory to previous research that did not consider cultural aspects. The authors compared OS in 150 manufacturing plants in four countries. Their work was based on the High-Performance Manufacturing (HPM) fourth-round project database and Hofstede's cultural theoretical framework. Without a doubt, the findings of this study are significant for international supply chain performance. The study helps managers better understand the social aspects of their global supply chain partners, which will lead to more effective OM. The study's main weakness is that the data used was selected from the HPM project and collected from manufacturing plants only. Each dataset represented one plant and the culture in which it was operating.

In the interest of understanding the effect of culture on OM, it would be more valuable to analyse all supply chain partners. This would provide a better understanding of the impact on operations in general. In another study linking national culture with operational research, Lee et al. (2018) examine the influence of national culture on bonus and penalty incentive contracts in exchanges within supply chains. The authors organized laboratory experiments in

three countries with different cultures. The data were collected from university students in Canada, China, and South Korea, and two incentive structures were used: bonuses and penalties. The results revealed the influence of culture on contracts and negotiations within supply chains. One major drawback was that the experiments were conducted with university students with an average age of 20.6 years, and some participants lacked work experience. Therefore, they were not associated with any organization. Another shortcoming of the experiment was that it was conducted at a national level and not across countries. The study initially suggested it would examine the effect of national culture, meaning cross-culturally, in the exchange process of international supply chains. However, the students were from one country and went through the experiments individually. Therefore, the results for all the students from the same country were collected and compared with the results of the other two countries, and this may not have captured the entire context of the cultural impact.

Recently, Alofan, Chen, and Tan (2020) investigated the role of national and organizational culture on the differences between multinational companies' headquarters and subsidiaries regarding management innovation adaptation. The data was collected from many multinational enterprises in Saudi Arabia, and the authors focused on implementing TQM. The findings show that various organizational and national culture structures result in differences in the application of practices when management practices are transferred from headquarters to subsidiaries worldwide. The authors emphasized that management innovations transfer differences by altering two fundamental conditions: fidelity and extensiveness. It shows the vital role of these two factors in management practices moving from headquarters to their subsidiaries worldwide. This study also provided deep insight into the specific role of culture, represented in the limited effect of national culture on extensiveness. However, it does not show any effect on fidelity. Perhaps the most serious disadvantage of this study is that it involved multinational enterprises' subsidiaries located in Saudi Arabia only, assuming that TQM practices were created at the headquarters. The authors did not compare subsidiaries in another country to prove that differences arise from different cultures. Therefore, due to the international expansion of supply chains, more signs of the cultural impact on various aspects of supply chains will emerge, particularly when supply chains include firms from many countries and thus with different national cultures.

There is implicit emphasis in the supply chain disruption literature on the role of culture when explaining some supply chain disruption stories, for example, in the study by Beaudet and Nishiguchi (1999), who referred to the flexibility of Japanese companies as the main element in the success of the Aisin Seiki case, and in Sheffi and Rice Jr (2005)'s claim of 'the

right culture' as a flexibility facet. Few researchers have explicitly discussed the link between culture and supply chain disruption. Durach et al. (2017) investigated the causes of disruption and supply chain management for Chinese suppliers and identified 22 causes of disruption between Chinese and Western organizations. They suggest 43 strategies to mitigate disruptions based on strategic supplier relationships with Chinese firms specifically. They indicate cultural differences as one of the main reasons for disruptions between Western and Chinese partners, in contrast with previously mentioned cases that found culture is a success factor.

This study's cultural differences influence a firm's perceptions and reactions, eventually creating misunderstanding and miscommunication between suppliers (Lee et al., 2018). These contradictory findings about culture's impact do not negate culture's effect on supply chain disruption but confirm it. The nature of this impact and its role in supply chain disruption require further investigation. Durach et al. (2017) state that material fragility causes supply chain disruptions flows in supply chain networks. Furthermore, changes in consumer preferences, price sensitivity and product life cycles, among other competitive pressures, drive the search for local supplier partners to bolster competitiveness. However, the disruption risk is not curtailed by opting for alternative suppliers (Bode & Wagner, 2015). In the face of such changes, the research shows that national culture impacts business and individual commitment and the overall relationship (Cho, Thyroff, Rapert, Park, & Lee, 2013). This impacts the efficacy of a company's operational strategies and the effectiveness of interactions during a disruption.

Busse, Schleper, Niu, and Wagner (2016) exemplify the scenario investigating the cultural disparities between Western buyers and Chinese suppliers. They reveal that in such a relationship, the Chinese suppliers' flexibility and orientation clashed with the Western enterprises' fundamental, structured working procedures, thus hindering the potential for the relationship to thrive. Further research demonstrates that ensuring effective coordination between supply partners is an ideal strategy to reduce the negative impact of supply chain disruptions and enhance supply chain efficiency. This facilitates improved availability of information for better decision-making (Tang, 2006). In this context, Kraude, Narayanan, Talluri, Singh, and Kajiwara (2018) recognize that managers are responsible for interpreting and making decisions based on their cultural lenses and the environment. One's cultural lenses determine the code of conduct and management strategies. Thus, managerial risk mitigation actions are influenced by the managers' culture. For instance, it is clear from

comparison studies between Japanese companies and American manufacturers that the former use intimate Keiretsu partnerships, which have risk implications.

The Japanese business culture, evolving post-World War II, profoundly shapes the motivation behind supply chain strategies (Kraude et al., 2018). Cross-cultural disparities emerge as potential sources of misunderstandings, complicating supply chain disruption mitigation and becoming disruptions in themselves. Managerial perspectives on risk mitigation vary across countries and different supply chain levels (Naor et al., 2010).

Kraude et al. (2018) conducted a quantitative study in Japan, the US, and Australia, revealing marked differences in risk perception and mitigation tactics. While the US and Australia showed few disparities, Japan exhibited unique patterns, emphasizing cultural influences on decision-making. Notably, redundancy and flexibility, vital mitigation methods, have distinct cultural implications. Sheffi and Rice Jr. (2005b) stress that building redundancy and flexibility into the supply chain enhances resilience. However, cultural nuances impact decisions on redundancy and flexibility, affecting risk management across the supply chain (Weber & Hsee, 1998).

Understanding cultural variations in risk perception is crucial as it shapes the context for risk management strategies. Cultures influence how organizations perceive and mitigate risks, providing buffers against disruptions based on exposure levels. The study sets the stage for our research by illuminating how cultural dimensions influence managerial decisions in mitigating supply chain disruptions.

2.4.2 Relationship between Culture, Supplier Relationships and Disruption Orientation

Culture and Supplier Relationships. A national culture underpins the culture of firms located within that country. It impacts behaviours and norms (Cho et al., 2013; G Hofstede et al., 1991; Waldman et al., 2006), thus creating differences between partners and suppliers from various countries. Therefore, the distance between these suppliers is geographical and cultural. The cultural differences between firms in a supply chain can make it difficult to establish solid and close relationships with partners recommended by research to achieve maximum advantages (Styles & Ambler, 2003). Cultural distance between suppliers has been investigated by several authors, who have identified several issues arising from cultural gaps, including different perspectives on business ethics, decisions and practices (Busse et al., 2016; Hewett, Money, & Sharma, 2006; Geert Hofstede, 1980; O'Reilly & Chatman, 1986; Tse, Lee, Vertinsky, & Wehrung, 1988; Wiengarten, Gimenez, Fynes, & Ferdows, 2015).

Culture differs from one society to another. Therefore, organizations must appreciate and understand cultural nuances (Fellows & Liu, 2020). Supply chains integrate many organizations to create the flow of goods and services from firms in different countries. Thus, to have a productive supply chain, each supply chain partner must have an in-depth understanding of each other and of the countries in which they are located (Lee et al., 2018), including the culture and its various elements (e.g. language, beliefs, behaviours and values; Fellows and Liu (2020). It is also essential to understand the management practices of these firms, as management philosophies that suit one culture might not suit others (Geert Hofstede, 1994b).

The role of national culture in supplier relationships has been highlighted in the literature. After reviewing several studies, we see that many disadvantages and misunderstandings occur between suppliers as a result of cultural differences (e.g. Hewett et al. (2006); Han et al. (2018)). Researchers have identified the effect of cultural differences between suppliers, how they can impact their regular transactions and the outcomes of these differences, including miscommunication, misunderstanding and differing expectations. If these issues are experienced during regular transactions among suppliers, this implies that these issues also occur during supply chain disruptions. Duong and Chong (2020) recognize culture as an influential factor in supplier collaboration during disruptions. Based on that, we assume that cultural differences between partners might have a more intense effect in disruptive circumstances than during normal circumstances, and their impact can also affect the way companies deal with disruptions in supply chains.

Culture correlates with each supplier relationship dimension (commitment, communication, conflict resolution, relational norms, and trust). In terms of communication, national culture differences affect how supplier chain stakeholders communicate and relate. Chiang and Svensson (2010) found differences in communication styles and approaches between high-context and low-context cultures. For example, the Chinese are indirect in how they convey messages. They tend to talk about things and hardly say no. In effect, one has to read between the lines and listen keenly to get the real meaning when communicating with Chinese counterparts in a supply chain.

Similarly, differences in communication in national cultures influence information flow during negotiations. In the context of Hofstede's cultural dimensions, there are remarkable differences in information flow between individualistic and collectivist cultures. For example, the Chinese culture is more collectivist, and it is natural for people to care about others' opinions and feelings when making decisions. This is contrary to Western culture, which is more individualist and where people are more likely to make independent decisions (Yates & De Oliveira, 2016). Due to the inherent cultural differences, as exemplified in Hofstede's cultural dimensions and GLOBE, decision-making, resource distribution, trust building and information flow are affected. Consequently, cross-culture communication is critical in achieving success in cross-cultural situations.

Several other studies have been conducted concerning culture and the dimensions of trust and commitment in supply chain relationships. The development of culture is based on cognitive criteria, such as competence, reliability and credibility, which lead to cognitive confidence (El Akremi, Ikram Nasr, & Sassi, 2007). In collectivist cultures, ties and a predisposition to support are strong. Thus, supply chain partners in those cultures tend to build strong ties, and the community takes precedence over the individual. In effect, building trust among the partners becomes about emotional biases (El Akremi et al., 2007).

Additionally, masculinity vs. femininity has implications concerning trust in the supply chain. Geert Hofstede (1994a) states that masculine cultures have high levels of aggressiveness, masculine values and an emphasis on material success. These tend to promote autonomy, individualism and competition, which in turn promote opportunistic behaviour at the expense of others. This contradicts feminine cultures, where roles are interchangeable between men and women because members are supposed to be gentle and humble. In such settings, affect-based trust is common. In masculine cultures, trust-building in the supply chain is based on logic.

Trust and commitment are important tools for strategic partnerships in any supply chain, as 'mistrust breeds mistrust' (Zhou, 2012). Trust is the major determinant in building committed relationships in supply chains. Indeed, Laeequddin, Sahay, Sahay, and Waheed (2010) argue that it is a prerequisite for the successful commitment of both customers and the various levels of suppliers. Unless commitment is translated into actionable commitment, there will be fewer economic gains from supply chain management. In effect, there is a need to better research the nexus between the level of trust and the degree of commitment.

The study by Griffith and Myers (2005) is one of the few to examine the idea of relational norms in supply chain relationships. The study focuses on the influence of the strategic fit of relational norm governance techniques in international supply chain partnerships between US organizations and Japanese partners. The findings suggest that company performance improves when the relational norms of information sharing fulfil the national culture relational norm expectations.

Another key aspect of supplier relationships is conflict resolution. Wolf Wolf and Pickler (2012) find that conflict intensity and resolution are critical in supply chain management. The prevalence of conflict does not necessarily lead to dysfunctional outcomes. However, proper conflict resolution in supply chains can lead to functional outcomes (Rosenberg and Stern (1970) as cited in John and Prasad (2012). Supply chain stakeholders face numerous conflicts that call for constructive management and resolution. This process begins with identifying the sources of conflict and then creating proper interventions to ensure functional outcomes (John and Prasad (2012). Because mutual distrust and other difficulties sometimes exist in their relationships, supply chain members can have significant antagonism prior to and after collaboration. Several studies have examined conflict resolution in supplier relationships, such as Clemons, Baddam, and Henry (2021) study. The authors seek to understand the effect of different knowledge-sharing routines on effective problem resolution in supply chain relationships. The findings reveal that different ways of communication have different effects on effective conflict resolution in supply chains. For example, face-to-face communication slows the process of effective problem-solving, whereas swift communication facilitates resolution. In addition, management affects how quickly or slowly the conflict will be solved. The latter brings in an aspect of management closely tied to culture, and the two affect conflict resolution.

Durach et al. (2017) highlight the importance of culture in managing supplier relationships during disruptions. However, they focus only on Chinese culture without comparing it with other cultures. A comprehensive comparison between cultures will reveal

how culture can influence relationships between suppliers during disruptions, which can be used effectively in managing supplier relationships during disruptions. National culture has been indicated to influence specific aspects such as trust, communication and decision-making processes (Gupta & Gupta, 2019); however, there is a shortage of evidence that this influence is also valid during disruptions. Durach et al. (2017) made one of the first attempts to show the impact of culture on supplier relationships during supply chain disruptions. However, such studies have many limitations that prevent them from showing the impact of culture in a general and transparent way because they focus on one culture or one aspect of the relationships (e.g. trust). Therefore, this work extends the research on the impact of culture on supply chains (Gupta & Gupta, 2019) by focusing on all the elements of supplier relationships that are impacted by national culture.

Culture and Supply Chain Disruption Orientation. Fellows and Liu (2020) attempt to describe the relationship between culture and supply chains. They state that:

> Culture pervades all our lives: we experience and 'do' culture every moment; culture conditions our behaviour, and, in turn, our behaviour modifies culture. Culture determines how we communicate, relate to other people, regard property, interact with the environment, and view time. (Fellows & Liu, 2020, p. 167).

Building upon this, the researchers illustrate the link between national culture and supplier relationships, as this explanation of culture is deeply rooted and can be extended and adapted to identify more links between culture and various organizational and supply chain aspects in general. Several studies have suggested that learning in organizations, in general, is affected by culture, and these studies have indicated that workplace learning development, evaluation and implementation are influenced by the cultural context (Felstead et al., 2009; Marquardt et al., 2004). Like supplier relationships, SCDO is also affected by culture, as SCDO is part of a firm's learning from experience with disruptions. Learning from previous experience with disruptions depends on a firm's employees' consciousness. It relates to their way of learning and how they dealt with disruption and learned from their previous mistakes. Fellows and Liu (2020) state that culture is rooted in all worker entities and influences their societies.

Although there is consensus regarding the relationship between culture and SCDO, there is insufficient investigation into the connection between these concepts. The current literature shows that decisions such as sales forecasts, sales and exports, and selling or

purchasing differ from country to country. They largely depend on where a company is located. Chung et al. (2015) contend that cultural frameworks are essential to successfully implementing supply chain techniques amid disruptions. Ryu et al. (2006) study the effect of the collectivist/individualist component and long-term orientation in decision-making. In the Korean context, the researchers established that companies in countries with a collectivist culture excel at managing long-term supplier relationships compared to companies in the West, where individualistic cultures predominate. Jungbae Roh, Hong, and Park (2008) contend that national cultures are to blame for the disparities in productivity between Japanese and American businesses.

(Wiengarten et al., 2011) investigate the moderating role of Hofstede's cultural dimensions and how they influence the quality process and management. These dimensions significantly impact a firm's effectiveness in responding to supply chain disruptions. Individualism moderates the investment in quality and the facilities themselves, while masculinity and uncertainty avoidance moderate the quality practices. McGinnis, Spillan, and Virzi (2012) state that businesses have distinctive logistics techniques due to cultural differences, as seen in Guatemala and the US. Connections between national culture and innovation, overall quality management and supplier selection (Rujirawanich, Addison, & Smallman, 2011); national culture and product development (Nakata & Sivakumar, 1996); and national culture and product characteristics (Dikova, Sahib, & Van Witteloostuijn, 2010) have also been revealed in the literature. Innovation is more perceptible in organizations in cultures with high uncertainty avoidance, collectivism, power distance, and low femininity vs. masculinity, as observed by Kaasa and Vadi (2010). Dowty and Wallace (2010) have found that cultural orientation is key when deciding about supply chain disruptions. Managers in the supply chain apply their cultural biases in their interactions with organizations from different countries. Dowty and Wallace (2010) outline how four cultural biases—fatalism, egalitarianism, hierarchism and individualism—affect management performance and firm interactions.

In this context, there is a need to understand differences in risk perceptions and management in the global supply chain. It is recommended that companies adapt their supply chains to local cultures to succeed (Jia & Rutherford, 2010). To that end, variations in risk perceptions among different cultures need to be studied to understand the implications of cultural orientation on approaches to designing and configuring supply chains. As indicated by Kumar, Liu, and Demirag (2016), ensuring supply chain continuity after a disruption demands understanding the sources of the disruption, the risks and the strategies that can be

implemented to resolve the situation. This necessitates action by managers who are influenced by their culture and environment. Based on the findings of this study, it is evident that there is a link between culture and SCDO. However, the literature review demonstrates that learning from previous experience with disruption depends on a firm's employees' consciousness. Thus, effective management of supply chain disruptions relies on one's way of learning from previous mistakes. Fellows and Liu (2020) state that culture is rooted in all worker entities and influences their societies. Existing literature has examined the risk perceptions and management dimensions relating to SCDO. Culture has a major influence on both management effectiveness and interactions between companies. In this context, there is a need to understand the differences in risk perceptions and the global supply chain management. Given that there are variations in risk perceptions among different cultures, studies on the effects of national culture on approaches to designing and configuring supply chains and on dealing with disruption are imperative.

2.4.3 Culture and Supply Chain Disruption in the Oil, Petrochemical and Gas Industry

Culture and Supplier Relationships in the Oil, Petrochemical and Gas Industry. The oil, petrochemical, and gas globalisation has forced companies to operate in many countries and deal with different national cultures. Recent studies on the oil and gas industry have considered culture and focused on safety culture as a result of the risky nature of the industry. Safety culture is an aspect of organizational culture that includes shared values, norms and practices mainly focusing on risks and safety (M. D. Cooper, 2000; Guldenmund, 2000; Reader, 2019). For one to understand the safety culture in the oil and gas industry, it is necessary to understand the dynamics of this industry, as explored in the literature.

The oil and gas industry has many players with different positions regarding access to consumer markets, resources, capital availability, technology and expertise (Edwards, Ishaq, & Johnsen, 2010). All these can be categorized into operators, suppliers, main contractors and sub-contractors. Even though the industry is characterized as one linked industry, it has many firms from different backgrounds, each representing multiple cultures and areas of expertise (Dauda & Yusuf, 2009). As a result, many external and internal forces influence the inherent risk management culture. The supply chain in this industry has three main sections. First, there is the upstream section, which entails exploration and production. Its main purpose is to find and produce oil and gas. Second, the companies in the downstream section produce oil and gas and market the refined products to the public and other corporate

consumers. Third, the midstream section is distinguished into storage and distribution.

Safety culture has been linked to national culture, as it tends to differ by country, and this difference is evident in international companies located in and operating in more than one country (Noort, Reader, Shorrock, & Kirwan, 2016; Reader, 2019; Tear, Reader, Shorrock, & Kirwan, 2020). Different studies have examined specific elements of safety culture, and these elements—such as communication—are also associated with national culture (Reader, 2019) and power distance (Tear et al., 2020). Gao, Fan, Wang, Li, and Pei (2019) have identified communication and coordination as one of four practices of safety management, followed by safety training, organizing responsibilities and procedures and inspection and monitoring. Communication is considered an essential element of safety practices (Mearns et al., 2013; Reader, Noort, Shorrock, & Kirwan, 2015), but it also varies with national culture (Reader, 2019). Moreover, Tear et al. (2020) have associated safety culture with national culture by focusing on power distance. In that study, the authors conclude that variation in power distance between nations, which has its roots in differences in national culture, influences safety culture and causes dissimilarities in the practices and applications of safety procedures. Tear et al. (2020)'s and Reader (2019)'s suggestions regarding the influence of national culture on safety culture contradict with the study by Mearns and Yule (2009) in which the authors state that national culture does not influence safety culture as much as other factors, such as safety measures and management's commitment to safety. Such inconsistency in research findings necessitates more research to examine the less-explored influence of national culture on safety culture (Reader, 2019). This will be valuable in industries such as the airline and oil industries.

In summary, there is little research conducted on the nexus between culture and supplier chain disruption in the oil and gas industry. Most of the studies have focused just on the supply chain's sustainability, considering the three stages of the supply chain (Ahmad, de Brito, Rezaei, & Tavasszy, 2017). In addition, many studies focus on safety issues in the supply chain, risk management and economic and environmental issues affecting the supply chain. Nevertheless, there is consensus that companies in this sector operate in a unique context and culture that influences their strategies to reorient the supply chain after a disruption (Gillespie, 2014). Internal and external factors influence the determinants of corporate strategy in the face of supply chain disruption. The internal factors consist of the firm's capabilities and limitations, and the external factors are the environmental threats and opportunities. The approach taken is influenced by the context and culture of the supply chain

in the host country. Therefore, further research is needed in this area to consider the context and culture.

Supply Chain Disruption in the Oil and Gas Industry. The oil and gas industry trades approximately 70% of its products and services globally (BP, 2018), and just like any other industry today, it is undergoing massive disruption. The world experienced considerable disruption due to the COVID-19 pandemic, and the demand for oil and gas decreased substantially. This led to a decrease in prices, resulting in losses expected to reach $1 trillion by the end of 2020 (Turak, 2020). This disruption is similar to the one caused by the Severe Acute Respiratory Syndrome outbreak 2013, when supply and demand in the oil markets were highly unstable. Such disruptions cost the international market a tremendous amount of money. This is mainly due to the nature of the oil and gas supply chain, as disruptions in tight-knit systems affect all partners. Disruptions in the oil and gas industry also affect other industries (Yuan et al., 2020), such as the food, iron, steel, and clay and stone industries (Kitamura & Managi, 2017). The long reach of the oil and gas supply chain exposes it to additional disruptions.

The oil and gas industry's continuous evolution and dynamic nature present numerous challenges to effective coordination during and after a disruption. Members of this supply chain cannot act independently because products pass through multiple chains that add value to them before they are consumed (Yusuf et al., 2014). In addition, due to globalization, reduction and outsourcing within the supply chain increase risk and expose the oil and gas supply chain to uncertainty. This makes the oil and gas supply chain susceptible to disruptions. To understand the evolution of supply chains, such as the oil and gas supply chain, T. Hill (2000), cited in Yusuf et al. (2014), states that firms hardly possess the activities and resources essential for producing their goods. Ramdas and Spekman (2000) argue that the goods purchased account for 50%–70% of a firm’s manufacturing potential; therefore, a firm’s competitive advantage depends on its supply chain network. On this premise, the oil and gas industry’s competitive advantage is its ability to forge supply networks and safeguard those networks from disruptions in the business environment (both internal and external). Loasby (1998) notes that businesses rely on supplier competencies, while non-retail companies rely on the ability of retailers to connect to customers. In actuality, various value stream activities within the oil and gas industry are not undertaken by the companies themselves but are outsourced to external suppliers. This underscores the need to manage disruptions effectively within the supply chain to increase value, competitive

advantage and firm performance. Effective management of supply chain disruptions in the oil and gas industry is of great important in achieving supply chain competitiveness.

Some of the largest oil reserves in the world are located in places with severe climate or ongoing conflict, such as the Middle East and the Persian Gulf (Huntington, 2018), or in regions commonly affected by natural hazards. Hurricanes regularly hit areas such as the Gulf of Mexico and the US states that border it (Florida, Alabama, Mississippi, Louisiana and Texas). This region is responsible for over 50% of US oil production (Wagner, Mizgier, & Arnez, 2014). Such risks expose the oil and gas supply chain to many disruptions and make supply chain safety critical. Such risks should be taken into account to secure the international energy supply and prevent or minimize disruptions that lead to enormous cost increases. Several studies have examined the security of the oil industry in different countries. For instance, C. Zhao and Chen (2014) characterized the risks to China's oil security as having three main dimensions—financial, energy flow and environmental. They concluded that all potential risks arise from the current threat to Chinese oil security, and all risks are related. Based on the above, it can be said that the oil and gas industry is highly affected by supply chain disruptions.

2.5 Research Gap

The literature on supply chain disruptions from the previous two decades focuses extensively on the operational aspects of supply chains relating to sustainability, strategies, resilience, design and the locations of the chains (Wagner & Bode, 2006; Xu et al., 2020). There is also a significant focus on disruptions in terms of how they occur and how to identify them to plan recovery and mitigation (e.g. Tomlin (2006); Craighead et al. (2007). However, little attention has been paid to understanding the nature of disruptions and the related social aspects. It seems that national culture plays a crucial role, but it been identified only implicitly and has not been examined explicitly (e.g. Beaudet and Nishiguchi (1999); Sheffi and Rice Jr (2005); Sheffi (2005); Zsidisin and Wagner (2010); Revilla and Saenz (2017). There is a need for empirical evidence and to pay explicit attention to the role of national culture in supply chain disruptions by examining the human side of supply chain management. According to the literature review conduced as part of this study, the lack of sufficient knowledge on the implied role could impair existing supply chain risk management strategies. This study endeavours to bridge the gap in the literature by explicitly focusing on the role of national culture in supply chain disruptions. A qualitative approach to exploring

the relevance of the concepts relating to supply chains helps to clarify the most recurring themes, given the shortcomings identified through the literature review analysis. The findings obtained using this approach will advance existing understanding of the impact of national culture on the correlation between supplier relationships, SCDO and the impact of supply chain disruptions and helped in modelling the quantitative phase.

After considering all available evidence relating to supplier relationships and reviewing studies on supply chain disruption, to the best of the author's knowledge, an empirical investigation of the impact of culture on supplier relationships during supply chain disruptions is missing from the literature. As mentioned above, the need for empirical evidence in the field is significant. Human beings represent a considerable, if not the most critical element of successful supply chain management (Anastasiou, 2012; Gómez-Cedeño, Castán-Farrero, Guitart-Tarrés, & Matute-Vallejo, 2015; Hohenstein, Feisel, & Hartmann, 2014). Research and practice need empirically accurate and relevant evidence of how human beings—given the underlying concept that they behave respective to their national cultures—might impact supply chain relationships and on their role in disruption outcomes. This research addresses this gap by highlighting the critical role of national culture in supply chain disruptions. The comprehensive empirical investigation focuses on two factors that motivate companies to act during disruptions (i.e. supplier relationships and SCDO). The study participants represent many national cultures, and thus this study is differentiated from existing research that only addresses a single culture. The impact of national culture on supplier relationships is based on the effect of national culture on all the elements that create these relationships. The approach is to structure the concept of national culture as a mediator or moderator of the relationship between supplier relationship elements, SCDO and supply chain disruption to evaluate its implied impact. The supplier relationship elements are identified and combined based on how they are affected by national culture (e.g. commitment, trust).

This study examines the influence of national culture comprehensively, which distinguishes it from previous works that examined the impact of national culture on supplier relationships by studying the aspects of supplier relationships separately (Gupta & Gupta, 2019) and from works that paid insufficient attention to the impact of national culture on supplier relationships during disruptions. Therefore, this study provides the required comprehensive understanding of the impact of a firm's national culture and the national culture of its employees on supplier relationships in general, as it helps fill the knowledge gap and contributes to the literature by responding to several calls for more research covering

supplier relationship aspects in general and whether they vary across different countries (Patrucco et al., 2020). Further, this study aims to provide an understanding of the impact of national culture on supplier relationships during critical times and during disruptions.

Furthermore, the study investigates the cultural influence on SCDO. The connection between this concept and a company's response to supply chain disruptions has been recognized in the literature by emphasizing the essential role of SCDO in minimizing the impact of disruption by preparing organizations for future disruptions. To the best of the author's knowledge, no previous study has linked national culture with this SCDO. This is despite evidence showing that organizational learning, information exchange and other elements involved in the learning process are related to cultural orientation. To address this gap, further empirical evidence is needed to examine the relationship between national culture and SCDO. This research investigates the impact of a firm's national culture and the national culture of its employees on SCDO based on several indications, such as that workplace learning in general is impacted by culture and that the firm learning from previous disruptions is a form of workplace learning.

The literature shows that this topic has not received adequate attention in supply chain disruption and cross-cultural studies (Revilla & Saenz, 2017; Sheffi, 2005; Zsidisin & Wagner, 2010). For instance, Fellows and Liu (2020) state that national culture is an essential element influencing all aspects of life. This implies that a firm's way of learning from previous disruptions is also impacted by national culture. Further, Yang et al. (2021) find that supply chain risk management capabilities are better served by information processing abilities that enhance learning from previous and present events. The outcome of improved information processing and organizational learning is improved supply chain resilience (Yang et al., 2021). These findings implicate the learning capacity of an organization or organizations in a sector, such as the oil and gas industry. Considering the disruptions that followed the COVID-19 pandemic in 2020, the study anticipates that companies will have deployed a variety of measures to ensure that the events during the pandemic were analysed and effective strategies created to ensure supply chain resilience in similar future events. Various empirical studies show significant relationships between organizational learning capabilities and national cultures (e.g. Berrell, Gloet, and Wright (2002); Beyene, Shi, and Wu (2016); Nieminen (2005); Senker (1996).

As indicated, the literature highlights the significance of risk perceptions and organizational management in SCDO. Cultural biases influence the effectiveness of management and interactions between corporations (Kull & Wacker, 2010). For example,

one study points out that the supply chain relations between Chinese and Western companies are at risk due to cultural differences (Jia & Rutherford, 2010). Their argument is that companies must adapt to the culture of the local market to succeed. In this context, there is a need to understand differences in risk perceptions, and management of the global supply chain is a critical issue in supply chain management. Variations in risk perceptions among different cultures need to be studied to understand the implications of cultural orientation on approaches to the design and configuration of the supply chain. While a significant portion of the existing literature recognizes the centrality of management in solving supply disruption issues, few studies focus on the influence of culture in mediating the effectiveness of SCDO. An approach to this challenge would necessitate action from managers who are influenced by their culture and the environment. The need for empirical evidence linking SCDO to national culture and supply chain disruption is apparent. The present study bridges this gap by developing empirical insights to associate various constructs of national culture dimensions with the relationship between SCDO and supply chain disruption.

Specifically, this study empirically examines the impact of national culture on the disruptions in the oil and gas supply chain. The supply chain of the oil and gas industry encounters many risks in all the supply chain phases, as Urciuoli et al. (2014) indicate. As Hintsa (2010) states, it faces certain threats expected to cause disruptions, such as theft, sabotage, hijacking and piracy. In addition, due to globalization, reduction and outsourcing within the supply chain continue to increase the risk exposure of the oil and gas supply chain and to increase uncertainty within the chain. This makes the oil and gas supply chain susceptible to disruptions. In the contemporary business environment, firms hardly possess the activities and resources essential for the production of their goods (T. Hill (2000)as cited in Yusuf et al. (2014). Based on this, the oil and gas industry's competitive advantage remains its ability to forge networks and safeguard those supply networks from disruptions in the business environment (both internal and external). Given that most oil and gas industry activities are outsourced to external partners, there is a need to manage disruptions effectively within the supply chain to increase value, the competitive advantage and firm performance. Effective supply chain disruption management in the oil and gas industry is important in achieving supply chain competitiveness. The present study makes further contributions to existing knowledge by identifying and describing the national culture dimension with the most significance in influencing supplier relationships and SCDO in managing oil and gas supply chain disruptions.

Based on these considerations about disruptions in the oil and gas supply chain, there is no evidence in the literature about how culture influences supply chains. Based on the described characteristics and nature of this industry chain, we know that it involves many cultures and faces many disruptive events. However, to the best of the author's knowledge, there is no study that has examined the effect of culture on supply chain disruptions in the oil and gas industry. This is irrespective of the importance of this topic, the findings about which contribute positively to understanding and implementing the necessary strategies and integrations for the flow of goods and services in this critical industry.

2.6 Conceptual Framework

The following section introduces the conceptual framework for the present research, which was developed based on an extensive literature review and an analysis of the research problem. The framework provided a foundation for the study and guided the investigation to answer the research questions. The framework outlines the key concepts, variables and relationships examined in the study, providing a clear roadmap for the data collection and analysis.

2.6.1 Research Questions and Hypotheses

Based on the research gaps mentioned above, the present study aims to answer the following research questions:

- What is the influence of national culture in managing supply chain disruptions in the oil and gas industry?
- How does national culture influence the relationship between supplier relationships, SCDO and supply chain disruptions in managing supply chain disruptions in the oil and gas industry?
- What cultural dimension is the most influential in managing supply chain disruptions?

The second research question breaks to form the two hypotheses, the basis for the following conceptual framework:

- National culture dimensions mediate/moderate the relationship between supplier relationship dimensions and supply chain disruption.
- National culture dimensions mediate/moderate the relationship between SCDO and supply chain disruption.

The hypotheses imply that national culture dimensions are the mediator/moderator variables in the study. Supplier relationship factors and SCDO are the independent variables, while supply chain disruption is the dependent variable in the resulting relationships. The study draws from the conclusions and insights of past research to base subsequent activities on the following conceptual frameworks.

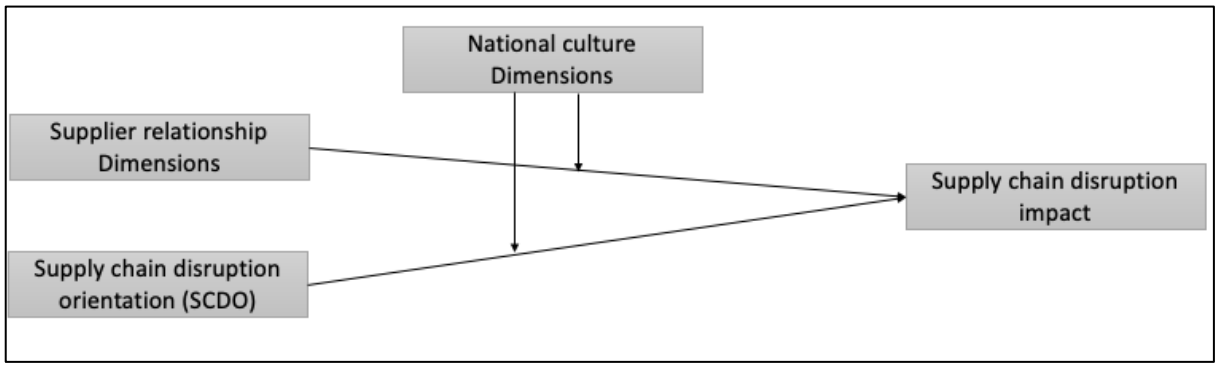

Figure 1 Conceptual framework 1

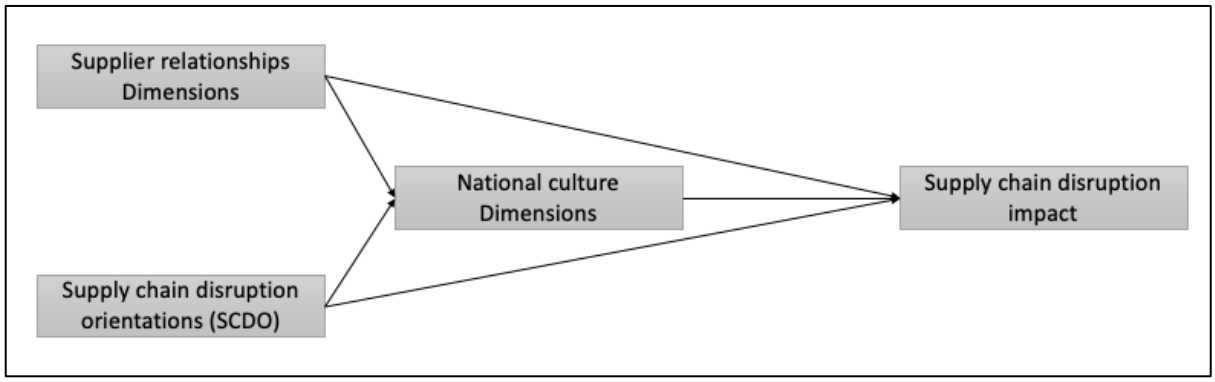

Figure 2 Conceptual framework 2

In Figure 1, the model implies that national culture dimensions act as moderators of the relationship between supplier relationship factors and the impact of supply chain disruption and between SCDO and the impact of supply chain disruption. Figure 2 shows how national culture dimensions act as a mediator of the relationship between supplier relationship dimensions and the impact of supply chain disruption and between SCDO and the impact of supply chain disruption. The frameworks follow the conceptual understanding of the mediating and moderating variables (in this case, the national culture dimensions), the independent variables (supplier relationship dimensions and SCDO) and the dependent variable (impact of supply chain disruption). Evaluating the variables in subsequent stages

helps to determine the implied impact of national culture on supply chain disruption through its effects on supplier relationships and the impact of supply chain disruption.

3. Research Methodology

This chapter consists of two sections. The first section initiates by elucidating the philosophical perspective of the research and the adopted research approach. It further outlines the methodological stance, illustrating the data collection strategies and design, along with an explanation of the research execution. The subsequent section comprehensively covers all aspects of the qualitative phase, from sampling to the data collection process and procedure. It then proceeds to detail the quantitative phase, offering insights into the quantitative instrument design and test, the sampling method for this instrument, and the quantitative data collection. Finally, the ethical considerations of both phases are comprehensively explained.

3.1 Research philosophy and method:

3.1.1 Research Philosophy

Researcher awareness of the philosophical perceptions that underpin issues under investigation is essential in management research. The philosophical perspective affects the overall examination and understanding of the research problem (P. Johnson & Clark, 2006). Therefore, three main themes are presented to explain the research philosophy of this study in order to understand the ontological perspective underlying the research assumptions. This is followed by an explanation of the research epistemology and axiology as the main means of viewing the research philosophy (Saunders, Lewis, & Thornhill, 2009).

3.1.1.1 Ontology

Ontology is how a researcher views the functioning and operation of the world to build upon those perceptions. It is based on the nature of reality and the researcher's assumptions about how the world operates (Creswell and Creswell (2017); Saunders et al. (2009). Two main positions must be considered when viewing reality—subjective and objective (Saunders et al., 2009).

Objectivism means that one reality exists that is separate from human interpretations, that social actor' perceptions are independent of social phenomena and unable to affect what is viewed (Saunders et al. (2009); Sale and Brazil (2004). Subjective means that reality differs based on the differences among individuals and that social entities are represented by the perceptions of social actors and cannot operate separately from those actors (Collis and Hussey (2003); Saunders et al. (2009).

3.1.1.2 Epistemology

Epistemology—which refers to a researcher's view of what comprises adequate knowledge and the process of obtaining this knowledge (Saunders et al., 2009)—is usually determined by research questions and can be characterized as postpositivism, constructivism, transformativism and pragmatism. These four paradigms or worldviews, as Creswell and Creswell (2017) call them, describe a researcher's beliefs that underlie their actions, which explain how the researcher views the world. This definitely affects the nature of research.

Postpositivism. The postpositivist or positivist paradigm represents traditional types of research, as it suggests a scientific method of knowledge creation. Positivist studies view phenomena via natural science methods, assuming that all relationships are transparent, while denoting a generalized law that explains these relationships (Guba & Lincoln, 1994). Thus, the knowledge in positivist studies is obtained specifically and carefully using particular numeric measures to support or reject a theory governing the research assumptions.

Constructivism. Constructivism or interpretivism is the opposite perspective of the world; the truth in this perspective is socially constructive. This perspective assumes that individuals or research participants create different and multiple meanings for a certain subject in the world, and the role of the researcher is to interpret all these different perspectives. Therefore, this paradigm mainly concentrates on personal interpretations of studied phenomena and the effects of those interpretations on the phenomena (Collis & Hussey, 2003).

Transformativism. This paradigm came into being in the late 1990s. Researchers following this paradigm believe there is no typical form of research that can describe the issues in the world, neither the perspective of positivism or of interpretivism. Because of complex political issues, the researcher must make an effort to promote social justice by studying aspects such as privilege and power (Mertens, 2008). Therefore, research is usually combined with a change agenda to transform the participants' environment (Creswell & Creswell, 2017).

Pragmatism. Pragmatism argues that there is no one position that suites all types of research. Research questions are the main basis of determining the philosophical perspectives of research (Saunders et al., 2009). Pragmatism declines the idea of pre-set theories or frameworks that form knowledge and that might limit the truth. Instead, it suggests knowledge is created by the real-life experience of researchers or participants (Easterby-Smith, Thorpe, & Jackson, 2012).

This approach is recognized as important in management research (Easterby-Smith et al., 2012) because it promotes intervention based on the notion that the truth exists in the interaction between action and knowledge (Goldkuhl, 2012). It suggests that the researcher works based on what works better with the issue under investigation (Saunders et al., 2009); therefore, this approach does not take one position. Rather, it suggests mediation and a combination of two contradicting positions, interpretivism and positivism (Creswell & Creswell, 2017).

Because this philosophy does not dictate one view of reality, it is suitable for mixed methods (R. B. Johnson and Onwuegbuzie (2004); Creswell and Creswell (2017). It provides a rational justification and freedom to the researcher to select the most suitable research method and procedures. This paradigm views the truth as what works at that exact time; thus, it is not separate from what is in the mind and is not totally independent of the individual mind. It asks 'what' and 'why' based on where the researcher wants to go with their research. Specially, this type of research occurs in a complex context, such as social and political contexts (Creswell & Creswell, 2017).

3.1.1.3 Research Philosophy of the Present Study

The philosophical stance is the researcher's assumptions concerning the nature of reality, which in turn defines the possible and available knowledge (Morgan, 2014). Based on this and the previous description of the main philosophical themes, the researcher will next describe the philosophical position for this research (Figure 3 shows the study's research philosophy, approach and selected elements). This research investigates the impact of national culture on supply chain disruptions and seeks to determine the extent of the impact of national culture on supply chain disruptions. The researcher assumed that the impact of national culture derives from the interaction between actors' experience and the surrounding environment, which includes culture. Therefore, from the researcher's viewpoint, the research purpose is achieved by considering and interpreting the perceptions and experience of people working within supply chains, as they are the main element impacted and influenced by national culture. The impact of culture in supply chain disruptions is identified by emphasizing the interaction between the actors in this case (supply chain employees) and their environmental elements, such as national culture and society.

Figure 3

Research onion adapted for this study from (Saunders et al., 2009)

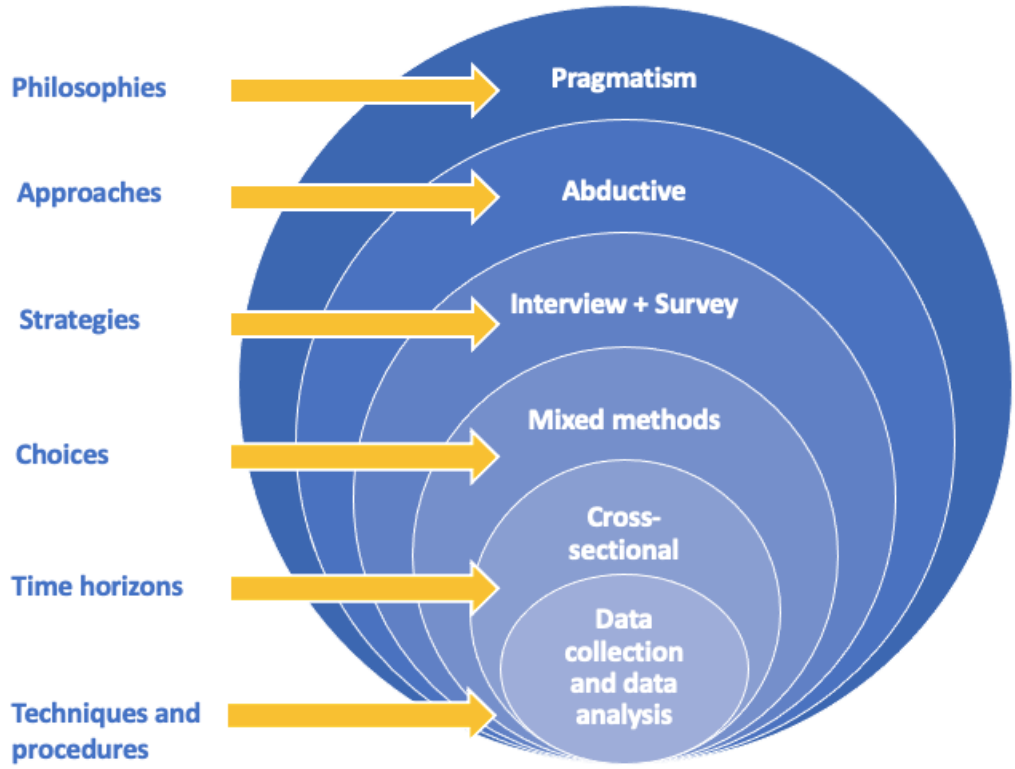

Figure 3 Research onion adapted for this study from Saunders et al. (2009)

The pragmatism paradigm is the philosophical approach in this research, as it promotes experience as a continuous interaction of actions and beliefs and the idea that concepts and ideas do not characterize the reality in question. Rather, what characterizes it is the interaction between the people under investigation and their society (Morgan, 2014). The pragmatism paradigm best serves this research. It suggests that the central determinant of the ontology, epistemology and axiology the researcher adopts is the research questions, where one path might be more suitable than others in answering specific questions (Saunders et al., 2009). Because the aim of the research questions is to investigate how national culture in a particular country affects supply chain disruption, this study seeks to interpret the perceptions of researchers and individuals from different national cultures and backgrounds about the influence of national culture on the supply chain in general and on disruptions specifically. This aim is attained by investigating the forms and aspects of national culture that have an impact on the supply chains. The subjective perception suggests that reality exists in the actors' subjective interpretations (Lindgren & Packendorff, 2009). Therefore, the researcher argues that national culture as a social phenomenon results from the actions and perceptions

of those social actors and can be subjectively interpreted. Understanding the actors' interpretation of national culture and its role in the supply chain in general and in supply chain disruption specifically and considering the researcher's interpretation of the indirect impact that the actors themselves might not acknowledge may help the researcher grasp the anticipated impact of national culture on supply chain disruptions.

Accordingly, interviews with individuals in the industry under investigation provide a comprehensive understanding of the influence of national culture and what aspects of its impact supply chain disruption. The other goal of the researcher is to measure the intensity of the cultural impact on supply chain disruptions. This impact on the representatives of supply chains is taken from the participants' perspectives in a way that can be compared and evaluated based on the countries to identify the variation and difference based on the cultural difference assumed initially in this research. This can be addressed using the human perception of culture (e.g. lived and communicated experience) and can be treated as a variable that changes from one country to another. Therefore, to determine the impact of cultural variation between countries on supply chain disruptions, this study aims to quantify these differences in national culture, which might make a difference to firms' supply chain disruptions. Therefore, the study quantitatively investigates how each of the national culture dimensions affect specific constructs of supply chain disruption that were identified in the first phase of research.

The last part of understanding research philosophy is axiology, which indicates how researchers judge values and build upon them (Saunders et al., 2009). The present study is based on these values, specifically those affecting the judgment and investigative ability of researchers. From this perspective, the researcher expects the information collected from participants to be affected by their cultural experiences and consciousnesses.

3.1.2 Research Approach

The research approach refers to the logic of inquiry that describes the relationship between data collection and the choice of analysis method and between data and theory (Kennedy & Thornberg, 2018). Essentially, there are three approaches in all types of research—inductive, deductive and abductive. An inductive approach begins with using data obtained by finding patterns from various empirical cases to make a final conclusion. A deductive approach begins with a particular theory or rule and tests how data support or reject that rule (Saunders et al., 2009). An abductive approach mostly builds a temporary hypothesis to demonstrate a certain case or data.

Qualitative research follows an inductive approach (Saunders et al. (2009); Creswell and Creswell (2017) wherein the researcher's main aim is to understand the nature of the problem in real life by collecting data via participant interviews. The research begins with researchers collecting and analysing data before theories are developed. This is followed by the researcher attempting to make sense of the collected information and eventually building a theory based on the collected data. This method is related to interpretivist philosophy (Marczyk, DeMatteo, & Festinger, 2010). The qualitative approach assumes that social reality varies and evolves continuously based on the actions and reactions of societal members (Bell, Bryman, & Harley, 2022), thus providing researchers flexibility when structuring research by allowing essential strategic changes as research progresses and considering the researcher's perceptions as an essential part of the research process (Saunders et al., 2009). Although such flexibility is required in some research, it can be considered a disadvantage in terms of research replication and generalizability. All this allows us to better understand the position of qualitative approach, and why the positivist perspective of the quantitative approach that uses scientific models to explain the shifting social world were not used.

A quantitative approach implies a deductive approach; it is based on scientific principles that perceive the reality to be separate from the researcher's perspective (Bell et al., 2022). The researcher starts developing theories or hypothesizes that represent a number of assumptions linking two or more variables or concepts while enabling testing via a designed research methodology to confirm or reject these assumptions (Saunders et al., 2009). This approach can explain causal relationships between several variables, as well as the operationalization of variables and concepts, thus allowing facts to be quantitatively measured. A deductive approach also has a highly structured methodology that supports research replication, which, in contrast to inductive research, requires a sufficiently large sample (Saunders et al., 2009).

An abductive approach, as described by Kennedy and Thornberg (2018), builds a temporary hypothesis to demonstrate a certain case or certain data; this hypothesis is the best potential describing the data compared to any other possible hypotheses. Awbrey and Awbrey (1995) state that abduction is the first stage of inquiry, as it involves considering an issue or a phenomenon and gaining a comprehensive understanding of all its aspects. This allows the emergence of additional assumptions that offer explanations for the phenomena and the support of these assumptions with justified reasonable explanations. Awbrey and Awbrey (1995) also state deduction is the second stage of inquiry in which the researcher

tests the hypotheses. This is followed by the last stage of induction when the researcher makes sure and verify the inquiry. This approach has the best potential for describing the data compared to any other possible approaches, and the researcher continues by investigating the hypothesis further (Kennedy & Thornberg, 2018). It is used to form links that help in understanding specific issues and relationships that are ambiguous (Danermark, Ekström, Jakobsen, & Karlsson, 1997), such as understanding the impact of a complex element (such as the impact of national culture on supply chain disruptions). An abductive approach is the most suitable type of inquiry for the current research because of its less structured nature and because it gives equal weight to both empirical observations and theoretical inferences, as it depends significantly on theories to explain the empirical observations and obtain valuable clarification (Modell, 2009). This eventually allows the researcher to perceive the truth by focusing on the phenomena itself and on how to understand and investigate it comprehensively.

3.1.3 Research Method

The three most common research methods are the qualitative, quantitative and mixed-method research approaches. The qualitative method is 'a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible' (Denzin and Lincoln (2011), pp. 4–5). Those who use this method try to learn from research participants, explore problems and identify variables, given that they start their research without identifying the main variables while asking broad and general questions (Creswell, 2012). Qualitative research involves gathering tremendous amounts of data from different perspectives, including that of the researcher (Robson (2002); Saunders et al. (2009).

With the quantitative research method, researchers collect data via numerical means, such as scores, ratings and scales (Dolowitz, Buckler, & Sweeney, 2017), while asking specific, narrow and measurable questions (Creswell, 2012). This method allows for generalizability of the findings in a statistically clear way using the results obtained from select sample (Petre, 2010). The unbiased and objective nature of quantitative research allows reporting study findings with fixed, standard evaluation criteria and structures (Creswell, 2012).

The mixed-methods approach is defined by Creswell and Creswell (2017) as a combination of qualitative and quantitative research and processes in one study and was

introduced in the 1980s. With this method, researchers use a combination of quantitative and qualitative approaches because they each have limitations, and by using both the disadvantages can be overcome (Creswell & Creswell, 2017; R. B. Johnson & Onwuegbuzie, 2004). Although mixed-methods research has benefits, there are also various drawbacks. According to Creswell and Creswell (2017), designing mixed-method studies is complex, requiring a detailed description of the processes and procedures involved. This involves visualizing the research model and identifying the flow of research steps and procedures.

One of the primary challenges highlighted by Creswell and Creswell (2017) is time. Conducting and analysing qualitative and quantitative research within a single study necessitate a substantial amount of time and resources. Successful implementation of this design also demands that researchers possess adequate knowledge and experience with both methods to efficiently analyse the collected data. Mixed-methods studies require a significant amount of data and resources to accomplish their research objectives (McMil & Schumacher, 2006). The collection of such a substantial amount of data also requires specific skills and abilities. Finally, presenting the two different types of findings at the conclusion of mixed-method studies can be challenging. Halcomb (2019) states that effective presentation of each method is paramount to providing a solid conclusion.

Considering the nature of this research and its research questions, the researcher employs the mixed-method approach because it is the most suitable in terms of the research scope and philosophy. It provides the researcher with much better opportunities to answer research questions, as qualitative research asks ‘why’ and ‘how’, and quantitative research asks ‘how often’ and ‘how many’, thus providing additional richness and insights (Malina et al., 2011). The research logic of the mixed-methods approach consists of deduction, induction and abduction (Blaikie & Priest, 2019), which benefit the current research. The inductive approach allows the researcher to explore the impact of national culture on supply chain disruptions from the participants’ perspectives, while the deductive approach allows the researcher to test the outcome of the inductive part. Finally, the abductive aspect is valuable to describe findings because it bridges the other two aspects (Morgan, 2014).

The mixed-methods approach also allows the researcher to better assess the degree of confidence in the research findings and the conclusions (Saunders et al., 2009). The objective of using this approach here is to obtain sufficient data to address the research questions while adhering to the time and resource limitations, with a particular focus on the intended population. A detailed explanation of the different steps and tasks involved in the study is provided for ease of understanding. This approach requires a strong understanding of both

qualitative and quantitative methods, which the researcher has gained through extensive in-person and online training provided by the university and other sources with the full support of supervisors. This has enabled the researcher to conduct a mixed-methods investigation.

3.1.4 Research Design

Research design, or as some authors have described it, strategies of inquiry, is a type of design or method that is used to collect data (Denzin & Lincoln, 2011). The research design for this study was determined based on the research questions, considering that this study was developed based on the pragmatic philosophy (Onwuegbuzie & Leech, 2006). The overarching objective of this study is to investigate the influence of national culture on supply chain disruptions. More specifically, the study delves into the ways national culture shapes the dynamics between suppliers and the orientation of supply chain disruptions. In doing this and to answer the research questions, the researcher employed a mixed-method approach involving a qualitative phase and a quantitative phase.

Because of the investigative nature of this research, data collection in this study followed the exploratory sequential mixed-methods model. Creswell and Creswell (2017) suggest several designs, such as exploratory sequential mixed methods, explanatory sequential mixed methods and convergent parallel mixed methods. The exploratory sequential method fits the current study best, as the literature indicates supply chain issues relating to national culture in general and supply chain issues relating to disruptions specifically require further clarification. Additional investigation is required, and therefore the sequential exploratory design seems the most appropriate to address any unclear issues (Creswell & Clark, 2017).

Creswell and Clark (2017) suggest using the sequential exploratory design when the problem under investigation is ambiguous and the variables unknown. The method begins with a qualitative investigative approach that involves gathering participant perspectives and identifying the key themes and variables to be used in the subsequent quantitative phase, which involves building a research instrument, such as a survey. This confirmative phase facilitates further investigation and helps confirm the qualitative phase findings (Creswell & Creswell, 2017). Combining both types of information in the sequential exploratory design enhances the validity and reliability of the findings. The qualitative data and its analysis provide rich, detailed information that helps in identifying the relevant constructs and variables and developing the quantitative stage. The quantitative data provides numerical

information that allows the researcher to test hypotheses and draw generalizable conclusions (Creswell & Clark, 2017).

In the current research, the information from the qualitative phase was used to develop the survey in the quantitative phase. Analysis of the qualitative data allowed the researcher to focus on some constructs that are more related to the aim of the study. These more suitable constructs are the key elements on which the survey was built. Figure 4 shows the research processes involved.

Figure 4

Research processes

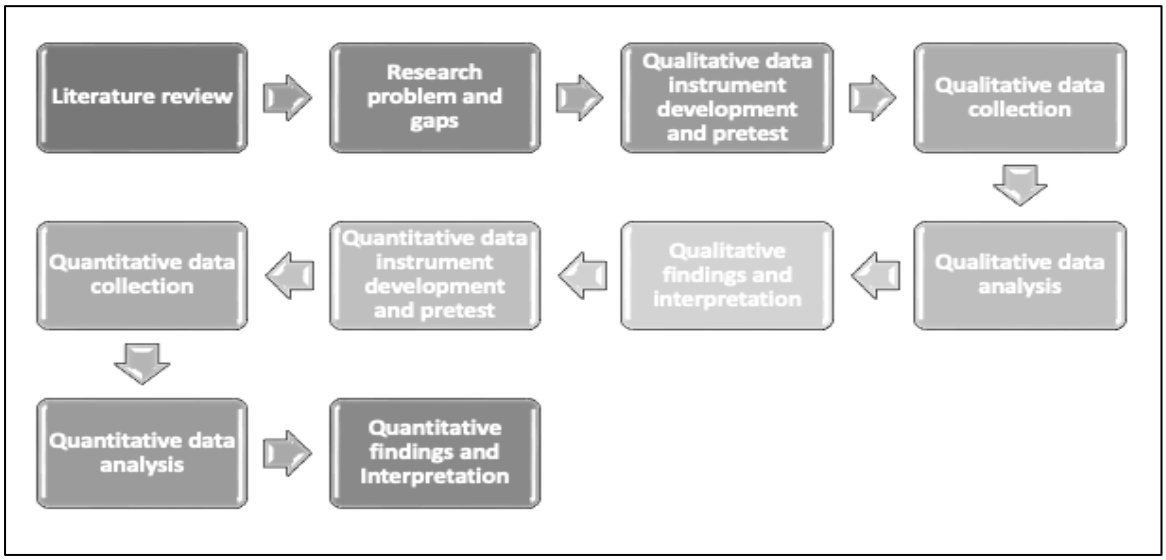

Figure 4 Research processes

3.2. Data Collection and Analysis

3.2.1 Introduction

This section explains the two phases of the mixed-methods exploratory sequential approach used in the current study. It begins by describing all aspects of the qualitative phase, from the sampling to the data collection process and procedure. It then details the quantitative phase, including a description of the quantitative instrument design and test, the sampling method for this instrument and the quantitative data collection. Finally, the ethical considerations of both phases are explained.

3.2.2 Qualitative Research Method

This study investigated the impact of national culture on supply chain disruptions. The researcher was keen to conduct this study due to the scarcity of information on the topic. The study began with a qualitative investigation to identify the essential elements relating to national culture and how it influences supply chain disruptions.

In the following section, the qualitative design, exploratory interviews, sampling process, and data collection procedures and protocols of the current study are described. Regarding the decision not to adopt a case study focus, this choice was deliberate and influenced by the study's nature and scope. The challenges posed by the pandemic made conducting in-depth case studies logistically complex and less feasible. Instead, the research pursues a broader perspective, exploring the impact of national culture on supply chain disruptions across various participants, companies, and nationalities within the industry. This approach allows for a more comprehensive examination of the phenomenon in a diverse context. This method lets researchers explore the topics under investigation in real situations, which allows for a full and deep exploration (Robson, 2002). It gives researchers a comprehensive picture of the issues under investigation via the obtainment of participants' perceptions, which are combined with researchers' observations and perceptions (Creswell, 2012).

3.2.2.1 Exploratory Interviews

The interview is the qualitative data collection method chosen. Interviews—structured, semi-structured and unstructured—help in gathering adequate and reliable information (Saunders et al., 2009). Structured or quantitative research interviews are similar to questionnaires. Researchers follow a list of organized questions and restrictions to gather

specific data (Saunders et al., 2009). This type of interview focuses on prespecified topics and thus does not allow detecting any potential issues that are not named beforehand.

With semi-structured interviews, the researcher also starts with a list of themes (Saunders et al., 2009). The difference with semi-structured interviews is that they may differ from one interview to another, as the question order is based on the flow of conversation, which provides more in-depth data compared to structured interviews. In semi-structured interviews, the researcher is able to concentrate on the most interesting answers relating to the research questions. Unstructured interviews have the same advantage of obtaining in-depth data by following the conversation, However, they do not have predetermined questions. This method requires an excellent understanding of topic under investigation.

In the current study exploring the role of national culture in supply chain disruptions, the interviews were semi-structured, thus combining the advantages of structured and unstructured interviews. This allowed the researcher the chance to enquire about the main predetermined themes while obtaining in-depth information from the participants by allowing room to follow the conversation and reorganize the question order according to the participants' answers. Differing contexts, such as occur with different national cultures, should be investigated in a flexible way that allows participants to clearly express and explain their views.

3.2.2.2 Interview Protocol

The interview protocol is a qualitative research format that lists the information needed to be obtained (Creswell, 2012). Based on the literature, the interview protocol for the exploratory part of this study is structured as follows. The first section introduces the interviewer and then provides a brief overview of the project and objectives, including a clear explanation of consent, confidentiality, anonymity and the possibility of withdrawing from the study (signing the consent form). Subsequently, background information about the company and interviewees is given (see Appendix 1).

The second section includes three questions. In this section, the researcher aims to get an overview of the firm's supply chain and to lead the conversation to focus on it. Then, to understand the firm's experience in working with different cultures, the researcher asks questions about suppliers and clients to gain a better understanding of the interviewee's and the company's experience working with international suppliers and clients. At the end of this

section, the conversation narrows to specify the targeted suppliers and clients who have longstanding relationships with the firm.

The third section concerns the firm's preparations for disruptions and contains eight questions. In this section, the researcher introduces the topic of disruption into the conversation with the aim of learning what kind of disruption the firm is going through generally and of allowing the respondent to explain how their firm deal with crises. The interviewee is asked to detail the practices their company develops to deal with disruptions and how the suppliers and clients have been included when facing disruptions. In this section, the researcher has the chance to understand the interviewee's firm's experience with disruption, how the firm predicts future disruptions, the most crucial method the firm uses to deal with disruptions and the parties that are included in these procedures and processes in practice. The researcher also explores whether the cultural differences between suppliers/clients has an impact on involvement and collaboration and whether there is any dimension in the supplier/client relationship affecting their involvement in the preparedness phase that is impacted by culture and that should be further considered.

The fourth section includes questions related to the company learning from previous experience. The researcher asks five questions about the firm's use of information, what they have gained from their previous disruption experience and how they use this information. This is followed by questions about a specific procedure that changed the firm after the previous disruption and that resulted in alterations to the current disruption response and about the degree of the improvement. The research then asks questions about whether the firm is planning ahead for disruption and whether it updates this plan after any disruption as a matter routine. At the same time, the researcher gains insight into the cultural impact on the process, such as an increase in collectivism and its impact on how the employees learned from the previous disruption and the interviewee's perception of key elements that impact the firm's disruption preparation and response.

In the fifth section, the interviewer asks five questions, all of which are about a specific disruption within the last two to three years. The researcher focuses on particular disruptions and real-life examples to gain a comprehensive understanding. The key outcome of this part is how the firm and their overseas and local suppliers used their previous disruption experience and how this experience impacted their decision making before, during and after disruption. The question goes further and investigates the impact of the firm's cultural aspects on these decisions, allowing the interviewee to present their perspectives, which

might be very beneficial to the research, as it might bring up some of the dimensions that might be impacted by culture and confirm the construct or add to it.

In the final section, the interviewer continues the questions on the same disruption the interviewee identified earlier; however, the focus here is on the impact of the disruption on suppliers' (local and overseas) relationships and on gaining further insight into the critical factors that had the most impact on the relationship, such as culture. This provides a greater understanding of the aspects of disruption responses that are important to relationships and how they might differ based on different nationalities or cultures. The longstanding relationship between the interviewee's firm and its suppliers allows the firm to examine the impact of the cultural aspects on the relationships. In this section, the participants are asked to relate their perspectives and observations of the general cultural differences between overseas and local suppliers and how these differences impact relationships in typical situations. This allows the researcher to continue to investigate whether these cultural differences vary between regular situations and disruptions.

Comparing local and overseas suppliers/clients illustrates the critical dimensions of supplier relationships that are impacted by culture in addition to the most relevant constructs that are worth studying. Comparing local and overseas supplier/client reactions during disruptions shows how culture is an essential element that impacts the disruption response. Therefore, the respondent's suggestions and views illustrate the critical dimensions of supplier relationships that are more vulnerable to the impact of cultural features. In turn, this confirms or add dimensions and components of the supplier relationship to the previous suggested constructs identified based on the literature.

3.2.2.3. Sampling

A sample is a selected part of a population that participates in specific research (Bell et al., 2022). The research questions and objectives in qualitative research are key elements in deciding the sampling strategy (Saunders et al., 2009), as is the researcher's judgement and decisions about the most appropriate participants for the research. Therefore, based on the qualitative exploratory enquiry in this research, the researcher utilized a purposive sampling strategy. Purposive sampling is when the researcher selects participants based on a variable that can be specified (Gilbert, 2008), thus allowing the researcher to consider participants represent cases that can best answer the research questions.

In this research, participants were individuals of various nationalities who had work experience in the oil and petrochemical supply chain. To be eligible to participate, the interviewees had to occupy positions that exposed them to instances of disruption and subsequent decisions. Therefore, this study specifically targeted top- and middle-level managers in the oil and petrochemical industry, ensuring the confidentiality of the participants by withholding the names of the companies for the sake of anonymity. The petrochemical industry is highly competitive and therefore companies are reluctant to share many details that could be detrimental for them if these are disclosed. Participants were extremely helpful in the collection of data, provided that confidentiality and anonymity is kept regarding their participation. Hence, the names of the companies involved in this research is not disclosed to fulfil the agreement with them and to respect the ethical constraints of this study. Many potential interviewees were contacted to arrange for the interviews via email and LinkedIn based on their job titles and industry experience. Fifty potential participants were sent all the information about the study, and all their background information was checked on LinkedIn to ensure it fit the inclusion criteria for this research.

The researcher's goal during this phase was to conduct interviews until no new information or themes could be found. This is known as data saturation, which occurs when the research process has reached a point where adding more data does not provide any significant new insights regarding the research questions or objectives (Walker, 2012). In this study, saturation was reached after interviewing the eighth participant between March–April 2021. The data collection during this period was particularly influenced by the challenges posed by the pandemic lockdown. The unique circumstances of this period, characterized by restrictions on movement and social interaction, significantly impacted the recruitment strategy, sampling strategy, and overall challenges faced in collecting data, especially within the oil and petrochemical industry. The lockdown measures necessitated a shift towards remote methods of data collection, such as online surveys or virtual interviews, to comply with safety protocols and mitigate the risks associated with in-person interactions. Additionally, the interviews and participation were affected by the busy and changing work schedules of industry professionals, compounded by the unstable situations brought about by the pandemic. These factors made it challenging to coordinate interviews and secure participation from key stakeholders within the industry, requiring flexible approaches to accommodate the dynamic nature of the circumstances. Despite these obstacles, innovative strategies were employed to engage participants and ensure the successful execution of the data collection process. The data collected from these eight interviews provided a wealth of

information on multiple perspectives and experiences of the population being investigated, a common stage in saturation in qualitative research (Guest, Bunce, & Johnson, 2006).

3.2.2.4 Data Collection Method

The qualitative data collection method for this research was semi-structured interviews with middle- and top-level supply chain managers. The researcher concentrated on the oil and petrochemical industry and on employees and companies representing various nationalities. The participants were adults from several companies with at least two years of experience in the supply chain department of their oil and petrochemical companies. The researcher conducted the interviews in English and Arabic because English is the most known and used language internationally and is the most common language spoken in the participants' industry and because Arabic is the researcher's mother tongue. The researcher collected the data herself, as she intended to carry on the data collection until reaching the point of saturation.

Participation was optional, and the researcher clearly informed the participants that they were able to withdraw at any time and that their contributions were voluntary. The interviewees were asked to sign a consent form before starting the interviews. In addition, a research information sheet was provided that included the study information, study purpose, interviewee selection criteria, how the data will be used, data recording procedures, methods and confidentiality procedures. The information sheet explained the benefits and risks of participating in the study, possible uses for the research, information about the study funding and organization and the researcher's and reviewer's contact information. The interviews were planned to be conducted online. The researcher contacted the participants to arrange a suitable time to meet, as the interviews were designed to be one hour long; however, the researcher left room for interviews that might last more than one hour. The conversations were recorded while the researcher took notes.

3.2.2.5 Data Analysis Method

After transcribing the interviews, the researcher began making sense of the collected data by analysing the information to make clear and usable patterns. The researcher employed thematic analysis, which involves reading through the information and identifying themes and patterns that represent the main information relating to the investigation (Alhojailan & Ibrahim, 2012). Thematic analysis is recommended to draw detailed

interpretations that are aligned with the research focus, as it is efficient in detecting variables and constructs that affect the research problem from the participants' perspective (Alhojailan & Ibrahim, 2012; Creswell, 2003). This method of analysis was chosen to analyse the qualitative part of this research because it allowed for the exploration of the impact of national culture on managing supply chain disruption by identifying the specific aspects that have been influenced by national culture.

The researcher followed the steps suggested by Braun and Clarke (2006) in conducting the thematic analysis. The researcher started by becoming familiar with the data collected and its context by reading through the interview transcripts. The researcher then began identifying words or sentences that present the core of the data and grouping related words and sentences to create meaningful codes and themes. These themes are the identified patterns or trends that are significantly associated with the research inquiry and aim. The researcher evaluated the themes by revisiting the meaning of the data to make sure it reflects the general theme and made appropriate adjustments. It is important to ensure clarity and to give a clear explanation of the main identified themes and what they encompass.

3.2.3 Quantitative Research Method

This section presents the quantitative phase of the study. After conducting and analysing the qualitative interviews, the researcher started the quantitative phase. The qualitative phase effectively identified the influence of national culture on the supply chain by identifying various themes that have been impacted by cultural factors. These themes were utilized in constructing the survey for the quantitative phase. Quantitative research dictates that researchers collect data via numerical means, such as scores, ratings and scales (Dolowitz et al., 2017), while asking specific, narrow and measurable questions (Creswell, 2012). This research method provides generalizability for research findings in a statistically clear way using the results from selected population samples (Petre, 2010). Furthermore, the unbiased and objective approach of quantitative research allows for reporting study findings with fixed standard evaluation criteria and structures (Creswell, 2012).

As this research is focused on the impact of culture on supplier relationships and disruption orientations of supply chain firms, and therefore on supply chain disruption, the quantitative method as a confirmatory second stage following an exploratory phase suited the research aim and objectives. Fellows and Liu (2020) state that quantitatively examining and measuring culture in the literature allowed them to identify how some cultural researchers

adopting an emic approach—viewing and measuring cultures from local perceptions and perspectives. These perceptions make it difficult for researchers to compare different cultures, rendering this view of culture unsuitable for cross-cultural research. By contrast, the etic approach—viewing culture from an outside perspective with positive numeric measurements that facilitate cross-cultural studies by minimizing biased perceptions of one culture (e.g. Hofstede's dimensions and GLOBE's dimensions)—has been applied to most cultural research. This view of culture gives researchers a generally clear idea of the cultural differences from the participants' perspectives, even if those differences are minimal. Therefore, the second phase of this research employed a general numeric method of measuring cultural differences and their impact on supply chain disruptions.

3.2.3.1 Quantitative Questionnaire

The quantitative research method includes various strategies to help the researcher collect data numerically. This study used a survey strategy, which is an effective data-collection method (Orr, 2006). The questionnaire is the most popular method for quantitative research in general (Flynn, Sakakibara, Schroeder, Bates, & Flynn, 1990); (Malhotra & Grover, 1998) and is the most commonly used strategy in research on management and business (Saunders et al., 2009). This strategy allows the researcher to study a selected sample of a population to produce quantitative descriptions of the sample that represent the entire population (Creswell & Clark, 2017). For a topic such as the one in this study, which investigates the impact of national culture on supply chain disruption, a relatively small sample that represents a large population on the topic of culture and supply chains is required for generalizability, as this investigation was designed to form a general conclusion.

In addition, economic rationales caused the researcher to use a questionnaire as the key strategy for the quantitative phase of the study. For the researcher to capture a large population that represents culture, the sample should contain representatives of many nationalities to show the variation in culture and how it impacts supply chain disruption. However, this is extremely difficult for data collection methods other than surveys, considering the many obstacles that may face the researcher, such as travelling costs, time and location constraints and research time limitations. All these reasons made the questionnaire the most suitable confirmatory method for this research to achieve the study aims and objectives within the research limitations.

3.2.3.2 Questionnaire Design

The questionnaire design was based on the results of the previous phase, as most of the instrument's key constructs were derived from the interview transcript analysis. The main themes identified from the interviews each represent an essential element in the questionnaire. The researcher acquired an overview of each of the constructs from the literature to find the most suitable measurement scales for each of the dimensions to be measured. Consequently, to develop a reliable and valuable measurement tool, the researcher used measurement scales that have been proven credible in many previous studies. The first part of the questionnaire included demographic questions and asked about the participants' nationality, the nationality of the participants' firms, where the firms operated and the participants' experience and occupation. The second part of the questionnaire dealt with national culture, one of the main constructs of the research.

The researcher used the individual cultural value scale (CVSCALE) by Yoo, Donthu, and Lenartowicz (2011) to measure Hofstede's five dimensions of culture at the individual level. By using this scale, the study measured national culture from the individual's perspective compared to studies that use Hofstede's national culture dimension metrics to measure culture in a more general way, such as at the country or national level. Hofstede's metrics are the most used measurements of culture in the literature. However, the literature has identified certain drawbacks associated with their use. For example, Hofstede's scale treats the population from a certain country as one unit from the same culture and ignores individual differences and all other variables, such as environmental impact (Yoo et al., 2011). Therefore, for this study, the researcher chose to investigate using a scale that focuses on culture at the individual level, as supply chain research concentrating on the oil and petrochemical industries is global and multinational in nature.

The third part of the questionnaire concerned supplier relationships. After reviewing the literature, the researcher decided to focus on five aspects of such relationships that are likely to be impacted by culture—communication and information sharing, commitment, trust, conflict resolution and relational norms. The measures of these items were adapted from Y. Kim and Choi (2015) and Jonsson and Zineldin (2003). The next set of items in this questionnaire measured supply chain digitalization and were adapted from Xue, Zhang, Ling, and Zhao (2013). The questionnaire went on to measure supply chain risk management in four different stages—risk identification, risk assessment, risk mitigation and risk control. The scale items for supply chain risk management were adapted from El Baz and Ruel (2021).

The last part of the questionnaire concerned SCDO, the impact of supply chain disruption and supply chain resilience. The measurement scale for SCDO came from the studies by Bode et al. (2011) and Essuman, Boso, and Annan (2020). The scale for the impact of supply chain disruption was also adapted from Bode Bode et al. (2011). The supply chain resilience scale items were adapted from Golgeci and Y. Ponomarov (2013).

A five-point Likert scale was used to measure the various items. A Likert scale is a set of statements for a real or hypothetical situation under investigation. Participants are asked to state whether they agree with a statement (the scale ranges from strongly agree to strongly disagree). This scale is recognized by many as one of the most important and most popular psychometric tools in social sciences research (Joshi, Kale, Chandel, & Pal, 2015), and most research participants are familiar with Likert-type scales and feel comfortable answering the questions used on these scales (I. D. Cooper & Johnson, 2016).

3.2.3.3 Questionnaire Testing

There are two phases of data collection in this research. The first phase is questionnaire testing, which occurs before the final phase of collecting the data. The researcher pre-tested the survey in two different phases. The first phase was a language and clarity test to see whether people from different backgrounds and with different levels of knowledge were able to understand the questions clearly. The researcher tested the questionnaire on 13 family members and friends, who were instructed to report any confusing or ambiguous questions. The points raised by the group were taken into consideration and any necessary changes were made.

In the second phase, the researcher pilot-tested the questionnaire with a group of eight participants. As no changes were made to the questionnaire and the eight participants came from the same required background and industry, their responses were included in the study. Six of these participants were industry professionals and two were company owners. Pilot testing provides the researcher with the ability to identify and understand the difficulties that might occur for participants while filling out the questionnaire and with the chance to address suggestions and eliminate unclear items. Therefore, it is essential to examine the research questionnaire to recognize questions that are vague or unclear for either the researcher or the participants (Rothgeb, Willis, & Forsyth, 2007). The suggestions and modifications were reviewed and made with consideration for the clarity of the study information and instructions and the required time to complete the questionnaire.

3.2.3.4 Sampling Methods

There are two main types of sampling methods, representative or probability sampling and judgemental or non-probability sampling (Churchill & Iacobucci, 2006). Probability sampling requires the sample to be selected from the population in a manner that ensures an equivalent probability to be elected for each unit in the sample. With non-probability sampling, the probability of being selected from the general population is unknown (Churchill & Iacobucci, 2006); (Kinnear & Taylor, 1996); (Saunders et al., 2009). There are several techniques for non-probability sampling, such as purposive sampling, convenience sampling, snowball sampling, quota sampling and self-selection sampling.

Purposive sampling is based on the researcher's judgement to choose suitable participants. Convenience sampling involves selecting participants based on the ease of obtaining the sample, such as the participants we meet randomly at libraries or airports, etc. (Saunders et al., 2009). Snowball sampling is mainly utilized when it is hard for the researcher to find participants; therefore, this method depends on participant referrals (Matthiesen & Binder, 2009). Quota sampling refers to a technique that gives the researcher significant control of the sample content and is based on non-random selection of the sample based on a specific quota (Saunders et al., 2009). Self-selection sampling is based on the participants' decision; this happens when the researcher lets each participant decide their suitability to participate in the study.

The current study used non-probability sampling. The researcher employed purposive sampling in each stage of the quantitative part of the research and in the testing and final data collection stages. The reason for choosing this sampling technique was the study's requirements, aim, objectives and time and cost limitations (C. Cooper & Schindler, 2008). The researcher used purposive sampling to focus on a homogeneous sample that includes adults of various nationalities who work in a supply chain department or have contact with suppliers in the oil and petrochemical industries. Given this particular inclusion criteria, the researcher had reasonable control over selecting the research sample and was able to investigate the elements under study in more depth, which eventually allowed the researcher to answer the research questions.

Research Sampling Strategy. Sampling is a technique that enables researchers to reduce the amount of data needed by focusing only on part of the research population instead of collecting data from the entire population (Saunders et al., 2009). The massive number of people involved in the oil and petrochemical industry supply chain are of many different nationalities, and for economic and time reasons the sheer size of the research population necessitated the selection of a reasonably sized sample. The sample frame refers to the sampling strategy a study used in selecting the qualitative sample. Here, the researcher followed the inclusion criteria (participants are adults) and selected potential participants based on their role in their organization, as the researcher sought to collect data from employees who work directly with suppliers and the supply chain in general to achieve the research aims and objectives.

When evaluating the accuracy and dependability of research findings, the size of the sample plays a critical role. This is also a crucial factor to consider during the planning stage of SEM studies, as noted by B. Hair, Babin & Anderson. (2018). While there is no set rule for determining the ideal sample size for SEM studies, researchers should aim for a practical size that fits within their research design and budget, according to Little (2013). Obtaining a sufficient sample size is highly recommended for SEM studies, as a small sample size can negatively impact various indicators, such as goodness of fit, as noted by B. Hair, Babin & Anderson. (2018); Kline (2015). Additionally, Marsh, Hau, and Wen (2004) state that large samples can also affect certain fit indices, such as p-value and chi-square. Therefore, it is crucial to use an appropriate sample size for SEM studies to ensure accurate and reliable results.

For this study's quantitative phase, the researcher gathered data from 162 individuals working in the oil and gas industry, which is considered sufficient as it exceeds the minimum recommended by B. Hair, Babin & Anderson. (2018) and falls within Kline (2015)'s suggested range of 100–200.

3.2.3.5 Data Analysis Method

Quantitative data analysis involves analysing data using mathematical and statistical models. It is used to identify patterns, trends and relationships and to gain insights from the data (Ong & Puteh, 2017). Types of quantitative data analysis include descriptive statistics, time series analysis, hypothesis testing, predictive analytics, correlation and regression analysis and multivariate analysis. Descriptive statistics summarize, organize and present

data informally and use numerical measures and graphical techniques to describe and explain a dataset's characteristics. In providing an overview of the data, descriptive statistics help to identify patterns or relationships (Kaur, Stoltzfus, & Yellapu, 2018). They can also be used to make predictions about future data. Descriptive statistics include measures of central tendency, such as mean and median, and variability, such as range, interquartile range and standard deviation (Mishra et al., 2019). They are a powerful data analysis tool and can be used to gain insights into population characteristics and trends.

Time series analysis is used to analyse data points that are collected over a period of time. It is utilized to uncover patterns and trends in the data and to identify relationships between variables (Sürücü & Maslakçi, 2020). It is often used to predict future values and detect anomalies. Hypothesis testing tests whether a specific claim or hypothesis about a population parameter is true or false. Hypothesis testing involves two competing hypotheses, the null and alternative hypotheses. It is critical to point out that the null hypothesis is a statement of lack of difference or change. The other hypothesis is a statement of the existence of a difference or change. A hypothesis test is performed to determine which of the two hypotheses is true (Sürücü & Maslakçi, 2020). Predictive analysis is a statistical technique used to analyse past data to predict future events. Predictive analysis can identify patterns and relationships between variables, which can be used to make informed decisions and predictions. Predictive analysis works by analysing past data and making projections about the future. It can also be used to identify trends and patterns and to detect anomalies. Predictive analysis can help researchers understand how different variables interact and how they can be used to predict outcomes (Van Calster et al., 2019)

Correlation and regression analysis are two statistical techniques used to analyse quantitative data. Correlation measures the direction and strength of a relationship between two variables. It is measured by the Pearson correlation coefficient and is represented with a value ranging between -1 and 1 (Kanai & Kubo, 2018). A Pearson correlation of 1 indicates a perfect positive linear correlation, which means an increase in one variable is associated with an increase in the other variable. Regression analysis predicts one variable's value based on another's value (Flatt & Jacobs, 2019). It estimates the relationship of the two variables and identifies the relationship strength. It allows one to predict the value of a dependent variable based on the value of one or more independent variables. Finally, multivariate analysis looks at more than one variable at a time. It is used to uncover intricate relationships among multiple variables and can be used in many different fields, such as marketing, finance and

research. The most common forms of multivariate analysis are factor analysis, principal component analysis and cluster analysis (Bhering, 2017).

Multivariate analysis can help identify relationships between variables that are not immediately evident when looking at one variable alone and can help make more accurate predictions of outcomes. Several scholars have discussed the advantages of multivariate analysis (e.g. B. Hair, Babin & Anderson. (2018); R. A. Johnson and Wichern (2007); Tabachnick, Fidell, and Ullman (2013). Having a more comprehensive image of the data can help in preventing incorrect or misleading associations by analysing the relationship between two or more variables. This technique can also help in reducing the complexity of data by summarizing information from multiple variables into a smaller set. Finally, multivariate techniques can help in recognizing underlying or latent variables that cannot be directly observed but that are inferred from the variables that can be observed. Therefore, considering these advantages and the aim of the current research to investigate the role of national culture, which is a latent variable, this study employed SEM to analyse the research data.

3.2.3.6 Structural Equation Modelling

SEM is a powerful and versatile tool used in social sciences to analyse complex relationships between multiple variables (S. K. Sharma, Gaur, Saddikuti, and Rastogi (2017); Jenatabadi (2015); Wright (1918, 1920, 1921). SEM is beneficial for analysing complex relationships in which causality is not necessarily assumed (S. K. Sharma et al., 2017). Furthermore, this technique enables researchers to evaluate both direct and indirect effects, making it particularly suitable for studying mediating and moderating effects (Holbert & Stephenson, 2003). Therefore, it is an appropriate analysis method for this research, which aims to identify the role of national culture and the mediating and moderating impact on supplier relationships, SCDO and the impact of supply chain disruptions.

The primary benefit of using SEM over other approaches is its ability to simultaneously analyse the effects of mediators and moderators. This means that the researcher can determine if a variable acts as a mediator or a moderator of the relationship between the independent and dependent variables (Gunzler, Chen, Wu, & Zhang, 2013). Additionally, SEM can be used to identify multiple causal relationships (K. K.-K. Wong, 2016). Identifying causal relationships is especially useful for analysing the effects of mediators and moderators on the dependent variable, as it identifies multiple pathways that could influence the dependent variable. Overall, SEM is an effective and efficient tool for analysing the

mediation and moderation effects of the study variables on the dependent variable. In addition, it allows for the simultaneous analysis of multiple relationships and the identification of various pathways that could influence the dependent variable (Gunzler et al., 2013).

Research Statistical Analyses. This research used two tools for statistical analyses: IBM's SPSS (version 26) and Smart PLS 3 Software. SPSS (version 26) is widely used in the statistical analysis of quantitative data. It is a powerful and versatile software package consisting of tools to collect and analyse data. It provides a wide range of statistical procedures and extensive data management tools (George & Mallery, 2021). SPSS analyses the relationships between various variables in a dataset, identifies trends and patterns and creates meaningful summaries and reports. It can also make predictive models, simulate results and generate meaningful visualizations.

SPSS calculates and compares multiple statistical parameters, such as frequencies, cross-tabulations, descriptive statistics, t-tests, linear regressions and chi-square tests. It also provides graphical tools for data analysis and generating meaningful visualizations, such as box-and-whisker plots, scatter plots and line graphs (Field, 2013). SPSS can also be used in research to test hypotheses and answer research questions (Bryman & Cramer, 2012). It can help researchers gain valuable insights into their data, identify trends and patterns and generate meaningful summaries and reports.

Smart PLS 3 is a software package used to analyse quantitative data (PLS is an acronym for partial least squares) and is the latest version of the original software. Smart PLS 3 provides users with various features and capabilities that make it a versatile tool for quantitative data analysis (Mohd Thas Thaker et al., 2021). Smart PLS 3 uses a SEM framework. It can be used to analyse multiple linear regressions and how multiple observable variables are related to one or more latent variables (K. K.-K. Wong, 2013). It also allows users to use confirmatory factor analysis (CFA) and path analysis to determine the relationship between latent variables and observable variables. In addition, Smart PLS 3 provides users with powerful data visualization and reporting tools.

Smart PLS 3 provides an easy-to-use graphical user interface and a wide range of statistical options. It supports both exploratory and confirmatory analysis, and users can customize the interface to produce results suitable for their analysis needs (Ramayah, Yeap, Ahmad, Halim, & Rahman, 2017). Smart PLS 3 can also be used to investigate relationships between variables and to identify latent variables that are not directly observable. In addition, Smart PLS 3 allows users to test hypotheses and conduct sensitivity analyses.

3.2.3.7 Measuring Reliability and Validity

Reliability and validity are both essential components of scale assessment. Reliability is a measure of how consistent a measure is and is necessary for evaluating the accuracy of a research instrument (Mohajan (2017); Fuller et al. (2020). Validity measures how well the measure's results reflect what is being measured.

Measuring Reliability. The reliability of constructs is calculated using Cronbach's alpha. Cronbach's alpha measures a survey's internal consistency or reliability (McNeish, 2018). Researchers may use this index to determine whether a set's components measure the same thing. Internal consistency is quantified using a standard scale from 0 to 1 with the help of Cronbach's alpha. Consensus is vital when the numbers are very close to one another. The alpha coefficient may be determined by correlating the scale items and then averaging the resulting correlations. The coefficient value can then be calculated by dividing this mean by the total number of scale points. Values closer to 1 on Cronbach's alpha coefficient scale indicate a more trustworthy structure (Vaske, Beaman, & Sponarski, 2017). If all the elements on the scale have a value of 1, then they are entirely connected, and if they all have a value of 0, then they are unrelated. Participant responses are considered trustworthy if their Cronbach's alpha for a whole set of questions is high. High ratings on one item tend to be reflected in high ratings across the board. Its consistency indicates that the measurements are reliable, and the items being compared all have the same quality standards.

Low values suggest that the set of elements do not accurately capture the same phenomenon. For example, responses deemed 'excellent' for one question do not indicate how highly participants scored the other items (Hoekstra, Vugteveen, Warrens, & Kruyen, 2019). This makes it very improbable that the questions measure the same attribute. Typically, this metric draws its information from test scores, survey forms and other standardized testing results. Although data may be continuous, it is often represented by discrete categories, such as Likert scales or even binary digits (Singh, 2017). The computations are based on the premise that all objects measure the same feature using the same scale. Cronbach's alpha coefficient is a commonly used measure of reliability in many areas, such as psychology, business and education. It is used to evaluate the reliability of a construct, and it is increasingly used to compare different constructs to determine the most reliable one (Taber, 2018). It is also used to measure the homogeneity of the items on a scale.

Measuring Validity. *The* Pearson correlation coefficient is used to measure validity. It is one common method for assessing the level of linear association between two variables.

The direction and strength of a link between two constructs may be evaluated using this method (Clark & Watson, 2019). The range of the Pearson correlation coefficient, usually known as 'r,' runs from 1 to -1. When two variables have a value of 1, it is perfectly positive, and when they have a value of -1, it is perfectly negative. To get the Pearson correlation coefficient, we divide the product of the two variables' standard deviations by their covariance. The Pearson correlation coefficient may be calculated using the following formula:

$$r = \text{cov}(X,Y) / SD(X) * SD(Y).$$

Several applications for the Pearson correlation coefficient test the reliability of a claimed relationship between two variables. For instance, if the Pearson correlation coefficient between two variables is > 0.5, the correlation is robust and statistically significant (Helmerhorst, Brage, Warren, Besson, & Ekelund, 2012). If the Pearson correlation coefficient between the two variables is < 0.3, they are unlikely to be related.

It is common practice in scientific trials, surveys and other types of research to calculate the Pearson correlation coefficient to assess the reliability of hypothesized correlations between variables. Tüzün, Eker, Aytar, Daşkapan, and Bayramoğlu (2005) note that it is also used in forecasting the future values of variables based on their present readings. The Pearson correlation coefficient is useful for researchers because it may tell them whether their variables are related and in what way.

Convergent Validity. Convergent validity is a measure of the similarity between two or more measures. It is used to evaluate the extent to which different measurements of the same variable lead to the same conclusions about a person's score (Le et al., 2017); (Swami et al., 2017). It is also used to evaluate the accuracy of a measure by comparing it to other validated measures of the same construct.

Discriminant* V*alidity. Discriminant validity measures how two or more steps of different constructs lead to different conclusions about a person's scores. It assesses the extent to which two measures measure other constructs and are not measuring the same construct.

The heterotrait–monotrait ratio of correlations (HTMT) is a statistical technique used to measure discriminant validity. It is used to compare the correlations of a measure with the other measures of the same construct and with the measures of a different construct (Ab Hamid, Sami, & Sidek, 2017); (Rasoolimanesh, 2022). The HTMT provides a single measure of discriminant validity that can be used to assess the extent to which a measure is assessing a

different construct than the other measures. HTMT is used for discriminant validity assessment because it assesses how well a latent construct is differentiated from all other constructs. The HTMT compares the correlation of the latent construct to its indicators to the correlation of the latent construct to the indicators of other constructs (Rönkkö & Cho, 2022). This helps to determine if the construct is distinct from the other constructs.

3.2.4. Research phases summary

In addressing the methodological approach to answer the research questions, a comprehensive strategy was employed, encompassing both quantitative and qualitative methods. Specifically focusing on Research Question 1, semi-structured interviews were conducted to delve into the intricacies of the topic. The second phase of this methodological framework involved a quantitative survey, designed to gather structured data and insights, tailored to address the nuances of Research Question 2. The subsequent table serves as a condensed yet detailed summary, delineating the distinct methods employed for each research question. Furthermore, the strategic combination of these two phases, leveraging both qualitative and quantitative approaches, provides a holistic and nuanced perspective. This integrated methodology forms the foundation for addressing Research Question 3. This organized and sequential approach aims to enhance the transparency and clarity of the research design.

Table 2 : Research phases summary

Research question	*Data collection Method*	*Data collection Instrument*	*Data analysis method*
First research question.	Qualitative method	Semi-structured interview	Thematic analysis
Second research question.	Quantitative method	Questionnaire	Structural Equation Modelling Smart PLS
Third research question.	Qualitative method+ Quantitative method	Phase 1+ Phase 2	

3.2.5 Methodological Limitations

First, the study was generally limited in terms of resources, specifically by time and financial constraints. As a result, it uses samples of 8 and 162 participants in the qualitative

and quantitative phases, respectively. A larger sample size in both phases could have increased the accuracy of the findings and likely the number of constructs impacted by national culture. The study's context in cross-cultural supply chain management signifies the need for a large sample size to capture representative and generalizable insights into the target population. However, collecting data from a target population of international supply chain employees (mainly at the middle and top management levels) proved a challenge given the resource constraints. For instance, despite referring to China in the discussion, the sample lacks representatives from the country whose presence in global supply chain activity has increased significantly in the recent past. However, finding authentic Chinese workers within the online networks and social media and scheduling interviews was challenging from the onset. Besides the unwillingness of such workers to participate in discussions involving their employers, the time and financial constraints hindered the ability to evaluate their authenticity as supply chain employees. The findings would also have greater reliability given a larger sample size. This is arguable from the viewpoint of error margins and standard deviation, which decrease with larger samples (Andrade, 2020). Furthermore, the findings could be subject to considerable false negatives or positives due to the sample size limitation (Andrade, 2020). Nevertheless, the sample provides sufficient data to model the mediating effects of national culture on the correlation between supply chain relationships, SCDO and the impact of supply chain disruption. While the limitation persisted, the researcher provided detailed descriptions of the data analysis techniques used to ensure the findings were significant. The researcher used Cronbach's alpha to determine the reliability and Pearson correlation coefficients to determine the validity of each construct. Before the SEM, the researcher applied all the tests involved in measurement model assessment (construct, convergent and determinant validity) and structural model assessment (path coefficients and R-squared goodness of fit). These tests increased the statistical significance of the findings by countering the sample size limitation.

Second, generalizability in mixed-methods research appeals to the desire to reduce bias in the methods of observation and data collection (Lucas, 2014). Using simulated quantitative data from the real world, Sykes, Verma, and Hancock (2018) explains that the potential for bias in mixed-method studies increases despite reaching saturation in qualitative studies due to non-random sampling. Sykes et al. (2018) state that ensuring uniform sampling across the qualitative and quantitative phases is one of the direct approaches to ensuring generalizability. It means optimizing the depth and breadth of the findings through streamlining the sampling methods applied throughout a study. The present study achieves

such streamlined generalizability by ensuring uniform inclusion/exclusion criterion during sampling, that is, similar representation of managerial levels and years of experience in the oil and gas industry supply chain. This implies that the findings are generalizable to the target population of the oil and gas industry supply chain management.

3.2.6. Ethical Considerations

This research follows the Aston Business School Research Ethics (University Research Ethics Regulations & Procedures, 2020) and the Code of Practice for the Safety of Social Researchers (2020) Ethical application number ABSREC026, Protocol V1, amended 20210225. The researcher provided participants with sufficient information about the study objectives and purpose to ensure informed consent. The consent forms show that the participants agreed to participate in this research, permit the researcher to keep information electronically for five years and allow physical data to be held for the duration of the PhD programme before being destroyed. The consent forms confirmed participants approval for sharing this information with the researcher, research supervisors, research examiners or any other entity that calls for evidence to support the research findings. This agreement also included participant authorization to publish the research findings.

Participant confidentiality was ensured by the researcher, who will maintain participant anonymity and data privacy by sharing the data only with permitted entities. Furthermore, the researcher reported the collected data anonymously after analysing it carefully and confirming that all participants were aware and clearly informed of the study's aims, with the assurance that no harm could befall the participants. This research also follows the eight data protection principles of the Data Protection Act (1998, 2020), as the data will not be used or analysed in a manner that is incompatible with the purpose for which it was collected. The researcher processed the data following the participants' rights. The data will be protected and kept safe in a separate computer, protected by a password to prevent unauthorized access, destruction or damage. Additionally, participants gave signed consent allowing the researcher to take data to countries outside the European Economic Area.

4. Research Qualitative Findings

This chapter presents a qualitative analysis of the data gathered in the study, which investigates the impact of national culture on the management of supply chain disruptions in the oil and gas industry. The research aim is to identify the specific factors that are influenced by national culture and provide insights into the research inquiry. The chapter describes the interview methodology, the characteristics of the participants and the research themes derived from the interview data. Ultimately, it establishes the primary research themes and constructs based on the following research questions:

- What is the influence of national culture in the management of supply chain disruptions in the oil and petrochemical industry?

- How does national culture influence the connection among supplier relationships, disruption orientation and supply chain disruptions in the management of supply chain disruptions in the oil and petrochemical industry?
- What cultural dimension is the most influential in the management of disruptions in supply chains?

4.1 Conducting the Interviews

Here, the researcher presents the analysis of the qualitative interview data. This data adds to the in-depth understanding of the role of culture in supply chain disruptions. After briefly summarizing the participants' demographics, the researcher presents the most frequently appearing themes. These themes were derived from an intense thematic analysis of the interview transcripts. The researcher analysed the transcripts using the three distinct phases that were explained in the previous chapter.

4.1.1 Participants' Demographics

Eight interviews were conducted in March–April 2021, during which the researcher sent invitations to supply chain managers and leaders in different countries via LinkedIn and email. The selection of countries was not specific to any particular region but aimed to include participants from diverse backgrounds within the oil and petrochemical industry. Numerous acceptance notes were received, reflecting the international outreach of the invitations. However, as themes emerged, saturation was reached after the eighth interview.

The chosen participants were adults in top- and mid-level managerial roles across various companies, each representing different national cultures. They possessed 2–20 years of experience in the supply chain departments of their respective oil and petrochemical companies, as detailed in (Table 2: Interview participants). Invitations were extended to individuals holding key positions with significant experience in addressing disruptions in the supply chain. The interviews were conducted anonymously, with the researcher emphasizing the voluntary nature of participants' contributions and their right to withdraw at any time.

Table 2 Interview participants

ID	*Management level*	*Gender*	*Home Nation*	*Company Home Nation*	*Years of Experience*
P1	Mid-level manager	Male	Saudi Arabia	Saudi Arabia + United States	6
P2	Mid-level manager	Male	Saudi Arabia	Italy	2
P3	Top-level manager	Male	Saudi Arabia	United Kingdom	16
P4	Top-level manager	Male	Jordan	United Arab Emirates	14
P5	Top-level manager	Male	United Kingdom	United States	10
P6	Top-level manager	Male	Kuwait	United States	10
P7	Top-level manager	Male	Saudi Arabia	Saudi Arabia	20+
P8	Top-level manager	Male	Jordan	International	20+

4.2 Qualitative Findings: Themes

The interview recordings were transcribed, and the qualitative data collected was accumulated in a database to organize and arrange the data. The database was created using Microsoft Word on a private and password-protected computer. First, a catalogue of data was created and organized by interview date. Next, data points were highlighted and assigned emergent codes.

Qualitative data analysis occurred using a thematic coding process (Miles, Huberman, & Saldana, 2014) in multiple phases. In the first phase of coding, the data was read to gain a general participant understanding of culture and its impact on supply chains. Data points were assigned emergent codes during this phase (see Table 3). Emergent coding further refined the data analysis by combining data into more specific categories (Miles et al., 2014) in order to identify relevant themes. Below is a table of codes and themes that were identified from the analysis.

Table 3 Themes and codes identified

Themes	**Codes**
National Culture	Power distance Uncertainty avoidance Long-term orientation Masculinity vs. Femininity

	Collectivism vs. individualism
Supplier Relationships	Trust Conflict resolution Communication Relational norms Commitment
Supply Chain Disruption Orientation	Learning from previous disruptions Preparedness Planning Continuous review Perception of risk
Organization Size	Company size and capabilities
Leadership	Decision making Openness Connection and relationships
Digitalization	New technology adoption Online business process Cost and time benefits
Company Experience	Mastery/expertise
Government Laws Regulations	Regulations

The main research themes were generated from the interview data using abductive thematic analysis. They are listed in Figure 5 along with the number of respondents whose responses were linked with them. These themes were identified after analysis of the priori data codes, which unified some codes into major themes that fell within the scope of the research. The themes facilitated the analysis of the relationship between culture, the cultural dimensions as described by Hofstede, SCDO, supplier relationships and supply chain disruptions.

Figure 5

Research themes in the interviews

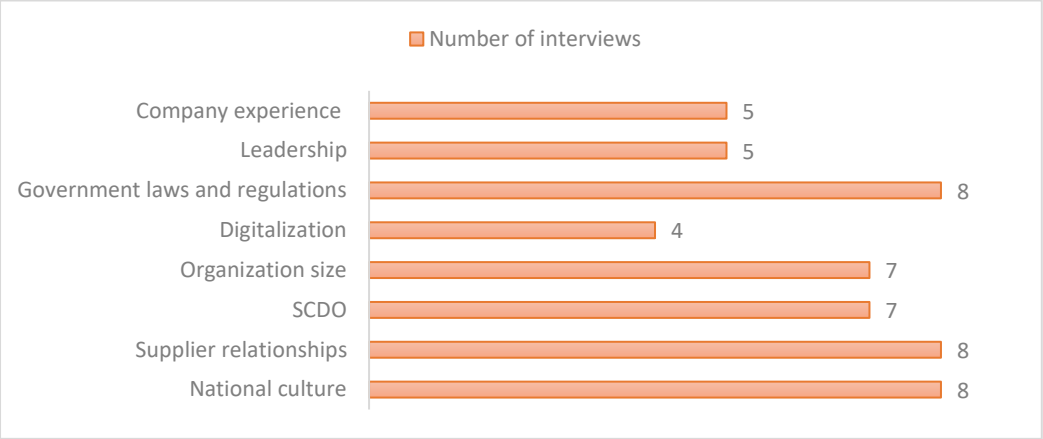

Figure 5 Research themes in the interviews

4.2.1 National Culture

The main theme emerging from the qualitative data analysis was national culture. The participants mentioned several aspects of culture, both implicitly and explicitly, in response to interview questions about how the companies were involved in their firm's supply chains differed based on their country and nationality. The participants attributed some of the aspects of their interactions with suppliers to the suppliers' nationalities or countries.

Based on the interviews, it can be seen that there are numerous distinct characteristics and variations associated with Hofstede's national culture dimensions, such as the power distance dimension that arose in the participants' answers. This dimension considers national values and the inequality in power distribution within a company, community or country. This concept was detected in some of the participants' comments while talking about negotiations during disruptions and how cultural differences and centralization impact their companies' negotiations. For example, two interviewees stated as follows:

> Sometimes in the discussion, the two parties are not in power to take the right decision, so you know that this guy is coming to waste your time; he's not a decision maker, so the guy simply will waste your time, will not take you anywhere, you cannot discuss options with him/her; this is like open-ended discussion.

> Sometimes, we may discover we've been talking to the wrong person, and we need to escalate to someone else, with the right people around the table.

The responses implicitly reveal the notion of power in various organizations. The respondents indicate how people in the lower power category mostly do not have the ability to make decisions; therefore, approaching them yields no results and is a waste of time. Thus, the respondents realize they have to look for people of a higher power rank. This idea was also expressed by interviewees when discussing organizational hierarchy and their way of working during supply chain disruptions, particularly in countries like Kuwait. One of the interviewees said, 'There are for sure some differences in how our organization setup, management setup, different approvals are required; Kuwait operates differently than other regions.' This response indicates the varying management types with different power notions and that there are different stages of approval during critical times. Some participants, such as those from a company in Saudi Arabia, also compared the way their firm operated to the way branches of that firm in other countries operated. One participant stated:

> Honestly … unfortunately, operations outside Saudi Arabia are centralized, meaning that decision making must be issues from within Khobar, which made things worse as decision making was slow, for simple things you have to get back to Khobar and take approval from A or B; they don't give privilege to the country manager to run the business or the project. There was some sort of centralization which affected negatively our outside projects.

Decision making during and after a disruption was slow in instances where other branches of companies had to involve the main branch to get approval for various decisions. The participants provided several examples of comparisons based on their experiences working for companies with different nationalities and national cultures. Their viewpoints provided clear insights to explain the power distance variations in the companies. The participants themselves referred directly to the companies' national cultures. One participant stated:

> We are an American-based company … so if you want to get something done in my company ... it will happen tomorrow, it will happen very quickly. If you're doing it for the right reasons, there are three levels between me and the president; it will very quickly get to the president, and something will happen.

This is a clear acknowledgement of the notion of the power distance dimension of national culture. American companies do not require approval at all levels up to the president to make a decision. One interviewee who was working at an American company compared his current company to the Anglo–Dutch company for which he previously worked:

> From a cultural perspective, within this company one is American, and American companies definitely like action; even if it's the wrong action, they will take action. If you're doing something, whether it's wrong or right, that's brilliant. Well done. At least you're doing something. When I was working at a branch of an Anglo–Dutch company, if I wanted to get something done, between myself and the president of the company were lots of layers, and therefore it would take time.

The interviewee describes the differences between getting things done in American companies compared to Dutch companies, where power distance is high.

The interviewees also mentioned the national cultural dimension of uncertainty avoidance and its influence. This dimension measures the level of uncertainty one is willing to accept and one's sense of threat from unknown and ambiguous situations in the context of a certain society and country. This dimension was clearly identified in the comparisons of how companies and suppliers of different nationalities behaved during a disruption. One participant stated:

> Russians come from communism, and what I find with a Russian mentality is that they want to be told what to do, so they won't do anything unless somebody higher tells them to, so they want more direction, they want people to say I've got a problem, and they want a solution to it. So they … want somebody higher up in the chain to tell them what to do; that could be very different from somebody from Saudi.

This reveals that Russians are not comfortable with high levels of uncertainty but instead want direction from above, which is not the case for most Saudis. Some companies have developed guidelines for interacting with suppliers to avoid creating unnecessary uncertainty. This is due to a high level of uncertainty avoidance. One participant stated that 'We deal with suppliers in the most professional way possible according to our guidelines and policies, and we respect any supplier we deal with.'

Acting professionally avoids casualism that can foster uncertainty. For some companies, the development of instructions for operations was vital to achieve their targeted goals and to minimize uncertainty. Take, for example, the following statement by a top manager:

> If we really want to have a very powerful supply and effective supply chain cycle management, we need to manage the supply chain and design first of all, how you design the supply chain to make the business expectation and to really make sure that this function is really adding the right value to the organizations. This is specifically done according to strategy business expectation.

This response indicates a higher level of uncertainty avoidance evidenced by adequate preparation and planning for unforeseen supply chain disruptions. This contrasts with the perspectives of some interviewees' firms that pay less attention to detailed planning for supply chain processes and to procedures to guide implementation.

A third dimension of the national culture theme to emerge in the interview data analysis was long-term orientation. This relates to the cultural perception of time, namely whether a culture is characterized by decisions based on a holistic view of time in which the future and past are considered together or whether action is determined based on current time and situational consequences. The data analysis revealed that long-term orientation was obvious in the participants' examples. For instance, one participant told a story in which he described his manager for 10 years passing by extra-large tanks that had always been in the field but had not been used for an extended period. Unexpectedly, the company experienced a terrorist attack on its field base that had an enormous impact on the location, even threatening all customer delivery plans. The tanks the manager had considered a waste of money turned out to be a key aspect in the company's recovery and mitigation plan. It is impressive that the company had invested for a terrorist attack without realizing, and after 12 years they were able to benefit from the investment. This exemplifies the long-term orientation culture dimension. The participant referred to this success story, the recovery of the deliveries and fulfilling the company's commitments to its customers in describing the company background when they stated:

> It was owned by Americans and the American mentality was present in it. These ideas of crisis management that perhaps was the one that helped and made the company's

> management more aware and understandable to make a plan B. The plan B helped the company recover its deliveries and fulfil company's commitments to its customers.

Uncertainty avoidance also emerged in comments on negotiations between companies, as some companies made concessions to achieve sustainable or long-term profit. This is an important feature of the long-term orientation dimension, exemplified by the company trying to build a lasting relationship with its suppliers. One participant stated:

> So, there's a formula to adjust that either on their or our favour; and that proposal faced internal challenge from our finance department because they thought that we were losing. Our argument was "Yeah, that could be it", but again ... at some point the finance department says "You're giving favours to the suppliers." No, we're not giving them any favour. We're trying to make sure that they stay in business because if they don't make money, they will not sell more. So, I wanted them to stay in business; they don't lose for me, and also, I don't lose. The formula was very carefully put ... it was some sort of formula to make sure that we, them and process are protected.

This was also obvious in opposing perceptions when firms refused to make concessions to obtain future gains. This is illustrated in the following response:

> The suppliers they have short vision; they want to take advantage of the moment. It did hurt them a lot because they lost the reliability or reputation because they want to increase the price for a client that has a long relationship with them, not caring what kind of impact it would happen to our business.

Evidently, the organization was keen to monitor the current prices offered by the suppliers and would sometimes not enter into agreements due to the higher prices set by the supplier for fear of lower future performance.

Another cultural dimension revealed in the participants' conversations was masculinity vs. femininity. This dimension pertains to the cultural beliefs and values attached to gender. For example, masculine cultures emphasize assertiveness, accomplishment, bravery and physical success, while feminine cultures emphasize modesty and compassion and encourage social relationships and harmony between people. When discussing the COVID-19 pandemic, the participants described their suppliers applying both masculine and feminine

values in many comments. For example, one participant stated that ‘People were more compassionate, especially some local suppliers here were trying to help but without really a plan. Some international corporates they were more prompt in putting a plan together.’ They went on to explain the masculine traits that dominated in situations in which the supplier’s purpose was to gain the maximum material profit from the catastrophe. They wanted to reap all the benefit but later they had to change. Such ego and resistance indicates a masculine culture. The participant stated that:

> At the beginning of COVID some companies continued their attitude: Take it or leave it. And six months down the road, they changed because they realized that the whole game has changed, so again that is cultural thing, I think. People have an ego, they don’t want to let it go, and they want to make sure that they have the upper hand and they think that it’s business as normal. So, we faced an issue with that one at the beginning. Later on, 4–6 months down the road when they’ve realized that everything is changing, they started talking with more common sense.

The participants also observed that various aspects of the masculinity vs. femininity dimension, such as compassion, modesty and insight into social relations among people, were present in most negotiations between companies and their suppliers. One participant stated:

> When you have a local company you have to be very tough. Usually, the owner gets involved, and in my case I’m thirty years old and if the owner calls me and he’s fifty or sixty years old, even if we are in a catastrophic situation, I’m raised in a way that I cannot raise my voice or deal with a guy that’s much older than me, even if there is a loss in the company. I will just convey my message in the most respectful way possible, so it’s critical, but since this is an old guy and he’s involved, I’ll try to avoid to talk to get him involved, but I’ll put the pressure on the lower management.

The participant is compassionate and respectful when dealing with older people. The response reveals aspects of the masculinity vs. femininity dimension of culture. Based on the existence of such values and beliefs, managers developed specific ways to work with diverse cultures. One participant stated:

> Honestly, my style of working comes with accommodating approach, dealing with people from the perspective of containing them. Even in Arab culture, usually we don’t like someone to come with direct ordering; we feel that it’s hard to accept. But

> when someone is coming with accommodating approach, looking for help … when we talk to people, we talk with respect and kindness, etc. These things, even if we cannot get what we want, at least we build the right relation with the person. Sometimes, it's not necessary to win at the same time, especially procurement team; they need to know this fact very clearly.

The response emphasizes the values of respect and kindness to ensure others' views and decisions are accommodated. These attributes also reveal masculinity vs. femininity.

Finally, the collectivism vs. individualism dimension was also reflected in many of the participant interviews. This dimension emphasizes a society's dominant views about the individual vs. collective approach to relationships and indicates the value that society places on personal time, individual achievement and freedom compared to the cohesiveness of collective efforts and the degree of loyalty to families and community. The participants explained their companies' culture from two perspectives: the internal perspective, the view from within the firm, and the external perspective, the view as a company with its suppliers and customers.

One participant described the individualist approach present in some companies based on his experience, saying 'Some businesses depend on individuals: the business becomes successful because X is there or Y is there, but if X or Y for a reason or another leaves the business, there is no one to rely on, and the business may fail.' This response reveals individualism in the organization. This can have a negative impact in the case that the person being depended upon is not around to deal with the issues, which might cause the business to fail.

In contrast, another participant explained his collectivist point of view in critical situations, such as those involving risk identification and mitigation. They stated:

> I believe what they call it the cross-functional team, they can determine these problems easily. You cannot bring for example a guy or a person from supply chain function and you ask them to determine all the risks; this will not happen. You need a guy from finance function, supply chain, sales, HR sometimes; these people will bring all the risks on the team, so we need to put an action plan. So it's a teamwork, it's a cross-functional approach.

This response emphasizes the role of collectivism as the organizational culture in identifying supply chain risks. A single person may pose a risk to the organization while trying to build

risk mitigation measures as opposed to being part of a well-coordinated team of experienced individuals who may effectively build risk mitigation measures.

Some participants described perceptions of their relationships with their local and international suppliers that indicated a collectivist approach. The response below illustrates how the organization worked as a team with foreign suppliers in managing supply chain disruptions. One participant stated that 'We're working as a team whether local or foreign suppliers.' Another participant explained the importance of collectivist cultural relations, noting that collectivist cultures emphasize the importance of strong relationships with suppliers and that the individualist approach does not lead to business success. Furthermore, it is crucial to deal with all individuals in a positive manner that improves operations and allows everyone to succeed. They stated:

> I, the supplier, will deal with you, the customer, only to what is contractually agree and nothing else; I don't care if you sink, if you swim. I don't think that applies, I mean, there's always going to be some kind of partnership element between businesses; everyone I would think, in terms of business, [want] the success of their partners more than wanting them not to succeed.

Throughout all the conversations with participants, it was consistently found that national culture dimensions played a significant role. These dimensions had both explicit and implicit effects on interactions with the focal company and suppliers. This emphasizes the importance of recognizing and addressing cultural nuances in global business ventures.

4.2.2 Supplier Relationships

The second theme emerging from the qualitative data analysis was supplier relationships. The importance of supplier relationships in managing supply chain disruptions has been reported in various published studies, and the fact that this theme emerged in all participant interviews proves its criticality. The participants highlighted several significant signs reflecting the supplier relationship in various contexts, such as trust, conflict resolution, relational norms, communication and commitment. Interviewees in several positions linked these dimensions to national culture.

Trust in the supplier relationship was associated with national culture. For example, one participant explained how trust varies among people and businesses of various backgrounds, thus influencing their decision-making process. They stated:

> There are, for example, different background that influence their decision making … trust as in some culture they value trust, word of mouth, other cultures they don't—they need everything in writing or documented. So sometimes in supply chain issues you want to solve issues on the phone; you don't have time for emails.

Another participant emphasized that trust, which is fundamental in personal situations, carries the same level of importance in business transactions. They stated, 'The thing is that trust and things like this are all definitely taken into consideration, not just our dealings in business, even at the personal level'.

Different participants also indicated that trust is an investment that grows over time and that can pay dividends at a later date. One participant stated:

> Remember that I said at the beginning that trust is very important because when you build trust you can take advantage of it in the future in a good way not a bad way; you can harvest a result of that. If you manage to build a good relationship and a good trust relationship with client and a supplier, and comes a point that you or he's in trouble, based on the previous history and trust they can listen and understand.

One respondent also explained the importance of transparency and trust that allowed them to work as single team with both local and foreign suppliers, stating that 'Of course, when there's transparency and trust, we're working as a team whether local or foreign suppliers'.

It was also noted that in relationships trust can foster agreement about the delivery of goods even before payment. One participant stated:

> Trust … when you're dealing with the supplier for 10–15 years, it reaches to the point that he's part of your firm or organization; he's a partner more than supplier. Sometimes they deliver the goods before receiving PO or money; it happens many times—delivering goods or shipping goods before receiving PO due to trust or long relations.

Therefore, in supplier relationships trust can foster agreement, which is essential in managing supply chain disruptions.

On the contrary, another participant indicated that the role of trust in the relationship is minimal and that it cannot serve as the basis for transactions. They emphasized that we cannot always rely on trust for transactions or as a driver of business; however, it is a component of the relationship. This participant stated:

> Definitely there's trust, definitely there's good intentions and good faith, and there's cases where they hold up their end of the deal and we hold up our end of the deal, but there always needs to be documentation because this is the way to deal with any aspect of business, not just in purchasing. I really don't see the trust aspect of it; for us at least, it's not the driver. It's a component of the relationship, which is very important; it's an integral component of the relationship, but it doesn't supersede formalities which are our necessity.

This response is a clear illustration that while trust is component of building good supplier relationships, it is not the key driver of business. Another interviewee agreed with this, stating that 'Trust is there, but it's not the driver, but it's kind of like the invisible force: we value it, but there's always going to be a form of dealing happening.'

The participants felt that trust is a crucial element in the supplier relationship in most situations, particularly conflict situations. It is important to have trust among supply chain partners to help each other during critical situations. One participant stated:

> Trust is always important, regardless of the situation. Obviously, any business goes through ups and downs and you want the partners which you deal with to stand with you when things are going down so that you stand with them when their things are basically going down, but still this is governed by properly written and executed relationships.

Another element of supplier relationships that was mentioned was the conflict resolution dimension of culture. One participant described a situation when local companies would go to war due to conflict, which impacts their overall relationships. However, this circumstance was not common for international suppliers, as they were reasonable and able to resolve any issues. One participant stated:

> I think reducing a conflict is heavily affected by culture and here sometimes it gets personal, companies have agreements all the time. Unfortunately, in some local companies, they take it personal and they go severe in … almost declaring a war on the other organization. But that with the smaller companies, even with the family companies that are run by some individuals who are not fully exposed to the market, some big firms they talk in more common sense and more openly, but unfortunately the ego issue is more common here than international companies.

Another participant provided an example of several types of negotiations employed in times of conflict. He recalled that he had suggested to his employee to be very prepared when facing the other party by understanding where they come from. They stated:

> For example, Chinese have their own way of negotiating, Americans have different way of bargaining or discussing the deal, but I believe the main challenge here is to come well-prepared about what you want and what are the areas that you need.

This participant laid emphasis on the best approaches to ensure that organizations create effective negotiations, which are key in building supplier relationships. The participant stressed the importance of entering into negotiations prepared and knowing exactly what you want.

The interviewees also provided real examples of how resolutions to critical situations differed based on the country in which the business was being conducted, which could sometimes lead to the necessity of engaging in illegal and unethical practices. One participant stated:

> When you work in Jabal Ali free zone, totally different culture when you work in Egypt, still working old-fashioned: papers, stamps, and the online applications is almost zero in Egypt, I noticed that different cultures and countries, rules: sometimes you must go through wrong ways to do your business.

This response illustrates the different aspects of culture that are evident in different countries. Resolution mechanisms differ according to the individual, according to the organization and according to the country.

The participants described times when a supplier faced an extremely critical situation and their firm was able and willing to help. They sacrificed without taking advantage of the supplier's unfortunate circumstances. One participant stated:

> There was a case we were dealing with an international supplier who had received a delivery note from a company in our country. However, the company cancelled the delivery while it was overseas. Since we had built a good supplier relationship with, they offered the goods to us at a 50% discount, to avoid the cost of transporting them back again. This was good to us as it helped reduce the cost of the purchases as we would be able to use them at a later date.

This shows how supplier relationships help foster cooperation between the supplier and the company for mutual benefit. Both the respondent's company and supplier benefited from the transaction.

Some participants expressed opinions regarding agreements and conflicts faced by their firms, noting that solutions should be fair to both parties and decisions should not be based on the short term. These aspects are crucial in building enduring supplier relationships. One participant stated:

> I told you; win-win situation should be always there. For instance, a supplier may offer cheaper prices for goods and services but instead deny you delivery services. Instead you have to go for other expensive transportation companies. We should always agree to a point that all the participants in a business transaction are equal and does not leave any disadvantaged.

Another participant described a negative experience with a critical supplier. The participant here emphasized that the main obstacles impeding resolution of the conflict were related to ineffective communication, stating that:

> It is difficult to deal with a local company than a global company. For instance, if you're talking prices, which we often do, it is difficult to agree with a local company. It is also inflexible and will always be looking for increase in pricing and trying to always force you to do things knowing that you've got to go to them because they are the main suppliers and you really need the product. They are also slow in making decisions, which reduces performance.

This response centres on the effect of ineffective communication and collaboration, which result in poor supply chain management. Effective communication ensures the parties collaborate for the overall benefit of both.

Communication becomes even more important in conflict resolution during critical and urgent circumstances, such as disruptions. One participant stated 'It was about communication, we just talk to each other, we all needed each other at this point to survive, and of course they listened to make sure that they want us to understand their issues and concerns.'

The interviewees emphasized communication and information sharing as indispensable components of building relationship with suppliers. One participant said:

> I believe you need to build the right communication channel with … the way you talk … look, based on my experience with dealing with people, usually if you come up with accommodating approach, people will give you what you want, you need nice talking, accommodating approach, also you need to manage the emotions.

Communication was specifically identified as a critical aspect of the decision-making process. One participant highlighted communication as playing a leading role in supply chain operations in general, stating:

> I would say communication is the biggest factor there, clarity of the request that comes out from the company to the supplier is an important one, completeness of the request, identification of the requirement in its most complete way, and above all I think communication with everyone involved … you know … supply chain's main role is communication in any organization.

Many of the interviewees described communication as linked with national culture. Following is an example of a firm that had trouble communicating with Chinese suppliers, especially by phone. The participant in this case stated:

> The main blocker with the Chinese suppliers is that most of them know how to write English, but when you call them on the phone their language is really tough. I don't know really how they do it; they write very nice emails, but when you call them, you can't pass a message or understand what they're saying. I don't want to be offensive in this, but this is the case. Sometimes when I [talk about] a complicated situation on the phone, I try to convey my message, convey the urgency, but unfortunately with the satires in China it's very difficult, so I had to send them an email, wait for them to reply.

Other participants preferred communicating with international companies, as they were generally more cooperative and responsive compared to local companies. One participant stated:

> When it comes to professionalism, definitely when it comes to international, the level of response is much better: people there are replying to the email, they're taking things seriously, they will make things clear for you, they're very transparent. I'm talking in general. Also, this is my own experience; I don't generalize it, but this

> speech represents me, I'm not generalizing this idea across, but usually you see things and also the level of standards and specification are much better, openly speaking, sometimes locally … first of all, they're not accessible.

Another interviewee stated that differences between international companies derive from variations in their ways of thinking because of the varying ways in which they transfer information. This is as a consequence of ineffective communication, which may create confusion in the company. One participant stated that 'People in international companies have different mindsets; they communicate using emails differently, they approach the escalation matrix differently.' However, another participant felt that local companies are better to deal with, especially because of accessibility. They stated:

> For a local supplier, I've got a direct telephone line to him if there's issues, or I needed to look at something; I'll get a decision within a day. Things happen very quickly, so I can talk about price. I need to find an aircraft to take a product from here to here, he'll immediately get that sorted, he'll get the pricing and get it done for me … yacht, I was speaking in term last week about getting a yacht within 10 minutes here; he got a yacht for me got a price and guaranteed it.

The participant went on to compare the local company his firm deals with to an international company, stating:

> For international company, I don't know who to talk to all the time, there's no point of contact and I don't know where to go if I have an issue. I try to hit one; if that's the wrong one I'll go to another one. In a local company if I have an issue, I'll know who to go to and know how to sort it. So culturally, definitely the global organizations are difficult to deal with if there's lot of people involved. Local organizations very easy, especially if there's one person heads the business, takes active interest in his business. He knows what's happening in any of his areas, and if I got an issue, he'll sort it out.

Another participant described how responsive most local suppliers are:

> I noticed that local company mainly they're very easy to deal with, they're elegant – once I send them an email or give them a call, they will abide to our instructions, respond immediately, there will be no resistance … they'll act immediately. But

> dealing with multinational employees it will be very hard because they will have policies and standards of their own that might contradict or clash with our requirements … local company if there's any requirement I'll just send an email and they'll do it immediately, but international companies will have lots of channels of communication, they have to go to their regional team, get approval from them, update their system, so it will be very complicated and gruesome and it will delay the process.

The responses reveal that communicating with local companies is easier than with international companies due to cultural differences. It is sometimes difficult to determine who to talk to in the case of international supply chain disruptions, which can majorly impact the flow of goods and services. Thus, cultural differences can be major obstacles in supply chain management, which necessitates the building of good supplier relationships. Lack of effective communication as a result of cultural differences can also result in inefficient operations.

During the interviews, the participants, all of whom worked in firms that interacted with companies having employees of many nationalities, discussed communication with suppliers and how it can be disrupted by events such as the COVID-19 pandemic. One participant stated:

> Because we have many suppliers in different locations, unfortunately due to the pandemic, we cannot keep track of regulations in, for example, the UK or the USA, so we rely on our suppliers to convey the message of any issues in their region to us, so we make sure that our suppliers … if there's any lockdown that will delay our orders, we make sure that they are conveyed in time. So, the main thing is ensuring our suppliers are communicating us all of the delays in relation to the pandemic or any other disruption.

This response illustrates the importance of communication in maintaining good supplier relationships to improve performance and supply chain management.

Based on their experiences, the participants emphasized the importance of maintaining strong and timely communication and engagement with suppliers. This is particularly crucial during times of disruption, as noted by one participant:

> Having basically proper engagement with suppliers when things like this arise and communication with them not just when we have situation but also maintaining good

> relationships with suppliers to understand where technology is going, where business is going. At some level, suppliers enter that partnership zone where you're dealing with them on a very high level for very important and critical stuff.

The response also emphasizes the role of communication, with the goal of creating good supplier relationships. The suppliers end up becoming more like partners in critical times affecting the management of deliveries.

Another participant explained how the relationship between his company and its suppliers was affected by disruption. It was difficult for the company to communicate with the suppliers effectively and provide the necessary information at the right time for planning purposes. They stated:

> A lot of it boils down to how we engage with the suppliers: staying in continuous touch with them, giving as much as possible in terms of information about where the business is going to forecast, giving them what they need to able to plan to be able to provide us with that we need in the future, you know what I mean? Call it business visibility; it's much easier said than done, then the visibility when you pass it down to the supplier in a way which makes it easier for them to be able to serve you better, that's a very important aspect, I believe, to how we mitigate against outages in the supply chain or disruptions in the supply chain.

The fourth cultural dimension that was mentioned as affecting supplier relationships was relational norms. Relational norms are the expectations and understanding that companies and their suppliers have of each other and of the goals of the relationship. Some participants provided examples that illustrated their approach to understanding their suppliers' ways of working by relating to the cultures and countries involved. One participant stated:

> International suppliers … because we have many suppliers in different locations, unfortunately due to the pandemic, we cannot keep track of regulations in, for example, the UK or the USA, so we rely on our suppliers to convey the message of any issues in their region to us, so we make sure that our suppliers … if there's any lockdown that will delay our orders, we make sure that they are conveyed in time rather than, for example, promising, sedate, as they just come on the promise that they can say "Sorry guys, your orders is to be ready in three weeks due to lockdown" so

> the main thing is ensuring our suppliers are communicating us all of the delays in relation to the pandemic or any other disruption.

This response highlights the need and value of understanding and understanding the expectations between suppliers and the company. In this case, the company expects the supplier to communicate effectively regarding issues affecting the supply of goods. Such relational norms are components of good supplier relationships.

Below is another response that clearly shows the importance of relational norms within the supply chain to ensure that organizations are comfortable working together. Some organizations avoid dealing with countries that have complicated logistic systems, making cooperation difficult. One participant stated:

> Some countries have more complicated logistic issues than others, so we tried to eliminate the orders on the countries that have logistic issues although the price was low. I have distributed purchasing load in a way that we buy from suppliers who are more efficient, very prompt, so we make sure that our operation is not interrupted and buy from the other suppliers that can deliver the material but it will take them a little bit more time, and the one that has cheap material but logistic challenges. At the end of the day, we have all the material coming even if it comes late, I'm not out of raw material.

A similar response related to a company's understanding of the way of getting things done in the supplier's country, which sometimes required illegal or unethical actions. The participant in this situation stated:

> We worked with customs in Egypt, Saudi, Oman, Kuwait, UAE. UAE were pioneers in supply chain and they have clear and simple regulations. The worst experience was in Egypt, things weren't transparent as expected, Kuwait also was bad, Saudi has changed regarding that in a positive way, whether Sabir, online, a lot of things have changed in the past 5–10 years.

Another example demonstrated that some firms should know someone inside the firm on a personal level to see action taken more quickly. It explains the role of relationship building in supply chain and supply chain disruption management. The participant in this case stated:

> I've got a good relationship with a global guy sitting in the UK but it's essential to have those relationships to get things done quickly, if I didn't know people, I can't just phone the international company's hotline…sure I can… but having a relationship, things can be sorted quickly. We had an issue last week about some engines that were going from the international company to be delayed, and I immediately got onto the guy in the UK and he was able deliver within the duration of 24–48 hours, that was purely just relationship, me phoning him up I knew … and I deal with him and that's it.

The main concern is ensuring that both suppliers and the firm have a clear understanding of what actions to take in critical situations, such as disruptions. One participant stated 'What I want them to do when I want them to do, all offers me alternatives if I haven't got a clue what to do, they generally do.'

Such implicit understanding of what to do even if it was not effectively communicated is fostered by quality supplier relationship norms. An understanding of goals and expectations should be established earlier in the supply chain, which ensures that firms and suppliers cooperate and coordinate effectively for better outcomes. One participant stated:

> I believe one of the drawbacks today we have in supply chain that most of the companies looking for a supply chain as a logistics operation; supply chain is not about logistics; it's about the outcome of the supply chain; the way the supply chain that should be designed should reflect both the supplier and customer expectations as well, so for example, you cannot build a lead-time/ delivery time to your customer while it is not in-line with the real time; you cannot for example say lead-time of two months and you commit to the customer that the delivery is one month.

Therefore, to achieve a consistent supply chain the supplier and the customer must be on the same page when it comes to strategic planning.

The final supplier relationship construct was commitment, which refers to each party's accountability in the relationship pertaining to whether the party is willing the make sacrifices, help and go beyond contractual obligations to maintain the relationship. Some indications of the construct of commitment were observed in the interview data, such as the following:

> Every time there is an issue with pricing, payment, also it's a repeated process… we all argue about the price. We've argued that we are a long-term customer and we buy from you on a regular basis so we expect better prices and they also argue that they are reliable suppliers, so we were resolving this by meeting on frequent basis and we try to put long-term agreement but again the type of commodity or the product you can't put a fixed price for one year at all, so many variables, so we have reached some sort of agreement, that the price is fixed for 3 months.

The response reveals the extent to which the firms and suppliers cooperated with each other to agree on specific prices for a duration, which shows a degree of commitment that they had for each other. A participant also explained the importance of building long-term partnerships with clients through commitments to ensures that the firm and the supplier all achieve a win – win situation. He stated:

> Usually we build a long-term partnership with suppliers and with customers as well because looking forward, usually our philosophy mainly depends on the concept of building long-term partnership because this is the way you create value, it's not about I need to squeeze you to get the best price out of you then I will build my success with reference to your challenges or failures; this is not a long-term partnership; we believe we can add value for both parties, win-win situation in long-term partnership.

Being committed requires a sound understanding of the other party's needs and expectations and being accountable to meet these expectations. Commitment ensures that all participants' obligations are achieved, which improves performance. One participant stated:

> We have to be sure that we understand the mode of operation of other suppliers to note what kind of challenges we might have when dealing with them. we have put a very important emphasis on the expediting – because as I told you when the attitude of some of my team was like "I send the people an email and that's it" so I had to work hard on my team to make sure that they really accept the responsibility, and that they have to take the ownership of the work, the order is not finished until the material is already delivered, accepted and also paid.

Furthermore, a respondent explained that disruptions are urgent and unexpected disturbances; therefore, they require additional responsibility and accountability to return everything to

normality. Accountability here brings out the need for commitment to ensure that firms achieve their obligations in critical times. This participant stated:

> Challenges are not normal things to have, right? So, in this case you need extraordinary skills of managing these things: you cannot manage crises and disturbances with the same way you manage things in a very normal way. So, I believe … first of all, people have to be working with sense of accountability, without accountability you cannot manage such things because when they miss the accountability, they cannot do anything in life, this is why.

Another participant named his firm's local supplier and discussed its critical role in overcoming the disruption compared to his firm's international suppliers. The local firm is much more committed than the international supplier. This participant stated:

> I think the specific factor is the persons and the company's ability to do things immediately, if I call the local supply, he's eminently available, the communications are exceptional, and that is something of importance especially when we have disruptions, any issue that we have we can get in touch with this company. It feels like we are partners…., I feel this is almost an extension of our company, the company feels when we have problems it has to do something, it's like an extension of my team rather than I'm battling against somebody. For international company, it may not be the case as they are not very close and committed.

The participant also elaborated, justifying how the local supplier was closer to the company compared to international supplier. He stated:

> I think it's easier to work with people that understand your organization very well. And he does. He understands rigs, understands if he doesn't answer his phone at 11 o'clock, it could cost me 30 thousand dollars a day, that's his mentality; if I phone an international company, I don't think they've got the same understanding of our company, they don't want to understand it, they don't need to understand it.

The response depicts the level of commitment that is experienced when dealing with a local partner rather than an international partner. Furthermore, another participant explained his negative experience with an international supplier compared to his experiences with local suppliers during a disruption. This participant stated:

> We found that the closeness in Europe was common during CORONA period, especially France closing for weeks, you cannot even reach the supplier, you send them an email there's auto-reply "out of office for 10-15 days"; in Saudi it wasn't like that, for local we found that we could rely on local suppliers more than foreign during CORONA periods, also shipping lines things were changing from day to day… the rates.

This response reveals how committed local suppliers are compared to international suppliers. Therefore, the organization finds it crucial to make more local contacts rather than international contacts.

Another interviewee provided an example illustrating lack of commitment on the part of some of his local suppliers, which had a significant negative impact on the firm. He stated:

> Locally there's 2–3 suppliers of chemical facilities, and we had worked together for a long time. However, here was a time there was a severe shortage of chemical supplies because one of the plants had unexpected shutdown. The supplier was reluctant to listen to us at the beginning, they wanted to use the situation and take advantage, we had arguments, discussions, and fights. We understood there was a shortage but they couldn't increase the prices just like that and so it didn't work at the beginning so we had to take severe measures just to teach them a lesson honestly and the materials from another oversea supplier.

Commitment is crucial for the performance of the supply chain overall and may help in supply chain disruption management. Furthermore, commitment fosters good supplier relationships for the benefit of both firms.

4.2.3 Supply Chain Disruption Orientation

The third theme that emerged from the interview data was SCDO. SCDO represents the company's ability to learn from its previous experience of disruption. Several interview participants asserted that their firms did not develop plans for their supply chains based on prior disruption experiences. One participant stated 'I expect that unfortunately there was no strategy whether to deal with such crises or similar ones; so, lessons learned were zero despite the fact that the company is really old.' This response shows that the company made no effort to learn from previous disruptions. A key to supply chain management is the ability

to maintain a consistent flow of information in the case of disruptions that enables the organization to learn from previous mistakes, which fosters SCDO. Another participant explained how his firm was dealing with disruptions, stating 'I cannot say there's a strategic way. It's much like firefighting. Unfortunately, this is wrong I know, but this is the reality. By firefighting I think it's the right term.' This response shows that the organization had no strategic way to deal with supply chain disruptions. Planning for disruptions is a key aspect in SCDO to ensure that the organization is working in a planned manner that eases tension.

Other participants emphasized that they engaged in continuous reviews of relevant plans and issues. One participant stated:

> We just try to review what we call item history or purchase history for the materials, orders and clients as well. We check if the PO is late or the delivery is late, who was the buyer responsible as well, we'll make sure the buyer either he explains why. We make sure that he's not repeating the same mistake again, or in some places we have to change the buyer. So internally there are reviews; we do continuous review based on the performance based on previous problems and issues.

This response reveals how the organization kept on monitoring data and reviewing possible mistakes and disruptions to ensure that they learn from previous attempts. This is an essential component of supply chain orientation that fosters effective supply chain management. Some firms' responses were not limited to the continuous reviews of plans; as another participant stated, they went further to discover the root of the problem and correct it. He stated:

> If there is any kind of disruption that happens, it is definitely … all the stakeholders … if there is a disruption, there is always going to be some root cause analysis to figure out what exactly happened, why did it happen, and how can we avoid this in the future.

The recovery process is a clear indication of the importance of SCDO in supply chain management. Thus, organizations can monitor and regulate their functions vis-à-vis supply chain disruption. This is a clear indication of SCDO importance, as it was also detected in how the firms perceived risks, as some companies assumed threats to always be looming. One participant stated 'Within the few months anything can happen; sometimes the insurance can go up, or the freight rate goes up. So there's a formula to adjust that either in their favour

or in our favour .' As an example, this participant described his own experience preparing for upcoming risks:

> We sat down for three days with the company and their safety and logistics people, me and my team three days, and we looked at every part in the process of shipping the rig, looked at every single part to see what could go wrong and then having mitigating plans to make sure that didn't happen, so every single step from rig being built-in in the US right away through to Erbil. For three days just looking at the risks that could go wrong without a particular thing, so it can be very well structured.

This response is a clear indication of how the organization made an effort to ensure they plan effectively for the upcoming risk and how they would help mitigate that risk. This would help ensure minimal disruptions and the mitigation of any disruptions.

When the interviewer asked the participants what factors they perceived to affect their firm's learning from previous disruptions based on their experience, most answers related to the financial impact of the disruptions. One participant stated 'Losses, when they lose money, they wake up. It's as simple as that, if we just give the common sense, please and this is important "ok fine" they don't wake up until they are hit with a hefty loss.'

The magnitude of the disruption and the effects are the drivers behind the lessons learned, as explained by most of the interviewees. One participant stated:

> How much disruption is caused, how much cost to the business … the one down in South Africa took around about 30% of their sales, so the whole country sales were reduced by 30%. When it's that big, everybody from the big president of the company wants to know what's happened, why has it happened? What do you do to put it right, etc. If it's a small impact, if it's something minor, the president wouldn't know about it.

Furthermore, it was evident from the responses that the firms were ready to establish and implement strategies to avoid similar disruptions in the future. Two participants stated as follows:

> I'd say that what we do is where this happens, we'll then plan it, so the imports/exports the procedure if there's a chance, you're losing a broker or an agent, you'll make sure that you're already working on it, there will be a written inner

> procedure to say this is how you're gonna do it. I would say in general planning is something.

> Whenever a disruption happens, we dig in to the root cause and we establish … if there's a gap in communication, we fix it, if there are people who we need to speak with at the supplier side … I don't have any specifics that I want to get into, but in general we're learning from each previous experience for the next one.

It is therefore evident the losses the companies experienced as a result of disruption are the key factors that fostered new strategies to mitigate future disruptions.

Other participants explained in detail how they would tackle disruptions and learn what to do if they happen again. For example, one participant stated:

> If we have a specific situation which has already been addressed in the past that we need to figure out why it happened again. So a lot of times when we go through something like this we accompany it with a process map; we use Visio, and we map out the process of how we want it to go not how it is today because we've already discovered "how it is today" created an issue, so "how do we want it to go?" we map it out in Visio and we use it moving forward, so if that case ever arose again, we need to identify if it's a human error, or if it's something we need to tweak in the process itself; basically, how we would go about addressing these things.

This response shows how the organization was keen to investigate the disruptions to identify what led to the loss and to map their way forward to ensure they know what to do to avoid the risks.

The relationship between SCDO and documenting the culture and the disruption experiences was raised by some interviewees. One participant stated:

> Sometimes you can get easily into the right results by looking to what others did and what is their experience, seeking, looking to the similar experience in the market, and also it's very important that these things should be documented in the right way because within the same organization, there are a lot of experience there, so we shouldn't reinvent the wheel. Sometimes we need to get access to a look book or a

> database and see what are the previous trials and experience so we can easily get a benefit of other experience as well; sometimes even the mindset of some of the local people, they're not … they say "oh this guy … he did not do it right". Okay, I do agree, but still I have a wrong to improve; you know the knowledge is accumulating process … you build your knowledge and you start from where others stopped rather than reinventing the wheel from scratch.

Documentation is seen as a process integrated in the SCDO to ensure that a record of activities is kept. This ensures that when similar disruptions occur, we do not start from zero but look back at the records and decide where to start intervention measures.

4.2.4 Organization Size

The fourth theme emerging from the qualitative data analysis was organization size. Organization size, particularly for suppliers, appeared to play a role in decision making during disruptions. The interviewees clearly stated that the size of the company they work with is important in several ways. For example, they linked the size of the company to the level of cooperation. One participant stated that 'Depending on the size … the bigger companies they tend to listen, we're talking about payment in this point, smaller companies they need the business, but they were not very cooperative.'

Another participant commented how international suppliers were more committed compared to local suppliers. They stated:

> I can find difference but working with bigger international companies … they work professionally, commitment is there, sharing information, solving issues, they're helping really, I appreciate them, but when you're talking about small suppliers, of course there's a difference.

The participants also indicated that large international suppliers were better at communicating and at sharing the information required for the supply chain flow. One participant stated:

> International businesses are similar firms from France, USA communicate effectively. I'm talking about big firms and companies. Forget about small suppliers, I think the international business is similar in the way of communication the culture, the way of communicating, the commitment, information sharing, I think it's the same everywhere when you're talking about big companies or big names.

These responses indicate that large companies are effective in managing the supply chain, which is facilitated through effective coordination and communication.

Furthermore, the participants explained that it is easier for bigger firms to react during disruptions, which ensures that supply chains are not as badly impacted. They were of the view that bigger firms were better to deal with compared to smaller firms. One participant stated:

> Maybe I think your question here relates more to the size of the supplier: how big is the supplier in terms of infrastructure and the setup to be able to accommodate for changes in our supply chain that can be quickly responded to and there you see what I'm saying; If I have a sudden change in my demand, a small supplier–local or outside–may not be able to react as quickly as a large supplier.

4.2.5 Leadership

The fifth theme emerging from the qualitative data analysis was leadership, which has a clear influence on disruption and on supplier relationships in general. A participant explained the importance of leadership in an organization, stating that 'Leadership is very important – people who can take it beyond their capabilities, they're reaching out, they're talking openly, they're taking it extra mileage to solve it. It's not about I did my job and it's fine and I think I'm safe now.'

Another interviewee differentiated between managers and leaders and justified why he perceived leadership to be the factor in a relationship that results in more effective work during a disruption. They stated:

> Leadership is very important. There are people who are managing; they're good as management—they have a system, they check the system and they take a decision. There's nothing wrong with that; they're totally fine, but these people will not lead the change, they will manage things as they are. Leaders believe in their people and the society; they are always bringing people to one goal. If the business is being managed by managers, it develops slowly compared to the one lead by effective leaders.

The response is a clear illustration of the leadership qualities that can help bring changes to the organization while ensuring effective supply chain management. In the following response, a participant explains that decision making is fostered by good management and

leadership in firms and supply chains. They stated that 'In general, there are personal reasons for the management that affected their decision making, The management and decision-making processes come from leaders. These are the drivers of the organizations.'

The importance of leadership, as explained by one of the interviewees, stems from the fact that relationships between companies are essentially defined by relationships between the people and the managers of the two companies themselves. This participant stated:

> I think when you talk about company relationship, you talk about people relationships, if I and the Indian director in charge of that other company, if we've got a good relationship, then that's 90% the way to succeed with the leadership characters.

Leadership was also mentioned by some participants as a reason for preferring to work with local businesses. Local organizations mostly have a single leader who is approachable and efficient, making it easier to accomplish tasks quickly. This is in contrast to international businesses, where one may experience delays and longer wait times. One participant stated:

> Local organizations very easy especially if there's one person, heads the business, takes active interest in his business, he knows what's happening in any of his areas, and if I myself got an issue he'll sort it out. I think you need them both, I prefer dealing with Agility rather than feels like I'm drowning in mud with Caterpillar, you get there in the end, but it takes quite a long time to get through the mud, Agility you feel things just happen.

One participant explained that establishing direct contact with one person who knows all the aspects of his/her business is convenient, especially during critical times, such as supply chain disruptions.

> A company fairly new freight forwarding company …. here in the UAE, they're run by quite a dynamic Indian gentleman, and he's young, he's go-getting and he's established, he's like the area manager and he's established this very dynamic freight forwarding logistics company, so I've got a direct telephone line to him if there's issues, or I needed to look at something; I'll get a decision within a day.

4.2.6 Digitalization

The sixth theme emerging from the qualitative data analysis was digitalization. The responses of the participants in this regard related to the differences between the younger generations and the older generations working in companies today. The current generation can adopt new technology quickly compared to older people. One participant stated:

> There are two generations: old schoolers, they think their way of looking to things is right and they're not accepting the change easily while if you see the new generation for example, they're well-connected, they use the technology in a very good way, so they're looking at the business from different angle, so if you see, for example, the old schoolers, they have the knowledge, they have the experience, they have the best practices to manage the business, but they're not updates while the new generation they're very smart, they use the life resources in a much efficient and effective way than the old-schoolers, so the transition between the old-school people and the new generation people should be managed in a proper way.

The participants clearly indicated the move towards digitalization significantly impacts all aspects of supply chains. Another participant stated:

> I noticed that lots of companies now are jumping to digitalization, even our billing now is accepting soft copies rather than hard copies of invoices, which is very good and it will reduce the billing processing time, and if I get my supplier paid on time, I will have a good and smooth operations, and the supplier side is also improved.

Indeed, some participants said they switched to more digital work methods after experiencing a significant disruption, such as the COVID-19 pandemic, during which the normal way of doing business changed to minimize operational impact. One participant stated:

> We found that we can work online from home, and we can manage to run the business from home. This is the most important thing. Rather than that, suppliers, operations, running as normal, we were not affected really during COVID.

This new way of doing business had its own impacts on many aspects of the supply chain, such as cost reduction, trust building and productivity enhancement. One participant stated:

> Management now is focusing on results other than other minor details like attendance, time, punctuality, coming to the office, so management or HR are not wasting their time on these regards, or wasting any infrastructure … like fingerprint, check-in, check-out, etc. This increased the trust within the team that everyone should get their job done rather than having them attend physically and waste a lot of time and efforts chasing people on their attendance and their punctuality.

4.2.7 Company Experience

The seventh theme emerging from the analysis of data was company experience, which refers to knowledge of and skill in dealing with business operations and supply chains. Companies' experience impacts the supply chain in general and supply chain disruption in particular. The participants noted that this experience is essential to overcome obstacles. One participant stated:

> The technical mastery … someone who knows what he/she is doing, who know different ways of tackling things, who know what are the challenges, how to manage them. There's something called situational leadership: there is no one size fits all. You cannot have one style to deal with all people; this is not part even of emotional intelligence. Everyone has a style of dealing with things. So, technical mastery is someone who knows the techniques of managing the business; so if I receive this challenge, how I treat it, what I did before, this will come with experience. However, yes, you need technical mastery, you need technical knowledge, but also experience. These people we call them central of expertise sometimes (COE); they are the ones who know the secrets of the business—how to tackle it, how to deal with it.

This response emphasizes the need for experts in the company who can predict and deal with business issues, thus improving performance.

Some participants felt large international companies are better situated during critical circumstances, such as the COVID-19 pandemic. These companies were more exposed to COVID-19, which increased their vulnerability while improving their ability to deal with the problem. One participant stated:

> I would say international companies are well-positioned than local companies since the COVID restrictions they're more exposed to it in the implications and they have

> lots of cases worldwide they're dealing with it, but local companies are located in Kuwait, so their scope of experiences is just limited to Kuwait.

One participant mentioned another reason international companies are better situated to handle disruptions. These companies are always ready to invest in digitalization to be able to work in different countries, which is not the case with local companies. According to this participant, 'They're ready to invest in digital solutions because they have global operations, so they're ready, but local companies don't have … or their operations do not accommodate investment or the infrastructure.'

4.2.8 Government Laws and Regulations

The eighth theme emerging from the analysis of data was government laws and regulations, which were cited by participants as relevant factors during times of disruption. Specifically, the participants emphasized that they follow all laws and regulations imposed by governments during catastrophic disruptions such as the COVID-19 pandemic. One participant stated:

> In general, we're following the instructions from government like how to deal with the goods or how to deal with the delivery man, but yeah we have HSE department here, it's making procedures, how to deal with other companies/suppliers, and we're following that.

The participants also discussed the significance of staying updated on all changes regarding supply chain operations in general and particularly during times of disruption. They emphasizing the importance of staying current with changes to government laws and regulations. One participant stated:

> Sometimes change of regulations, we bringing material from abroad and the procedure was that we obtain permit of quality internally … and they changed the law, so we had to change … some materials were already in the port, but this law was newly passed, so we had to do it really fast. In some cases, we had to send it back to the country or region and resend it again. Unfortunately, these kinds of problems are not in your control, change of regulations happens all the time; if you're not updated, you'll suffer losses. We suffered through that one.

Business environments change constantly, requiring organizations to remain alert and ready to respond. The response below emphasizes the dynamic nature of government laws that require organizations to adapt quickly. One participant sated:

> So today you sleep on something, you wake up on something else. You see a lot of changes; everyone recognizes this: new talk of changes everyone recognizing this these days. So it's not about I live with my domain without looking to the things around us; inflation is there, new governmental regulations are always there and updated.

Regulations such as those enforced by governments to control the spread of the pandemic were mentioned. One participant stated:

> Obviously, the mitigation efforts and all the regulations that were issued by the Ministry of Health are now applied to everyone. For example, having a mask, observing social distancing and serving certain number of people at a one time; these are things which any supplier who is arriving to our facility needs to adhere to, so we're forcing that.

Governmental regulations also apply to suppliers during times of disruption, thus impacting relationships between companies and their out-of-country suppliers. One participant stated:

> We have already distributed all of our suppliers that they need to follow certain protocols related to the safety measures that have been communicated by the Ministry of Health when they visited us to deliver equipment or deliver services or coming for visits, so I don't see the COVID-19 as a disruption crusade to be honest with you; it's more like the supplier needs to adhere to what the Ministry of Health has identified as required precautions to be able to do business with our company I'll say.

Responsibility for staying current on and managing all the changes to the laws and regulations in each country, especially for international companies, was transferred to higher-level employees. One participant stated:

> But you have a broker, brokers in different countries, brokers in Saudi Arabia are very different from brokers in Russia, but at the end of the day, they are your intermediary between the government, the customs and yourself. So, they're what we term an

> agent, and an agent takes a roundabout to become an agent, for us it will take about 3–4 months, so it's a big, long process because you're representing us to the government, so you got to go through a lot of different fact finding and compliance before you get there. So before I joined we might have one person in the broker in a country; if something happens to that person or that company or that company gets blacklisted because they've done something wrong or incorrect, you then got a lead time 3–4 months to turn on a new one.

Because of the effects of laws and regulations, one of the participants reported preferring to work with local companies. However, they also explained the need to have international suppliers as a second option. This participant stated:

> I'm always supporting to go with local supplier; however, you need to manage the other factors as well. I believe also international should be used in terms of … in case of emergency or keep it as plan B as we call it, but work with local to provide the better prices because it's not a matter only of prices; sometimes there's a regulation change, blockage, always for each item you need to have at least 2–3 suppliers available in the vendors database.

4.3 Research Themes and Constructs

After comprehensively reviewing the interviews, it became evident that managing supply chains during times of disruption is heavily influenced by national culture. The interviews provided valuable insights into how the perceptions, expectations and attitudes of the parties involved in supply chains are shaped by their respective national cultures. These findings underscore the importance of cultural factors in effectively managing supply chain disruptions. Upon thorough examination of the interview data, it became apparent that national culture exerted a substantial impact on several of the themes discussed. This finding is particularly significant as it directly addresses the first research question, which seeks to understand the influence of national culture on supply chain management practices during disruptions. To better meet the research objective of investigating the correlation between national culture and supply chain disruptions, the researcher narrowed down the list of themes and concentrated on specific topics that better served the research objective in order to provide deeper insight.

The impact of national culture was mentioned in all participant interviews, explicitly and implicitly, and its impact on several aspects of supplier relationships was discussed by some participants, primarily relating to human characteristics. It was found that the dimensions of national culture had a large impact on the operations of local and international supply chains. The national culture dimensions of power distance, individualism vs. collectivism, uncertainty avoidance and masculinity vs. femininity were evident in the responses regarding the supply chain and supply chain disruption management. This complies with the logic followed in this research, which is to understand how culture influences the supply chain in general and supply chain disruptions in particular through its direct impact the key actors. To capture the effect of variations in culture on the those involved in supply chain disruptions, the researcher focused on the companies' relationships across countries rather than on their internal relationships. Accordingly, the second main theme in this research was local and international supplier relationships, external interactions that are impacted by different cultures. The participants explained explicitly the importance of supplier relationships in managing supply chains and supply chain disruptions. Therefore, other themes had to be excluded. These themes and the reasons for their exclusion are discussed below.

The participants discussed government laws and regulations, a theme that emerged from the analysis of the interview transcript, in relation to the COVID-19 pandemic and other catastrophic events that can typically impact an entire country. The literature contains some insights about government laws and regulations being affected by culture, such as the impact of cultural variation on decision making within some government departments (R. E. Meyer & Hammerschmid, 2010). Several participants indicated that governments laws and regulations impacted their relationship with their suppliers, especially during times of disruption when the focal firm and its suppliers followed the laws and regulations of their government or the government of the country in which their company is located. National culture is also linked to government laws and regulations, as the findings of several studies emphasize that officials in all governments must understand the cultural variations in the society they serve because they will eventually impact the community's trust in and expectations of the government (Zhang, Li, & Yang, 2022). The topic of government and its relationship to national culture is important because it impacts many areas, including the response to a supply chain disruption; However, it is a broad topic that requires significant investigation and analysis in several fields, such as public administration and sociology.

Leadership is another broad topic identified via the interview data analysis, although it appeared less often than supplier relationships and government laws and regulations. The subject of leadership and its relationship to national culture has been the topic of many studies, such as those by Geert Hofstede (1980, 1983, 1993, 1994b); G. H. Hofstede and Hofstede (2001) and GLOBE (House et al., 2002). These studies state that leadership practices and characteristics are directly impacted by differences in national cultures. The literature on supply chain management includes supply chain leadership, which refers to the leadership of the focal company that takes the leading role in managing the supply chain as a whole. Many studies have investigated that specific topic (Mokhtar, Genovese, Brint, & Kumar, 2019). Despite the massive amount of interest in leadership in management in general and in supply chains particularly, the leadership theme was eliminated from this study due to time and resource limitations. One of the main reasons for excluding this theme was that the complications involved in including it far outweighed the benefits of including it. It is a broad field, similar to government laws and regulations, that includes many domains, each of which would require additional time and investigation. Another reason is that this study focuses on the impact of national culture on supply chain disruptions by studying the impact of national culture on supplier relationships, which by itself is a broad topic that requires deep attention to comprehend and capture all the elements impacted.

Digitalization is a theme that was present in four of the eight interviews. The interviewees addressed the idea of digitalization in certain cases, such as during the COVID-19 pandemic, indicating that either digitalization was an advantage that helped to mitigate the impact of the pandemic that led to the disruption or that it should be added to every supply chain company based on the COVID-19 experience. This is viewed in terms of the ability of the organization to utilize digitalization measures during the pandemic and to continue that use afterwards. According to one participant response, the organizations realized they could work more effectively online rather than in-house. Most of the participants identified a digital information structure as one of the critical changes they would like to see implemented following the pandemic experience. This contradicts with Özkanlısoy and Akkartal (2021), who state that the original benefits of digitalization were less significant than the complexity that it brings to the supply chain and that the advantages of digitalization cannot be achieved without the reinforcement of problem-solving and trust among suppliers.

Company size and company experience were also mentioned by the interviewees. The company size variable has been identified as a key factor that influences interorganizational relationships (Handley & Benton Jr, 2012), and it has an influence on the supplier and buyer

relationship and its performance (Villena & Craighead, 2017). However, this construct has primarily been used as a control variable in research on supply chains (Faruquee, Paulraj, & Irawan, 2021). The researcher chose to exclude this theme because the perspective and scope of this study mainly relate to national culture and its influence on supply chain disruptions. Company size is not affected by national culture. Similarly, a company's international experience, as a candidate variable in this research, did not support the research purpose and objectives. According to the literature, a company's international experience consists of two parts—the work-related international experience and the non-work-related international experience of employees (Takeuchi, Tesluk, Yun, & Lepak, 2005). The non-work international experience refers to employees' personal travels for reasons such as vacation or study. This means that international experience is measured on an individual basis; it is processed for each employee individually to build an assumption about the company's experience, which may generate inaccurate results, as the entire sector is characterized by being one of the most international and multinational sectors. Investigating the impact of national culture on the relationship of the work experience of individual employees and the response of their entire organization to supply chain disruptions does not provide a realistic view of the impact of culture, as the question will arise as to what culture had the impact—the employee's national culture, the employee's international culture or the company's national culture.

The qualitative findings highlight the significant influence of national culture on supply chain management practices during disruptions, addressing the first research question directly. Building on this, the subsequent quantitative analysis further explores how national culture impacts supply chain disruptions and identifies influential cultural dimensions. This findings sets the stage for exploring the three key themes—supplier relationships, disruption orientation, and national culture—in the quantitative findings, providing a focused examination of their impact on supply chain dynamics.

5. Research Quantitative Findings

5.1 Introduction

This chapter presents the quantitative data analysis and findings of the study. The descriptive statistics of the sample are presented, followed by the statistical techniques for checking the hypotheses. Frequencies and percentages were used to summarize the demographic data, and descriptive statistics (mean, standard deviation) were used to summarize the study items. Cronbach's alpha coefficient was used to measure the reliability of constructs, and the Pearson correlation coefficient was used to measure validity. SEM was used to analyse the mediation and moderation effects of the study variables on dependent variables.

And following are the research questions that navigated the research exploration:

- What is the influence of national culture in the management of supply chain disruptions in the oil and petrochemical industry?

- How does national culture influence the connection among supplier relationships, disruption orientation and supply chain disruptions in the management of supply chain disruptions in the oil and petrochemical industry?
- What cultural dimension is the most influential in the management of disruptions in supply chains?

5.2 Data Preparation and Description

The collected data was prepared for hypotheses testing in several steps. First, the survey responses were collected from the original electronic survey forms and copied to an Excel spreadsheet. This was necessary to allow export of the data to the SPSS statistics software. However, the data were coded before being exported. The variables, item codes and acronyms are presented in Table (4). The Excel spreadsheet was inspected for missing data, especially where some participants skipped some or all questionnaire items. Only complete questionnaire datasets were considered valid and included in the final analysis. Incomplete questionnaire data were excluded, as dealing with missing data is difficult and can introduce or amplify potential bias in parameter estimation, thus weakening the generalizability of the results (Dong & Peng, 2013).

Table 4 Variable and item codes

Variable Codes	Acronym for the Items Code
National culture :Power distance	PD_(1-5)
National culture :Uncertainty avoidance	Unca_(1-5)
National culture: Long-term orientation	Longt_(1-6)
National culture: Masculinity Vs Femininity	Mas_(1-4)
National culture: Collectivism Vs Individualism	Coll_(1-6)
Supplier Relationships: Trust	Tr_(1-5)
Supplier Relationships: Conflict resolution	ConfR_(1-4)
Supplier Relationships: Communication	Commun_(1-5)
Supplier Relationships: Relational norms	RN_(1-5)
Supplier Relationships: Commitment	Commit_(1-5)
Supply Chain disruption orientation	SCDO_(1-5)
Supply chain disruption Impact	DisIm_(1-6)

The data for this study was collected from participants from 13 countries (Saudi Arabia, Egypt, Pakistan, Uganda, Jordan, India, Qatar, Kazakhstan, the US, the UK, Nigeria, Kuwait and Bahrain) who work at companies with 10 different nationalities (Saudi Arabia, Egypt, Denmark, Qatar, the US, the UK, Nigeria, Kuwait, the UAE and Italy). These international companies operate in eight locations (Saudi Arabia, Qatar, the US, the UK, the UAE, Kuwait, Algeria and Oman). As shown in Figure 1, the sample comprised more than 79% top- or middle-level supply chain managers. This was important in order to obtain the perspectives of relevant decision makers.

Figure 6

Composition of sample participants

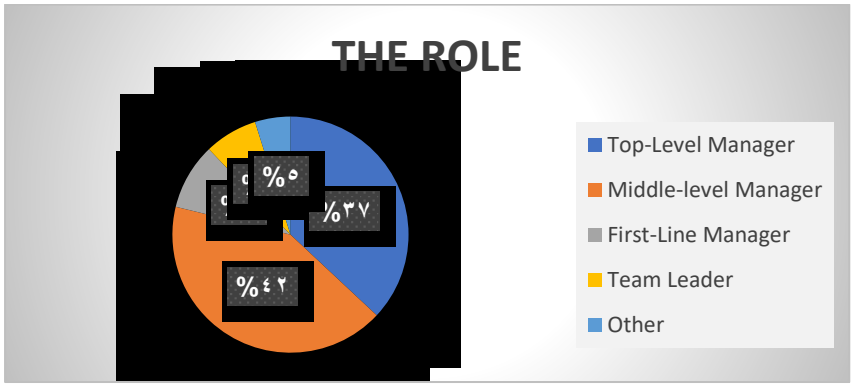

Figure 6 Composition of sample participants

Due to the different levels of supply chain managers, it was essential to assess their experience. Therefore, the participants were asked to specify how long they had worked as a supply chain professional. Of the participants, over 80% had at least nine years of work experience in the supply chain field (Figure 7). The fact that the participants were highly experienced is beneficial, as it allowed for more reliable data to be gathered. Experienced individuals are more likely to be familiar with the research topic, enabling them to provide

more accurate and meaningful responses (DeCastellarnau, 2018). Additionally, having highly experienced participants potentially allows for more in-depth answers, as they may have a greater understanding of the subject. This can be especially beneficial in a qualitative study, as the data collected depends more on the respondents' personal experience.

Figure 7

Years of experience

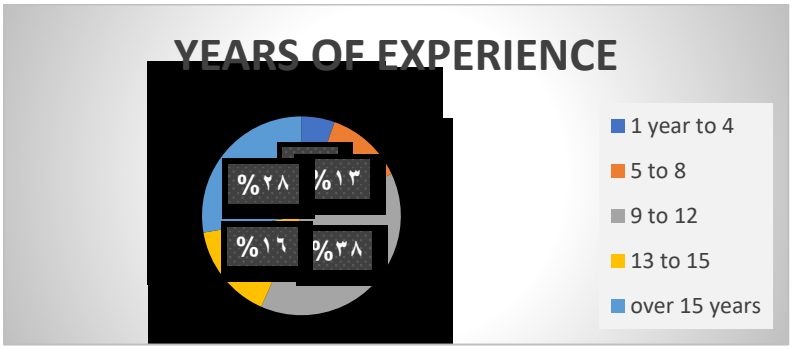

Figure 7 Years of experience

5.2.1 Data Descriptive Statistics

The frequencies and percentages for the demographic variables of the study were calculated. Frequency and percentage were used to summarize demographic data, as this helps to understand the composition of a sample population. For example, a value's frequency in a population may be calculated by counting its occurrences, whereas a percentage measures how much of that population that value accounts for (Salas-Rueda, Salas-Rueda, & Salas-Rueda, 2020). Therefore, understanding the distribution of a demographic within a population requires frequency and percentage. For example, if a researcher were to analyse the demographic data of a particular city, frequency and percentage would help determine the number of people in each age group, the number of people in each income group and even the number of people in each religious group. This information can be used to understand the composition of a city's population and its various demographic features.

Descriptive statistics also summarize study items, such as the standard deviation, median and mean. The mean is a measure of the central tendency of the data, which is the tendency of the data to cluster around a central point (Kaliyadan & Kulkarni, 2019).The median is the middle value of the data, and the standard deviation measures the variation in the data (Kaur et al., 2018; Mishra et al., 2019). These measures can be used to understand the general nature of the data, such as whether it is distributed normally, skewed or mainly homogeneous or heterogeneous.

Descriptive statistics were used to summarize the study items and are shown in Table 5. It can be seen that most participants (52.5%) are operating in Western countries or regions, followed by the Middle East (47.5%). However, this difference was not significant, so the

sample can be considered as representative of both Western and Middle East regions. About 63% of supply chain firms had a workforce of at least 1,000. Accordingly, the sample participants mainly represent large firms, with 79% of respondents being mid- and top-level managers. In general, 83% of the participants had at least nine years of experience; therefore, their views were based on in-depth knowledge.

Table 5 Frequencies and percentages for demographic data

Variables		**Frequency**	**Percent**
In what country or region are you operating?	Western	85	52.5
	Middle East	77	47.5
	Total	*162*	*100.0*
What is the approximate total number of employees the company has in all the locations?	I don't know	6	3.7
	1–49	8	4.9
	50–999	46	28.4
	1,000–4,999	57	35.2
	5,000 or more	45	27.8
	Total	*162*	*100.0*
What is your title/position at the company?	Top-level manager	61	37.7
	Middle-level manager	68	42.0
	First-line manager	14	8.6
	Team leader	11	6.8
	Other	8	4.9
	Total	*162*	*100.0*
How many years of experience do you have in the oil and gas industry?	Over 15 years	45	27.8
	13–15	26	16.0
	9–12	64	39.5
	5–8	20	12.3
	1–4	7	4.3
	Total	*162*	*100.0*

Table 6 summarizes the study or variables. Uncertainty avoidance was the study variable with the highest mean ±SD of 3.94±0.66, while power distance had the lowest mean of 2.30±1.10. However, in general, the difference between the means of the constructs was considerably small, indicating that the variables are interrelated and therefore should be investigated further to determine the most significant relationship.

Table 6 Descriptive statistics of the study variables

Variables	**Mean**	**Standard Deviation**
Power Distance	2.30	1.10
Uncertainty Avoidance	3.94	0.66
Collectivism	3.59	0.69
Masculinity	3.01	1.02

Long-Term Orientation	3.86	0.69
Commitment	3.57	0.65
Communication	3.14	0.92
Trust	3.49	0.93
Conflict Resolution	3.14	0.82
Relational Norms	3.59	0.73
Supply Chain Disruption Orientation	3.74	0.84
The impact of supply chain disruption	3.29	0.86

5.2.2 Reliability

The researcher computed the Cronbach's alpha coefficients to measure the reliability of the study variables. Cronbach's alpha ranges from 0–1, with values > 0.6 considered acceptable for further analysis (Taber, 2018). The coefficient was calculated for each of the variables to check individual reliability. This involved deleting items with lower reliability to get the final items included in every construct, as shown in Table 7. The analysis suggests that all study variables are reliable based on Cronbach's alpha values of > 0.6.

Table 7 Cronbach's alpha values of the study variables

Variables	**No. of Items**	**Initial Cronbach's Alpha**	**No. of Items after Deletion**	**Cronbach's Alpha**
Power Distance	6	0.839	6	0.839
Uncertainty Avoidance	5	0.664	5	0.700
Collectivism	6	0.696	6	0.700
Masculinity	4	0.788	4	0.788
Long-Term Orientation	6	0.740	6	0.740
Commitment	5	0.497	4	0.6
Communication	5	0.727	5	0.727
Trust	5	0.817	5	0.817
Conflict Resolution	4	0.550	3	0.630
Relational Norms	5	0.664	5	0.700
Risk Identification	4	0.750	4	0.750
Risk Assessment	5	0.825	5	0.825
Risk Mitigation	3	0.704	3	0.704
Risk Control	4	0.811	4	0.811
Supply Chain Disruption Orientation	5	0.792	5	0.792
The impact of supply chain disruption	6	0.798	6	0.798

5.2.3 Validity

The researcher calculated the Pearson correlation coefficients to measure the validity of each of the study variables. The Pearson correlation coefficient ranges from -1–1. Significant correlation coefficient values > 0.5 reflect good validity (Keller et al., 1998); (Afthanorhan, 2013). Table 8 shows that all items had good validity, with all Pearson correlation coefficients being significant and > 0.5.

Table 8 Pearson correlation coefficients of the study variables

Variables	Items	Correlation Coefficients
Power Distance	People in higher positions should make most decisions without consulting people in lower positions.	.854**
	People in higher positions should not ask the opinions of people in lower positions too frequently.	.828**
	People in higher positions should avoid social interaction with people in lower positions.	.791**
	People in lower positions should not disagree with the decisions of people in higher positions.	.850**
	People in higher positions should not delegate important tasks to people in lower positions.	.882**
Uncertainty Avoidance	It is important to have instructions spelt out in detail so that I always know what I'm expected to do.	.636**
	It is important to follow instructions and procedures closely.	.583**
	Rules and regulations are important because they inform me of what is expected of me.	.669**
	Standardized work procedures are helpful.	.673**
	Instructions for operations are important.	.710**
Collectivism	Individuals should sacrifice self-interest for the group.	.734**
	Individuals should stick with the group even through difficulties.	.533**
	Group welfare is more important than individual rewards.	.576**
	Group success is more important than individual success.	.676**
	Individuals should only pursue their goals after considering the welfare of the group.	.649**
	Group loyalty should be encouraged even if individual goals suffer.	.620**
Masculinity	It is more important for men to have a professional career than it is for women.	.814**
	Men usually solve problems with logical analysis; women usually solve problems with intuition.	.787**

	Solving difficult problems usually requires an active, forcible approach, which is typical of men.	.799**
	There are some jobs that a man can always do better than a woman.	.731**
Long-Term Orientation	Careful management of money (thrift)	.708**
	Going on resolutely despite opposition (persistence)	.519**
	Personal steadiness and stability	.600**
	Long-term planning	.721**
	Giving up today's fun for success in the future	.718**
	Working hard for success in the future	.701**
Commitment	On occasion, our company makes sacrifices to help suppliers/customers.	.660**
	Our firm's relationship with suppliers/customers goes beyond the letter of the contract.	.617**
	Both our company and suppliers/customers often go out of their way to help each other.	.614**
	Our company is just another company with which suppliers/customers do business.	.466**
	Suppliers/customers expect their relationship with our company to strengthen over time.	.546**
Communication	Both my company and suppliers/customers share information that might benefit the other party.	.680**
	Our company regularly shares its proprietary information with suppliers/customers.	.767**
	In our company's relationship with suppliers/customers, information exchange occurs informally and often outside prespecified formal channels.	.732**
	Suppliers/customers regularly share their proprietary information with our company.	.687**
	The suppliers'/customers' personnel frequently visit our place of business.	.589**
Trust	Our company trusts suppliers/customers to keep their promises.	.824**
	Suppliers/customers have confidence in what our company says.	.810**
	Suppliers/customers have always been fair in their negotiations with our company.	.736**
	Suppliers/customers trust that our company would not take advantage of our relationship and try to profit at their expense.	.661**
	Our suppliers/customers are trustworthy companies.	.766**
Conflict Resolution	When there are disagreements, my company and suppliers/customers tend to blame each other.	.738**
	There are lingering feelings of resentment and frustration about unresolved issues with suppliers/customers.	.663**

	When there is a problem, all facts are assessed to try to reach a mutually satisfactory solution.	.502**
	When there are particularly difficult problems, suppliers/customers sometimes notify our company that they can take their business elsewhere.	.712**
Relational Norms	If either our company or suppliers/customers experience a problem in our relationship, we can count on each other to find a solution.	.697**
	Suppliers/customers always reciprocate the favours we do for them.	.652**
	Our company receives fair compensation from suppliers/customers for what we put into our relationship.	.632**
	Our suppliers/customers favour options that benefit both them and us rather than ones that just benefit them.	.598**
	Even in adverse situations, both our company and our suppliers/customers will stay together.	.687**
Supply Chain Disruption Orientation	We always feel the need to be alert to possible disruptive events.	.780**
	Previous unexpected disruptions show us where we can help improve our company's operations.	.723**
	We recognize that supply chain disruptions are always looming.	.648**
	We think a lot about how threatening events could have been avoided.	.732**
	After an unexpected operational disruption has occurred, our management leads in analysing it thoroughly.	.805**
The impact of supply chain disruption	Procurement costs/prices for the purchased item	.703**
	Overall efficiency of our operations	.744**
	Quality of our final product(s)	.659**
	Responsiveness to customer demands	.718**
	Delivery reliability (on-time delivery, order accuracy)	.687**
	Sales	.735**
	**. Correlation is significant at the 0.01 level (2-tailed).	

All items had Pearson correlation coefficients > 0.5, meaning they are reliable and significant. In the next stage of analysis, SEM was used to test the research hypothesis.

5.3 Structural Equation Modelling

The SEM method was used to represent, estimate and test a network of relationships between observed and unobserved (latent) variables. This method is useful, as it facilitates quick testing of the hypothesis and confirms the mediation and moderation relationships among variables (Suhr, 2006). Though similar to traditional regression analysis, SEM is more powerful because it deeply and simultaneously examines the relationships and measurement errors among variables (Beran & Violato, 2010). In the present study, SEM was useful for checking the moderating effect of independent variables on the dependent variables based on the theoretical underpinning presented in previous sections.

SEM consists of two types of assessments, measurement model assessment and structural model assessment. Measurement model assessment consists of construct, convergent and discriminant validity. Structural model assessment consists of path coefficients, R-squared and goodness of fit. SEM can be performed using two techniques—covariance-based SEM and partial least square SEM (Joseph F Hair, Hult, Ringle, Sarstedt, & Thiele, 2017). Covariance-based SEM uses maximum likelihood as a default estimation method to estimate parameters. This method requires normality and can be done using SPSS Analysis of Moment Structures (AMOS) programme (IBM Corp, Armonk, NY) In statistics, parametric testing assumes that the random variable of the analysed data is normal, such that it is well-modelled by a normal distribution (the Gaussian distribution or bell-shaped curve). Therefore, testing for normality is important before any statistical analysis, as it helps determine whether the data is drawn from a normally distributed population (Mishra et al., 2019).

PLS SEM estimates parameters using the PLS estimation method and is considered to be the most comprehensive method (McDonald, 1996) in (Joseph F Hair et al., 2017) because it does not requiring data normality. It can be done using software such as Smart PLS, Visual PLS or PLS-Graph. In the present study, a normality test was performed on the data, and it was found that the data lacked normality (see section 6.3.1). Therefore, this study used Smart PLS, variance-based SEM software that utilizes PLS (Ramayah et al., 2017). Smart PLS can be used for very small samples (K. K.-K. Wong, 2013). The small sample size in the present study justified the use of this specific software as part of the SEM analysis.

The present study included two mediation and moderation theories to understand causal relationships (Musairah, 2015). A mediator explains how or why two variables are related, while a moderator affects the strength or direction of the relationship (Musairah, 2015). The primary hypothesis tested was whether a change in the mediating variable could mediate the

impact of the independent variable on the result. When a mediator is present, the effect of an antecedent (an independent variable) is transmitted (by mediation) to the dependent variable, thereby amplifying the causal relationship (outcome). Thus, a mediator explains the mechanism through which an independent variable affects a dependent variable (Musairah, 2015).

Interaction/moderator variables moderate the relationship between an independent variable and a dependent variable. Moderators help explain what conditions or factors influence the relationship among the dependent and independent variables to be stronger or weaker (Musairah, 2015).

To check the main hypothesis, we first look at a simplified regression equation excluding the mediator:

$$y_i = \gamma^*_o + \gamma^*_{xy} x_i + \varepsilon^*_{yi}.$$

Accepting the H0: γ*xy = 0 (null hypothesis) for this simplified regression equation means that the intervention and the result are not connected, and therefore we should not consider mediators. We would analyse the SEM for the mediation model if we rejected the null hypothesis for this shortened regression equation. The null hypothesis, H0: γxy = 0, represents full mediation (that is, the action has no direct influence on the result). If this null is not accepted, then considering direct, indirect and total effects in evaluating partial mediation becomes relevant. With the Delta or Bootstrap technique, it is straightforward to draw inferences regarding such effects.

5.3.1 Normality Assessment

Mardia's multivariate skewness and kurtosis test was used to test for normality assumption. Kurtosis measures how peaks of a distribution are positioned, and skewness measures symmetry, more specifically the lack of symmetry of the normal distribution (H.-Y. Kim, 2013). The test is guided by two hypotheses, the null hypothesis ('there is no normality') and the alternative hypothesis ('there is normality'). Figure 8 shows the normality test results for all 12 variables of interest in the present study. A probability value (p-value) of > 0.05 indicated normality; otherwise, the data was considered to have no normality (Ramayah et al., 2017). Thus, from Figure 8, the p-value of < 0.00000 means the null hypothesis is accepted and the alternative hypothesis is rejected. This indicates that the data in this research lacks the normality distribution to pass those tests.

Figure 8

Mardia's multivariate skewness and kurtosis results for the study variables

```
Sample size:  162
Number of variables:  12

Univariate skewness and kurtosis
                        Skewness SE_skew Z_skew Kurtosis SE_kurt Z_kurt
Collectivism              -0.515   0.191 -2.703   -0.253   0.379 -0.667
Committment               -0.438   0.191 -2.296   -0.457   0.379 -1.206
Communication             -0.042   0.191 -0.221   -0.813   0.379 -2.145
Conflict.Resolution       -0.206   0.191 -1.080   -0.824   0.379 -2.173
Long.Term.Orientation     -1.106   0.191 -5.798    1.240   0.379  3.270
Masculinity               -0.072   0.191 -0.378   -1.108   0.379 -2.923
Power.Distance             0.629   0.191  3.301   -0.985   0.379 -2.597
Relational.Norms          -0.550   0.191 -2.886   -0.342   0.379 -0.901
SC.Disruption.Impact      -0.415   0.191 -2.175   -0.379   0.379 -1.001
SC.Disruption.Orientation -0.897   0.191 -4.706    0.511   0.379  1.347
Trust                     -0.400   0.191 -2.100   -0.818   0.379 -2.157
Uncertainty.Avoaidance    -0.610   0.191 -3.200    0.133   0.379  0.351

Mardia's multivariate skewness and kurtosis
                b          z     p-value
Skewness  34.61846 934.698379 0.00000e+00
Kurtosis 185.13861   5.950226 2.67772e-09
```

Figure 8 Mardia's multivariate skewness and kurtosis results for the study variables

5.3.2 Hypothetical Research Model

Based on the research questions and hypothesis that implies national culture dimensions are the mediator/moderator variables in the study, supplier relationship factors and SCDO are the independent variables and supply chain disruption is the dependent variable in the resulting relationships. This section presents the iterative analysis of the research models. This analysis began with a first attempt to test the research hypothesis models, as all the research items are employed. Having determined the fit measures of the initial model, it was possible to identify any necessary modifications. The refined main and final models for this research (the mediation and moderation models) are presented in the following section.

Initial Model (Mediation). Model 1 was built to include moderation variables (commitment, communication, trust, conflict resolution, relational norms, SCDO) and mediating variables (power distance, uncertainty avoidance, collectivism, masculinity, long-term orientation). The dependent variable was the impact of supply chain orientation. This model consists of all items with no deletions. Mediation of the dependent variable by national culture was expected in the initial model. As national culture can negatively or positively

influence the creation of effective or ineffective supply chain policies and practices, it is a significant mediator of the supply chain.

Model Design. Figure 9 shows the structural equation model for initial model 1.

Figure 9

Structural equation model for initial model 1

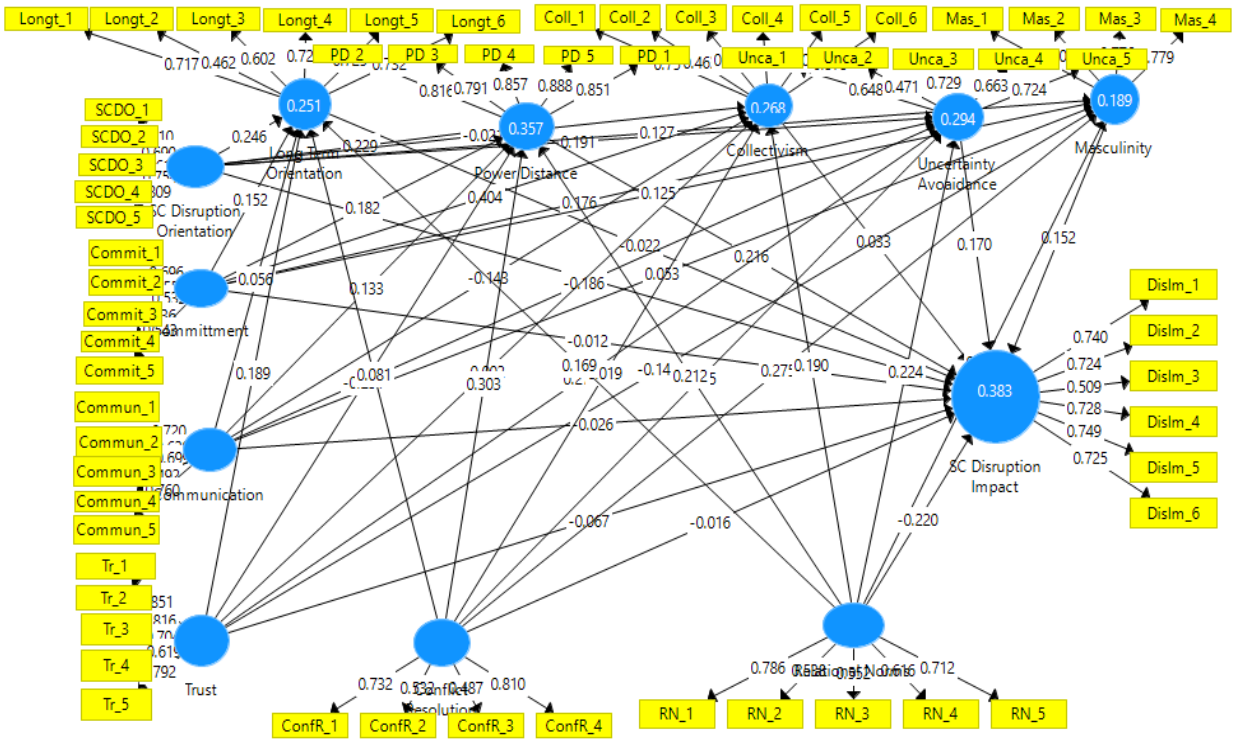

Figure 9 Structural equation model for initial model 1

Construct Validity. In this initial model, factor loadings were calculated for each item to measure construct validity. Items were considered valid if their values exceeded 0.6 (Keller et al., 1998); (Afthanorhan, 2013). Table 9 below shows factor loadings for construct validity for initial model 1. The table includes factor loadings for all constructs with items < 0.6. Therefore, these items were marked in bold numbers for deletion in the final model to improve the goodness of fit.

Table 9 Factor loadings for construct validity for initial model 1

Items	Factor Loadings	Items	Factor Loadings	Items	Factor Loadings	Items	Factor Loadings
Coll_1	0.757	ConfR_1	0.732	Mas_1	0.821	SCDO_3	0.61
Coll_2	**0.463**	ConfR_2	**0.532**	Mas_2	0.738	SCDO_4	0.754
Coll_3	**0.549**	ConfR_3	**0.487**	Mas_3	0.776	SCDO_5	0.809
Coll_4	0.706	ConfR_4	0.81	Mas_4	0.779	Tr_1	0.851

Coll_5	0.705	DisIm_1	0.74	PD_1	0.851	Tr_2	0.816
Coll_6	**0.575**	DisIm_2	0.724	PD_2	0.816	Tr_3	0.704
Commit_1	0.696	DisIm_3	**0.509**	PD_3	0.791	Tr_4	0.619
Commit_2	0.559	DisIm_4	0.728	PD_4	0.857	Tr_5	0.792
Commit_3	**0.533**	DisIm_5	0.749	PD_5	0.888	Unca_1	0.648
Commit_4	**0.536**	DisIm_6	0.725	RN_1	0.786	Unca_2	**0.471**
Commit_5	**0.543**	Longt_1	0.717	RN_2	**0.538**	Unca_3	0.729
Commun_1	0.72	Longt_2	**0.462**	RN_3	**0.552**	Unca_4	0.663
Commun_2	0.639	Longt_3	0.602	RN_4	0.616	Unca_5	0.724
Commun_3	0.699	Longt_4	0.721	RN_5	0.712		
Commun_4	**0.492**	Longt_5	0.725	SCDO_1	0.81		
Commun_5	0.76	Longt_6	0.732	SCDO_2	0.69		

Convergent Validity. Convergent validity indicates the degree to whether a common construct is being captured by two different items in the research (Carlson & Herdman, 2012). The average variance extracted was computed for measuring convergent validity. Average variance extracted values > 0.5 reflect good validity (Cheung & Wang, 2017). Table 10 shows the average variance extracted for measuring convergent validity for the initial model. Table 10 shows that of 12 construct items for measuring convergent validity for the initial model, eight have average variance extracted values of < 0.5 (in bold). Therefore, it could be improved by the suggested deletion of the items in the construct validity section.

Table 10 Average variance extracted for measuring convergent validity for the initial model

Constructs	**Average Variance Extracted**
Collectivism	**0.403**
Commitment	**0.333**
Communication	**0.447**
Conflict Resolution	**0.428**
Long-Term Orientation	**0.445**
Masculinity	0.607
Power Distance	0.708
Relational Norms	**0.42**
Supply Chain Disruption Impact	**0.491**
Supply Chain Disruption Orientation	0.545
Trust	0.579
Uncertainty Avoidance	**0.427**

Discriminant Validity. The HTMT coefficient for measuring discriminant validity was then calculated. HTMT values < 0.9 reflect good validity (Joseph F Hair, Ringle, & Sarstedt, 2013). Discriminant validity is a subtype of construct validity that shows how well a test measures the concept it was designed to estimate. In other words, discriminant validity specifically confirms whether theoretically unrelated constructs are indeed unrelated (Strauss & Smith, 2009). To have discriminant validity, two latent variables must statistically reflect distinct theoretical ideas. The Fornell–Larcker criteria is one method commonly used to evaluate discriminant validity. HTMT is known for its more precise value, where an HTMT score close to 1 suggests poor discriminant validity. Applying the HTMT as a standard must be measured against some cut-off. The recommended threshold value for HTMT is 0.85, as it is more accurate in establishing that each construct indicator is conceptually different and therefore has discriminant validity (Voorhees, Brady, Calantone, & Ramirez, 2016). Table 11 shows HTMT values for various constructs. From the table, it is can be seen that there is good discriminant validity, as the HTMT values are < 0.85. Constructs with the poorest discriminant validity values were uncertainty avoidance/C5 (0.83), relational norms/C2 (0.81) and commitment/C1 (0.74), in that order.

Table 11 HTMT values for discriminant validity for initial model 1

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
Collectivism												
Commitment	0.74											
Communication	0.18	0.38										
Conflict Resolution	0.34	0.35	0.35									
Long Term Orientation	0.49	0.50	0.20	0.39								
Masculinity	0.50	0.31	0.26	0.52	0.29							
Power Distance	0.51	0.39	0.15	0.60	0.27	0.57						
Relational Norms	0.48	0.81	0.25	0.32	0.42	0.27	0.44					
SC Disruption Impact	0.28	0.28	0.35	0.35	0.29	0.35	0.42	0.21				
SC Disruption Orientation	0.24	0.27	0.45	0.36	0.38	0.24	0.33	0.26	0.58			
Trust	0.15	0.45	0.72	0.52	0.35	0.16	0.21	0.24	0.20	0.16		
Uncertainty Avoidance	0.59	0.56	0.15	0.38	0.83	0.21	0.40	0.46	0.36	0.42	0.32	

C: reflects constructs in the rows

R-Squared Goodness-of-fit Index. The R-squared coefficient or the coefficient of determination was calculated using a regression model. It reflects the goodness of fit in a regression model. The R-squared coefficient quantifies how well a regression model fits a dataset. For this, we divide the total squared deviation from the held values by the absolute squared deviation from the mean of the observed values (Akossou & Palm, 2013). R-squared values > 0.15 reflect the acceptable goodness-of-fit mode (J. Cohen, 1988); (Joe F Hair, Ringle, & Sarstedt, 2011). Table 12 shows R-squared coefficient values for the goodness of the initial model fit. All dependent variables had R-squared values > 0.15, ranging from 0.189–0.383, indicating the goodness fit of the initial model. It was advisable to adjust the model to be appropriate by removing some items, as mentioned in the construct validity section.

Table 12 R-squared coefficient values for the goodness of fit for the initial model

Dependent Variable	**R-Squared**
Collectivism	0.268
Long-Term Orientation	0.251
Masculinity	0.189
Power Distance	0.357
Supply Chain Disruption Impact	0.383
Uncertainty Avoidance	0.294

Path Coefficients. Table 13 shows path coefficients for the initial model. For each variable presumed to be a cause, the table below displays the path coefficient, which represents the direct influence of that variable on another variable similarly presumed to be an effect. Of the 41 possible paths, only 14 (in bold) showed a significant cause ($p < 0.05$). For example, commitment was found to have a significant causal effect on power distance ($p = 0.008$) and uncertainty avoidance ($p = 0.042$). Power distance had a significant causal effect on the impact of supply chain disruption ($p = 0.019$). No cause–effect was found for commitment on collectivism, conflict resolution on power distance and supply chain disruption orientation on the impact of supply chain disruption.

Table 13 Path coefficients for initial model 1

Paths	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P-Values
Collectivism -> Supply Chain Disruption Impact	0.033	0.032	0.093	0.353	0.724
Commitment -> Collectivism	0.404	0.399	0.095	4.26	0
Commitment -> Long-Term Orientation	0.152	0.16	0.092	1.653	0.099
Commitment -> Masculinity	0.125	0.121	0.1	1.251	0.212
Commitment -> Power Distance	0.182	0.178	0.069	2.648	**0.008**
Commitment -> Supply Chain Disruption Impact	-0.012	-0.006	0.084	0.147	0.883
Commitment -> Uncertainty Avoidance	0.176	0.182	0.086	2.038	**0.042**
Communication -> Collectivism	-0.143	-0.138	0.104	1.372	0.171
Communication -> Long-Term Orientation	0.056	0.037	0.096	0.584	0.56
Communication -> Masculinity	0.053	0.073	0.18	0.291	0.771
Communication -> Power Distance	0.133	0.112	0.126	1.051	0.294
Communication -> Supply Chain Disruption Impact	-0.026	-0.048	0.108	0.239	0.811
Communication -> Uncertainty Avoidance	-0.186	-0.156	0.114	1.627	0.104
Conflict Resolution -> Collectivism	0.019	0.034	0.085	0.224	0.823
Conflict Resolution -> Long-Term Orientation	0.081	0.092	0.1	0.808	0.419
Conflict Resolution -> Masculinity	0.275	0.278	0.09	3.053	**0.002**
Conflict Resolution -> Power Distance	0.303	0.305	0.077	3.952	0
Conflict Resolution -> Supply chain Disruption Impact	-0.016	-0.017	0.083	0.189	0.85
Conflict Resolution -> Uncertainty Avoidance	0.035	0.049	0.095	0.365	0.715
Long-Term Orientation -> Supply Chain Disruption Impact	-0.022	-0.013	0.085	0.259	0.796
Masculinity -> Supply Chain Disruption Impact	0.152	0.155	0.084	1.808	0.071
Power Distance -> Supply Chain Disruption Impact	0.216	0.22	0.092	2.344	**0.019**
Relational Norms -> Collectivism	0.19	0.202	0.096	1.977	**0.049**
Relational Norms -> Long-Term Orientation	0.169	0.172	0.096	1.767	0.078
Relational Norms -> Masculinity	0.121	0.121	0.092	1.324	0.186
Relational Norms -> Power Distance	0.212	0.223	0.068	3.099	**0.002**
Relational Norms -> Supply Chain Disruption Impact	-0.22	-0.209	0.097	2.267	**0.024**

Relational Norms -> Uncertainty Avoidance	0.224	0.225	0.09	2.493	**0.013**
Supply Chain Disruption Orientation -> Collectivism	-0.021	-0.013	0.084	0.253	0.8
Supply Chain Disruption Orientation -> Long-Term Orientation	0.246	0.238	0.082	3.007	**0.003**
Supply Chain Disruption Orientation -> Masculinity	0.127	0.13	0.094	1.343	0.18
Supply Chain Disruption Orientation -> Power Distance	0.229	0.223	0.08	2.868	**0.004**
Supply Chain Disruption Orientation -> Supply Chain Disruption Impact	0.384	0.372	0.077	4.982	0
Supply Chain Disruption Orientation -> Uncertainty Avoidance	0.191	0.202	0.063	3.027	**0.003**
Trust -> Collectivism	-0.002	-0.007	0.092	0.018	0.985
Trust -> Long-Term Orientation	0.189	0.2	0.085	2.227	**0.026**
Trust -> Masculinity	-0.145	-0.145	0.11	1.312	0.19
Trust -> Power Distance	-0.251	-0.238	0.106	2.365	**0.018**
Trust -> Supply Chain Disruption Impact	-0.067	-0.063	0.104	0.645	0.519
Trust -> Uncertainty Avoidance	0.277	0.259	0.086	3.217	**0.001**
Uncertainty Avoidance -> Supply Chain Disruption Impact	0.17	0.173	0.099	1.723	0.085

Mediation Final Model.

Model Design. Figure 10 shows SEM for final model 1 after the deletion of factor loading items with construct validity of <.6 to improve fitness. Items were considered valid if their values exceeded 0.6 (Keller et al., 1998); (Afthanorhan, 2013). The six items that had values < 0.6 were deleted (Coll_1, Coll_4, Coll_5, Commun_2, Commun_3 and Commun_5).

Figure 10

Structural equation modelling for final model 1 after the deletion of factor loading items with construct validity of <.6 to improve fitness

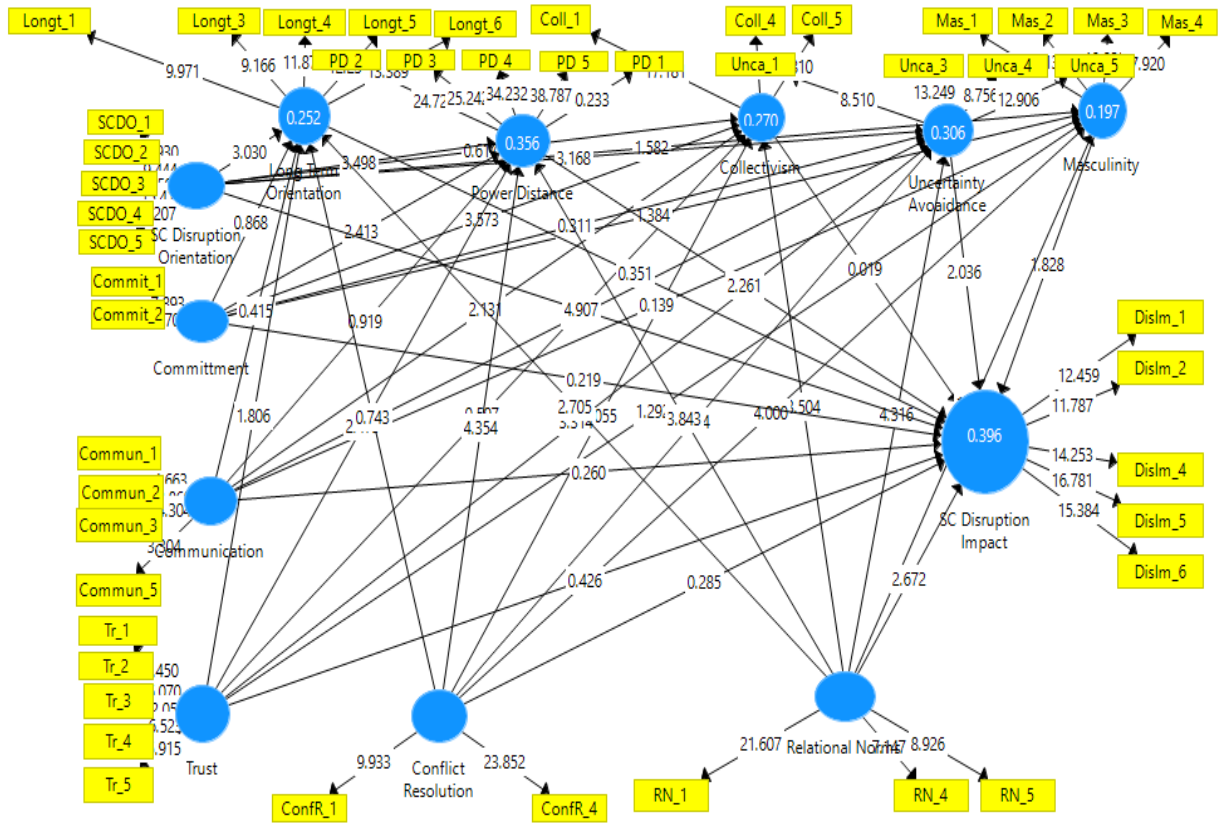

Figure 10 Structural equation modelling for final model 1 after the deletion of factor loading items with construct validity of <.6 to improve fitness

Factor Loadings for the Final Model. Table 14 shows the factor loadings for construct validity for final model 1. In this final model, it is notable that factor loadings for all items are > 0.5, as is desirable for analysis.

Table 14 Factor loadings for construct validity for final model 1

Items	Factor Loadings	Items	Factor Loadings
Coll_1	0.794	Mas_4	0.758
Coll_4	0.74	PD_1	0.856
Coll_5	0.779	PD_2	0.818
Commit_1	0.845	PD_3	0.788
Commit_2	0.686	PD_4	0.856
Commun_1	0.692	PD_5	0.886
Commun_2	0.621	RN_1	0.828
Commun_3	0.684	RN_4	0.642
Commun_5	0.802	RN_5	0.716

ConfR_1	0.768	SCDO_1	0.811
ConfR_4	0.915	SCDO_2	0.687
DisIm_1	0.735	SCDO_3	0.608
DisIm_2	0.724	SCDO_4	0.752
DisIm_4	0.734	SCDO_5	0.812
DisIm_5	0.754	Tr_1	0.851
DisIm_6	0.723	Tr_2	0.817
Longt_1	0.734	Tr_3	0.707
Longt_3	0.635	Tr_4	0.624
Longt_4	0.738	Tr_5	0.786
Longt_5	0.714	Unca_1	0.663
Longt_6	0.745	Unca_3	0.738
Mas_1	0.828	Unca_4	0.666
Mas_2	0.749	Unca_5	0.726
Mas_3	0.789		

Average Variance Extracted Values for the Final Model. Table 15 shows the average variance extracted for the final model 1. As seen in the table, all constructs have average variance extracted values > 0.50. Therefore, the final model has statistically good convergent validity.

Table 15 Average variance extracted for measuring convergent validity for final model 1

Constructs	Average Variance Extracted
Collectivism	0.595
Commitment	0.592
Communication	0.5
Conflict Resolution	0.714
Long-Term Orientation	0.511
Masculinity	0.611
Power Distance	0.708
Relational Norms	0.537
Supply Chain Disruption Impact	0.539
Supply Chain Disruption Orientation	0.545
Trust	0.58
Uncertainty Avoidance	0.5

HTMT Scores for the Final Model. Table 16 shows HTMT scores used in the final model 1. Only collectivism/C1 and commitment/C2 had high HTMT scores (0.77), which were very close to the recommended threshold value for of 0.85 (Voorhees et al., 2016). While valid, these score indicate weak discriminant validity. Still, the final model 1 was validly used for discriminating between groups.

Table 16 HTMT scores for discriminant validity for final model 1

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
Collectivism												
Commitment	0.73											
Communication	0.18	0.40										
Conflict Resolution	0.32	0.14	0.22									
Long Term Orientation	0.38	0.48	0.18	0.16								
Masculinity	0.45	0.30	0.28	0.49	0.26							
Power Distance	0.58	0.38	0.16	0.52	0.22	0.57						
Relational Norms	0.60	0.61	0.30	0.17	0.54	0.32	0.48					
SC Disruption Impact	0.26	0.25	0.35	0.27	0.24	0.37	0.46	0.25				
SC Disruption Orientation	0.19	0.20	0.44	0.12	0.38	0.24	0.33	0.26	0.63			
Trust	0.13	0.54	0.76	0.39	0.34	0.16	0.21	0.30	0.17	0.16		
Uncertainty Avoidance	0.61	0.38	0.16	0.18	0.86	0.20	0.43	0.69	0.39	0.45	0.31	

C: reflects constructs in the rows

R-Squared Coefficient Values for the Goodness of fit of the Final Model. Table 17 shows the R-squared coefficient values for the goodness of fit of the final model. R-squared values may be anything from 0–1, with 1 indicating a perfect match. R-squared values > 0.15 represent a good fit, meaning that the regression line accurately predicts the data points. This is the 'acceptable goodness-of-fit' mode (J. Cohen, 1988); (Joe F Hair et al., 2011). The table shows that the R-squared values for all dependent variables were > 0.15 for the final model. The goodness of fit improved for construct validity for initial model 1 after deleting factor loadings for all items < 0.6.

Table 17 R-squared coefficient values for the goodness of fit for the final model

Dependent Variables	**R-Squared**
Collectivism	0.27
Long-Term Orientation	0.252
Masculinity	0.197
Power Distance	0.356
Supply Chain Disruption Impact	0.396
Uncertainty Avoidance	0.306

Path Coefficients. In this part, the results of testing the hypothesized model are presented. The assumed mediating roles of national culture dimensions in the correlation between supplier relationships and SCDO and the impact of supply chain disruption are identified in detail.

Power Distance

Table 18 shows the path coefficients of the mediating effect of power distance for model 1. From the table, the following observations were made:

- There is a total mediating effect of power distance on the relationship between commitment and the impact of supply chain disruption. There is a significant effect of commitment on power distance (p-value = 0.016 < 0.05) and a significant effect of power distance on the impact of supply chain disruption (p-value = 0.024 < 0.05), while there is no significant effect of commitment on the impact of supply chain disruption (p-value = 0.827 > 0.05).
- There is no mediating effect of power distance on the relationship between communication and the impact of supply chain disruption. There is an insignificant effect of communication on power distance (p-value = 0.359 > 0.05) and a significant effect of power distance on the impact of supply chain disruption (p-value = 0.024 < 0.05), while there is no significant effect of communication on the impact of supply chain disruption (p-value = 0.795 > 0.05).
- There is a total mediating effect of power distance on the relationship between trust and the impact of supply chain disruption. There is a significant effect of trust on power distance (p-value = 0.016 < 0.05) and a significant effect of power distance on the impact of supply chain disruption (p-value = 0.024 < 0.05), while there is no significant effect of trust on the impact of supply chain disruption (p-value = 0.671 > 0.05).
- There is a total mediating effect of power distance on the relationship between conflict resolution and the impact of supply chain disruption. There is a significant effect of conflict resolution on power distance (p-value = 0.0001 < 0.05) and a significant effect of power distance on the impact of supply chain disruption (p-value = 0.024 < 0.05), while there is no significant effect of conflict resolution on the impact of supply chain disruption (p-value = 0.776 > 0.05).

- There is a partial mediating effect of power distance on the relationship between relational norms and the impact of supply chain disruption. There is a significant effect of relational norms on power distance (p-value = 0.0001 < 0.05), a significant effect of power distance on the impact of supply chain disruption (p-value = 0.024 < 0.05) and a significant effect of relational norms on the impact of supply chain disruption (p-value = 0.008 < 0.05).
- There is a partial mediating effect of power distance on the relationship between SCDO and the impact of supply chain disruption. There is a significant effect of the impact of supply chain disruption on power distance (p-value = 0.0001 < 0.05), a significant effect of power distance on the impact of supply chain disruption (p-value = 0.024 < 0.05) and a significant effect of SCDO on the impact of supply chain disruption (p-value = 0.0001 < 0.05).

Table 18 Path coefficients of mediating effect of power distance for model 1

Paths	Original Sample (Beta)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P-Values
Commitment -> Power Distance	0.161	0.16	0.067	2.413	0.016
Power Distance -> Supply Chain Disruption Impact	0.212	0.221	0.094	2.261	0.024
Commitment -> Supply Chain Disruption Impact	-0.015	-0.021	0.069	0.219	0.827
Communication -> Power Distance	0.119	0.107	0.13	0.919	0.359
Power Distance -> Supply Chain Disruption Impact	0.212	0.221	0.094	2.261	0.024
Communication -> Supply Chain Disruption Impact	-0.029	-0.052	0.11	0.26	0.795
Trust -> Power Distance	-0.259	-0.243	0.105	2.473	0.014
Power Distance -> Supply Chain Disruption Impact	0.212	0.221	0.094	2.261	0.024
Trust -> Supply Chain Disruption Impact	-0.046	-0.034	0.107	0.426	0.671
Conflict Resolution -> Power Distance	0.3	0.303	0.069	4.354	0.0001
Power Distance -> Supply Chain Disruption Impact	0.212	0.221	0.094	2.261	0.024
Conflict Resolution -> Supply Chain Disruption Impact	0.021	0.022	0.073	0.285	0.776

Relational Norms -> Power Distance	0.266	0.265	0.069	3.843	0.0001
Power Distance -> Supply Chain Disruption Impact	0.212	0.221	0.094	2.261	0.024
Relational Norms -> Supply Chain Disruption Impact	-0.233	-0.224	0.087	2.672	0.008
Supply Chain Disruption Orientation -> Power Distance	0.273	0.271	0.078	3.498	0.0001
Power Distance -> Supply Chain Disruption Impact	0.212	0.221	0.094	2.261	0.024
Supply Chain Disruption Orientation -> Supply Chain Disruption Impact	0.384	0.37	0.078	4.907	0.0001

Uncertainty Avoidance

Table 19 shows the path coefficients of the mediating effect of uncertainty avoidance for model 1. From the table, the following observations were made:

- There is no mediating effect of uncertainty avoidance on the relationship between commitment and the impact of supply chain disruption. There is no significant effect of commitment on uncertainty avoidance (p-value = 0.756 > 0.05) and a significant effect of uncertainty avoidance on the impact of supply chain disruption (p-value = 0.024 < 0.05), while there is no significant effect of commitment on the impact of supply chain disruption (p-value = 0.827 > 0.05).
- There is no mediating effect of uncertainty avoidance on the relationship between communication and the impact of supply chain disruption. There is an insignificant effect of communication on uncertainty avoidance (p-value = 0.084 > 0.05) and a significant effect of uncertainty avoidance on the impact of supply chain disruption (p-value = 0.024 < 0.05), while there is no significant effect of communication on the impact of supply chain disruption (p-value = 0.795 > 0.05).
- Uncertainty avoidance has a total mediating effect on the relationship between trust and the impact of supply chain disruption. There is a significant effect of trust on uncertainty avoidance (p-value = 0.001 < 0.05) and a significant effect of uncertainty avoidance on the impact of supply chain disruption (p-value = 0.024 < 0.05), while there is no significant effect of trust on the impact of supply chain disruption (p-value = 0.671 > 0.05).

- There is no mediating effect of uncertainty avoidance on the relationship between conflict resolution and the impact of supply chain disruption. There is no significant effect of conflict resolution on uncertainty avoidance (p-value = 0.253 > 0.05) and significant effect of uncertainty avoidance on the impact of supply chain disruption (p-value = 0.024 < 0.05), while there is no significant effect of conflict resolution on the impact of supply chain disruption (p-value = 0.776 > 0.05).
- There is a partial mediating effect of uncertainty avoidance on the relationship between relational norms and the impact of supply chain disruption. There is a significant effect of relational norms on uncertainty avoidance (p-value = 0.0001 < 0.05), a significant effect of uncertainty avoidance on the impact of supply chain disruption (p-value = 0.024 < 0.05), and a significant effect of relational norms on the impact of supply chain disruption (p-value = 0.008 < 0.05).
- There is a partial mediating effect of uncertainty avoidance on the relationship between SCDO and the impact of supply chain disruption. There is a significant effect of the impact of supply chain disruption on uncertainty avoidance (p-value = 0.0001 < 0.05), a significant effect of uncertainty avoidance on the impact of supply chain disruption (p-value = 0.024 < 0.05) and a significant effect of the impact of SCDO on the impact of supply chain disruption (p-value = 0.002 < 0.05)

Table 19 Path coefficients of mediating effect for uncertainty avoidance for model 1

Paths	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P-Values
Commitment -> Uncertainty Avoidance	0.025	0.03	0.08	0.311	0.756
Uncertainty Avoidance -> Supply Chain Disruption Impact	0.204	0.196	0.1	2.036	0.042
Commitment -> Supply Chain Disruption Impact	-0.015	-0.021	0.069	0.219	0.827
Communication -> Uncertainty Avoidance	-0.168	-0.165	0.097	1.732	0.084
Uncertainty Avoidance -> Supply Chain Disruption Impact	0.204	0.196	0.1	2.036	0.042
Communication -> Supply Chain Disruption Impact	-0.029	-0.052	0.11	0.26	0.795
Trust -> Uncertainty Avoidance	0.281	0.279	0.085	3.314	0.001
Uncertainty Avoidance -> Supply Chain Disruption Impact	0.204	0.196	0.1	2.036	0.042

Trust -> Supply Chain Disruption Impact	-0.046	-0.034	0.107	0.426	0.671
Conflict Resolution -> Uncertainty Avoidance	0.079	0.082	0.069	1.144	0.253
Uncertainty Avoidance -> Supply Chain Disruption Impact	0.204	0.196	0.1	2.036	0.042
Conflict Resolution -> Supply Chain Disruption Impact	0.021	0.022	0.073	0.285	0.776
Relational Norms -> Uncertainty Avoidance	0.335	0.337	0.078	4.316	0.0001
Uncertainty Avoidance -> Supply Chain Disruption Impact	0.204	0.196	0.1	2.036	0.042
Relational Norms -> Supply Chain Disruption Impact	-0.233	-0.224	0.087	2.672	0.008
Supply Chain Disruption orientation -> Uncertainty Avoidance	0.213	0.224	0.067	3.168	0.002
Uncertainty Avoidance -> Supply Chain Disruption Impact	0.204	0.196	0.1	2.036	0.042
Supply Chain Disruption Orientation -> Supply Chain Disruption Impact	0.384	0.37	0.078	4.907	0.0001

Collectivism

Table 20 shows the path coefficients of the mediating effect of collectivism for model 1. From the table, the following observations were made:

- There is no mediating effect of collectivism on the relationship between commitment and the impact of supply chain disruption. There is a significant effect of commitment on collectivism (p-value = 0.0001 < 0.05), no significant effect of collectivism on the impact of supply chain disruption (p-value = 0.985 > 0.05) and no significant effect of commitment on the impact of supply chain disruption (p-value = 0.827 > 0.05).
- There is no mediating effect of collectivism on the relationship between communication and the impact of supply chain disruption. There is a significant effect of communication on collectivism (p-value = 0.034 < 0.05), no significant effect of collectivism on the impact of supply chain disruption (p-value = 0.985 > 0.05) and no significant effect of communication on the impact of supply chain disruption (p-value = 0.795 > 0.05).
- There is no mediating effect of collectivism on the relationship between trust and the impact of supply chain disruption. There is no significant effect of trust on

collectivism (p-value = 0.551 > 0.05), no significant effect of collectivism on the impact of supply chain disruption (p-value = 0.985 > 0.05) and no significant effect of trust on the impact of supply chain disruption (p-value = 0.671> 0.05).

- There is no mediating effect of collectivism on the relationship between conflict resolution and the impact of supply chain disruption. There is a significant effect of conflict resolution on collectivism (p-value = 0.04 < 0.05), no significant effect of collectivism on the impact of supply chain disruption (p-value = 0.985 > 0.05) and no significant effect of conflict resolution on the impact of supply chain disruption (p-value = 0.776> 0.05).
- There is no mediating effect of collectivism on the relationship between relational norms and the impact of supply chain disruption. There is a significant effect of relational norms on collectivism (p-value = 0.0001 < 0.05), no significant effect of collectivism on the impact of supply chain disruption (p-value = 0.985 > 0.05) and a significant effect of relational norms on the impact of supply chain disruption (p-value = 0.008 < 0.05).
- There is no mediating effect of collectivism on the relationship between SCDO and the impact of supply chain disruption. There is no significant effect of conflict resolution on collectivism (p-value = 0.538 > 0.05), no significant effect of collectivism on the impact of supply chain disruption (p-value = 0.985 > 0.05) and a significant effect of conflict resolution on the impact of supply chain disruption (p-value = 0.0001 < 0.05).

Table 20 Path coefficients of mediating effect for collectivism for model 1

Commitment -> Collectivism	0.289	0.284	0.081	3.573	0.0001
Collectivism -> Supply Chain Disruption Impact	0.002	0.002	0.087	0.019	0.985
Commitment -> Supply Chain Disruption Impact	-0.015	-0.021	0.069	0.219	0.827
Communication -> Collectivism	-0.243	-0.224	0.114	2.131	0.034
Collectivism -> Supply Chain Disruption Impact	0.002	0.002	0.087	0.019	0.985
Communication -> Supply Chain Disruption Impact	-0.029	-0.052	0.11	0.26	0.795
Trust -> Collectivism	0.061	0.05	0.102	0.597	0.551

Collectivism -> Supply Chain Disruption Impact	0.002	0.002	0.087	0.019	0.985
Trust -> Supply Chain Disruption Impact	-0.046	-0.034	0.107	0.426	0.671
Conflict Resolution -> Collectivism	0.168	0.17	0.082	2.055	0.04
Collectivism -> Supply Chain Disruption Impact	0.002	0.002	0.087	0.019	0.985
Conflict Resolution -> Supply Chain Disruption Impact	0.021	0.022	0.073	0.285	0.776
Relational Norms -> Collectivism	0.289	0.293	0.082	3.504	0.0001
Collectivism -> Supply Chain Disruption Impact	0.002	0.002	0.087	0.019	0.985
Relational Norms -> Supply Chain Disruption Impact	-0.233	-0.224	0.087	2.672	0.008
Supply Chain Disruption Orientation -> Collectivism	-0.055	-0.045	0.088	0.617	0.538
Collectivism -> Supply Chain Disruption Impact	0.002	0.002	0.087	0.019	0.985
Supply Chain Disruption Orientation -> Supply Chain Disruption Impact	0.384	0.37	0.078	4.907	0.0001

Masculinity

Table 21 shows the path coefficients of the mediating effect of masculinity for model 1. From the table, the following observations were made:

- There is no mediating effect of masculinity on the relationship between commitment and the impact of supply chain disruption. There is no significant effect of commitment on masculinity (p-value = 0.167 > 0.05), no significant effect of masculinity on the impact of supply chain disruption (p-value = 0.068 > 0.05) and no significant effect of commitment on the impact of supply chain disruption (p-value = 0.827 > 0.05).
- There is no mediating effect of masculinity on the relationship between communication and the impact of supply chain disruption. There is no significant effect of communication on masculinity (p-value = 0.89 > 0.05), no significant effect of masculinity on the impact of supply chain disruption (p-value = 0.068 > 0.05) and no significant effect of communication on the impact of supply chain disruption (p-value = 0.827 > 0.05).

- There is no mediating effect of masculinity on the relationship between trust and the impact of supply chain disruption. There is no significant effect of trust on masculinity (p-value = 0.197 > 0.05), no significant effect of masculinity on the impact of supply chain disruption (p-value = 0.068 > 0.05) and no significant effect of trust on the impact of supply chain disruption (p-value = 0.671> 0.05).
- There is no mediating effect of masculinity on the relationship between conflict resolution and the impact of supply chain disruption. There is a significant effect of conflict resolution on masculinity (p-value = 0.0001 < 0.05), no significant effect of masculinity on the impact of supply chain disruption (p-value = 0.068 > 0.05) and no significant effect of conflict resolution on the impact of supply chain disruption (p-value = 0.776> 0.05).
- There is no mediating effect of masculinity on the relationship between relational norms and the impact of supply chain disruption. There is no significant effect of relational norms on masculinity (p-value = 0.058 < 0.05), no significant effect of masculinity on the impact of supply chain disruption (p-value = 0.985 > 0.05) and a significant effect of relational norms on the impact of supply chain disruption (p-value = 0.008 < 0.05).
- There is no mediating effect of masculinity on the relationship between SCDO and the impact of supply chain disruption. There is no significant effect of conflict resolution on masculinity (p-value = 0.114 > 0.05), no significant effect of masculinity on the impact of supply chain disruption (p-value = 0.068 > 0.05) and a significant effect of conflict resolution on the impact of supply chain disruption (p-value = 0.0001 < 0.05).

Table 21 Path coefficients of the mediating effect for masculinity for model 1

Paths	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P-Values
Commitment -> Masculinity	0.119	0.118	0.086	1.384	0.167
Masculinity -> Supply Chain Disruption Impact	0.154	0.154	0.084	1.828	0.068
Commitment -> Supply Chain Disruption Impact	-0.015	-0.021	0.069	0.219	0.827
Communication -> Masculinity	0.025	0.04	0.178	0.139	0.89

Masculinity -> Supply Chain Disruption Impact	0.154	0.154	0.084	1.828	0.068
Communication -> Supply Chain Disruption Impact	-0.029	-0.052	0.11	0.26	0.795
Trust -> Masculinity	-0.14	-0.142	0.108	1.292	0.197
Masculinity -> Supply Chain Disruption Impact	0.154	0.154	0.084	1.828	0.068
Trust -> Supply Chain Disruption Impact	-0.046	-0.034	0.107	0.426	0.671
Conflict Resolution -> Masculinity	0.286	0.291	0.072	4	0.0001
Masculinity -> Supply Chain Disruption Impact	0.154	0.154	0.084	1.828	0.068
Conflict Resolution -> Supply Chain Disruption Impact	0.021	0.022	0.073	0.285	0.776
Relational Norms -> Masculinity	0.16	0.149	0.084	1.895	0.059
Masculinity -> Supply Chain Disruption Impact	0.154	0.154	0.084	1.828	0.068
Relational Norms -> Supply Chain Disruption Impact	-0.233	-0.224	0.087	2.672	0.008
Supply Chain Disruption Orientation -> Masculinity	0.151	0.156	0.096	1.582	0.114
Masculinity -> Supply Chain Disruption Impact	0.154	0.154	0.084	1.828	0.068
Supply Chain Disruption Orientation -> Supply Chain Disruption Impact	0.384	0.37	0.078	4.907	0.0001

Long-Term Orientation

Table 22 shows the path coefficients of the mediating effect of long-term orientation for model 1. From the table, the following observations were made:

- There is no mediating effect of long-term orientation on the relationship between commitment and the impact of supply chain disruption. There is no significant effect of commitment on long-term orientation (p-value = 0.386 > 0.05), no significant effect of long-term orientation on the impact of supply chain disruption (p-value = 0.726 > 0.05) and no significant effect of commitment on the impact of supply chain disruption (p-value = 0.827 > 0.05),

- There is no mediating effect of long-term orientation on the relationship between communication and the impact of supply chain disruption. There is no significant effect of communication on long-term orientation (p-value = 0.672 > 0.05), no significant effect of long-term orientation on the impact of supply chain disruption (p-value = 0.726 > 0.05) and no significant effect of communication on the impact of supply chain disruption (p-value = 0.827 > 0.05).
- There is no mediating effect of long-term orientation on the relationship between trust and the impact of supply chain disruption. There is no significant effect of trust on long-term orientation (p-value = 0.071 > 0.05), no significant effect of long-term orientation on the impact of supply chain disruption (p-value = 0.726 > 0.05) and no significant effect of trust on the impact of supply chain disruption (p-value = 0.671> 0.05).
- There is no mediating effect of long-term orientation on the relationship between conflict resolution and the impact of supply chain disruption. There is no significant effect of conflict resolution on long-term orientation (p-value = 0.458 > 0.05), no significant effect of long-term orientation on the impact of supply chain disruption (p-value = 0.726 > 0.05) and no significant effect of conflict resolution on the impact of supply chain disruption (p-value = 0.776> 0.05).
- There is no mediating effect of long-term orientation on the relationship between relational norms and the impact of supply chain disruption. There is a significant effect of relational norms on long-term orientation (p-value = 0.007 < 0.05), no significant effect of long-term orientation on the impact of supply chain disruption (p-value = 0.726 > 0.05) and a significant effect of relational norms on the impact of supply chain disruption (p-value = 0.008 < 0.05).
- There is no mediating effect of long-term orientation on the relationship between SCDO and the impact of supply chain disruption. There is a significant effect of conflict resolution on long-term orientation (p-value = 0.003 < 0.05), no significant effect of long-term orientation on the impact of supply chain disruption (p-value = 0.726 > 0.05) and a significant effect of conflict resolution on the impact of supply chain disruption (p-value = 0.0001 < 0.05).

Table 22 Path coefficients of the mediating effect of long-term orientation for model 1

Paths	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P-Values
Commitment -> Long-Term Orientation	0.096	0.107	0.111	0.868	0.386
Long-term Orientation -> Supply Chain Disruption Impact	-0.03	-0.019	0.084	0.351	0.726
Commitment -> Supply Chain Disruption Impact	-0.015	-0.021	0.069	0.219	0.827
Communication -> Long-Term Orientation	0.039	0.027	0.094	0.415	0.678
Long-Term orientation -> Supply Chain Disruption Impact	-0.03	-0.019	0.084	0.351	0.726
Communication -> Supply Chain Disruption Impact	-0.029	-0.052	0.11	0.26	0.795
Trust -> Long-Term Orientation	0.172	0.186	0.095	1.806	0.071
Long-Term orientation -> Supply Chain Disruption Impact	-0.03	-0.019	0.084	0.351	0.726
Trust -> Supply Chain Disruption Impact	-0.046	-0.034	0.107	0.426	0.671
Conflict Resolution -> Long-Term Orientation	0.052	0.056	0.07	0.743	0.458
Long-Term orientation -> Supply Chain Disruption Impact	-0.03	-0.019	0.084	0.351	0.726
Conflict Resolution -> Supply Chain Disruption Impact	0.021	0.022	0.073	0.285	0.776
Relational Norms -> Long-Term Orientation	0.259	0.257	0.096	2.705	0.007
Long-Term orientation -> Supply Chain Disruption Impact	-0.03	-0.019	0.084	0.351	0.726
Relational Norms -> Supply Chain Disruption Impact	-0.233	-0.224	0.087	2.672	0.008
Supply Chain Disruption Orientation -> Long-Term Orientation	0.255	0.252	0.084	3.03	0.003
Long-Term orientation -> Supply Chain Disruption Impact	-0.03	-0.019	0.084	0.351	0.726
Supply Chain Disruption Orientation -> Supply Chain Disruption Impact	0.384	0.37	0.078	4.907	0.0001

Summary of Final Mediation Relationships

By introducing a third hypothetical variable, the mediator variable, the mediation summary attempts to uncover and explain the mechanism or process behind an observed

association between independent and dependent variables. A mediation model provides an indirect link between the independent and dependent variables (Aguinis, Edwards, & Bradley, 2017). Here, the independent variable influences the dependent variable via the interaction of the dependent variable with the mediator variable. By doing so, the mediator variable helps to define the connection between the dependent and independent variables. Table 23 shows a summary of mediating relationships for model 1. Commitment and conflict resolution have total mediating relationships with power distance, a society's social distribution of power in a certain national culture. Communication has no mediating relationships. Trust has total mediating relationships with power distance and uncertainty avoidance compared with relational norms and SCDO, which have partial mediating relationships with power distance and uncertainty avoidance.

Table 23 Summary of mediating relationships for model 1

Mediation Relationships	Power Distance	Uncertainty Avoidance	Collectivism	Masculinity	Long-Term Orientation
Commitment	Total	No	No	No	No
Communication	No	No	No	No	No
Trust	Total	Total	No	No	No
Conflict Resolution	total	No	No	No	No
Relational Norms	Partial	Partial	No	No	No
Supply Chain Disruption Orientation	Partial	Partial	No	No	No

Moderation Final Model

The researcher conducted moderating estimation for power distance, uncertainty avoidance, collectivism, masculinity and long-term orientation on the relationship between commitment, communication, trust, conflict resolution, relational norms, SCDO and the impact of supply chain disruption. The moderation relationship in the final model was suggested, as it is useful in explaining the relationship between the variables based on the literature. The moderator was therefore expected to affect the direction or strength of the relationship between the variables.

Model Design

Figure 11 shows the structural equation model for moderation model 1.

Figure 11

Structural equation model for moderation model 1. P: power distance, U: uncertainty avoidance, C: collectivism, M: masculinity, L: long-term orientation. (1): commitment, (2): communication, (3): trust, (4): conflict resolution, (5) relational norms, (6): supply chain disruption orientation. For example, P1 means the moderating effect of power distance on the relationship between commitment and the impact of supply chain disruption.

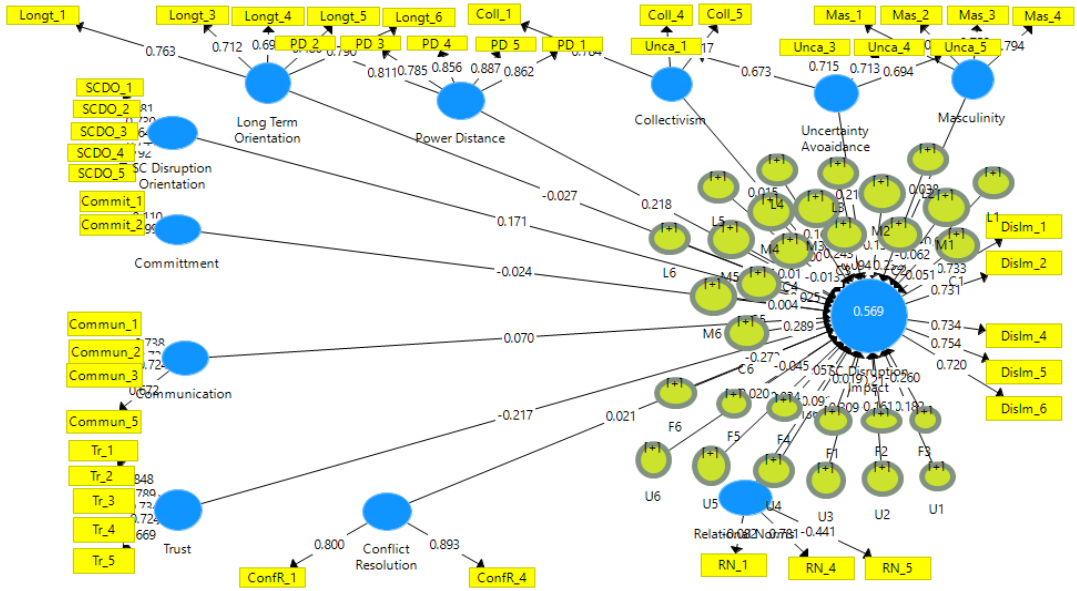

Figure 11 Structural equation model for moderation model 1

Path Coefficients

In this part, the results of testing the hypothesized model are presented. The assumed moderating role of national culture dimensions in the relationship between supplier relationships with SCDO and the impact of supply chain disruption are identified in Table 24. From the table, the following observations were noted:

- There is no moderating effect of power distance on the relationship between commitment, communication, trust, conflict resolution, relational norms and SCDO and the impact of supply chain disruption. The p-values for P1, P2, P3, P4, P5 and P6 are > 0.05.
- There is no moderating effect of uncertainty avoidance on the relationship between commitment, communication, trust, conflict resolution, relational norms and SCDO and the impact of supply chain disruption. The p-values for U1, U2, U3, U4, U5 and U6 are > 0.05.
- There is no moderating effect of collectivism on the relationship between commitment, communication, trust, conflict resolution and relational norms and the

impact of supply chain disruption. The p-values for C1, C2, C3, C4 and C5 are > 0.05. The exception is for SCDO (C6), where the p-value is 0.03 < 0.05.

- There is no moderating effect of masculinity on the relationship between commitment, communication, trust, conflict resolution, relational norms and SCDO and the impact of supply chain disruption. The p-values for M1, M2, M3, M4, M5 and M6 are > 0.05.
- There is no moderating effect of long-term orientation on the relationship between commitment, communication, trust, conflict resolution, relational norms and SCDO and the impact of supply chain disruption. The p-values for L1, L2, L3, L4, L5 and L6 are > 0.05.

Table 24 Moderating estimation for model 1

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P-Values
P1 -> Supply Chain Disruption Impact	0.019	0.008	0.121	0.156	0.876
P2 -> Supply Chain Disruption Impact	0.217	0.161	0.145	1.492	0.136
P3 -> Supply Chain Disruption Impact	-0.26	-0.159	0.144	1.798	0.073
P4 -> Supply Chain Disruption Impact	0.057	0.073	0.108	0.526	0.599
P5 -> Supply Chain Disruption Impact	-0.045	0.083	0.13	0.345	0.73
P6 -> Supply Chain Disruption Impact	-0.273	-0.234	0.155	1.764	0.078
U1 -> Supply Chain Disruption Impact	-0.182	-0.043	0.144	1.263	0.207
U2 -> Supply Chain Disruption Impact	-0.161	-0.044	0.153	1.051	0.294
U3 -> Supply Chain Disruption Impact	0.309	0.192	0.176	1.758	0.079
U4 -> Supply Chain Disruption Impact	0.091	0.038	0.121	0.754	0.451
U5 -> Supply Chain Disruption Impact	-0.034	-0.099	0.144	0.236	0.814
U6 -> Supply Chain Disruption Impact	-0.02	0.05	0.15	0.133	0.894
C1 -> Supply Chain Disruption Impact	0.051	0.019	0.126	0.407	0.684
C2 -> Supply Chain Disruption Impact	0.232	0.131	0.151	1.537	0.125
C3 -> Supply Chain Disruption Impact	-0.094	-0.051	0.144	0.652	0.515
C4 -> Supply Chain Disruption Impact	-0.013	0	0.119	0.109	0.913
C5 -> Supply Chain Disruption Impact	0.025	0.038	0.124	0.204	0.838
C6 -> Supply Chain Disruption Impact	0.289	0.218	0.133	2.172	0.03
M1 -> Supply Chain Disruption Impact	-0.062	0.003	0.115	0.538	0.591
M2 -> Supply Chain Disruption Impact	-0.132	-0.08	0.152	0.869	0.385
M3 -> Supply Chain Disruption Impact	0.243	0.167	0.148	1.646	0.1
M4 -> Supply Chain Disruption Impact	0.004	0.016	0.129	0.03	0.976
M5 -> Supply Chain Disruption Impact	0.011	-0.009	0.108	0.1	0.921
M6 -> Supply Chain Disruption Impact	0.004	0.008	0.117	0.037	0.97
L1 -> Supply Chain Disruption Impact	-0.041	-0.013	0.122	0.339	0.735

L2 -> Supply Chain Disruption Impact	-0.092	-0.094	0.164	0.558	0.577
L3 -> Supply Chain Disruption Impact	0.052	0.076	0.148	0.351	0.726
L4 -> Supply Chain Disruption Impact	-0.162	-0.124	0.132	1.223	0.222
L5 -> Supply Chain Disruption Impact	0.026	-0.024	0.129	0.205	0.837
L6 -> Supply Chain Disruption Impact	0.066	-0.002	0.169	0.391	0.696

5.4 Conclusion

In conclusion, the final model demonstrated that power distance has a total mediating effect on the relationship between commitment, trust, conflict resolution and supply chain disruption. Only partial mediating effects of power distance were observed on relationship norms, SCDO and supply chain disruption. However, no mediation effects of power distance were observed on communication and supply chain disruption. Trust has a total mediating relationship with power distance and uncertainty avoidance. This can be attributed to the influence national culture has on power distance (a society's social hierarchy). Relational norms and SCDO had a partial mediating relationship with power distance and uncertainty avoidance. In addition, commitment and conflict resolution had a total mediating relationship with power distance, and communication had no mediation relationship with uncertainty avoidance. Last, no moderating effect of national culture dimensions was found on the relationship between commitment, communication, trust, conflict resolution and relational norms and the impact of supply chain disruption, except for collectivism, which moderates the relationship between SCDO and supply chain disruption (Table 25 summarizes the result).

Moreover, these findings address the second and third research questions, which inquire into how national culture influences the connection among supplier relationships, disruption orientation, and supply chain disruptions in the oil and petrochemical industry, as well as identifying the most influential cultural dimension in managing disruptions in supply chains. The discussion in the following chapter will delve into these different findings and their contributions to knowledge, shedding light on the intricate relationship between national culture and the management of supply chain disruptions.

Table 25 Summary of quantitative analysis results

Mediation Relationships	Power Distance	Uncertainty Avoidance	Collectivism	Masculinity	Long-Term Orientation
Commitment	Total	No	No	No	No
Communication	No	No	No	No	No
Trust	Total	Total	No	No	No
Conflict Resolution	Total	No	No	No	No
Relational Norms	Partial	Partial	No	No	No
Supply Chain Disruption Orientation	Partial	Partial	No	No	No
Moderation Relationships					
Commitment	No	No	No	No	No
Communication	No	No	No	No	No
Trust	No	No	No	No	No
Conflict Resolution	No	No	No	No	No
Relational Norms	No	No	No	No	No
Supply Chain Disruption Orientation	No	No	Yes	No	No

6. Discussion

6.1 Introduction

This study sought to understand the impact of national culture on supply chain disruption using Hofstede's five dimensions. It used a sequential mixed-methods design consisting of two phases. The first phase involved collecting and analysing qualitative data. This phase formed the foundation of the study as a whole by identifying the essential role of culture as expressed by respondents working at various companies involved in supply chain operations. Using thematic analysis, this phase brought to light eight main themes relating to the research problem—company experience, leadership, government laws and regulations, digitalization, organization size, SCDO, supplier relationships and national culture. The qualitative findings underscored the significance of the influence of national culture on supply chain operations. For example, the respondents highlighted the impact of culture on decision making, such as how companies respond to supply chain risks. The study then focused on three of the most prominent themes—national culture, supplier relationships and SCDO—in the quantitative phase.

Statistical analyses were conducted in the quantitative phase to evaluate the implied effect of national culture. Descriptive statistics provided a summary of the respondent characteristics and the study items. Validity and reliability tests for the 12 constructs were conducted. One SEM analysis was used to evaluate the moderating and mediating effects across various relationships between independent and dependent variables theoretically determined in previous sections. Two models were developed from the analyses. The initial model analysed the mediating impact of national culture on the relationship between the independent variables (commitment, communication, trust, conflict resolution, relational norms and SCDO) and the dependent variable of the disruptive impact on supply chains. A second SEM analysis was used to study the quantitative data in terms of the moderating effect of the cultural dimensions on the relationship between the constructs and the impact of supply chain disruption. The analyses mainly revealed the mediating effects of the power distance and uncertainty avoidance cultural dimensions on the hypothesized relationships. The findings showed no moderating effects across all the relationships, except for SCDO, which affects the impact of supply chain disruption and is significantly moderated by collectivism. This chapter provides a research-linked discussion that interprets the findings of the qualitative and quantitative analyses.

6.2 Influence of National Culture on the Management of Supply Chain Disruptions in the Oil and Gas Industry - A Qualitative Perspective

The analysis revealed several prominent themes in relation to the role of national culture in supply chain disruption. This section provides a summary of the key findings linked to theory and the literature. Regarding human characteristics, the participants in the qualitative phase indicated that supplier relationships are significantly affected by national culture. This finding is justifiable in that national culture backgrounds/viewpoints influence people's intentions and actions (e.g. Bogatyreva, Edelman, Manolova, Osiyevskyy, and Shirokova (2019), behaviour, communication (Holliday (2020);Geert Hofstede (2019) and character (Kitirattarkarn, Araujo, & Neijens, 2019). Given the direct role of people in supplier relationships, their qualities/characteristics impact such things as decision making, preferences, communication and interpersonal relations.

The research shows the influence of national culture on such things, and the qualitative findings of this study verify that culture is important in supplier relationships and supply chain disruption. Regarding the two main themes of national culture and supplier relationships, the researcher emphasized external relationships (between companies) rather than internal relationships during the interviews. This ensured that the respondents talked about relationships across countries rather than within them—a critical element given the conceptualization of national culture from Hofstede's perspective. The themes are consistent with various studies implicating national culture in business activities, particularly supply chain management (e.g. Doetzer (2020); Golini, Mazzoleni, and Kalchschmidt (2018); Hamri, Ouariti, and Lechheb (2016); S. Liu, Tan, Mao, and Gong (2021); Magnier-Watanabe and Senoo (2010); Pagell, Katz, and Sheu (2005); C. W. Wong et al. (2017). The findings introduce a nuanced perspective in supply chain management and research characterized by the need to understand the influence of country-level cultural dynamics. According to past insights (e.g. Doetzer, 2020; Pagell et al., 2005), they extend existing research insights by including Hofstede's national culture dimensions as influential factors in day-to-day supply chain management operations.

The third main theme emerging from the qualitative phase was SCDO. The interviewees felt that national culture affects the ability of the people running their companies to respond to and learn from disruptive events. Indeed, research shows clear links between national culture and organizational learning (Škerlavaj and Dimovski (2009); Walczak (2008). In a review of 280 studies from 1995–2019, El Baz and Ruel (2021) found that national culture impacts both operational and supply chain management. They note an

increased interest in the need for a better understanding of the role played by national culture. The findings of our qualitative study verify this increased interest while contributing to existing research by providing on-the-ground perspectives of supply chain workers. An organization's awareness of and ability to respond to and learn from disruptive events are emphasized by the respondents. They cite actions such as reviewing historic response records to ensure they avoid mistakes in current disruptive events and random response actions like 'firefighting' depending on the specific conditions of each organization. The respondents also related the uniqueness of each SCDO strategy to the factor of culture. For example, some organizations are unwilling to learn from others and instead prefer to develop their own unique strategies. SCDO strategies may therefore differ across organizations and countries due to the different ways of thinking and approaching situations as influenced by culture. This study prioritized the construct of SCDO in the quantitative phase due to its prominence in the interview responses and its considerable importance in supply chain activity.

In the qualitative phase, numerous additional themes emerged, shedding light on the intricate dynamics of supply chain management in the oil and gas industry (EL Baz, Jebli, Cherrafi, Akenroye, & Iddik, 2022).The theme of government laws and regulations, particularly in response to the COVID-19 pandemic, emphasized the importance of aligning supply chain activities with emergency measures issued by trade authorities. Participants highlighted the influence of national culture on policymakers, shaping decisions in the interest of their respective countries (Eckerd, Boyer, Qi, Eckerd, & Hill, 2016). Despite its relevance, this theme was excluded from the quantitative phase due to its broad scope spanning various disciplines and the potential for under-representation in cross-national research (Govindan, 2021).

Another noteworthy theme was leadership, revealing the role of national culture in shaping leadership practices within the supply chain (Geert Hofstede, 1980, 1983, 1993, 1994b). While respondents emphasized its importance, the theme was excluded from the quantitative phase due to its substantial coverage in existing research areas, potential complexities, and resource limitations (Gordon & Yukl, 2004; Schneider & Somers, 2006; Van Wart, 2013). The theme of digitalization emerged, showcasing its central role in supply chain management and its correlation with national culture (Agi & Jha, 2022; Chunsheng, Wong, Yang, Shang, & Lirn, 2020; Queiroz et al., 2021). Despite its significance, the theme was excluded from the quantitative phase due to its broad context, time constraints, and the multifaceted nature of digitalization's impact on supply chains (Özkanlısoy & Akkartal, 2021).

Company size, identified as a theme, reflected suppliers' valuation of larger organizations for their perceived efficiency in payment, commitment, communication, and collaboration (Handley & Benton Jr, 2012; Villena & Craighead, 2017). Despite its impact on inter-organizational relationships, the theme was excluded from the quantitative phase as it primarily functions as a control variable and is not influenced by national culture (Faruquee et al., 2021). The theme of a company's international experience also surfaced, emphasizing the value of past experiences in navigating supply chain disruptions (Daniel & Sonnentag, 2014; Geurts & Demerouti, 2003). Categorized into work-related and non-work-related experiences, this theme held potential significance but required extensive research to comprehensively understand its benefits at both organizational and individual levels. Due to these challenges, the theme was excluded from the quantitative phase to ensure accurate conclusions aligned with the study's objectives.

This section answers the first research question about the influence of national culture on the management of supply chain disruptions in the oil and gas industry. The qualitative phase gathered the perspectives of people working in the supply chain industry. The interviews revealed that the respondents were aware of and had opinions about how national culture impacts their role in supply chain relationships. The most prominent themes appearing in the interviews were national culture, supplier relationships and SCDO. Each theme has underlying sub-themes that were used to develop the constructs and to model various relationships in the subsequent SEM process.

The qualitative findings indicate that national culture has considerable influence on the management of supply chain disruptions in the oil and gas industry. The following quotes from respondents illustrate this:

> We are an American-based company … so if you want to get something done in my company ... it will happen tomorrow, it will happen very quickly. If you're doing it for the right reasons, there are three levels between me and the president, it will very quickly get to the president and something will happen.

> Russians come from communism, and what I find with a Russian mentality is that they want to be told what to do, so they won't do anything unless somebody higher

> tells them to, so they want more direction, they want people to say I've got a problem, and they want a solution to it. So, they … want somebody higher up in the chain to tell them what to do; that could be very different from somebody from Saudi.

The quotes indicate that people's actions and decisions in supply chain operations reflect cultural variables. For instance, the high power distance characteristic of Russia may be why Russians tend to prefer absolute authority. Compared to the US, the general implication is that supply chain operations in Russia are more centralized. Consequently, supply chain partnerships between US and Russian companies likely experience some challenges, as those involved might disagree on elements such as the chain of command, communication and transparency. This is a significant finding relative to the first research question about the impact of national culture on supply chain management in the oil and gas industry. Based on this finding, one may also suppose that supply chain employees in high power distance contexts are more trusting than those in low power distance contexts because the former have no choice than to accept what is required by those in power. Further, communication may be more structured in high power distance contexts, with little transparency and a strict chain of command in terms of how employees interact with their superiors. A quantitative analysis was therefore conducted to establish the validity of the respondents' claims. The national culture dimensions were applied to the relationship between supplier relationships and supply chain disruption and to the relationship between SCDO and supply chain disruption as either moderators or mediators to evaluate the hypothesized influence.

6.3 Mediating Effect of National Culture on the Relationship between Supplier Relationships, SCDO and Supply Chain Disruption - A Quantitative Perspective

The mediating impact of national culture on the relationship between supplier relationships, SCDO and supply chain disruption was investigated. The quantitative analysis revealed various insights that supported or contradicted existing literature in several ways.

6.3.1 Power Distance

Commitment. The study found that power distance had a total mediating impact on the relationship between supplier commitment and supply chain disruption. This follows theoretical insights that organizational supply chain practices may differ significantly across countries, mainly due to varying cultural backgrounds (Reader, 2019; Tear et al., 2020). The finding complements several past studies. According to a meta-analytical study of commitment across cultures by Fischer and Mansell (2009), continuance and affective commitment are positively and significantly impacted by increasing power distance. X. Zhao, Huo, Flynn, and Yeung (2008) argue that there is a substantial impact of national culture on commitment in supplier relations. They emphasize commitment, especially in relationships in China, which is characterized by higher power distance than most other advanced economies, such as the US (X. Zhao et al., 2008). The study also emphasizes the need to identify differences in power relations across countries.

In contrast to the present study's findings, Doering, De Jong, and Suresh (2019) argue that there is no significant impact of the national culture dimensions on the relationship between supply chain integration and performance. The study's contrary findings could be because the focus was on the relationship between supply chain integration and supply chain performance and because of the methodological differences between Doering et al. (2019) and the present study.

The finding that power distance totally mediates the relationship between commitment and supply chain disruption is substantial. Commitment as a supplier relationship factor would not improve or worsen a supply chain disruption scenario without considering the power distance dimension. In a nutshell, the relationship ceases to exist when one ignores the power distance factor. From a conceptual viewpoint, high power distance cultures prefer to remain in control of situations, programmes and processes—they expect the second party to submit unwaveringly to their power and perceived influence in the relationship. That could be a problem if the relationship involves high and low power distance parties. Neither will have the mindset to comply with the other. The low power distance party will find the power priorities of the high power distance party a deterrent to the greater purpose of sustaining the relationship. The findings also imply that if both parties have a similar power distance, they are likely to commit more to any efforts to mitigate disruption and sustain the relationship. Therefore, the power distance dimension is critical in oil and gas supply chain relationships, as it negatively or positively impacts commitment, such as when establishing positive

interpersonal relationships to sustain organizational relationships and mitigate damage caused by disruptive events such as COVID-19.

Trust. The study finds that power distance totally mediates the relationship between trust and supply chain disruption. Past studies have explored the implications of power distance on the relationship between trust and supplier relationships and have obtained various supporting and contradicting findings.

Hewett et al. (2006) found that power distance is a major determinant of corporate cultures and negatively impacts supplier relations. Corporate cultures are the blueprint of how a company thinks, operates, behaves and reacts to different situations. In most cases, corporate culture reflects the home country's culture and values. For instance, Asian companies predominantly have high power distance compared to Western companies. This power distance gets expressed as, for instance, centralized operations, that is, distancing the leadership and management from employees and external stakeholders (except for powerful and wealthy investors). Trust becomes a critical factor in relationships with such an organization because they prefer to keep such a structure, including with supply chain partners. Following this context, Yeung, Selen, Zhang, and Huo (2009) found that contrary to popular Western opinion, high power distance improves supplier relationships and trust compared to low power distance situations, thereby proving that the element of power distance mediates the relationship between trust and supplier relationships. Ireland and Webb (2007) argue that effectively balancing trust and power tends to offset the risks and uncertainties in supplier relationships, especially during disruptive events. Conceptually, this notion applies in terms of where trust is necessary. In a high power distance context, it is likely that the centralized structures also exhibit significant opaqueness in their dealings. However, low power distance contexts have clear data-based mechanisms of transacting. The concept of trust is inconsequential to the success or failure of supplier relationships in low power distance contexts. However, in high power distance contexts, building trust is prioritized. Therefore, the finding that power distance mediates the relationship between trust and supply chain disruption applies to understanding the cross-cultural complexities of managing supply chains, especially during disruptions.

Some studies have found contradicting results. Zaheer and Zaheer (2006) argue that when the relationship is between parties from cultures that promote an institutional level of trust, there is a chance that they invest less in risk and uncertainty management. Conceptually, low-power distance countries encourage open and equal communication and

information exchange in supplier relationships (Zaheer & Zaheer, 2006).This is unlike when one party is from a high power distance culture and the other a low one, a scenario where the former takes responsibility for mitigating any risks or uncertainty and the latter trusts that everything is under control. Ostensibly, the greater emphasis on power distance as a mediator of the relationship is clear in the context. However, it also implies that this relationship could benefit from focused research to better understand trust between high and low power distance actors in supplier relationships during disruptive events.

Conflict Resolution. The present study shows a total mediating impact on the relationship between conflict resolution and supply chain disruption. Research on the impact of power distance on conflict resolution is prominent in the psychology and management disciplines (Tyler, Lind, & Huo, 2000). Within the context of supply chain disruption, the present study hypothesizes that power distance mediates the relationship between supply chain relationships and conflict resolution. This follows the conceptualization that long-term supplier relationships depend on the involved parties' ability to resolve and manage conflicts. Supply chain environments are very volatile (Maloni & Benton, 2000), meaning conflicts are highly likely. There are two forms of power—(1) non-mediated that means expert, reference, and legitimate, and (2) mediated which means that it is legal legitimate, coercive and reward,. Maloni and Benton (2000) find that predominantly, non-mediated power has a positive and significant impact on the relationship between conflict resolution in two firms and supply chain sustenance than mediated power. If a conflict arises in supplier relations, non-mediated power is more likely to deliver positive results (resolution and continuity of the relationship) than mediated power. Regarding the notion of power from the national culture perspective, organizations from high power distance cultures behave differently from those from low-power distance cultures. The former is likely to prefer centralized dealings and communication only when necessary, and the latter is likely to prefer a democratic and highly transparent environment (Rao, 2013) and a mediated form of power (Maloni & Benton, 2000). According to Rao (2013), this means the contrasting perceptions of power and its value might hinder the chances of resolving a conflict and maintaining the relationship. It is likely that the parties will agree to terms that favour their preferred power positions, meaning that disagreements are more likely than agreements. In disruptive situations, the pressure is amplified, thus lowering the chance of successful conflict resolution. Therefore, the power distance dimension is a critical element of conflict management in a disruptive supply chain situation in the oil and gas industry.

Vitolla, Raimo, Rubino, and Garzoni (2019) are in agreement, having found that national culture dimensions, including power distance, have significant positive impacts on integrated reporting, a more transparent reporting mechanism. The authors find its preference in low power distance cultures than high power distance cultures, implying that disagreements are likely in contexts involving parties from either end of the power distance dimension. In such contexts, conflict resolution efforts will likely fail, thereby having a negative consequence on the relationship and on the disruption. Purohit and Simmers (2006) find that power distance affects the very willingness to participate and the conflict management strategy preference of each party. Gunkel, Schlaegel, and Taras (2016) find that power distance positively and directly impacts the choice of conflict resolution strategy. High power distance cultures prefer avoiding the process but when forced to face it they dominate the proceedings (Gunkel et al., 2016). Similar findings are reported in other studies (e.g. Fu, Han, and Huo (2017); Munson, Rosenblatt, and Rosenblatt (1999); Zhu, Krikke, and Caniëls (2018), thus substantiating the finding that power distance totally mediates the relationship between conflict resolution and supply chain disruption. This means that conflict resolution is inconsequential to supply chain disruption without considering the implications of power distance. Therefore, this study's finding that power distance had a total mediating impact on the relationship between conflict resolution and the impact of supply chain disruption supports previous research.

It is worth noting that the different kinds of power are used differently across cultures. Cultures with high power distance tend toward coerciveness and legitimacy. Ignoring the context of different forms of power and how they affect supplier relationships across cultures, the results in the present study support the general finding that the relationship between conflict resolution and supply chain disruption is mediated by power distance.

Relational Norms. As established in the present study, power distance partially mediates the relationship between supplier relationship norms and supply chain disruption. This investigation stems from the conception that organizational behaviour is determined by the home country's culture (Wuyts & Geyskens, 2005). Therefore, companies in high power distance countries prefer a similar approach, while those in low power distance countries prefer a high level of equality, transparency and openness in their dealings (Wuyts & Geyskens, 2005). In other words, relationship norms—such as communication, quality and performance, risk management, technology roles, the roles and responsibilities of various parties—are formed according to power distance orientation. Therefore, the finding indicates that power distance increases the relevance of the relationship between relational norms and

supply chain disruption. However, other factors are relevant in the context, hence the partial mediation effect. Such factors include trust and commitment, which are found to be fully mediated by power distance. Therefore, overall, the influence of national culture in supply chain relationships must be considered, particularly because of the volatility of global oil and gas supply chain activity.

The finding backs the findings of other studies in a similar context. Hoppner, Griffith, and White (2015) have found a significant and positive impact of national culture on relationship norms. They argue that acts such as reciprocity are universal in social relationships irrespective of context. However, reciprocity differs in terms of how, when, where and who is responsible for its execution based on culture. Consequently, the study findings imply that power distance mediates the relationship between relationship norms and supply chain disruption. In the recent high-risk situation of the COVID-19 pandemic, supplier relationships were subjected to considerable institutional pressures due to disruptions in human activity, such as travel and ongoing contractual costs (Roscoe et al., 2022). For example, in that situation, a US company importing goods through an Indian supplier would be subject to an environment of non-uniform pressure, requiring each company to make its own independent decisions and maximize its profits (Roscoe et al., 2022) in accordance with its company norms.

According to Griffith and Myers (2005), relational norms do better in environments where cultural values and norms support the expectations of suppliers. For example, when selecting suppliers, organizations seek ones in countries with a good cultural fit. The findings of the present study partially support the notion that supplier relationships extending beyond the contractual terms are better positioned to survive disruptive events. The 'beyond-contract' relationship factors, such as reciprocity, motivate the parties to seek the best interest of each other despite the conditions.

Supply Chain Disruption Orientation. SCDO is a company's awareness of possible scenarios regarding opportunities and risks during supply chain disruptions. The present study has found that power distance has a partial impact on the relationship between SCDO and the impact of supply chain disruption. In other words, a firm's ability to be proactive and recognize the risks and opportunities relative to disruptive events is influenced by the power distance dimension. The finding supports the findings of other studies.

Umar and Wilson (2021) find that factors such as cultural norms within supplier relationships impact their potential to survive disasters and disruptions. Chunsheng et al.

(2020) find that in high power distance countries, acts such as knowledge sharing critical to SCDO are limited to 'authorized eyes only'; they tend to exclude parties perceived as less powerful. Consequently, there is a negative influence on the relationship between SCDO and the impact of supply chain disruption, whereby the involved parties have limited capacities to implement relevant mitigation measures. The findings of Wang et al. (2019) support this finding. In looking at the recent intellectual capital conflict between the US and China, they found that mistrust occurs when cultural norms such as a disinclination to share knowledge are in play. Such cultural norms within supplier relationships affect SCDO and result in ineffective management of supply chain disruptions.

The information-sharing context is also consistent with Golini et al. (2018), who use national culture (power distance and individualism–collectivism) to determine its impact on supply chain information sharing. They find that power distance has a positive impact on information sharing among suppliers and customers. The higher the power distance, the higher the chances that a country's suppliers share information (Golini et al., 2018). This is argued to be caused by the coercive nature of authority in high power distance countries; if the government demands that suppliers share information openly, they will comply almost unquestioningly (Golini et al., 2018). Given that information sharing is one of the enablers of successful SCDO, the findings of the present study support the influence of power distance. However, the emphasis lies on the partial nature of the mediating effect of power distance, implying that other factors contribute to the dynamics in the relationship between SCDO and supply chain disruption outcomes for a given supplier relationship.

In terms of organizational learning, C.-J. Chen, Guo, Wang, and Lin (2022) argue that a moderate level of power distance results in the best organizational learning outcomes. This is in comparison to low and high power distance variations, which both cause decreases in performance (C.-J. Chen et al., 2022). Lin, Sanders, Sun, Shipton, and Mooi (2020) argue that power distance mediates the relationship between market sensing capabilities, a major element in organizational learning, and human resource management and innovation in various organizations. High power distance countries exhibit a greater mediating effect in the relationship (Lin et al., 2020). The learning competence of an organization is critical to SCDO. Therefore, the present study's findings support these and other concepts within the notion of the effect of national culture on the relationship between supply chain relationships and the impact of supply chain disruption.

Communication. The study finds no significant mediating effect of power distance on the relationship between communication and the impact of supply chain disruption. This

finding contradicts the findings of previous studies in this regard. For instance, Golini et al. (2018) (as explored above) find that information sharing is affected by power distance. Organizations in high power distance cultures willingly comply with coercive measures to enforce such action (Golini et al., 2018). Those in low power distance cultures go to great lengths (including legal interventions) to prevent such coerciveness and likely question the authority issuing the directive, especially if it conflicts with their goals or persuasion (Golini et al., 2018).

Further, while studying the impact of relational norms on the strategic fit of supply chain governance across borders, Griffith and Myers (2005) found that information sharing is a core element of high power distance and usually collectivist cultures. Organizations are usually centralized, meaning communication and information exchange is a norm or minimal expectation rather than a requirement (Griffith & Myers, 2005). This is unlike low power distance and usually individualistic societies where shared information can be used (or misused) by the other party for their individual gain (Griffith & Myers, 2005). Golini et al. (2018) make similar claims following findings that power distance significantly impacts supply chain information sharing between suppliers and customers.

In the context of national culture and its impact on supply chain relationships, Dash, Bruning, and Guin (2007) propose that power distance affects the relationship between communication quality and efficiency and supply chain relations, the antecedent of effective management of supply chain disruptions. In this context, the underlying concept is that high power distance organizations with significant authority will ignore any complaints or issues arising from the low power partners, while those in low power distance societies will encourage discussion, consultation and participative decision making (Dash et al., 2007). The outcome, relative to the prominent theme in the current study, is that power distance affects communication efforts in supplier relationships. As relates to supply chain disruption, a negative impact of power distance on the relationship between communication and supply chain disruption will most likely cause the failure of the said supply chain relationship. Therefore, the present study's findings contradict the prominent findings regarding the mediating effect of power distance on the relationship between communication and supply chain disruption. In contrast, the previously described outcomes regarding the impact of power distance on several aspects of supplier relationships (conflict resolution, trust) and SCDOs are based on the implications of power distance in relation to information sharing and transparency.

6.3.2 Uncertainty Avoidance

Trust. The study finds a total mediating impact of uncertainty avoidance on the relationship between trust and the impact of supply chain disruption. Researchers argue that trust mediates the ability of those in a supply chain relationship to willingly exchange relevant and accurate information, thereby promoting an environment likely to maximize opportunities and minimize risks in a disruptive scenario (e.g. Dash et al. (2007); Hoppner et al. (2015); Qu and Yang (2015); Yeung et al. (2009); Zaheer and Zaheer (2006). Trust also mediates the effectiveness of information sharing, a pivotal element of successful supplier relationships (Umar & Wilson, 2021).

As established in the present study, the mediating influence of uncertainty avoidance varies across cultures, with Western countries scoring higher than Asian countries, such as China (Atuahene-Gima & Li, 2002; Chang, Hsu, Shiau, & Tsai, 2015). Atuahene-Gima and Li (2002) state that uncertainty avoidance significantly impacts trust, expressed, for example, in sales performance. Trust-based relationships do not affect performance in cultures of high uncertainty avoidance, unlike in cultures with low uncertainty avoidance (Atuahene-Gima & Li, 2002). Essentially, this argument is based on the notion that a high level of trust is needed between parties in a relationship to seek opportunities in high-risk situations in low uncertainty avoidance cultures (Atuahene-Gima & Li, 2002). These situations are mostly triggered by unplanned and uncertain events, such as disruptions to the sprawling supply chain of the oil, petrochemical and gas industry. However, trust is a non-factor in cultures that avoid uncertainties—there are no prevailing conditions to develop the trait to maximum effectiveness. Findings from the present study justify this argument, given that its participants are from a mixture of low and high uncertainty avoidance cultures. The total mediating effect of uncertainty avoidance is valid, whether negative, positive, or neutral, as established in Atuahene-Gima and Li (2002).

Qu and Yang (2015) find that the uncertainty avoidance dimension has negative consequences for supply chain collaboration due to the same underlying concept, as argued from Hofstede's conceptualization. The relevance of this article in the present study emerges in the notion that trust impacts supply chain collaboration, the effectiveness of which determines the survivability of supplier relationships amidst disruptive events (Qu & Yang, 2015). Again, the findings in the present study support this notion by validating the claim that uncertainty avoidance mediates the relationship between trust and the impact of supply chain disruption.

Chang et al. (2015) find that uncertainty avoidance affects the relationship between the efficiency of knowledge sharing and knowledge-sharing intentions. Knowledge sharing and related intentions are core measures of trust in business and social contexts (Chang et al., 2015) . Given this conception, the relationship between trust and supply chain disruption is likely to experience the effect of uncertainty avoidance, as found in the present study. This could occur when companies from high uncertainty avoidance cultures (e.g. the US) seek supplier relationships with companies from low uncertainty avoidance cultures (e.g. China). Given their varying perceptions of trust and its role in high-risk conditions (Atuahene-Gima & Li, 2002), the parties will likely disagree on any efforts to sustain the relationship beyond the disruption. Therefore, the findings in the present study support a considerable amount of existing research by finding a total mediating effect of uncertainty avoidance on the relationship between trust and the impact of supply chain disruption.

Relational Norms. The present study finds a partial mediating effect of uncertainty avoidance on the relationship between relational norms and the impact of supply chain disruption. The finding supports various previous studies in this context.

According to the findings of Dekker, Donada, Mothe, and Nogatchewsky (2019), relational norms involve more than the basics (rules of interactions, technological roles and responsibilities of each party)—they are derived and influenced significantly by national cultural values. Cultures with high uncertainty avoidance will not prioritize relationship norms compared with cultures of low uncertainty avoidance, whose risky endeavours depend on effective, collaborative and transparent relationships (Griffith & Myers, 2005; S. Liu et al., 2021; Qu & Yang, 2015) . Therefore, Dekker et al. (2019)'s findings include that relational norms work best in less complex collaboration environments where the chances of being influenced by uncontrollable factors such as cultural values are limited. This does not imply that supplier relationships cannot exist across borders; instead, it means that for relationships forged in more complex environments (e.g. cross-border supplier relationships), factors such as uncertainty avoidance, among others (e.g. varying trade policies and other cultural orientations), impose unwanted complexities in the relationships. The impact of uncertainty avoidance in the resulting relationships is thus supported.

While appreciating that trust is an independent variable in the present study, the proven effects of its lack in supplier relationships could impact relational norms (Huang, Han, & Macbeth, 2020). The notion of trust is especially emphasized in China under the value of 'guanxi'—strong relationships based on personal trust, moral obligations and favours or

reciprocity (Huang et al., 2020). Therefore, in such a high uncertainty avoidance culture, relational norms will heavily depend on trust, the presence or value of which in supply chain relationships is significantly impacted by the national culture (Huang et al., 2020). Huang et al. (2020) argue that supply chain relationships are influenced by the relational norms in this context, supporting the findings in the present study.

Albuloushi and Algharaballi (2014) find that uncertainty avoidance impacts relationship norms, arguing that the former influences how individuals develop their views and behaviours regarding social interactions. Qu and Yang (2015) also find that uncertainty avoidance has negative consequences for the coordination of supply chains. This implies that cultures of low uncertainty avoidance will depend significantly on relationship factors such as relationship norms for the survival of their supplier relationships amid disruptive events (Qu & Yang, 2015). The implications of uncertainty avoidance are thus supported in the context that it partially mediates the relationship between relational norms and the impact of supply chain disruptions.

Supply Chain Disruption Orientation. The study finds that the relationship between SCDO and the impact of supply chain disruption is partially mediated by uncertainty avoidance. The finding aligns with several other past studies. Yang et al. (2021) find the critical significance of information and processing capabilities in supply chain resilience and the management of supplier relationships in disruptive environments. Information sharing and processing are among the factors that enable success in SCDO efforts in an organization. Specifically, anticipating risks and opportunities in a disruptive environment depends on how fast a company can access and process related information to develop appropriate mitigations (Yu et al., 2019). As noted earlier, organizations from high uncertainty avoidance cultures, such as the US, tend to prefer rational, statistically proven approaches to managing uncertainties (Atuahene-Gima & Li, 2002). Organizations in low uncertainty avoidance cultures, such as China, prefer to base their relationships on social factors such as trust and relationship norms (Atuahene-Gima & Li, 2002). A high uncertainty avoidance culture will also work harder to minimize uncertainty and manage disruptions in the future than a low uncertainty avoidance culture because it is highly associated with how they deal with uncertainty and ambiguity in situations such as disruptions.

However, research also argues that high power distance associated with low uncertainty avoidance positively mediates the relationship between communication and supplier relationships (Griffith & Myers, 2005). This could negate the notion that low uncertainty

avoidance cultures might fail in SCDO approaches. Nevertheless, effective information exchange and communication translate into effective supplier relationships and increased chances that the relationships survive disruptive events (Yang et al., 2021). Therefore, the arguments culminate in the primary conception that uncertainty avoidance partially mediates the relationship between SCDO and the impact of supply chain disruption.

Conflict Resolution, Communication and Commitment. The results indicate no significant mediating impact of uncertainty avoidance on the relationship between conflict resolution, communication and commitment and the impact of supply chain disruption. The finding is significantly different from most past studies in a similar context. For instance,Y. Liu and Almor (2016) argue that across supplier relationships, multiple social mechanisms impact survivability (e.g. cultural influences). Uncertainty avoidance is one social mechanism that impacts activities such as communication, conflict resolution and commitment in supplier relationships (Albuloushi & Algharaballi, 2014). Therefore, the findings in the study are contrary to popular opinion about the impact of national culture on supplier relationships.

Gupta and Gupta (2019) argue that uncertainty avoidance affects the nature of communication and communication preferences across cultures. High uncertainty avoidance cultures prefer considerable openness and transparency in communication (Le Nguyen, Larimo, & Ali, 2016). In low uncertainty avoidance cultures, the authoritarian approach demands unquestioning acceptance; however, those in power decide to communicate or deal with conflict (Le Nguyen et al., 2016). The outcome is clear—uncertainty avoidance affects the nature of and approach to conflict resolution and communication in supplier relationships. This translates into its effect on the ability of relationship factors such as communication, norms and commitment to be helpful in navigating the impacts of supply chain disruption. This view contradicts the present study's findings that show no significant impact of uncertainty avoidance on the relationship between communication and the impact of supply chain disruption.

Last, commitment in supplier relationships improves the ability to overcome disruptive events. However, the relationship depends on the national cultural orientation of the parties involved in terms of uncertainty avoidance. X. Zhao, Huo, Selen, and Yeung (2011) argue that in low uncertainty avoidance cultures such as China, commitment is critical in efforts to develop effective collaborations with suppliers. Qu and Yang (2015) lean toward the same argument in supporting their broader purpose of understanding the impact of uncertainty avoidance in supply chain collaborations. These studies contradict the results of the present

study in that the relationship between commitment and the impact of supply chain disruption is mediated by uncertainty avoidance. This leaves significant room for research in this area and provides a possible focus for future investigations of a similar nature.

6.3.3 Collectivism

The present research finds that the relationships between commitment, communication, trust, conflict resolution, relational norms and SCDO and the impact of supply chain disruption are not mediated by collectivism. The underlying concept in this section is that organizations from collectivist cultures (e.g. China) will act variably in the terms of factors above compared to those from individualistic cultures (e.g. the US). However, the results suggest that collectivist and individualistic values have no influence on the factors listed and how they relate to the impact of supply chain disruption, implying some contradictions. For instance, J. V. Chen, Yen, Rajkumar, and Tomochko (2011) found that supplier collectivism/individualism had positive and significant impacts on trust, commitment and information sharing during communication in supplier relationships. Kumar et al. (2016) follow this line of argument in a study of national culture and the effect on disruption management in supply chains. Their findings indicate positive and significant impacts on efforts to manage disruptive impacts on supply chains.

Durach and Wiengarten (2020) find that collectivistic values, as drawn from the national culture, are significant influences in decision processes and decisions across supply chain integration and operation. They also report that such integration depends heavily on the ability of involved parties to agree and commit to the various terms (Durach & Wiengarten, 2020). The overreaching conclusion of these and other previous studies is that collectivism influences the relationship between commitment, communication, trust, conflict resolution, relational norms and SCDO and the impact of supply chain disruption. Therefore, the present study's findings remain a topic for future in-depth investigation.

A possible reason for such contradiction could be the choice of methodology (e.g. sampling, sample size and research design) (Reich, 2010). A second and more convincing reason is that the different research contexts (research questions, hypotheses, variables and approaches) may account for the difference (Reich, 2010). The present study investigates the mediating impact of national culture on the relationships listed. However, most of the reviewed papers investigate the impact of national culture on the factors above as direct rather than mediating effects. Irrespective of this difference, the implication is that the papers

cited all show some impact of collectivism on the factors, hence the indication that the present findings necessitate further investigation in future.

6.3.4 Masculinity

Like collectivism above, the present study finds no significant mediating effect of masculinity on the relationship between commitment, communication, trust, conflict resolution, relational norms and SCDO and the impact of supply chain disruption. However, due to the discrepancies between the findings on collectivism in past research, there is a significant chance that the cultural dimension of masculinity has some effects on the implied relationships. The relationship between masculinity and trust in supply chain partnerships is not well researched. However, some studies have suggested that traditional notions of masculinity may have an impact on the level of trust established between companies in a supply chain. The traditional notions of masculinity may lead individuals to focus on obtaining powerful and dominant terms in supplier negotiations. Under the concept of relationship marketing, Oly Ndubisi (2004) argues that masculine qualities have a considerably negative impact on the formation and maintenance of business relationships. Geert Hofstede and Usunier (2003) argue that masculinity and other cultural dimensions impact international business negotiations, including supply chain negotiations.

Egoistic tendencies associated with masculine cultures are also found to have negative consequences for business relationships, impacting things such as technology use and acceptance (Srite & Karahanna, 2006). This implies that the finding in the study contradicts much of the existing literature supporting the notion that masculinity affects the correlation between supplier relationships and the impact of supply chain disruption. Within the qualitative interview, the study finds a similar line of thought on the part of some respondents, indicating that ego is a detriment to supplier relationships. Its association with masculine tendencies implies its considerable importance in supply chain relationships.

It is important to keep in mind that most of the masculinity factors are general tendencies, and not all individuals display these behaviours. Additionally, masculinity is a complex construct, and other aspects of masculinity may also affect trust in supply chain relationships. Evidently, supplier relationships between companies on either end of this orientation can be impacted by the resulting influences.

Further patterns are evident, such as those established above for collectivism. Samaha, Beck, and Palmatier (2014) find that masculinity has no significant impact on international

relationships across companies, a view that supports the findings in the present study. However, if employing the traditional sense of masculinity, there are possible implications in terms of communication, relationship norms, conflict resolution methods, commitment and SCDO. For instance, research shows that in the traditional sense, masculine cultures have a defined set of communication behaviours and characteristics—typically assertiveness, dominance, coerciveness and competitiveness (Guang & Trotter, 2012; Geert Hofstede & Usunier, 2003). This means that organizations in highly masculine cultures (including the US and China) will prefer coercive and power-oriented behaviour and unquestionable communication mechanisms with highly centralized structures (Geert Hofstede & Usunier, 2003)

The same applies to conflict resolution efforts. Geert Hofstede and Usunier (2003) argue that conflict usually results in fighting or wars. The recent business wars between the US and China are an excellent example of this. Le Nguyen et al. (2016) and Mohammed, Prabhakar, and White (2008) find that masculinity affects the ability to trust and communicate between parties, meaning it hinders their ability to resolve conflict. The cascade of events leads to the termination of the supply chain relationship when faced with disruptive events.

The argument conflicts with the finding of the present study that masculinity has no significant impact on the relationship between commitment, communication, trust, conflict resolution, relational norms and SCDO and the impact of supply chain disruption. As some studies support the notion (e.g. Samaha et al. (2014), future research could aim to provide improved empirical measurements for individual factors while using masculinity as the mediating variable. This could provide more clarity on the issue.

6.3.5 Long-Term Orientation

The study finds no significant mediating effect of long-term orientation of commitment, communication, trust, conflict resolution, relational norms and SCDO and the impact of supply chain disruption. Cultures with high long-term orientation prefer to keep traditions, heritage and norms and to approach change with caution (Geert Hofstede & Usunier, 2003). Cultures with low long-term orientation prefer pragmatic and rational approaches, readily accepting change and encouraging future generations to avoid traditions (Geert Hofstede & Usunier, 2003). This may hinder the development of trust and other social factors, such as cooperation, necessary for the long-term existence of a relationship. Without trust and

cooperation, it can be challenging to establish and maintain a successful and long-lasting supply chain partnership. He and Sun (2020) argue that trust and commitment are significant elements in high long-term orientation cultures.

Cambra-Fierro and Polo-Redondo (2011) find that long-term orientation affects communication, trust, commitment and cooperation in supplier relationships across cultures. Barnes, Leonidou, Siu, and Leonidou (2010) find that opportunism, characteristic of low long-term orientation cultures, is a major hindrance to the longevity of supply chain relationships between Western exporters and Hong Kong importers. Factors such as trust, commitment and relationship norms arise with considerable conflict, thereby leading to the preference for contractual relationships (Barnes et al., 2010). C. L. Wang, Siu, and Barnes (2008) argue that Chinese companies predominantly seek to establish relatively longer-term relationships compared to Western companies in cross-border business relationships and supply chains. The long-term orientation cultural factor is responsible for such varying preferences in supplier relationships.

C. L. Wang et al. (2008) find that Renqing (translated as informal social responsibility induced by a party in a guanxi relationship; Wang et al., 2008) is a major influence in how Chinese organizations relate with others in international supply chains. It has a significant effect on first impressions, impression management, face saving and decision making in relationships (C. L. Wang et al., 2008). Lui and Ngo (2012) find that long-term orientation significantly and positively impacts relationship norms across cooperative relationships in international business.

It is also worth noting that trust in a supply chain partnership is a multi-dimensional construct and can be influenced by many factors, such as cultural differences, the nature of the products or services being exchanged, the level of dependency between partners and the overall economic and competitive environment. Given these arguments, the findings in the present study largely conflict with existing research in the field. They present a further research opportunity to develop an in-depth evaluation and description of the implied relationships and the mediating effect of long-term orientation.

In summary, this section discusses findings regarding the mediation part of the second research question. The findings suggest that power distance and uncertainty avoidance are the most influential in the behaviour of supply chain workers in relation to managing supplier relationships and SCDO amid disruptive events. Specifically, power distance had total influence on the relationship between supplier relationships and supply chain disruption in the terms of commitment, trust and conflict resolution. Uncertainty avoidance also had a total

mediating impact on the relationship between supplier relationships and supply chain disruption. Consequently, trust stands out in this instance as the determinant that matters the most in terms of how national culture affects the dynamics of supplier relationships during disruptions. The finding is also supported by the findings of the qualitative phase in that the respondents had similar perceptions. For instance, one respondent stated:

> There are for example different background that influence their decision making, trust as in some culture they value trust, word of mouth, other cultures they don't – they need everything in writing or documented, so sometimes in supply chain issues you want to solve issues on the phone, you don't have time for emails.

Further, power distance and uncertainty avoidance had partial mediating impacts on the relationship between relational norms, SCDO and supply chain disruption. Last, power distance did not have any mediating impact on communication, as with uncertainty avoidance, which did not affect communication, conflict resolution and commitment in supplier relationships in relation to supply chain disruption. Collectivism, masculinity and long-term orientation did not mediate any of the hypothesized relationships in the study. Therefore, regarding the mediating impact of national culture in relation to the second research question, power distance and uncertainty avoidance are significant forces in the management of supply chain disruption in the oil and gas industry.

6.4 Moderating Effect of National Culture on the Relationship Between Supplier Relationships, SCDO and the Impact of Supply Chain Disruption - A Quantitative Perspective

Based on the current study results, national culture did not significantly influence commitment, communication, trust, conflict resolution, relational norms and SCDO in terms of the impact of supply chain disruptions. The exception is collectivism, which has a moderating effect on SCDO.

6.4.1 Collectivism and Supply Chain Disruption Orientation

The study finds that the relationship between SCDO and the impact of supply chain disruption is moderated by collectivism. The finding is consistent with the findings of several previous studies. A critical factor in SCDO success in an organization is information sharing

and processing, specifically the ability to anticipate risks and opportunities in disruptive environments. To develop appropriate mitigations, companies need to be able to access and process relevant information quickly (Yu et al., 2019). In terms of information sharing, previous studies show that collectivism/individualism has positive and significant impacts on many aspects of information sharing in supplier relationships (J. V. Chen et al., 2011).

According to Sarafan, Squire, and Brandon–Jones (2020), the collectivism/individualism cultural dimension also has an influence on risk perception associated with supply chain disruption; they showed a negative relationship between collectivism/individualism and risk perception associated with supply chain disruption. This means high collectivism is associated with lower risk perception. Managers and decision makers who appreciate the interdependence among the groups and societies they belong to prefer to see their colleagues as shields that could save them from losses cause by disruptions (Sarafan et al., 2020). This leads us to the idea that decision making by itself is influenced by collectivism across supply chain integration and operations (Durach & Wiengarten, 2020).

6.4.2 Power Distance, Uncertainty Avoidance, Long-Term Orientation and Masculinity

Contrary to the study findings, Tyler et al. (2000) argue that power distance has a general moderating impact on social and business relationships. Individuals in high power distance cultures will be less concerned with how authorities approach their decisions, strategies and solutions regarding challenges in the supply chain. However, those in low power distance contexts will be more interested in the whys and hows of the decisions and actions of those with higher authority (Tyler et al., 2000). Purohit and Simmers (2006) argue that power distance is a major determinant of the choice of conflict management strategy, mainly between compromising and avoiding strategies. High power distance cultures will prefer to avoid the conflict situation, usually to avoid ‘stooping too low’ (Purohit & Simmers, 2006). Low power distance cultures will prefer compromising, encouraging scenarios where both parties in the relationship are open to all requirements to sustain the relationship (Purohit & Simmers, 2006). Further complications emerge if the conflict scenario involves the two opposites of high and low power distance parties (Purohit & Simmers, 2006). These findings suggest the possible moderating effect of national culture on supply chain relationships and of SCDO on supply chain disruption. Therefore, this contradictory finding is worth further investigation in the future.

Lin et al. (2020) find a significant moderating role of power distance in the relationship between human resource management strategies and companies' capacity for innovation. This is key given the notion of information exchange and organizational learning within the broader communication construct in the present study. Past research has found that effective communication and information exchange are antecedents of successful innovation and creativity in organizations. They enable work-based learning (e.g. Battistelli, Odoardi, Vandenberghe, Di Napoli, and Piccione (2019) knowledge sharing (e.g. Azeem, Ahmed, Haider, and Sajjad (2021) and teamwork (Ali, Bahadur, Wang, Luqman, & Khan, 2020). The communication-related factors are critical to the successful development of innovation capabilities (Dasgupta & Gupta, 2009). They also factor significantly into supplier relationships, as communication is an enabler of long-term relationships (Hsu, Kannan, Tan, & Keong Leong, 2008; Ojha, Dayan, Struckell, Dhir, & Pohlen, 2022). The study shows that power distance moderates the relationship between conflict resolution and supplier relationships, translating into possible impacts on supply chain disruption. Therefore, the present study's finding of the moderating effects of power distance contrast with popular opinion in past research. However, as evident in the sources cited above, past literature pays little to no specific attention to factors such as communication and the impact of national culture on the hypothesized relationships (Revilla & Saenz, 2017; Zsidisin & Wagner, 2010). Therefore, the implied influence of national culture on the relationship between communication and supply chain disruption necessitates further research.

Albuloushi and Algharaballi (2014) find that trust in supply chain relationships is significantly moderated by culture, mainly uncertainty avoidance. Cultures with low uncertainty avoidance, such as China, emphasize trust and socially oriented relationship building. Trust enables their ability to deal with risks better than cultures with high uncertainty avoidance (Zaheer & Zaheer, 2006). Skowronski, Benton Jr, and Handley (2022) find that power distance moderates the effectiveness of relationship norms, commitment and collaboration. These findings validate the contradictory findings of the present study.

The prominence of trust in China is contrasted by its unimportance in high uncertainty avoidance cultures (Atuahene-Gima & Li, 2002). This suggests that in cross-cultural supplier relationships, the parties must have some trust to allow the relationship to thrive. An American company would be venture into long-term supplier relationships and contracts, while the Chinese supplier would be more open and transparent with information and communication.

The scenario indicates the involvement of power distance, uncertainty avoidance, masculinity and long-term orientation. For instance, agreeing to share more information implies going against the notion of power distance and unquestionable authority. High power distance cultures will prefer situations where they have total control over proceedings and decisions, including centralization, to prevent questioning authority (Rao, 2013). An American company going into a longer contractual agreement than normal will be willing to accommodate a level of trust beyond the rational and calculable risk. This indicates presence of the long-term orientation dimension and the factor of trust in supplier relationships (Doney, Cannon, & Mullen, 1998). The overreaching idea in this argument is that national culture determines when supplier relationships and SCDO will affect the impact of supply chain disruption. For instance, organizations in highly long-term oriented cultures will be less inclined to information sharing and transparent communication, implying that communication might be hampered (Barnes et al., 2010). However, they will value trust and commitment more, as enshrined within such cultures (e.g. China) (Barnes et al., 2010). This means that the finding that national culture has no moderating impact on the relationship between supplier relationships and SCDO and the impact of supply chain disruption is contrary to a majority of past research.

Wotela (2018) argues that such contradictions are reasonable in research and are due to a variety of factors. One such reasonable argument is the sample description. In the present study, a higher number of participants from Western countries would imply that the general research outcomes lean towards scenarios where trust does not play a significant role in supplier relationships, as argued by Atuahene-Gima and Li (2002). Participants from Asian cultures such as China will lean towards more trust and socially oriented relationships. In the former scenario, the data is likely to show the insignificance or inexistence of the moderating effect of national culture on supply chain relationships.

In summary, with the exception of collectivism and its established moderating impact on the relationship between SCDO and supply chain disruption, the study finds that it has no moderating effect on the constructs. With respect to the moderating effect of national culture, the results imply that it had no moderating impact on the relationship between supplier relationships and supply chain disruption and between SCDO and supply chain disruption. However, in the second instance of SCDO, collectivism had a moderating impact on the relationship between SCDO and supply chain disruption. This implies that in terms of the moderating effects, all the national culture dimensions considered did not impact the relationship between supplier relationships and supply chain disruption. Of the dimensions,

only collectivism had a moderating effect on SCDO and supply chain disruption in the oil and gas industry. The results answer the research question regarding the moderating effects of national culture on the relationship between SCDO, supplier relationships and supply chain disruption.

6.5. Cultural Dimensions that Most Influence the Management of Supply Chain Disruption

The purpose of this mixed-method study was to explore the role that national culture plays in supply chain disruption from a qualitative and quantitative perspective. As a result of the in-depth interviews in the qualitative phase of this study, it was determined that national culture influences supply chain disruptions in various ways. The participants clearly identified supplier relationships and SCDO as key factors influenced by national culture. To understand this influence and how it affects the relationship between supplier relationships and disruption orientation during supply chain disruption management, the study examines the moderating and mediating effects. Mediation refers to the underlying processes and mechanisms that link antecedents and outcomes of an effect. Moderation refers to the conditions under which an effect differs in size (Aguinis et al., 2017).

Based on the quantitative investigation, power distance and uncertainty avoidance are the most impactful in terms of the established mediating effect on the relationship between supply chain relationship constructs, SCDO and supply chain disruption. In supply chain management, the findings have considerable implications. As stated, power distance and uncertainty avoidance are the most impactful on supplier relationships and disruption orientation. In a real-life instance, activities such as planning and supplier selection should prioritize evaluating the cultural fit with potential partners to avoid possible cultural conflicts arising due to a mismatched agenda. In context, an oil and gas distributor in the US should consider the possible misalignment of intentions as fostered by the cultural background of a Chinese supplier. Suppose a disruptive event occurs, such as COVID-19; the latter party would choose to avoid conflict resolution and would likely withhold information. Both conditions would create mistrust with the US distributor.

As detailed previously, the other three cultural dimensions fail to have a mediating impact on the relationship between supplier relationships and supply chain disruption. Regarding the moderating effects, only collectivism moderates the relationship between SCDO and supply chain disruption. A comparison with past research shows that these findings contrast considerably. Further, this study did not demonstrate a moderating effect on

supplier relationships. The small sample size likely explains why the moderating effect was absent; small sample sizes cause the models to have low statistical power, potentially explaining the lack of a moderating impact (Aguinis et al., 2017). The finding led to some implications and recommendations for future research, detailed in the subsequent chapter.

To summarize, the study establishes the mediating role of national culture in the relationship between supplier relationships, SCDO and the impact of supply chain disruption. This means that national culture might change the processes or strategies applied in supply chain practice to mitigate and work through disruptions. This is in contrast to previous research that shows the role of culture as moderating (e.g. Purohit and Simmers (2006); Tyler et al. (2000), a role that is less impactful in the core process of managing supply chain disruptions. This implies that organizations preparing mitigation strategies for disruptions must consider national culture. They have to focus on, for instance, the variable power distributions among the supply chain partner companies given their cultural differences. Power distance affects the urgency and speed of reaction, given its impact on organizational structure and decision making. It may also impact risk management planning for disruptive events where approaches and styles of communication, trust, commitment, conflict resolution and relational norms vary according to the different power and uncertainty avoidance biases. As noted, decision making during disruptions needs to be both timely and accurate to allow for the effectiveness of responses. As noted in the literature review section, power distance implies the expected and accepted unequal distribution of power in society (Geert Hofstede et al., 2005). In societies with a high level of power distance, power is hierarchically distributed, and members with less power accept this inequality. In contrast, societies with lower power distance exhibit negative perceptions and unacceptance of unequal power distribution. Consequently, the varying perceptions across cultures could be a challenge to disruption management. People with authority or higher positions in high power distance societies would have great power over their subordinates. In comparison, those in low power distance societies think that influential leaders do not need considerable power compared to their subsidiaries. Linking back to the literature review, various aspects of organizational and supply chain activity (e.g. negotiations) were linked to the power distance dimension of national culture (Buttery & Leung, 1998). Subsequently, the imperative for supply chain players is to consider the role that such varying power perceptions might have in managing supply chain relationships and the effective implementation of SCDO.

Further, their focus should also include the cultural influence on the companies in the supply chain relative to uncertainty avoidance. Uncertainty avoidance is critical to the way

that the companies react to disruptions. The different perceptions relating to uncertainty avoidance create varying perceptions of risk and risk management planning. Societies with high uncertainty avoidance feel insecure in unknown situations—they tend to plan ahead to eliminate ambiguity. Societies with low uncertainty avoidance are more accepting and tolerant of ambiguity and unexpected situations (Beugelsdijk & Frijns, 2010). They see, anticipate and react to risk differently. Therefore, the national culture of the supply chain partners and suppliers must be included in the strategies to improve supplier relationships and to learn from disruptive events.

6.6 Chapter Summary

The chapter provides a detailed discussion of the mixed-methods study of the role of national culture in the correlation between supply chain relationships and supply chain disruption. The thematic evaluation of responses from the qualitative phase revealed various insights, especially regarding the key issues in supply chain relationships. The prominent themes from that phase include national culture, supplier relationships and SCDO. The national culture theme is considered in terms of Hofstede's cultural dimensions—power distance, masculinity, long-term orientation, uncertainty avoidance and collectivism. Supplier relationships include five independent variables—commitment, communication, trust, conflict resolution and relational norms. A quantitative evaluation of the mediating and moderating effects of national culture on the relationship between the independent variables and the dependent variable of the impact of supply chain disruption revealed mixed results.

Regarding mediating effects, the study found a total impact of power distance on commitment, trust, conflict resolution and the impact of supply chain disruption. Power distance also partially mediates the relationship between relational norms and SCDO and the dependent variable. There is no mediating effect of power distance on the relationship between communication and the impact of supply chain disruption. Uncertainty avoidance had a total mediating effect on the independent variable of trust and partial impacts on relational norms and SCDO. There was no mediating impact on communication and the impact of supply chain disruption. Uncertainty avoidance also had a total mediating effect on trust, while partially impacting the relationship between relational norms and SCDO and the impact of supply chain disruption. There was no mediating impact on these relationships of conflict resolution, communication and commitment.

The study also investigated the mediating impact of collectivism, masculinity and long-term orientation on the relationship between supplier relationships, SCDO and the impact of supply chain disruption. There was no significant mediating effect across the relationships. A review of past research indicates that the findings both support and contradict existing findings, with some research and managerial implications as detailed in the next chapter.

In addition, the study developed SEM for the moderating effect of national culture, which revealed no significant effect across the six constructs or on their relationship with the impact of supply chain disruption. Unlike the mediating model, these results appear to be in full contrast to findings in past research, posing significant research and managerial implications.

The study found that national culture—mainly the power distance and uncertainty avoidance dimensions—has a significant mediating impact on the relationship between supplier relationships, SCDO and supply chain disruption. This means that the implied relationship lacks the context of the 'how' and 'why' without the factor of national culture. While this argument is debatable (non-cultural factors could determine such relationships), the imperative for organizational practice is to reconsider the importance accorded to these cultural factors in day-to-day supply chain activities. Amid increasing volatility in the oil and gas industry and global supply chain networks, understanding how national culture impacts individuals' willingness to ensure the survival of relationships could be of strategic significance and a competitive advantage in supply chain management. An organization with a greater understanding of national culture will be better positioned to research, identify, select and forge resilient supply chain relationships across borders. This can make a huge difference in the hypercompetitive oil and gas industry.

Strategically, an organization's ability to benefit from SCDO also rests significantly on the ability to understand the cultural dynamics involved. The topic of SCDO has recently become quite popular, especially after the pandemic (Hussain, Nazir, Rashid, & Sattar, 2023). A general shift from supply chain resilience to SCDO is evident (e.g. Stekelorum, Gupta, Laguir, Kumar, and Kumar (2022); Hussain et al. (2023), with some contexts considering SCDO a pivotal precursor to resilience (Liu & Wei, 2022). The present findings emphasize the pivotal significance of insights on SCDO, indicating that success in related strategies is achievable only through understanding the interplay of national culture dynamics. The imperative for managers and organizations is clear—aligning SCDO strategies with national culture knowledge could improve the strategic success of related practices.

These findings have significant implications for practice. For instance, power distance—found to have mediating impacts on various elements of supplier relationships and SCDO—can be a useful factor in contract development and potential supplier evaluation. When a company in the US desires suppliers from Russia or other high power distance countries, they should consider how the tendency to control operations could impact their ability to mitigate a disruptive event. Such a scenario means information will be delayed, as the company's supply chain workers must pass through various levels of authority and approvals to release any required information to the partner. However, the factor of time is critical to successful mitigation of emergencies and disruptions in the supply chain. The delays caused by the partner could be the difference between successful disruption mitigation and failure. Alongside power distance, uncertainty avoidance is shown to affect supplier relationship factors and SCDO. In practice, such an effect could be evident during disruption management. The trust factor in supplier relationships was totally mediated by uncertainty avoidance in its relationship with disruption. As discussed, trust is typically lacking in cultural contexts with high uncertainty avoidance—organizations and people will prefer rational and evidence-based approaches to operations. In practice, the findings imply that a company in Russia will likely experience some discomfort dealing with suppliers from China, owing to the latter's tendency to trust and allow higher levels of uncertainty in operations. When choosing suppliers, such a factor should be a central consideration, as it poses the risk of hindering relationships—more so with increased uncertainty associated with disruption. In general, considering the national culture factor before entering long-term supplier relationships could determine the longevity and resilience of the supply chain. This makes it imperative to consider national culture in supply chain management operations. Following this line of thought, the concluding chapter establishes various other implications for various parties implicated by the findings.

7. Conclusions and Recommendations

7.1 Introduction

This mixed-methods study investigated the role of national culture in supply chain disruptions. The purpose of using this approach was to explore the impact of national culture on supply chain disruptions by studying the impact of national culture on the correlation between supplier relationships, SCDO and supply chain disruptions. Qualitative interviews of supply chain relations' constructs and SCDO and to determine how national culture impacts the correlation with supply chain disruptions helped identify the constructs used for the quantitative phase of the study. This chapter concludes be detailing the study's insights, their theoretical, empirical, methodological and practical implications and the methodological, practical and theoretical limitations.

7.2 Summary of Research Process

A comprehensive literature review revealed considerable gaps regarding the significance of national culture in supply chain disruptions. There has been extensive focus on the operational end of supply chain activity, particularly on issues such as resilience, sustainability, strategies and supply chain design. Attention has also been paid to the occurrence of supply chain disruptions and mitigation and recovery strategies. Few studies have proposed understanding the social aspects of disruption, and those few studies have been implicit (e.g. relationships) (Revilla & Saenz, 2017); Zsidisin and Wagner (2010). To help fill the gap, the present study sought to understand supply chain disruption and the key role plated by national culture.

First, the study sought to investigate the influence of national culture in managing supply chain disruptions in the oil, petrochemical and gas industry. Second, it sought to determine how national culture influences supplier relationships, SCDO and supply chain disruptions in the oil and gas industry. Third, it sought to determine which cultural dimensions are most influential in managing supply chain disruptions.

The researcher conducted explorative interviews in the qualitative phase of the study. Eight interviews were conducted between March and April 2021. Participants were sought and contacted to arrange for the interviews via LinkedIn and email and comprised adults with 2–20 years of experience in various companies and countries working in supply chain operations in the oil and gas industry. The home nations of participants include Saudi Arabia, Jordan, the UK and Kuwait, while their employing companies are located in Saudi Arabia,

the US, Italy, the UK, the UAE, with some firms being global. All interviews were conducted online, following relevant protocols such as time management and using pre-determined questions. Data was collected in transcripts.

The transcripts underwent intense abductive, thematic analysis. According to Hurley, Dietrich, and Rundle-Thiele (2021), the abductive thematic analysis method aims to find a logical and practical explanation for an observed phenomenon. This approach ensured that the researcher remained focused on the target information and prevented the discovery and inclusion of arbitrary and abstract results that were irrelevant to the research questions (Thompson, 2022). Each resulting theme was discussed in detail in terms of the respondents' perspectives. The quantitative phase was then conducted, where the themes were designed into several constructs that make up the study's independent, dependent, moderating and mediating variables.

In the quantitative phase, the national culture theme was broken down into five sub-themes—power distance, uncertainty avoidance, collectivism, masculinity and long-term orientation. These were tested for validity and reliability as mediators or moderators of the correlation between supplier relationships, SCDO and the impact of supply chain disruptions. Supplier relationships were broken down into five sub-themes—commitment, communication, trust, conflict resolution and relational norms. These were tested for validity and reliability as the independent variables. SCDO is considered an independent theme entailing a firm's ability to be aware of various risks and predispositions and to recognize the criticality of learning from challenges and opportunities (Yu et al., 2019). It was the sixth independent variable and was tested for validity and reliability using various methods. Subsequently, the mediating and moderating effects of national culture were modelled against the relationships. SEM using Smart PLS software was employed to test the mediating and moderating effects. The study arrived at different conclusions regarding the effect of national culture on supply chain disruptions.

7.3. Main Findings and Conclusion

7.3.1 Influence of National Culture on Supply Chain Disruption Management in the Oil and Gas Industry

The qualitative phase of the study revealed that individuals in the supply chain industry strongly related to several themes that emerged during the interviews. National culture (power distance, uncertainty avoidance, collectivism, masculinity and long-term orientation), supplier relationships (commitment, communication, trust, conflict resolution

and relational norms) and SCDO were most prominent, given the human-focused research purpose (i.e. to bridge the gap in past studies regarding the role of social elements in supply chain disruptions and relationships). The interviews contextualized responses to the external supplier relationships (i.e. those between companies), thus capturing a cross-country perspective of how the relationships work. Including these responses in the present study followed the desire to capture the social dimension of supply chain disruptions, SCDO and supply chain relationships in terms of the influence of national culture.

The themes of government laws and regulations, leadership, digitalization, organization size and international experience were also identified. However, they were excluded from the present study for various reasons. First, leadership, digitalization and laws and regulations are among the most expansive, conflicted and debated themes. Their inclusion would have distracted the study from its primary focus. Second, the study faced resource and time limitations that discouraged expansive research into these themes. Third, factors such as organizational size and international experience have not shown any consistent association with national culture in past research, thereby proving to be invalid in the second phase of the study.

The findings answer the first research question. The respondents supported the idea that national culture indeed influences supply chain disruption management in the oil and gas industry. They also suggested that supplier relationships and SCDO deserve further attention in terms of how national culture affects supplier relationships and SCDO interaction with supply chain disruptions.

7.3.2 Quantitative Phase Results - Mediating and Moderating Impacts of National Culture

Extensive quantitative tests were conducted for the constructs in the quantitative phase, including Pearson's correlation for validity and Cronbach's alpha for reliability. Twelve constructs emerged as valid and reliable, with statistically significant scores across the tests. Further tests were conducted in the SEM stage, including normality assessment using Mardia's multivariate skewness and kurtosis and the R-squared goodness of fit. The SEM used SMART PLS. The SMART software was selected over other programmes such as AMOS following failure to achieve normality using Mardia's multivariate skewness. Two SEM models were developed, one for each hypothesized relationship using the mediating and moderating variables. The study found that national culture had more mediating effects on the relationships but no moderating effects. This implies that national culture adds context to

the causal relationships implied between the independent and dependent variables; its absence makes the causal relationship ambiguous (MacKinnon, 2011). It also implies that national culture does not change the direction or strength of the relationship amid the dependent and independent variables; its absence does not affect the causal relationship implied (MacKinnon, 2011). However, an exception of collectivism moderating the relationship between SCDO and supply chain disruption was established. The findings are further summarized in the following sub-sections, and their implications are discussed in detail later.

Mediating Effect of National Culture on Supply Chain Relationships, SCDO and the Impact of Supply Chain Disruptions. The first SEM revealed several insights in terms of contextualizing the relationship between the constructs in supplier relationships, SCDO and the supply chain disruption using three levels of impact—total (complete) impact, partial impact and no impact. The results showed that national culture had mediating impacts on the relationships between the independent variables and supply chain disruptions (see Table 26).

Table 26 Summary of mediating impact of national culture

National Culture Dimension	**Mediation Impact**		
	Total	Partial	None
Power distance	Commitment, trust and conflict resolution	Relational norms, SCDO	Communication
Uncertainty avoidance	Trust	Relational norms and SCDO	Conflict resolution, communication and commitment
Collectivism			Trust, relational norms, SCDO, conflict resolution, communication, commitment
Masculinity			Trust, relational norms, SCDO, conflict resolution, communication, commitment
Long-term orientation			Trust, relational norms, SCDO, conflict resolution, communication, commitment

The findings answer the mediating end of the second research question. Specifically, power distance and uncertainty avoidance affect the correlation between supplier relationship factors, SCDO and supply chain disruptions.

Moderating Effect of National Culture on Supply Chain Relationships, SCDO and the Impact of Supply Chain Disruptions. The second SEM evaluated the moderating impact, that is, the extent to which the relationships between the supply chain relationship constructs, SCDO and the impact of supply chain disruptions are affected by national culture. The results suggest there is no moderating impact of national culture on the independent and dependent variables, as hypothesized for the mediating relationship above. However, an exception was found whereby collectivism moderates the relationship between SCDO and supply chain disruptions. This finding proves contradictory because there is considerable evidence in past research that national culture moderates supplier relationships and the dynamics that exist in the relationship with supply chain events such as disruptions. The somewhat incompleteness of the findings of past research is one of the main points covered in this chapter.

The findings respond to the moderating end of the second research question. Only the collectivism dimension of national culture moderated the relationship between SCDO and supply chain disruptions.

7.4 Contributions of the Research

The present study provides insight into an area of supply chain activity that has been insufficiently covered by recent research. The human context of supply chain relationships is critical and is argued to be a central aspect of success or failure in cross-border supply chain relations. Based on Hofstede's national culture dimensions, the study shows that supplier relations, examined in terms of commitment, communication, trust, relational norms and conflict resolution, and SCDO affect the impact of supply chain disruptions. The study does not cover the direction of impact (i.e. negative or positive). The primary agenda was to investigate and test the various hypotheses that there is an effect of national culture. With some exceptions, national culture appears to mediate the relationships generally but does not appear to have a moderating effect. Nevertheless, the study makes significant theoretical, empirical and practical contributions to research in this and related fields.

7.4.1 Theoretical Contributions

The study aimed to evaluate national culture's mediating and moderating impact on the relationship between firms' supplier relationships, SCDO and supply chain disruptions in the oil and gas industry. The topic of supply chains has been extensively researched. However,

much of the focus has been on the operational dimension. Virtually no studies have attempted to link the human context of supply chains in terms of supplier relations and the role of national culture. Therefore, the present study makes several theoretical contributions.

First, Hofstede's ideas regarding national culture and its impact on business have proved significant. While past studies have investigated supply chain relationships and supply chain disruption (e.g. Bode et al. (2011); Durach and Machuca (2018); Habermann, Blackhurst, and Metcalf (2015); Park, Min, and Min (2016); Polyviou, Croxton, and Knemeyer (2020), few studies have described the effects and implications of national culture on the behaviours that determine the human side of these relationships. The present study contributes in this regard by providing specific insights into the role of national culture in supplier relationships, SCDO and supply chain disruption in the oil and gas industry. It examined the cultural effect at the individual level in supplier relationships, SCDO and supply chain disruptions. As the desire to capture the human side of events during oil and gas industry supply chain disruptions was the primary objective of the study, supplier relationships and SCDO was examined from the perspective of individuals, and by looking at national culture from the same perspective the study provides a deeper understanding of how national culture impacts supply chain disruptions.

The findings reveal the considerable influence of national culture on supplier relationship factors. For instance, in the relationship between commitment, trust, conflict resolution, relational norms and the impact of supply chain disruptions, the study found that power distance has mediating effects. Theoretically, the findings complement past research findings by integrating this human dimension into supplier relationships. The concept of national culture and how it impacts the development of character and behaviour among individuals is key to this argument. Because supply chain relationships are forged by individuals from different countries and companies, the role of their national cultures in these relationships should not be ignored as it has been in past research. People working in supply chain operations are responsible for researching, identifying and implementing supply chain relationships across countries. The study finds that because their personalities, characters and behaviours are influenced by their different national cultures, national culture plays a role in aspects such as commitment, trust, conflict resolution and relational norms.

Regarding uncertainty avoidance, the findings contribute to the existing understanding of the dynamics of national culture in supply chain relationships and supply chain disruption. Trust is one element whose relationship with the impact of supply chain disruptions was totally mediated by uncertainty avoidance. Various studies relating to the topic support the

finding (e.g. Atuahene-Gima and Li (2002); Chang et al. (2015); Qu and Yang (2015). As discussed in the previous chapter, the argument is that trust is more prevalent in cultures with low uncertainty avoidance than in cultures with high uncertainty-avoidance. The former type is likely to depend on human qualities such as trust, which give immaterial assurance that their long-term ventures and investments will be in 'good hands.' The latter type puts little emphasis on factors such as trust; they are willing to engage in transactions when there is sufficient rational and evidence-based grounds. In addition, they prefer short-term ventures. Based on this, the theoretical contribution includes that the research on supply chain relationships and supply chain disruption should endeavour to contextualize the human factors that are central to the existence of supply chains.

Second, the study contributes to the understanding of SCDO by factoring the construct among those primarily included in the SEM. The present study finds that the relationship between SCDO and the impact of supply chain disruptions is partially mediated by power distance and uncertainty avoidance. Simply put, an organization's ability to perceive and manage risks in a disruptive environment is dependent on the dynamics of supplier relations and is affected by power distance and uncertainty avoidance. For example, the findings imply that high power distance and low uncertainty avoidance cultures, such as India (Migliore, 2011; Rao, 2013), prefer environments that prioritize centralized information exchange and organizational learning practices. Coupled with centralized leadership, voice and sense of direction during disruptive events, organizations in these cultures have a greater chance of implementing successful SCDO strategies because the national culture factor complements these preferences. However, high uncertainty avoidance and low power distance cultures may lack centralized communication and authority figures, which could be a negative catalyst in disruptive events.

Theoretically, the study contributes to the existing research by underscoring the need to reconsider opinions and perspectives on the role of national culture in managing supply chain disruptions. As a relatively popular topic in the modern supply chain research context, increased attention to the role of national culture in SCDO will improve understanding of the concept for greater practicability.

Finally, while the correlation between supply chain relationships, SCDO and the impact of supply chain disruptions can be mediated by other factors, the study findings suggest that the correlation lacks context without the mediating effect of national culture. This perspective is widely supported in the existing literature (e.g. Fellows and Liu (2020); Felstead et al. (2009); Marquardt et al. (2004). For instance, national culture dimensions such as power

distance and uncertainty avoidance influence the preference of conflict resolution approaches, the value of trust, communication, commitment and the ways to establish relationship norms. The desired outcome is to foster resilient supplier relationships capable of overcoming disruptive events, such as the recent Covid-19 pandemic. Within this argument, there is a further theoretical contribution in that the findings challenge existing research regarding the extent to which national culture is involved in supply chain relationships. The findings emphasize that the national culture variable in the correlation between supply chain relationships, SCDO and the impact of supply chain disruptions is a central factor in forming and maintaining successful relationships.

7.4.2 Empirical Contributions

The study also makes some empirical contributions. As identified earlier, little empirical attention is given to researching the role of national culture in the correlation between supply chain relationships, SCDO and the impact of supply chain disruption. The empirical approach in the study provides a unique view of the implied impact of national culture.

First, the study empirically confirmed that the national culture dimensions of power distance and uncertainty avoidance have some complete and partial mediating effects on the correlation between supplier relationship factors, SCDO and the impact of supply chain disruptions. The results of a rigorous statistical analysis of the mediating role of national culture in the correlation of supply chain relations and SCDO with the impact of supply chain disruptions validate that the mediating variable should be central to research efforts in the field. As a mediator, its absence in related research weakens the arguments made in past empirical research. The mediating impact is limited to specific national culture dimensions (power distance and uncertainty avoidance) and supply chain relations (commitment, trust, conflict resolution and relational norms) in relation to the impact of supply chain disruptions. In addition, the mediating impact of the national culture dimensions on the supplier relationship variables and SCDO varies, as detailed in the quantitative results above.

Second, the study provides an employee and industry-focused perspective of perceptions regarding the role of national culture. The quantitative phase involved participants from 13 countries working in 10 different countries in North America, the Middle East, Asia, Africa and Europe. This is empirically significant, as the findings

represent a global perspective of the role of national culture in supply chain disruptions in the oil and gas industry.

Third, 78% of the respondents had mid- and top-level supply chain management roles, and 82% had over nine years of experience in supply chain operations at their respective companies. The empirical value of such a sample includes great richness and depth of insight. These individuals are involved in day-to-day decision making, communications, relationship management, planning, integration and other supply chain activities, and their opinions amplify the value of the insights obtained in the present study.

Fourth, the mixed-methods approach employed here contributes to existing research on supply chain disruptions and the role of national culture. Specifically, the sequential exploratory design captures the value of the qualitative and quantitative insights derived from using the methodology. This means that rather than deriving the critical issues in supply chain disruption from previous research (the predominant approach), the study draws its themes from the qualitative phase and then tests their relevance, validity and relationships with the mediator and moderator in the quantitative phase. The outcome is an all-inclusive view of the mediating impact of the specified national culture dimensions on the correlation between supply chain relationships, SCDO and the impact of supply chain disruptions. The approach is referent to the notion that existing research in the field is typically limited to the operational context, and less is known about human values in supporting supply chain activity. Therefore, the informativeness of the findings encourages the use of mixed methods in future research, given that that it helps draw from current issues to develop constructs that can be tested, validated and modelled in the quantitative phase.

Moreover, past research focused on culture and supply chain disruptions has been mainly based on either qualitative *or* quantitative methodologies (e.g. Durach et al. (2017); Kumar et al. (2016); Parast and Subramanian (2021). Further, a comprehensive review of related studies by El Baz et al. (2022) reveals the prominence of quantitative and qualitative methodologies as opposed to mixed methods. This supports the fact that the mixed methods used in the present paper make a major methodological contribution by improving the depth of knowledge about the role of national culture in supply chain disruptions in the oil and gas industry. Specifically, the methodology adds value to existing solutions to supply chain issues in the context of disruptive environments and cultural factors. Widespread adoption of mixed methods in future research can improve the insights in the present study and increase the value of research insights on the topic overall.

Last, from an execution perspective, the study provides a more integrated approach to theory development and explanatory power. Its findings are superior to those in past research related to the study topic. This means that considering past research has used either qualitative or quantitative methods and has focused predominantly on the operational context, the findings of this study using mixed methods have revealed substantially deeper insights. More specifically, the present study is unique in that it integrates multiple cultural dimensions, supplier relationship factors and SCDO. Therefore, the mixed-methods approach has allowed a more holistic view of the relationships involved and of the impact of national culture in the oil and gas industry. Extending such an approach in future research can help improve supply chain operations and management practices while advancing knowledge of the field.

7.4.3 Practical Contributions

This study also makes a significant practical contribution. It proposes an integrated approach to evaluating potential suppliers and supplier relationships using a national culture context to determine long-term relationship potential in disruptive supply chain environments. Organizational supply chain practices—mainly planning and the selection and integration of suppliers—must consider the potential mediating effect of power distance and uncertainty avoidance on the correlation of supplier relations constructs and SCDO with supply chain disruptions. For instance, the study finds that power distance impacts the relationship between commitment, trust, conflict resolution, relational norms (elements in supply chain relations) and supply chain disruption. It also mediates the relationship between SCDO and supply chain disruption. Putting context to the commitment factor, X. Zhao et al. (2008) argue that supplier relations between organizations from high power distance and low power distance cultures are likely to suffer from a lack of commitment due to differing views on the role of power in their relationships. Given this context, supplier planning and selection in the oil and gas industry should include an evaluation of the cultural orientation of potential supply chain partners to achieve optimal results in supply chain relationships during disruptive events.

Similarly, trust is found to be more consequential in low uncertainty avoidance and high power distance cultures (e.g. India) than in high uncertainty avoidance and low power distance cultures (e.g. Italy, US, UK). This is supported by various past studies (e.g. Atuahene-Gima and Li (2002); Yeung et al. (2009); Qu and Yang (2015). When there is a

sufficient, transparent and open exchange of information (characteristic of low power distance cultures), rational strategies will prevail. This is unlike high power distance cultures that emphasize control and centralization of communications. The latter translates into low transparency, implying that each party must trust that the other's actions are well intended. Therefore, as argued above, the practicality of the finding is to include insights into cultural orientations during supplier evaluation and selection to provide optimal conditions for long-term supplier relationships and survival amid disruption.

Further, the effect of power distance on the relationship between SCDO and the impact of supply chain disruption is prominent in the study. The ability to learn from and maximize positive outcomes of disruption depends on other factors, such as organizational learning and information exchange, which can be perceived as communication. The overreaching argument is that cultures with high power distance are likely to survive disruption because of a centralized approach to communication and the greater relevance of concepts such as trust. It amplifies the criticality of managerial consideration of national culture, particularly during disruptive occurrences. In the oil and gas industry, the choice of supply chain partners should consider that the implied scenario is highly likely (consider COVID-19) and, therefore the need to strategically select those suppliers whose cultural contexts align. Strategically, it means selecting suppliers from countries with similar cultural dimensions.

7.5 Limitations

While the study makes some significant contributions to existing research, it has some methodological, practical and theoretical limitations.

7.5.1 Practical Limitations

The study's motivation includes the empirical and evidence gaps detailed in the literature section. Therefore, the discussion involves a range of past research not necessarily alluding to the mediating or moderating impact of national culture on the relationships hypothesized. Simply put, while the papers cited provide some solid arguments, they were conducted under different contexts and for different concepts than those considered in the present study within supply chain relationships (e.g. commitment, trust, communication) or SCDO. The study results in an entirely novel typology. It includes an unusually high number of variables and constructs used in the SEM to establish the mediating and moderating effects of national culture. This helps to account for the limited knowledge of the studied context.

Last, the study has some practical limitations, mainly in terms of the effort to select appropriate analytical tools. For instance, all the constructs lack normality when tested using Mardia's multivariate skewness. This automatically limits the choice of SEM estimation methods to partial least squares on Smart PLS software, excluding alternatives such as maximum likelihood, which is the default method in most SEM software (Beran & Violato, 2010). While this is a considerable factor in bootstrapping, P. N. Sharma and Kim (2013) argue that the PLS approach coincides with and produces greater accuracy with smaller samples, while maximum likelihood is more convenient for larger samples. This factor acts as a shield against the earlier sample size limitations noted.

7.5.2 Theoretical Limitations

A major constraint was the lack of sufficient theoretical background on Hofstede's dimensions of national culture (McSweeney, 2002) and their role in supply chain disruption. Therefore, using these dimensions in the present study limited the researcher in the sense that there were limited past research papers to ground the discussion. Consequently, the study used the sequential exploratory mixed-methods approach to source the relevant constructs and concepts in terms of the impact of national culture directly from participants. If there had been sufficient theoretical background, the researcher would have opted for a quantitative methodology, as the constructs could have been drawn from past research.

Additionally, in association with the condition that lack of a sufficient theoretical background forced the choice of a mixed-methods approach, the findings may be considered moderately biased. This is because of a natural human weakness—subjectiveness on the part of participants when giving opinions about issues relevant to their day-to-day experiences. In other words, because the qualitative insights help in building the hypotheses and subsequent constructs used in the quantitative phase, the study anticipated that findings could be significantly motivated by individual bias and subjective opinions. Nevertheless, the intensive tests for reliability and validity, among others, mitigate this limitation to a substantial level. A considerable number of constructs are eliminated through rigorous tests.

7.6 Recommendations for Future Research

Despite the limitations, the study produced some important insights into the role of national culture in supply chain disruption. These have considerable implications for organizational practice and future research.

The study employed a mixed-method approach in investigating the role of national culture in supply chain disruption with a focus on the oil and gas industry. Mainly, the study finds that in the correlation between supply chain relationship factors and SCDO with supply chain disruption, power distance and uncertainty avoidance have significant mediating impacts. However, specific factors and levels of mediation were established for the independent variables, as detailed in previous sections.

Based on the contributions, limitations and implications established, the study makes several recommendations for future research. First, the study recommends that future research aim to improve on the findings by applying the individual relationships hypothesized to larger data samples. The findings of such a study could help substantiate the conclusions while advancing the theoretical notions implied.

Second, in general, research in the field should make an effort to add to the depth of empirical evidence on the role of national culture in supply chain disruption. As established in the present study, national culture appears to have considerable mediating impacts on the implied relationships. Therefore, the oil and gas sector, among other sectors, could benefit significantly from an improved understanding of the impacts. In addition, the increasing rate of globalization and global trade should prompt such studies to better understand the dynamics of cross-border trade. Therefore, further research in the field is highly recommended.

3.5 Appendix 1

Interview Protocol

Welcome and introduction of the interviewer
Overview of the project and objectives
Explanation of consent, confidentiality, anonymity and the possibility of withdrawing (signing the consent form)

1.Introduction

1. Can you please tell me about yourself? (title, background, experience, past places of work)
2. Can you give me a brief introduction to your company? (HQ, composition of workforce)
3. What is your current position and how long have you been in that position?
4. In how many countries does your company operate and What are your main markets?
5. Do you have multiple employee nationalities in your organization?

Questions	**Sub-questions**
Supply chain	
6. Could you please briefly describe your firm's supply chain?	
7. Where are your suppliers and clients based?	• What is the range of relationships periods between those suppliers/client and your firm?
Preparing for disruptions	
8. What are the most common severe disruptions experienced in your company's supply chain?	• How often are these disruptions expected to happen?
9. What is your company's experience in handling crises/disruptions?	
10. Are risk and crisis management areas where you engage with your suppliers/clients?	• Are there specific procedures for this? - Do they derive from your organization, the supplier (client) or both?
11. Have you noticed any conflicts or differences in the way the organizations prepare when operating in different countries?	• Do you notice any differences due to the different cultures? • How do you resolve them?
Learning	
12. Can you elaborate on your firm's mechanisms to learn from previous disruptions?	

13. What in the current response procedures of your firm differs from previous disruptions?	• How are these different? • Did you refer to a previous plan or experience during the latest disruption? • Can you mention specific examples in which employees learned from the previous disruptions and implemented changes?
14. What aspects/factors do you think have affected how the firm learned from previous experience with disruption?	
Experience during disruption	
15. Could you please describe the most recent severe disruption that your firm experienced?	• When was it discovered and what happened?
16. What did your firm do to stop/mitigate/reduce the impact of the disruption on the supply chain?	• What aspects you think affected the decision-making processes during these phases?
17. Did you find that any cultural aspects of your firm and your firm's suppliers affect your decisions and actions during that disruption?	
Impact of disruption on suppliers	
18. Could you select and describe to me two of the firm's critical suppliers (one local and the other overseas) with which your firm's relationships lasted at least two years?	*(While answering the rest of the interview questions, please keep in mind the selected supplier and clients.)
19. Could you compare the most noticeable cultural differences between them?	• How do these differences affect their relations/supplier relationship management with your firm? (e.g. cultural differences such as communication, commitment, trust, information sharing)
20. What was the role of these suppliers/clients in this particular disruption?	
21. What do you think was the effect of your firm's relationships with overseas and local suppliers/clients in managing the disruption?	• What factors of these relationships led to (less or more) effective work during this disruption? • What suppliers/clients were easier to collaborate with to mitigate the impact of disruptions, local or overseas ones?

22. Could you compare your company's experience with local suppliers/clients and your company's experience with overseas suppliers/clients during the most recent disruption by providing examples?	• What is the role of culture in these experiences?
23. How do you think your firm's and your firm's suppliers' cultural factors affected these relationships during the disruption?	Specifically in terms of the firm's commitment, information sharing, conflict resolution, trust and relational norms
24. Could you compare the firm's latest disruption to the previous one and describe how your firm worked with its suppliers?	

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