

**INTEGRATING TRANSFORMATIONAL LEADERSHIP APPROACH AND
LEVERAGING DIGITAL TECHNOLOGIES TO MITIGATE THE SUPPLY CHAIN
DISRUPTION**

by

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School of Business, Technology, and Health Care Administration

A Capstone Project Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Business Administration

In General Management

Capella University

12/2026

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Instructions

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Problem

Purpose

Method

Population

Results

Implications/Uses

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Acknowledgments

The acknowledgments differ from the dedication in one significant way: The acknowledgments recognize individuals who have supported the writer's scholarly efforts as they relate to the doctoral manuscript or who have held a role in the writer's academic career as it relates to the research of the manuscript. This might mean special faculty or other support people from Capella or other organizations. If you received financial support from fellowships, grants, or other organizational support, it could be noted in this section.

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PART 2: CAPSTONE PROJECT

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Signature Assignment 1: Topic (Specialization Course 4)

Signature Assignment 2: Literature Review (Specialization Course 5)

Signature, Assignment 3: Proposal (Advanced Doctoral Course 1)

Signature Assignment 4: IRB Approval Data Collection (Advanced Doctoral Course 2)

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1.0 TOPIC

1.1 Introduction

Markets in the contemporary world are typified by globalization and increased competition. These market trends have seen the emergence of lean supply chain management practices in the supply chain industry, which aims at instituting cost-effective supply chain management via just-in-time delivery, continuous flow of processing and proper scheduling (Katsaliaki et al., 2021). However, the efforts contribute to the complexity of the supply chain system functioning, which aggravates serious the disruptions. The supply chain sector in America is currently experiencing numerous and interconnected disruptions, with pandemic outbreaks and geopolitical tensions, staffing shortages and natural disasters likely to keep impacting it (Deep et al., 2025). One of the key problems that have led to the challenges is that not all supply chains managers in the United States (U.S.) use transformational leadership as a means of managing risks. In addition, insufficient use of digital technologies also does not allow building resilient and adaptive supply chains.

Although the vulnerability awareness is increasing, numerous organizations continue to rely on the old systems and responsive strategies, resulting in unexpected disruption (Dura et al., 2025). In the absence of organized risk assessment systems, firms cannot predict the bottlenecks, diversify suppliers, or find alternative transportation as a result of which delays, stockouts and higher operational expenses are observed. Resilience is also missing to influence the motivation and productivity of workforce (Alicke and Foster, 2024). The stress on the supply chain systems when they are not prepared is transmitted to employees as they tend to be over-stressed, lack clear priorities and workflows are hard to manage especially in times of crisis.

Lack of digital tools like real-time tracking, predictive analytics and automated supply chain platforms adds to further inefficiencies (Dura et al., 2025). Not only do the technologies come in handy to improve visibility and decision-making processes, but they also help establish a more proactive and collaborative work environment (Yeboah et al., 2025). Consequently, employee morale and engagement tend to decline in an unfavorable manner in organizations lacking the capabilities, subsequently impacting performance adversely. It is essential to address the shortcomings by incorporating transformational leadership, as well as use digital tools that will help keep operational efficiency at an acceptable level and prepare the U.S. supply chain industry to face the uncertainty in the future.

Making more people aware of how to handle risk management and technology during the disruption will assist supply chain managers to handle the operational and financial effects (Katsaliaki et al., 2021). Katsaliaki et al. (2021) report that half of the organizations experience supply chain disruptions on an annual basis. Moreover, 60% of small businesses are compelled to shut down after experiencing a disruption in the supply chain. Both climatic conditions, political changes, disasters as well as human factors are some of the factors that lead to the disruption of supply chain. Thailand flood 2011 is one of the examples of natural disasters that caused disruption in supply chain of companies such as General Motors, Apple, and Toshiba (Katsaliaki et al., 2021). During 2019, COVID-19 impacted the world supply chain in a devastating manner. Outages in supply chains put businesses, lives at risk, and impact the economy (Katsaliaki et al., 2021). Supply chain managers, therefore, ought to develop resilience, which is a crucial concern in the overall field of management.

1.2 Problem of Practice

The overall business issue is that supply chain industry companies are more susceptible to supply chain disruptions, which leads to an amplified effect of supply chain disruptions on operations and finances (Katsaliaki et al., 2021). As per Gerschberger et al. (2023), disruptions undermine the abilities of the employee and can result in them losing motivation, creativity, and absences, which, in general, impact the performance efficiency of an organization. Senna et al. (2020) also state that human factors risk to health and safety is caused by the disruptions. The dangers include an absence of a drive, absenteeism, and loss of creativity (Gerschberger et al., 2023).

The particular issue is that not all supply chain managers within the U.S. have effective supply chain risk management principles and digital technologies to establish resilience, which leads to lower operational efficiency and motivation to work personnel in disruptions (Deep et al., 2025). The supply chain managers are not ignorant of the supply chain disruptions, yet between 60% admit that they have not established adequate remedies to address the supply chain disruptions (Katsaliaki et al., 2021, p.967). Many organizations continue to use the conventional business management methodologies, which cause failure of management efforts and people management. Alicke and Foster (2024) point out that organizations do not have the leadership competencies and technology-supported risk management strategy to cope with supply chain resilience, which aggravates the disruptions. Supply chain managers found that companies are not sufficiently equipped to deal with significant disruptions, as they lack risk alleviation measures and investments in digital solutions, such as predictive analytics (Zhang et al., 2023). Furthermore, the lack of systems frequently leads to disruption of communications, ineffective

working processes and increased stress among workers of the supply chain, which reduces productivity and motivation even more.

1.3 Gap in Practice

The practice gap is that U.S. supply chain managers are not provided with evidence-based methods of integrating transformational leadership and using digital technologies to increase the resilience of operations and workforce in case of supply chain disruptions (Yeboah et al., 2025). According to Donadoni et al. (2019), the supply chain management market has not come together on how to leverage the disruptive digital technologies to address the disruptions. An example is the report by McKinsey & Company that showed that dealing with the disruptions in the supply chain decreased to 34 percent as compared to 59 percent (Alicke & Foster, 2024). The absence of evidence-based approaches to risk management are the major reasons why the percentage of dealing with the disruptions decreased. Olowo (2023) reported that institutional structures that had conventional leadership paradigms reacted more slowly to a risk, impacting the effectiveness of their operations, which aggravated the disruptions. When organizations will not be able to fit the leadership models with the technology adoption towards better integrated decision-making in supply chains, then it will be difficult to develop agile and proactive systems that are able to disruptions in the supply chains in crisis situations.

1.4 Purpose of the Project and Project Questions

Purpose: This qualitative inquiry project aims to investigate the views of U.S. supply chain managers regarding how transformational leadership and digital technologies can be used to formulate principles that can create resilience in operations and workforce during supply chain disruptions.

PQ1: How do the U.S. supply chain managers view incorporating the transformational leadership concepts in enhancing the resilience of the workforce in case of a supply chain failure?

PQ2: How do U.S. supply chain managers feel about using digital technologies to support supply chain resilience in the wake of supply chain disruptions?

1.5 Preliminary Terms and Definitions

Resilience. The resilience that enables supply networks to efficiently cope with disruptions (Gerschberger et al., 2023).

Disruptions. An interruption in processes and entities facilitating the production, sales, or distribution of goods and services (Gerschberger et al., 2023).

Risk Management. Reducing the probability of occurrence or impact of a negative event (Katsaliaki et al., 2021).

Sustainability. The strength to survive difficult circumstances in the market environment (Katsaliaki et al., 2021).

1.6 Project Justification

To alleviate supply chain-related shocks, supply chain managers must develop knowledge of the best practices. The scale of negative impacts on the supply chain makes it possible to consider risk management aspects that are essential in managing the supply chain (Gurtu and Johny, 2021). The management strategies ought to be oriented at minimizing operational and financial hazards in case of disruptions in supply chains. It is important to fill the gap by applying transformational leadership and implementing digital technology such as artificial intelligence to achieve strong risk management to ensure the sustainability of the supply chain industry in the U.S. and its operations. Supply chain managers should, therefore, acquire a

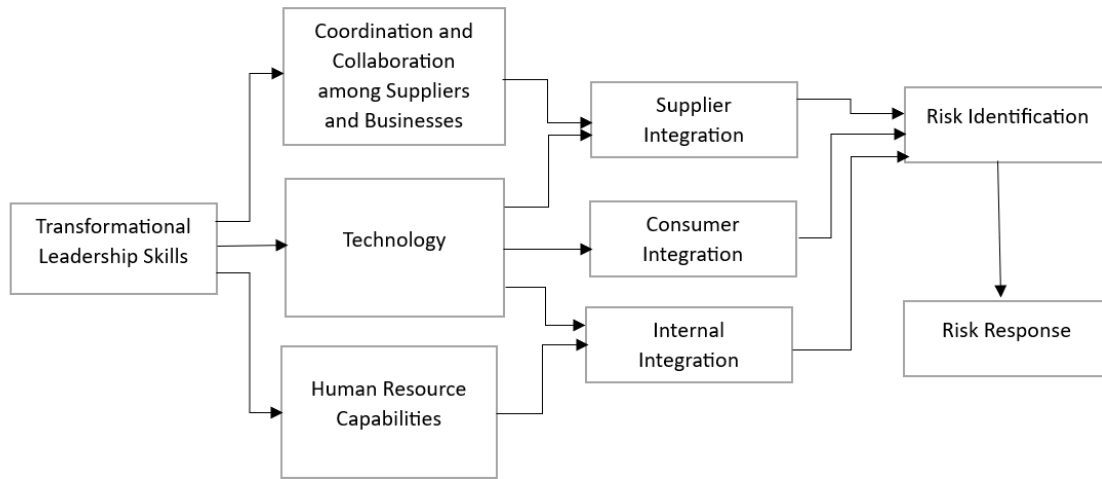
wealth of knowledge regarding addressing the risks, and enhancing resilience of supply chain systems. Essentially, the research must provide the answer to the project question; what strategies should supply chain managers use to enhance the resilience of supply chain systems in the event that there are more supply chain disruptions.

The expertise gained during the project will be used to shape the policies to enable competent supply chain risk management in such incidents. Paul et al. (2023) suggested that responding to the questions on how to create supply chain resilience will assist supply chains to surpass the employee, financial and operational effects of disruptions on their wellbeing, finances, and operations. The education will be critical to a minimum of 80 percent of the people who end up failing because of failure to respond to them through recovery strategies. Senna et al. (2020) also suggested the importance of supply chain managers in finding ways to alleviate the outcomes of negative human factors caused by disruptions to supply chains. The human factors cause demoralization and absenteeism which is unfavorable to operation resilience.

1.7 Preliminary Project Framework

Figure 1

Visual Representation of Project Framework (Munir et al. 2020).



The implemented project framework is based on Munir et al. (2020), where the main integration is between suppliers and consumers and among the internal ones. Munir et al. (2020) proposed internal integration to be the most appropriate option of managing risk when disruption in the supply chain takes place. The major concept introduced in the supply chain integration is information processing capability, which enhances the capability of an organization to obtain and process information provided by suppliers and consumers. The integration of consumers with suppliers has a combined effect of optimal organizational performance when faced with disruptions. In the fast and changing supply chain landscape of today, integrating the changes in the internal environment within organization would not provide resilience. Organizations will have to go through transformational leadership, which encompasses visioning, team empowerment as well as innovation and a set of AI-based digital technologies that can be part of decision-making and predictive analytics. According to Dura et al. (2025), technology has a role to play in the process of supply chain resilience mediation. The use of technologies like the AI-based decision-making tools enhances the management and design of the supply chains by sharing the up-to-date information and simulating various scenarios. Therefore, the technology

aspect is a direct reply to the problem of preventing the disruptions of the supply chain in advance (Guo et al., 2024). Such technologies that are integrated into three domains of the framework contribute to improved decision-making and transparency throughout the supply chain, which also boosts the performance of the organization.

The framework also entails leadership skill particularly through transformational leadership style. This is because the dynamic capability theory, a theory where transformational leadership fits well, refers to the competence of an organization to assimilate, develop, and restructure both internal and external capabilities, is essential in reacting to the fast-changing conditions (Ayaz, 2022). Transformation leadership can serve as an agent of dynamic capabilities, which includes the culture of agility (Taseer and Ahmed, 2022). Transformational leaders generate innovation, empower followers and bring about cultural change by developing cultures of adaptability and resilience, which is significant in developing a motivated workforce capable of surviving through the unpredictability (Karimi et al., 2023).

The framework reinforced the idea that the human resource capability, including training of the workforce, collaboration, as well as adaptive capabilities is a key determinant in maintaining motivation in case of an operation disruption. The supply chain integration enables effective flow of information, which will lead to supply chain resilience. Besides, technological capabilities, as well as human resource capabilities, are also helpful in resilience building (Saeed et al., 2022). The framework relates the transformational leadership to the technological integration to counter the supply chain resilience, operational and social features.

1.8 Preliminary Project Plan

A qualitative research method will be used in the study. A qualitative approach is applicable to studies aiming to identify the participants unique perspectives, since the study will

aim at identifying the unique perspectives of supply chain managers on the best strategies to enhance supply chain resilience (Reynolds, 2024). The project best suits qualitative inquiry because of the comprehension of contextualized knowledge of resilience that relates to the interplay of human, organizational, and technological aspects. As opposed to quantitative methods, which focus on measurement and their generalizability, qualitative approaches assist in putting the emphasis on the aspects of what drives decisions and leadership behaviors and practices in times of crisis (Enas et al., 2021). Lack of supply chain transformational leadership and digital tools explains their disruptions; the qualitative approach is suitable in order to gather the information with the practitioners (Reynolds, 2024). Qualitative investigations reveal patterns, themes, and strategies that cannot be measured but are of utmost importance in building resilience and high performance in a supply chain setting.

The research will attempt to elicit the views of the U. S. supply chain management on the risk management principles to curb the disruptions of the supply chain. In that regard, the sample of the study participants will consist of 10-12 supply chain managers in the U.S., who have experience in risk management principles. The project will employ purposive sampling to help it come up with a sample of ten high-value supply chain managers with whom to obtain the data in developing a study sample. Subedi (2021) argues that purposive sampling is helpful in gaining a deeper insight into the phenomenon.

Durmic (2020) argues that interview questions in data collection help in conducting qualitative narrative inquiry. Participants will be eligible as long as they have 20 years of experience and are up-to-date on risk management. Semi-structured (open-ended) interview questions will be used as a source of data. The semi-structured (open-ended) interviews done with the Zoom conferencing system will take 45-60 minutes. These qualitative interview

questions will be pre-structured and will be made consistent with the project question to close the practice-business problem gap. The strength of the single online channel is that not all the study participants will be available on the online channels (Khan and MacEachen, 2022). The backup plan will be to open the interview to various online platforms such as WhatsApp, Skype, and email. Thus, the study participants will be able to make numerous options out of which to select their most convenient channel.

Data analysis will be done using thematic analysis. The thematic analysis will involve a systematic form of organising the data and extracting the corresponding themes (Dawadi, 2021) and will be developed according to six-step process by Braun and Clarke. The analysis in this form of six steps enables inference of themes and their applicability to the research. Thus, thematic analysis is appropriate to the research as it results in the creation of new understandings. The initial one is transcription and getting acquainted with the data. The derivation of the initial themes is also involved in the first step. The second one is the identification of keywords, which aids in determining the recurring terms, patterns, and visual components (Naeem et al., 2023). In the third step, a researcher coded the patterns to come up with manageable units of the raw data. The fourth step results in the creation of themes as a result of the units. The fifth step is conceptualization that entails the interpretation of the themes that are formulated by the researcher in the fourth step. The last phase is to formulate a conceptual model that describes how the various themes interact to make a contribution to the study.

The IRB approval, data collection, data analysis, report presentation, edits, and presentation are all part of the project timeline.

1.9 Summary

The project's key focus is on general management for managing the supply chain disruptions in the industry. Katsaliaki et al. (2021) found that the supply chain disruption rates are at 56 percent. The identified practice problem and gap in practice were that supply chain managers do not have evidence-based approaches that could help them incorporate transformational leadership and use digital technologies to boost operational and workforce resilience in the face of supply chain disruptions. Although more and more disruptions occur at a greater rate and magnitude, most managers do not have systematic guidelines to draw on when making decisions, coordinating their workforce, or adopting technologies (Donadoni et al., 2019; Katsaliaki et al., 2021). The project, therefore, aims to create insights that will assist organizations to become more resilient, minimize losses in operations, and promote the proactive application of AI-based technologies and transformational leadership practices. This project will use a qualitative research design, as this research design would be most appropriate to investigate the views and experiences of supply chain managers.

The conceptual framework of the study involves considering the interplay between the supply chain manager and the human resource team and the technological and structural capacities of an organization (Munir et al., 2020; Saeed et al., 2022). Moreover, the theoretical attributes of a dynamic capability theory can also offer insight into the capability of leaders to sense, react, and recuperate disruptive experiences by means of robust leadership, digitalization, and employee interactions. The second section in the study is the literature review section. The segment will entail literature article selection and inclusion criteria, applied frameworks, review of past and current practitioners sources and review of current and past scholarly sources.

2.0 LITERATURE REVIEW

2.1 Introduction

The proposed qualitative inquiry study will examine how supply chain managers in the U.S. view the idea of integrating transformational leadership and using digital technologies to alleviate the impact of supply chain disruptions. The contemporary supply chains are becoming more susceptible to disruptions, which in most cases may lead to tremendous operational and financial burdens. One of the underlying challenges that makes supply chains vulnerable is the absence of good principles of risk management and the unproductive use of digital technologies among some supply chain managers (Deep et al., 2025). The gap in the study will be bridged by analyzing practitioner experiences, as well as academic knowledge, to pinpoint and incorporate strategies that will help to increase workforce and operational resilience. According to the research by Atieh and Abushaega (2025), the theory of dynamic capabilities was used to introduce a supply chain resilience framework, wherein two pillars emerged, namely, the leadership capability and technological capability. The paper demonstrates that leadership that encourages and instigates change (i.e., transformational leadership) assists organizations in adapting and bouncing back quickly after upheavals. The authors also give both theoretical and empirical evidence on the dynamics between leadership and digital capabilities in bringing about resilience amid supply chain disruptions. The section describes the practices of locating pertinent sources, reviews the theoretical frameworks employed in the sources, and summarizes the literature review that brings together the viewpoints of both academics and practitioners. A literature review is the backbone of a research project, as Snyder (2019) underlines, which allows developing a theory and analyzing the problem being studied in a multidimensional manner. The inclusion of various perspectives in the review makes it a sure way of having a holistic

understanding of the principles and practices that can be used to develop effective risk mitigation strategies. Within the framework of the research, the literature review will be essential in revealing the existing models and practices concerning transformational leadership and digital technologies that will eventually guide the research recommendations on how to transform the supply chain in order to be more resilient during disruption.

Alvarenga et al. (2021) note that supply chain risk management is also essential to warn organizations about the inefficiency of operations and the financial losses thereof. Alvarenga et al. (2021) indicate that organizations and supply chain managers require incorporating the principles of visibility, collaboration, and analytics in their supply chain management efforts. Andersson and Pardillo (2020) argue that the market environment is extremely sporadic and that the industry needs more research on the principles that would enhance the mastery of supply-chain risk management principles among practitioners and leaders. Reynolds' (2024) research shared the significance of leadership in realizing sustainable and resilient supply chain practices. This paper shows the transformational leadership style of digital innovation adoption, especially in unpredictable settings, through the creation of a culture of trust, learning, and active risk management. Another opinion that is supported by the study is that transformational leadership allows digital transformation of supply chains, and it is crucial in mitigating disruptions. Culot et al. (2024) systematic review showed that IoT, AI, blockchain, and predictive analytics integration significantly contributed to improving the supply chain visibility, flexibility, and responsiveness during the COVID-19 pandemic. The paper contends that digital technology-embracing leadership is a key facilitator of supply chain resilience. The paper also reveals that in combination with supportive leadership, digital technologies can contribute to operational resilience during some crucial disruptions. Literature review will be used as a critical point of

departure for formulating a theoretical perspective of how transformational leadership and digital technologies can be used to improve supply chain risk management. The literature will assist in identifying the major principles and strategies that could make supply chain managers resilient to disruptions in terms of operations and the workforce. Through a combination of theoretical and practical insights, the review will provide the needed background to inform data collection among professionals in the logistics and supply chain business. The main themes will be the role of transformational leadership in cultivating flexibility and engagement among staff, applying digital technologies like AI, IoT, and predictive analytics to enhance visibility and responsiveness, and adopting the dynamic capabilities theory as a concept of resiliency. Although the Six Sigma framework has traditionally been involved in process improvement, this review will evaluate the applicability alongside more modern, technologically era-oriented techniques of risk reduction under the influence of a complex and continuously developing supply chain setting. The major components of the Six Sigma framework are presented in the form of the acronym DMAIC, which encompasses a definition of risks, measurements, analysis, improvement, and control (Andersson and Pardillo, 2020). The risk classification framework generally classifies the risks into internal and external risks (Baryannis et al., 2019). The risks further breakdown to supply side and demand-side risks. These classification methods also reflect an idealistic principle of comprehending risk. The risk analysis framework indicates strategies to apply in measuring and controlling the risk, such as the statistical analysis technique (Biers et al., 2020). Another framework is the automation and mechanization framework that gives information on automation and mechanization implementation to reduce risks in the supply chain (Diakantonis, 2022). The practitioner frameworks cover the ICT supply chain risks, a robust supply chain network, and the supply chain risk management frameworks. The risks

framework of the ICT supply chain identifies the risks posed by information communication systems and the approaches to address the risks. The strong chain of supply network model suggests the use of research and development to construct a wide range of measures, including identifying alternative suppliers, building infrastructure, and performing an agency-wide vulnerability evaluation (Abramowicz and Karim, 2021).

2.2 Method for Discovering Literature

Breslin and Gatrell (2023) assert that a literature review is an important part of establishing the foundations to justify the next study and come up with new theoretical concepts. The research process in this instance is iterative, as previous research can be integrated to form new meanings through development, expansion, and refinement of emergent themes. Thus, a literature discovery process was included in this research. The discovery of literature happened with the help of internet searchers with the available practitioner and scholarly repositories. The type of resources that were included in the literature review were trade journals, conference papers, peer-reviewed journals, and reputable publication sources like Forbes and The New York Times. The existing practitioner and scholarly resources must be published no earlier than 2019 and 2024. The scholarly repositories included are ABI/INFORM, Google Scholar, ProQuest, and ResearchGate. Sources for the review were selected to make sure that they are objective in their analysis. The review also established the applicability of the sources to supply chain risk management as compared to general business risk management.

Targeted search terms based on the main themes of the study, such as transformational leadership in supply chain management, digital technologies to maintain operational resilience, and minimizing risks amid supply chain disruptions, led to the literature discovery process. To be credible, academic sources were chosen according to their publication in peer-reviewed

academic journals, whereas practitioner views were obtained through reputable business and industry magazines like Forbes and Harvard Business Review. The validity of the practitioner sources was also proven using background checks of authors, indicating that they are qualified experts in the field of supply chain or operations management through institutional affiliations, professional experience, and past publications. In line with the suggestions of Chandler et al. (2019), the search strategy was closely related to the research concepts to capture relevance and depth. The search terms consisted of the following phrases: supply chain disruption risk management, leadership during supply chain crisis, digital transformation in logistics, and creating resilience using technology. The methodology offered a solid ground for the determination of conceptual frameworks as well as practical applications pertaining to the qualitative inquiry.

The inclusion and exclusion criteria outlined in Snyder (2019) revolve around obtaining resources contributing to answering the research question. The inclusion and exclusion criteria for this study were based on the sources' relevance to the supply chain risks and risk management and being published within the last five years. The sources used belonged to respected peer-reviewed and business journals. Journals and peer-reviewed sources are used in accordance with the high-quality screening of the methodologies applied to create the knowledge, resulting in the creation of highly trustworthy information (Steer & Ernst, 2021). One inclusion criterion was to identify only the practitioner sources in reputable periodicals and trade journals. On the other hand, sources from blogs and Wikipedia were excluded. The reason why such sources were left out is that they depict the views of the masses of people, who lack the expertise to bring forth the views in question. According to Mammadova (2020), the sources of

research, such as Wikipedia and personal websites and blogs are not reliable because they are the sources of unverified information.

Table 1

Section 2: Literature Review Sources

Description	Scholarly	Practitioner	Totals
Within the past 5 years	55	12	67
More than 5 years old	19	7	26
Totals	74	19	93
Sources unique to section 2	50	10	60

Note: List of Scholarly and Practitioner Resources

2.3 Applied Frameworks

Partelow (2023) says that frameworks are indispensable research instruments that aid in organizing the investigation process in various fields. The framework's development incorporates the works of scholars aimed at generalizing the interests, values, and knowledge and finding their relationships to understand a particular phenomenon. Frameworks may be used to give quantifiable indicators that are part of a problem, whereas others have general concepts. The major applications of frameworks are as follows: hypothesis, theory generation, and empirical generation. In a nutshell, frameworks come in handy in guiding the research process. The usage of the corresponding theoretical cases in the research conducted with the intention of formulating principles to mitigate supply chain disruptions will prove beneficial in revealing the connection

between the following key themes in the research: leadership, adoption of technology, and resilience. The transformational leadership theory and dynamic capabilities theory will be useful in determining how leadership behavior and organizational adaptability will lead to workforce and operational resilience. The theories will be used to interpret the qualitative data and identify how the visionary leadership and make-or-buy-or-buy decisions may lead to the successful use of digital tools, including AI, IoT, and predictive analytics, to manage disruption successfully. Although Lean Six Sigma, classification, and risk analysis are the traditional models that have played a role in process efficiency and risk evaluation, this study aligns them with the more modern and dynamic models to shape a comprehensive knowledge of supply chain risk management in the digital age.

2.3.1 Applied Frameworks Used in Scholarly Research

Goldsmith (2021) argues that frameworks are the best instruments in building a structured outline of the common themes in the study. The framework comes in handy with the identification, development, and interpretation of how the themes interact. The mathematical frameworks used in this work and this literature expose how the main factors intertwine in the case of supply chain disruptions and principles of supply chain risk management.

Lean Six Sigma Framework Lean Six Sigma framework places an emphasis on the value of projects, processes, and improvements. The lean techniques comprise rules that regulate both the processes and operations (Andersson and Pardillo, 2020). In 1777, Six Sigma was invented as a process improvement guide. It was created as a guideline on how to make improvements in the production process in Motorola. When Six Sigma was introduced, it focused on process analysis based on data (Antony et al., 2017). Other larger organizations would also gain popularity in the use of Six Sigma in the previous years, and learning institutions

would adopt it. The framework was first introduced as a measure, analysis, improvement, and control (MAIC) by Bill Smith at Motorola. However, Welch would face some difficulties due to ambiguity in issues that need to be addressed, and this introduced a design aspect as the primary element, leading to design, measure, analysis, improvement, and control (DMAIC). The framework would then gain a lot of acceptance among scholars and practitioners as a process improvement process. Since the 1990s, Six Sigma has found its application mostly as a quality improvement principle in service, process, and product offerings (Yang et al., 2022). Various industries such as Motorola, General Electric and Allied Signal have used the framework. The other important evolutions in the Six Sigma are the evolutions of the components of the six sigma such as the design of six sigma which includes an iteration step. It answers a question as to whether the improvements are good enough and then goes on to control and close the design process. Dr. Mikel Harry was instrumental in the evolution of Six Sigma and there was a great shift of MAIC to DMAIC with the introduction of the defining step in the process improvement. Cooperation in supply chain management, continuous improvement, efficient use of resources, and elimination of waste are some of the ideas that were included. Here, Six Sigma is a regulating approach of supply chain procedures management. In the framework of the study dedicated to the development of principles aimed at improving supply chain resilience, the Six Sigma concept can be regarded as the background model of the process improvement that helps to supplement more general strategies, including transformational leadership and digital innovation. The structured approach to Six Sigma, DMAIC, provides viable processes that supply chain managers can adopt to conduct the risks in the supply chain methodologically, evaluating, and managing them effectively. The phases allow organizations to minimize variability, enhance efficiency in the process, and put control mechanisms in place in case of

disruptions. Although the paper will mainly be based on the concept of integrating transformational leadership and digital technologies, Six Sigma will be analysed as an auxiliary tool in operations. The study will examine how certain tools and techniques in each step of the DMAIC can be utilized efficiently, especially in conjunction with the use of leadership-based decisions and digital skills, to develop an all-encompassing risk management plan.

Risk Classification Framework: The initial documentation of the risk classification framework is in Christopher and Peck (2004), where there is an attempt to broaden the category of risk of supply chain disruption. The categorization was fuelled by the fact that there was uncertainty in the demand and supply risks. The types of risk were classified into the following categories: supply risks, demand risks, process risks, control risks, and environmental risks. The framework was extended by Singhal et al. (2011) to encompass risk categories based on operational characteristics, market characteristics, product characteristics and miscellaneous. The miscellaneous category comes off as the environmental factors in the later versions by Shahbaz et al. (2019). Shahbaz et al. (2019) elaborate the risk classification model to feature a cascading classification of the risks. The cascade has internal and external risks as the broad categories. The internal risks are further sub-classified into supply, process and demand risks that are internal to the organization and logistic, collaboration as well as financial risks that are internal to the organization with external effects to a certain degree. Lastly, the environmental risks are mainly external.

Baryannis et al. (2019) apply the risk classification framework to research the dynamics in the principles of supply-chain risk management. The framework is based on the various methods of categorizing risk in risk management of supply chain management. The framework is propelled by the desire of the supply chain managers to know the nature of the risk, and

therefore come up with risk mitigation strategies. The categories of supply chain risk involve external, internal, but not organization-specific, and internal organizational. Additionally, the risks may be classified as either supply or demand-side supply chain risks. These categories coincide with the ones introduced by Shahbaz et al. (2019), such as internal, internal, but with external impact and external risks. All in all, Baryannis et al. (2019) recognize that risk poses both tactical, operational, and strategic problems, indicating the necessity to address those inefficiencies. Applying artificial intelligence is one of the suggestions that can be used to correct the various kinds of risks. Another classification framework of risks was created by Hudnurkar et al. (2017), and it evolves on the requirement that risk managers have knowledge of what kind of risks the risk is, the conditions and factors that motivate these risks. Different researchers have also provided insights on the classification of risks taking different methods, usually, classifying risks in terms of internal supply chain variables or external environmental variables. Standardized risk classification system increases the consistency and rigor of risk management strategies as it allows the structured understanding of the possible vulnerabilities (Hudnurkar et al., 2017). As per the framework developed by Hudnurkar et al. (2017), risks fall under such categories as human resources, product characteristics, supply chain processes, infrastructure, and external environmental factors. Risk classification, as part of the context of the study, is a supporting component under the larger principle of risk measurement, which is critical to effective disruption mitigation. By explicitly defining and classifying risks, supply chain managers will be able to better focus leadership strategies and technological interventions to handle the risks. The research is in line with its purpose, which is to combine transformational leadership with digital tools to not only evaluate risk but react swiftly and anticipatively to it to ensure a greater resiliency.

Automation and Mechanization Framework: The highest stage of the automation of supply chain management systems can be seen in Huhns et al. (2002) which summarizes the advances of an international joint conference on automation. At this point, scholars and practitioners deliberated on the feasibility of automation in supply chain management and found it feasible to utilize software to automate the supply chain process. Another significant development of the concept of utilizing supply chain management was done by Devarajan (2018) in evaluating possible use cases. The most common use cases that are pertinent to supply chain management are the operations and procurement. In automobile logistics, automation may be utilized to give meaningful insights to handle inventory and carrier movement. The latest development of the concept has been artificial intelligence and machine learning (Aljabhan, 2023). These features are expected to make automated systems more scalable, efficient and faster in processing information related to the supply chain, such as disruption risks and mitigation strategies.

As a solution to reduce the risks in the supply chain, Diakantonis (2022) suggests employing automation and mechanization. The framework is based on the experiences of the practitioners in the logistics industry. Moreover, the development of automation and mechanization of supply chain risk management has been influenced by the development of technology (Aljabhan, 2023). Another major development that occurred is the advent of artificial intelligence that resulted in the data mining approach of supply chain risk management. According to Helo and Hao (2022), the data mining abilities of AI will incorporate gathering and scaling data of functions and dealings sensor feeds and deriving the required knowledge in areas of major choices, which also comprise supply chain disruption risk management. Although the opportunities of growing risk management practices through AI are good, Helo, and Hao (2022)

also state that companies are bound to experience financial difficulties when obtaining and developing AI resources.

Aljabhan (2023) has become one of the most prominent researchers who have studied the concept of applying automation to the management of risks in the supply chain. The effect of automation on supply chain risk management has also been examined by Andiyappillai (2021). The results suggest that automation in supply chain management enhances the supply chain risk management results. One of the sources of supply chain risks and disruptions is labor shortages. Automation and mechanization help to curb the cases of labor shortages, warning businesses of operational inefficiencies (Diakantonis, 2022). Self-driving trucks are one of the automation mechanisms that have been recommended. In the context of the study, automation and mechanization are vital variables that can be utilized as a supply chain management principle, more so through the utilization of the emerging technology in artificial intelligence. Ganesh and Kalpana (2022) emphasize that with the adoption of AI, big data analytics will be able to obtain knowledge about risk of disruption of the supply chains. The weaknesses in supply chain disruption risk management have been limited sources of data and the intricacy of data analytics to be used by human operators. The introduction of AI into supply chain management offers the possibility of improved data acquisition and processing. The study will delve into determining how supply chain managers can enhance their supply chain risk management strategies by leveraging technological capabilities. Kara et al. (2020) identify some recommendations for developing technological capabilities, which include developing a data mining module. Risk assessment, prioritization, and risk management actions are then incorporated into the data mining module. This framework will identify the key processes that will be necessary to incorporate the supply chain risk management concepts and the emerging technological

potentials with the concept of transformational leadership. In the frame of the project, the automation and artificial intelligence (AI) integration will be one of the major tools in improving the efficiency and responsiveness of supply chain disruption management. In particular, the framework will facilitate the formulation of concrete principles that can guide supply chain managers to embrace and use AI-based automation tools to enhance operational continuity and agility in the event of disruptions. One of the essential areas of the investigation will be the management of people and technology with the aim of detailing how a culture of innovation, adaptability, and trust can be generated through transformational leadership throughout the process of implementing AI and automation solutions. Such a two-fold focus on technological and human aspects indicates the aim of the study to construct holistic, strong-tie strategies to cope with the challenges in the supply chain.

2.3.2 Applied Frameworks Used in Practitioner Research

The practitioner sources applied frameworks are ICT supply chain risk management, robust supply chain, and supply chain risk management frameworks. These frameworks provide practitioner experience guidelines on how to address the common supply chain risks. There are those that involve extrapolating ideas in the ICT context to the business context.

ICT Supply Chain Risks: Government agencies are dominated by the practitioners' bodies, with the most dominant seeking to shape the concept of ICT supply chain risks. To explore the role that ICT can play in developing supply chain disruption risk vulnerabilities, the National Institute of Standards and Technology (NIST) organized a forum of managers. Interestingly, the possible introduction of AI into supply chain disruption risk management results in considerable ICT capacities. Thus, ICT presents itself as a resolution, as well as creates new emergent challenges. To assist businesses in improving their ICT supply chain risks, the

National Coordinator for Critical Infrastructure Security and Resilience 2023 developed a resource book. The principles of ICT supply chain risk management will be applicable in the project with the possibility of integrating automation in the supply chain disruption risk management. Here, automation itself is a risk, and supply chain managers will be called upon to formulate principles that can help navigate these ICT risks.

The supply chain risk management framework is provided against the backdrop of the management of federal government supply chains. This framework was created by the Federal Accountability Office because it is based on ICT supply chain systems and because it is characterized by common threats that are associated with ICT in supply chains. This framework was therefore a product of the work done by the Government Accountability Office in an effort to ensure that the systems in government were secure. According to Kieras et al. (2021), supply chain security is an aspect that has evolved with the emergence of modern information and communication systems and their incorporation into the supply chain. The optimal guidelines for supply chain risk management are formulated by incorporating measures offered by the National Institute of Standards and Technology (NIST). According to the Federal Accountability Office, the federal ICT systems may be compromised in terms of their integrity, which influences their availability. Thus, the federal government should establish a supply chain management practice for ICT systems to enhance the availability of systems (Federal Accountability Office, 2020). These guidelines offer a guideline that other organizations can follow to improve their risk management principles. These values involve the establishment of an executive oversight group that supervises the activities of ICT supply chains, carrying out agency-wide evaluation, creating ICT requirements for suppliers, and creating infrastructure to identify compromised ICT systems. Critical aspects of the framework involved in the research context, such as the creation

and structuring of an oversight team, as well as supplier requirements development, are the optimal supply chain risk management principles. The supply chain risk management oversight team can utilize research and development guidelines developed from this study to acquire key information to aid the supply chain management process.

The Robust Supply Network Framework: The concept of the robust supply network has the main pioneers Chopra and Sodhi (2014), who have elaborated on the concept in the field of practitioners. The key concept in the creation of a strong supply chain network is the regionalization of the network. Regionalizing the network implies that the fact that some of the regions would be potentially isolated from the disruptive events. Later works of the framework have been published in Abramowicz and Karim (2021), who highlight the importance of multiple suppliers and substitutional design.

The strong supply chain network framework underscores the importance of research and development (R&D) in supporting the supply chain systems and making them resilient to disruptions. This framework was created in the context of ongoing challenges in technological and managerial areas, as it emphasizes that R&D can enhance core supply chain capabilities, including sourcing different suppliers, risk management, and the development or creation of systems that enable substitution and flexibility (Abramowicz and Karim, 2021). In the framework of the current research, R&D is regarded as a crucial facilitator of producing actionable knowledge that enhances the responsiveness of suppliers and the preparedness of organizations. Furthermore, with the help of transformational leadership, R&D can be aligned to human resource development strategies that will enable employees to promote innovation, engage in collaboration, and play an active role in building strong, responsive supply chain networks. Innovation, lifelong learning, and sharing knowledge within the supply chain are

largely facilitated through transformational leadership. Better people management can be used to increase the ability to use R&D, not merely to tremendously develop any technology, but also to develop the way of communicating and coordinating with the suppliers. Past studies (Manurung et al., 2023) indicate that those organizations that invest in R&D, particularly in line with leadership excellence, are in a better position to combine resources, enhance teamwork, and develop flexible risk reduction measures. Finally, the overall aim of this paper (to create intelligent, responsive, and resilient supply chain ecosystems that can survive disruption) is supported by the combination of leadership and technology via R&D.

Supply Chain Risk Management Framework: It is a development of the Office of the Director of National Intelligence. Risk assessment in this regard by the Office of the Director of National Intelligence is in relation to risks posed by information communication technologies. Meanwhile, the ideas proposed can be applied to the broader supply chain risk management strategy. The office of the Director of National Intelligence measures the risk in terms of cost, schedule, and performance. The threats, vulnerabilities, and consequences are the variables that are introduced in the framework. Applying this framework to research and develop supply-chain risk management principles will focus on determining the threats, conceptualizing vulnerabilities, and mapping out the consequences. To a great extent, the efforts would result in the creation of a risk matrix, which would be a perfect supply-chain risk management principle in this study.

2.4 Review of Scholarly Literature

The section critically reviews scholarly peer-reviewed journal articles and classic texts that discuss the issue of supply chain disruptions and organizational vulnerability. The literature review will be divided into two subsections: the first (Section 2.4.1) will analyze prior academic

attempts at reducing supply chain risks, with a distinction between the early strategies, namely, integration, workforce training, information sharing, firm innovativeness, multi-agency collaboration, and redundancy planning. Section 2.4.2 discusses the existing academic activities, which put emphasis on the innovative solutions, such as the categorization of risk, the supply chain flexibility, resources distribution, coordination, ripple effect of the disruptions, and the assistance of digital technologies, i.e., big data analytics. The systematic review lends credence to the qualitative study of transformational leadership and digital tools in the supply chain industry through the project and the larger objective of determining evidence-based practices that can enhance resilience.

2.4.1 Previous Scholarly Efforts to Address the Problem

The analysis of the previous scholarly sources is in this section. The above scholarly literature discusses internal integration and information exchange, multi-agency cooperation, firm innovativeness, supply chain integration, redundancy initiatives, and aggressive supply chain risk management. The analysis of these focus areas provides an understanding of past efforts' successes and challenges that still linger.

Riley et al. (2016) recommend internal integration, information sharing, and training as the best strategies to raise the organizational capability to mitigate and respond to disruptive events. The strategies contribute to the development of dynamic capabilities, the ability of the organization to sense risks, assess threats, and respond to the emerging disruptions in an adaptive way. Nevertheless, due to the existing issue and gap in practice, lots of supply chain managers in the U.S. do not have organized, evidence-based strategies that could be used to ensure that these practices are incorporated in the most effective way. The continuation of the old style of managing things and the lack of incorporating transformational leadership and digital

technologies make organizations susceptible in times of crisis. Although Riley et al. (2016) highlighted the importance of internal alignment and knowledge flow that is proactive, the current literature and industry statistics demonstrate that these strategies are not used in most of the supply chains (Alicke and Foster, 2024; Katsaliaki et al., 2021). The lack of connection shows the necessity of investigating how modern leadership practices and digital technologies can make internal integration work, increase the effectiveness of training, and make real-time information exchange possible, which will resolve the resiliency issue in U.S. supply chain practices. Internal integration in Riley et al. (2016), information sharing in Huong et al. (2016), Singh et al. (2018), multinational collaboration, and Colicchia et al. (2019) information-sharing themes encapsulate the study purpose by revealing the need for an organization to have frameworks to help build trust and information sharing. Hence, the research will examine how a supply chain and human resource managers can help in information sharing, collaboration, and internal integration of an organization. The contribution of the supply chain and human resource managers will be explored in terms of the themes of information-sharing policy in Costantino et al. (2014), and contractual obligations in Li et al. (2015) and Riley et al. (2016), the need for advanced information-sharing capabilities, and their contribution to raising the ability of organizations to mitigate and respond to disruptions within the supply chain. The initial major element of a well-managed supply chain discovered by Riley et al. (2016) is the internal integration, which is the coordination of numerous internal processes by an organization through the integration of the information of various departments. According to Huong et al. (2016), there is a problem of information sharing because of the lack of trust among the supply chain partners. The success of information sharing, according to Huong et al. (2016), is relative, according to a case study of 11 New Zealand companies. Huong et al. (2016) point to the issue of

a trade-off between efficiency and responsiveness, which contravenes Riley et al. (2016), who place the emphasis on swift dissemination of information with complex information systems. Singh et al. (2018) note that a problem that multiorganizational collaboration has to grapple with is the conflict of organizational interests, which can be matched to concerns of Huong et al. (2016) regarding the loss of efficiency.

Biao et al. (2014) and Li et al. (2015) investigate the role of multi-agency collaboration in the tourism industry and show effective supply-chain disruption risk management. Li et al. (2015) attribute the success of collaboration in the tourism industry to the non-competitive engagement of the government and the public, and using contractual obligations. The success of Information Sharing and Analysis Organizations (ISAOs) in Colicchia et al. (2019) was because of the government factor. The discussion of the ISAOs raises questions about the role the government can play in supporting multi-agency collaborations in the context of filling the gap in the principles of facilitating effective supply chain risk management.

The aspect of the creation of an information-sharing policy, as pointed out by Costantino et al. (2014), is consistent with the requirement of Li et al. (2015), who also state that the contract needs to be established. Costantino et al. (2014) and Riley et al. (2016) concur in the necessity of a higher level of information processing in order to make a firm more resilient to disruptions. According to Colicchia et al. (2019), the best approach to encourage information exchange among organizations is legal protection and interpersonal relationships. The stance of Colicchia et al. (2019) on legal protections is consistent with other guidelines in the field; Costantino et al. (2014) and Li et al. (2015) on contractual framework to safeguard the interests of all parties. Colicchia et al. (2019) give an example of the Information Sharing and Analysis Organizations (ISAOs) by President Obama in the USA. The program resulted in establishing

organizations that gather and disseminate data on cyber threats among businesses. It is worth noting that the centralization of data collection and analysis is key to the feasibility of the ISAOs. As such, the most effective method, which would enable decentralized information sharing, is trust.

The internal integration as a driver of operational innovation by Wong et al. (2013) is similar to the Zhao et al. (2013) development of organizational processes and practices that improve customer needs achievement. The studies by Chaudhuri et al. (2018), Scholten et al. (2019), and Zhao et al. (2013) support the idea of organizational learning and employee training as the crucial aspect of internalization. One such firm is Cisco, which formulated new routines to react to non-routine disruptions. In 2005, Cisco could not locate resources capable of helping it to deal with an influx of demand due to Hurricane Katrina; it came up with plans to deal with such unpredictable situations in the future (Scholten et al., 2019). As a result, Cisco was able to address the sudden demand spikes due to the Japan earthquake in 2011 (Scholten et al., 2019). The strategy of Scholten et al. (2019) is oriented toward using the experience of the past in the employee training programs. Zhao et al. (2013) suggest cross-functional collaboration, which is consistent with Chaudhuri et al. (2018), who focus on inter-departmental collaboration. In Cisco, internal integration, the source of which is learning from the past, has proven effective in frustrating the disruptive attacks of the future. Generally, the literature review demonstrates the importance of increasing the ability of the supply chain managers to spearhead a supply chain disruption by persisting with the management process via acquisition of the principles in people, multi-organizational, and technology management. Supply manager's capabilities translate to human resource, organization, and, ultimately, supply-chain capabilities.

In their study, Golgeci and Ponomarov (2013) interviewed top-level managers in the field of logistics and supply chain management to assess how innovativeness contributes to enhancing the responsiveness of a firm to disruptions in the supply chain. Their results underline the fact that innovativeness is a vital organizational asset that increases dynamic capabilities, which is the capability of the firm to sense, react to, and recover from disruption. In particular, the study established a positive relationship between the innovation capacity and the capacity of a firm to deal with supply chain risks and found that this relationship is strong. This highlights the need to develop a culture that supports new ideas, technology, and processes to be nimble amidst disruption. Kwak et al. (2018) support this view by demonstrating that companies that undertake process and technology innovation, especially in the areas of operations, procurement, monitoring, and forecasting, are more effective in building resilient systems of supply chain risk management.

Not every organization, though, is successful in capitalizing on innovation. According to Parast et al. (2019), enabling conditions (e.g., leadership support, collaboration, information sharing) can determine the success of an innovation. These results are extensions of Golgeci and Ponomarov (2013) in that innovation does not work alone and without the organizational structure to facilitate innovation. Also, Weingarten et al. (2016) highlight the necessity to make multiple organizational assets like knowledge, technology, and suppliers collaborate to form an integrated response to disruptions. Combined, these studies indicate that although innovative resilience is a potent force, its success rests on strategic assimilation, inter-functional coordination, and executive dedication. This understanding is directly connected with the gap in practice identified, as numerous supply chain managers in the U.S. have not yet implemented

evidence-based strategies that are integrated, entailing the use of innovation, leadership, and digital tools to reduce the risk of disruption.

2.4.2 Current Scholarly Efforts to Address the Problem

The section covers a survey of the existing academic literature that is geared towards exploring this exact issue, which most supply chain managers in the U.S. do not understand: the practical principles of risk management that should be used to empower employees and organizations to withstand supply chain shocks. The literature is centered on the role of emerging strategies like the implementation of big data analytics, the modeling of the disruption situation, and the creation of flexible and redundant systems to help build operational resilience. A special concern is raised with regard to the contagiousness of disruptions in the supply chain and the role played by cross-organizational cooperation in the alleviation of these risks. The recent academic activity shows a significant change from the traditional and reactive models of risk management to more proactive, automated, and data-driven strategies. The shift is in line with the given practice gap, in which the lack of effective integration of technology and leadership concepts still remains a barrier to supply chain resilience. The section offers important information on how researchers conceptualize, model, and manage supply chain disruptions by using emerging technologies and collaborative structures to facilitate the development of evidence-based plans to assist supply chain managers in enhancing risk preparedness and response. Finally, the analysis will be used to inform the formulation of principles that can be used by managers to efficiently overcome the risks of supply chain disruption in an ever more dynamic and complex environment.

The article by Kamalahmadi et al. (2022) is a content analysis that studies the role of investments in flexibility and redundancy in creating resilience in supply chains due to risk.

Redundancy may incorporate proactive activities, like having a buffer stock or dual sourcing, to cushion the organization against possible risks, even before disruption may arise. Flexibility, in turn, involves improving the flexibility of the supply chain systems, such as the strategic choice of flexible suppliers. Kamalahmadi et al. (2022) suggest that by using flexible suppliers, the company can shift part of the risk to the supplier, who in turn would need to have its risk management practices and be able to scale up production in case of disruption. The research discovered that the two strategies could reduce risk, but flexibility has the ability to provide greater adaptive and long-term benefits in addressing dynamic supply chain threats. In line with the above, Azadegan et al. (2021) demonstrated that operational slack (backup inventory and spare capacity) offers moderate protection, especially against minor or temporary disruptions. Nevertheless, its functionality reduces within extended or intricate situations. This has been demonstrated to be much more effective in keeping production running in case of major disruptions, as Mackay et al. (2020) and Kamalahmadi et al. (2022) discovered that flexibility strategies, including agile supplier networks and adaptive production planning, played an important role in ensuring operational continuity. The writings highlight that the capability of flexible supply chains, particularly those underpinned by responsive and collaborative suppliers, is better placed to absorb shocks and recuperate faster.

In spite of the identified benefits, Kamalahmadi et al. (2022) warn that supplier flexibility may become a source of new risks, especially in case the risk is mitigated by a single partner. The problem raises one unresolved gap: the supply chain managers have no clear principles on how to balance and combine redundancy and flexibility without having to overcompensate one of them. Thus, although the advantages of flexibility are well-substantiated in practice, the literature demonstrates that there is a gap in the literature in relation to comprehensive, evidence-

based frameworks that help managers to maximize both strategies simultaneously to eliminate the drawbacks of traditional risk mitigation practices.

Bahrami and Shokouhyar (2022) employ a cross-sectional survey research design to evaluate how the capability of big data analytics can be used to manage disruption in supply chains. Big data analytics culminates as an essential tool in unraveling key changes in the market and business environment. According to Bahrami and Shokouhyar (2022), big data analytics boosts the level of innovativeness and risk management by firms, whereas Etemadi et al. (2021) report that cybersecurity threats are a common threat to big data analytics. Bahrami and Shokouhyar (2022) and Dolgui and Ivanov (2021) hold that big data analytics plays a decisive role in alleviating the impact of disruptions in the supply chain and is implemented with relative success. Nevertheless, Etemadi et al. (2021) mention that cybersecurity threats are the most common when implementing big data analytics in supply chain management. Etemadi et al. (2021) also mention that the cost-effectiveness of using big data analytics would prove cost-effective over time. One solution that companies ought to evaluate, despite the high initial cost and the cybersecurity risks, is big data analytics. Big data analytics is a part of technology that is then directed to supplier, internal, and consumer integration. Essentially, big data analytics would play a crucial role in sensing and analyzing the data, both internal and external. Bahrami and Shokouhyar (2022) and Dolgui and Ivanov (2021) share a similar view on the usefulness of big data analytics in enhancing the capabilities of organizations in responding to disruptions in the supply chain. However, the studies haven't explored the application of big data analytics in practical scenarios and dynamics that would facilitate access to the technology and navigate the risks.

The supply chain coordination activities involve harmonizing the supply chain players in order to remove conflicting interests. As noted by Dolgui and Ivanov (2021), networked systems of supply chains, which imply a high degree of interconnectedness and a wide range of locations, are particularly susceptible to the consequences of disruptions. This emphasizes the importance of solving real-time visibility and responsiveness on board throughout the whole supply chain. As a response to this difficulty, Liu et al. (2021) and Bahrami and Shokouhyar (2022) point out the importance of enhancing data availability and transparency. In particular, Bahrami and Shokouhyar (2022) suggest implementing big data analytics to tackle the problem of information scarcity that prevents the possibility of identifying and mitigating risks. These results are directly connected to the issue and gap in practice because not all supply chain managers have the technological foundation and evidence-based frameworks to employ such tools to their advantage.

Although all three articles concur on the significance of improved information flow, Ersahin et al. (2024) move further to the relation-based approach to supply chain coordination, stating the presence of strong supplier relations as the key to overcoming the turbulence. This relational perspective is supported by Duong and Ha (2021) and Malik et al. (2024), who show that supplier integration, achieved by collaboration, information sharing, and strategic alliances enhances the ability of a firm to absorb and respond to shocks. These findings are indicative of the fact that timely information yielded by data analytics may be used, but the success of these tools relies on the quality of a relationship and trust between organizations.

Importantly, Ali et al. (2024) brought an essential twist to the matter the role of leadership to facilitating supplier coordination and logistics innovation. According to them, leadership styles affect employee commitment and general success of the collaborative risk

management activities. The arguments further complicate the results of Ersahin et al. (2024) and Malik et al. (2024), who offer that integration does not work without effective, dynamic leadership to build trust, drive innovation, and direct supply chain partners towards a common purpose.

The literature shows that the current practice gap should be tackled through a multidimensional approach to implement technological solutions such as big data analytics and human-focused ones such as trust-building and transformational leadership. Though the need to integrate supply chains is widely accepted, the literature also mentions a lack of clear principles to reconcile digital tools together with relational and leadership strategies. This amalgamation indicates that in pursuit of genuine resiliency, supply chain managers need to go beyond single-minded approaches and integrate comprehensive frameworks that concurrently enhance data prowess, cross-organizational coordination, and leadership skills.

Dolgui and Ivanov (2021) show that organizations can use proactive and reactive strategies to mitigate supply chain disruption risks but with mixed outcomes due to the cost and operational constraints in implementing these measures. Katsaliaki et al. (2021) reflect the intricacy of interventions within the supply-chain risk management, and it can also be seen in the analysis by Dolgui and Ivanov (2021). The existing academic literature demonstrates the shift in the approaches based on inventory reserves and using additional suppliers to the development of the powerful infrastructures. According to Mackay et al. (2020) and Kamalahmadi et al. (2022), one of the possible solutions to these challenges is big data analytics. Although there exists a lot of literature review on the topic of big data analytics and supply chain coordination, knowledge gaps remain on the most appropriate leadership strategies required to enable collaboration, and

the ability to build capacity in terms of big data analytics. Practical application and particularly in the U.S. setting is one of the gaps that justify the worth of the present project.

2.5 Review of Practitioner Literature

The section will come with a literature review of previous and current literature on practitioners pertaining to supply chain risk management. The review makes use of reliable and quality practitioner materials, such as publications of Harvard Business Review, MIT Sloan Management Review, Forbes, Fortune, and the Wall Street Journal, and governmental reports, white papers of consultants and trade journals in specific industries. These sources are useful in giving real-world experience of how organizations manage risk in supply chain disruption and assessment of industry views on trends, best practices and issues in implementation.

The literature review of practitioners is based on the following central themes: cost-effectiveness of risk reduction measures, computerization and automation of supply chain systems, internal organizational capacity development, and digital transformation and supplier diversification as a resilience tool. These topics correspond to the objective of this study to close this gap in the knowledge and implementation of practical evidence-based principles of risk management and digital tools by the U.S. supply chain managers, in particular, in the times of disruptions. This part will be broken down into two major subsections to reflect the scholarly review structure, 2.5.1 (past attempts to solve the problem) and 2.5.2 (present attempts to solve the problem). Taking a closer look at the past and present practice of practitioners, the review will not only show the existing challenges and the strategies evolving but also demonstrate the gaps that are still crucial to the practice of supply chain risk management. The reflections provide a realistic idea of the ways in which practical activities contribute or do not contribute to

resiliency-enhancing in supply chain management, especially under the premises of transformational leadership and the adoption of digital technologies.

2.5.1 Previous Practitioner Efforts to Address the Problem

This segment is an overview of the past practitioner-related approaches with regard to supply chain risk management. Balancing cost-effectiveness with risk management is one of the main concepts. The rise in the dependence on technological improvements is also one of the prevailing traits in the analysis. These lessons would be useful in deciding on the developmental process of the practices that can address the supply chain risks. The concept of computerizing the supply chain system translates to one of the strategies in enhancing the organizational capacity to identify supply chain risks and support the decision-making process. However, the principles have gaps to reduce the risk of supply-chain disruption. The top approach that has been established in these sources is redundant inventory that has cost limitation.

Chopra and Sodhi (2014) note that the traditional supply-chain risk management approaches are characterised by limited cost-efficiency. Disruptive risks have ripple effects on the supply chain and spill over to other operational areas. Segmentation and regionalization of the supply chain are some of the strategies suggested by Chopra and Sodhi (2014) to reduce the risk of supply chain disruption. Nevertheless, Basu and Ghosh (2015) refute this stance of Chopra and Sodhi (2014) by stating that the strategy poses major challenges to small-scale firms with no technical and financial resources to hire several suppliers. Chopra and Sodhi (2014) also highlighted the value of using technological opportunities and diversifying supply chains, including regionalization and having several suppliers to be able to identify and mitigate the risk of supply chain disruption. As the analysis shows, regionalization is more agile and able to contain risks due to geographical dispersion, but that presents a challenge to implementation,

particularly by small and mid-sized enterprises which do not have the resources to create or sustain many regional supplier networks. In the same vein, dependency risk reduction has been partially achieved via utilization of alternative suppliers, although the approach has been linked to higher procurement expenses and ease of coordination.

Fiksel et al., in turn, suggest that other companies revert to domestic markets in some of their core activities (reshoring) as a tactic to enhance supply chain visibility and control (2014). Although this approach has its benefits in terms of resilience, it goes against the stance of Chopra and Sodhi (2014) that believes in external diversification as opposed to internal consolidation. But both studies point to similarity in the risk posed by lean operations, specifically the reliance on a few suppliers, which may increase the vulnerability in the event of major disruptions. Basu and Ghosh (2015) build on the discussion by examining the trade-offs of collaborating with several suppliers. The results indicate that, although diversification may enhance supply continuity, it adds increased operational expenses and may cause inefficiencies, especially in quality control, and lead time management. This is consistent with the financial and management costs that Chopra and Sodhi (2014) recognize is associated with the redundancy of suppliers.

In order to overcome the limitations, Fiksel et al. (2014) propose to implement Enterprise Risk Management (ERM) frameworks, which would allow organizations to more holistically and data-driven approach disruption preparedness. Although ERM is a strategic value by merging risk signals on cross-functional and geographical basis, the success of the tool is usually limited by difficulties in obtaining timely and correct data and timely and appropriate reactions to various and changing risk origins. Throughout the research, one of the critical gaps is that, in spite of the different levels of success in strategies, such as supplier diversification, reshoring, and ERM, no particular recommendations exist on how supply chain managers can consider the

practicability of each of them. The fact that there is no clear criteria that direct the choice of alternative suppliers and integrate the risk-informed decision frameworks highlights the role of evidence-based principles. Although these strategies fit into supplier and consumer integration components of the implemented framework, they demand organizations to enhance their ability to collect and interpret signals provided by the upstream and downstream members of the supply chains. Simchi et al. (2014) claim that common supply chain risk management is not difficult because it is based on the easily available historical data. Conversely, disruptive events in supply chains are very challenging owing to the absence of data to help in the calculation of risks. To mitigate the scarcity of historical data, supply chain managers can leverage computer capabilities to develop the ability to use mathematical models in computing the risk and developing risk management plans. The automated capabilities would assist an organization in coming up with what-if scenarios whilst expecting major disruptive events. The computerized models are also capable of assisting an organization to determine their concealed exposures. The weakness of this model lies in its use of measures of risk but not reduction. The main emphasis of the model in this case is to find out the risk exposures to the occurrence of certain events. Although quantification of risk plays a crucial role in the supply-chain risk management, ideals to counter the risk are crucial Chopra and Sodhi (2014) and Simchi et al. (2014) differ on the cost-effectiveness of the endeavors. The article by Chopra and Sodhi (2014) and Simchi et al. (2014) emphasizes the shortage of historical information underpins the argument by FM Global (2013) that the risk of supply chain disruption management must include dynamism. FM Global (2013) introduces the dynamism as the capability of the organizations to gather information about its stakeholders and calculate the way operational characteristics of these stakeholders are likely to affect the supply chain in the event of a disruption.

Using the mathematical model that Chopra and Sodhi (2014) recommend is tedious, leading to the need for computerization, as presented in Simchi et al. (2014) for information sensing and processing, as captured in Staff (2014). This analysis indicates that there is a shift in reactionary response to supply chain disruption to dynamic responses. Nevertheless, the principles, based on which organizations are supposed to create the dynamic capabilities in sensing and responding to the risks of supply chain disruption, have their gaps.

2.5.2 Current Practitioner Efforts to Address the Problem

Here, current practitioner literature on supply chain disruption risk management is discussed. The key parts include developing internal capacity, digital transformation, and promoting supplier health. The internal capacity development can be significantly in the form of a national specific project where the government applies to decrease excessive dependence on imports. In promoting supplier health, clients and suppliers invest in increasing suppliers' ability to withstand disruptive events. Lastly, digital transformation enhances effectiveness in collaborations, gathering of data, and accuracy in its analysis. The main gap in these studies is on the factors that would enhance the health of the supplier, hence its capacity to survive disruptive events.

Shih (2022) suggests that internal capacity to deal with supply chain disruptions should be developed. Relative national dependency on international suppliers of essential components and products have been identified in the context of nations, thus subjecting them to disruptions in the exporting countries (Shih, 2022). As a result, countries are exploring opportunities for building local production. Developing nation-specific internal capacity is a great initiative that would protect a nation from international disruptions. Yet, the practicality of the idea on a large scale or on different materials and products is poor. Secondly, it is not easy to develop

production capacity internally in the context of industries. On the one hand, Shih (2022) frames the concept of internal capacity through the national lens; on the other hand, Dutta (2023) suggests the idea of the internal capacity as a growing internal cooperation of stakeholders to ensure operational efficiency. Another concept introduced by Dutta (2023) is the cultivation of inhouse capacity where he applies this to working with supply chain partners to enhance the availability of information to facilitate forecasting.

Marotta (2024) gives an example of successful internal integration by Ford and Breweries in America. With the pandemic, Ford was able to build the in-house capability of producing ventilators and breweries had to step in and produce hand sanitizers on their own. The effectiveness of the internal capacity development in this case was dependent on the relatability of the needs of the disruption, which is seldom the case. The idea of internal capacity proposed by Shih (2022) agrees with the side of Marotta (2024). But the point of divergence is that Shih (2022) is concerned with national-level internal capacity whereas Marotta (2024) is concerned with organizational-level internal capacity. Under the project, these components are in coordination and collaboration, and building human resource capabilities. Further, Shih (2022) and Marotta (2024) internal capacity positions agree with Lowman (2023) guidelines on the development of internal capacity. Lowman (2023) guidelines are acquisition of physical infrastructure, technology, intelligence, and appropriate policies and procedures.

Another strategy that Shih (2022) recommends is promoting supplier health. Health promotion among suppliers is one of the main considerations that enable organizations to foster sustainability of supply chain, and therefore reduce the spillover effect. Spillover effect states that pain of the supplier is transferred into the clients. Thus, the client ought to invest in the programs that would bring health in suppliers, such as maintaining cash flows, ensuring that the

supplier is financially sound. Management activities that will need a lot of client support for the supplier are shared demand planning and promoting flexibility. Wellener et al. (2022) surveyed supply chain executives qualitatively and found that supply chain resiliency is becoming increasingly popular among supply chain managers. The supply chain resilience strategies identified are the involvement of more than one supplier, digital tools, incorporation of efficiency, and enhancement of the relationships in the current supply chain. The analysis of Dunkelberger (2023) of artificial intelligence usefulness in supply chain disruption management supports the position of Wellener et al. (2022) on the use of digital tools. According to Dunkelberger (2023), artificial intelligence can sense, analyze, and create very responsive preventive actions. The importance of building internal capacity is supported by Wellener et al. (2022), Shih (2022), and Marotta (2024). Nonetheless, there is a gap in the ways of establishing the internal potential and concept that Wellener et al. (2022) and Dunkelberger (2023) develop by suggesting to capitalize on digital capabilities. At the same time, guidelines on how to leverage artificial intelligence and digital tools have been under-explored, hence the need for this project.

Schewnk (2023) relies on the expertise to formulate the strategies for promoting supply chain risk management. Digital transformation and diversification have been suggested as the strategies to follow. Diversification also involves diversification of the sourcing bases as well as suppliers. Such initiatives make sure that the impact on one region or supplier would not give impact on the other regions and suppliers resulting in the continuity of business. Digital transformation encompasses incorporating existing and emerging technologies, including machine learning and artificial intelligence, and capabilities to enhance predictive analysis in supply chain disruption risk management. One of the technological solutions that can gather and

process critical supply chain data is open-source intelligence. Jackley (2023) also states that technology can be used as a good strategy to enhance the supply-chain disruption risk management. The integration of data can be achieved with the help of technology and automation and is applicable in the planning, supplier, and inventory management. Other positive results of automation include a greater visibility of the supply chain, which warns the firms against unpleasant surprises. Galer (2023) also indicates that supply chain automation is an excellent technique for facilitating stakeholders' collaboration and access to information. Automation of systems enables more data availability and access, thereby decreasing the lead times in supply-chain risk management decisions. Automation also involves applying artificial intelligence in analyzing data and defining factors and the right control measures. Schewnk (2023) and Galer (2023) concur that digital capabilities are needed to enhance supply chain resilience. The importance of predictive supply chain management solutions is also noted by KPMG (2020). Predictive supply chain solutions enable organizations to predict the risk of supply chain disruption. Predictive solutions rely on artificial intelligence to simulate possible occurrences and make appropriate predictions. Nevertheless, the ideals of the supply chain management that aid the process of technology acquisition, technology management and application to improve the supply chain disruption risk management which is least researched, highlighting why it is necessary to have this project. Other key considerations are the type of resources required to oversee the realization of big data analytics. In the context of the study, big data analytics can be classified as technology and its use as the mediator of internal, supplier, and consumer integration.

2.6 Synthesis of Literature

The synthesis of the literature review indicates that there is a need to have supply chain disruption risk management principles. The principles highlight the fact that other principles are necessary to be incorporated with the already existing supply chain disruption risk management principles. The current principles highlight traditional approaches of risk management like double stocks in Grotsch et al. (2013) and backup planning by Kamalahmadi et al. (2022). But these principles have difficulties. Chopra and Sodhi (2014) and Dolgui and Ivanov (2021) have supported the stance on limitations of conventional supply disruption risk management with the help of redundancy and flexibility. Grotsch et al. (2013), Katsaliaki et al. (2021), and Kamalahmadi et al. (2022) all find the issue of data sensing and information sharing to be a problem of contingency planning. Grotsch et al. (2013) also suggest that the role of the decision-makers involves the role in the information acquisition, sharing, and processing. The functions of decision-makers, which, in this instance, are the supply chain managers, have not been thoroughly investigated in the context of supply chain disruption risk management.

Mackay et al. (2020), extends the ideas by Kamalahmadi et al. (2022), Katsaliaki et al. (2021), and Grotsch et al. (2013) that the best approach to supply-chain disorders is creating robust systems that collect and process information about supply-chain disruptions. Well-established mechanisms that gather and analyze the supply chain disruption risks data. The conceptualization of robust systems is in the role of supply chain and human resource managers in informing the development of technology, human resource, and coordination capabilities to respond to supply chain disruption risks (Abramowicz & Karim, 2021; Kara et al., 2020; Manurung et al., 2023; Singh et al., 2018). Mackay et al. (2020) point out that the effectiveness of flexibility and redundancy risk alleviation strategies is determined by the rapidity of the disruption commencement, the duration of the disruption, as well as the attitudes the decision-

maker holds. Bahrami and Shokouhyar (2022) extend Kamalahmadi et al. (2022), Katsaliaki et al. (2021), and Grotsch et al. (2013)'s ideas on the need for robust systems by recommending the integration of big data analytics in supply chain disruption risk management. Continuing on the information limitations of traditional supply chain risk mitigation measures, Simchi et al. (2014), Biao et al. (2014), Bahrami and Shokouhyar (2022), and Dolgui and Ivanov (2021) report that big data analytics avoids these challenges and results in high-quality data gathering. Although there has been advancement on the big data analytics, the difference still exists on the issue of effective collaboration between the agencies (Wiengarten et al., 2016). Ersahin et al. (2024), Malik et al. (2024), and Duong and Ha (2021) sum up the role of big data analytics in the integration of the supply chain. Huong et al. (2016) mentions a shortage of trust as one of the limitations in multidisciplinary collaboration and utilizing big data analytics. According to Ali et al. (2024) and Parast et al. (2019), the establishment of trust between supply chain partners can be brought about by leadership. The exploration of the concepts that will result in the creation of strong systems comes under the factors of technology and human resource abilities. Such factors further reduce to the requirement of the supply chain managers leadership skill.

2.6.1 Evidence of the Themes of What is Known in Practice

The former is the application of traditional proactive and flexible strategies in the management of the risk of supply chain disruption. Conventional measures emphasize developing flexibility, redundancy, and proactive measures that are void of computerization or big data analytics (Kamalahmadi & Parast, 2017; Talluri et al., 2013). The review of the academic publications by Tang (2006), Kamalahmadi and Parast (2017), Talluri et al. (2013), Grotsch et al. (2013), and Kirilmaz and Erol (2017) suggests that the applied measures of proactive and reactive supply-chain disruption risk management were relatively successful. The

use of backup suppliers and backup inventory has come in handy in some supply chain disruption situations.

The second theme is the integration of supply chain and development of a strong system to prevent the constraints of traditional principles of risk management. Tang (2006), Kamalahmadi and Parast (2017), Talluri et al. (2013), Grotsch et al. (2013) and Kirilmaz and Erol (2017) also refer to the impracticability of these methods when highly unpredictable supply-chain disruptions are involved. The constraints bring about a knowledge gap on the principles that supply chain managers can use to enhance the strength of supply chain systems to react to the very unpredictable disruptions. The presented ideas contain suggestions offered by Wiengarten et al. (2016) and Flynn et al. (2010) regarding the supply chain integration. The implications of the need to increase information-sharing abilities between employees and entities are brought about by supply chain integration. The necessity of information sharing by entities also results in the notion of multi-agency collaboration, which was mentioned by Biao et al. (2014) and Li et al. (2015). Meanwhile, the principles that the organizations ought to employ to establish the multi-agency collaboration effective in reducing the supply-chain disruptions have a gap. Moreover, there remains a big gap on how an organization can improve its ability to create, as well as integrate information in times of supply chain disruptions. This issue in turn results in the recommendations by Bahrami and Shokouhyar (2022), Kamalahmadi et al. (2022), Schewnk (2023), and Mackay et al. (2020) to employ big data analytics to come up with dynamic capabilities of a firm in a highly uncertain supply-chain disruption. However, the knowledge gap regarding the principles that can be used to effectively implement the principles of supply-chain risk management remains. The research in this case will explore principles that the supply chain

managers need to efficiently organize multidisciplinary teamwork, facilitate information exchange, and apply data analytics to supply-chain disruption risk management using big data.

The third theme emerged in the practitioner literature is strong innovativeness, which comes out as an urgent reaction to the increasing demand of having strong and versatile supply chain systems (Galer, 2023). As Galer points out, supply chain automation is a core initiative towards promoting innovation in risk management; that allows companies to identify, evaluate and react to disruptions in a more productive manner. In line with this perspective, Schewnk (2023) emphasizes the concept of integrating big data analytics with automation as one of the enablers of supply chain resiliency.

These insights of practitioners are consistent with previous findings by Simchi et al. (2014) and Liu et al. (2021), who emphasize that the need to increase data acquisition and computational power is also necessary to facilitate the responsiveness of supply chains. Such overlapping between these sources creates a feeling of a developing agreement on the significance of incorporating innovation and data-driven technologies into risk management plans. However, regardless of such recommendations, there is still a knowledge gap that exists among supply chain managers. In particular, the uncertainties surround the ways of using innovation and big data analytics principles to develop dynamic capabilities that help organizations tune into risks of disruption, analyze and adapt to them.

In addition, the lack of innovativeness in terms of leadership and management of the supply chains is a factor that contributes to this gap. According to Ali et al. (2024) and Parast et al. (2019), the lack of the relevant leadership qualities, i.e., transformational leadership, strategic foresight, and effective coordination, could result in the fact that innovation activities not translating into resilience. Therefore, the distance is not just technological but also managerial,

indicating the necessity of combined leadership-technology solutions that would cater to both human and system preparedness.

Under the realm of supply chain disruption risk management, different stakeholders are able to offer distinct opinions and knowledge that can be used to formulate the knowledge and bridge the gap in its application. Supply chain managers present down-to-earth and practical knowledge, based on their first-hand experience of the disruption and its operational challenges. The authors reiterate that real-time decision-making, digital tools (such as big data analytics) integration, and leadership approaches that increase workforce adaptability are needed. Nevertheless, not all are able to use systematic and evidence-based principles to guide the management of disruption risks, as most people tend to resort to the classic methods that cannot be adapted easily and do not meet the needs of large-scale operations. Researchers, in their turn, offer a deeper theoretical and analytical insight, which uncovers systemic weaknesses and offers frameworks of improvement in terms of resilience, dynamic capabilities, enterprise risk management (ERM), transformational leadership, etc. The contributions contribute to the academic base of knowledge on complex disruption dynamics, but are often not immediately applicable without being translated into practical tools. Government agencies and policymakers have a role to play through regulation standards and provision of infrastructure, systems of data sharing, and financing projects that impact how organizations react to large-scale disruptions (e.g., pandemics, geopolitical crises). The authors propose a more extensive systemic resiliency and inter-organizational coordination, but their policies might not necessarily correspond with the realities of firms. Together, these stakeholders present a multidimensional perspective on the issue: practitioners are urgent and real, researchers are conceptually clear, and policymakers are systemically supportive. The practice gap that exists between these groups needs to be bridged

through collaborative efforts between these groups so that they come up with actionable, evidence-based strategies, which are both theoretically and practically viable.

Compared to the components of the applied framework, this theme aims to facilitate a secondary avenue of inquiry: how supply chain managers can create technological and human resource competencies that improve the capabilities of the organization to sense, analyze, and respond positively to disruptions. This secondary area of interest augments the main line of enquiry that looks at how the leadership abilities of supply chain managers, in turn, affect their ability to develop and internalize those abilities successfully. Combined, the dimensions justify the aim of the study of determining evidence-based principles that can guide supply chain managers to overcome the current gap in practice in managing the risk of disruption.

2.6.2 Evidence and Explain the Basis for the Final Choice of Framework

The last decision of the framework is based on the capability theory. The last framework is summed up by a combination of the robust supply chain network with the mechanization and automobile framework. The strong supply chain network framework introduces the research, development, and acquisition of data and processing as the motives of strength (Abramowicz and Karim, 2021). The automation and mechanization framework shows the plans for obtaining superior data acquisition and processing (Aljabhan, 2023). But on its own, the automation and mechanization structure lacks sufficient aspects to understand all the aspects of coming up with strong systems. The risk classification framework, as indicated by Baryannis et al. (2019) and Hudnurkar et al. (2017), lacks the integration of risk response principles; therefore, it is not suitable for investigating principles to make the supply chains robust. The last theory-based framework is the dynamic capability theory, which assimilates the major aspects of the Six Sigma framework. The last framework, in this instance, spreads the principles of the Six Sigma

framework. The Six Sigma elements that are improved in this case include measuring, analysing, and controlling the disruption through the dynamic capabilities (Yang et al., 2022).

The supply chain risks management framework offers an initial framework, which alone is adequate, as it does not encapsulate the objective of the study, that is, the necessity to learn about the principles around the use of digital technologies and leadership capabilities to enable supply chain disruption risk management. The theory of dynamic capabilities provides a powerful theoretical framework to deal with the specific business issue that most supply chain managers in the U.S. do not have a proper evidence-based approach to establish resilience and deal with the risk of disruption. The theory describes how an organization feels, grasps, and adapts itself to the changes and external shocks in the environment (Golgeci and Ponomarov, 2013). Dynamic capabilities within the framework of supply chain risk management are vital in explaining why certain managers are able to adjust to disruptions as opposed to other managers who cling to old-fashioned and less adaptive practices. As an illustration, the lack of acquisition of real-time data, the integration of digital tools, and internal collaboration can greatly restrict the adaptive responses of a firm, pointing to a void that is directly filled by the dynamic capability theory.

The sound supply chain frameworks suggested by Chopra and Sodhi (2014), Abramowicz and Karim (2021), and Manurung et al. (2023) fit into this theory quite well because they put the emphasis on constant innovation, internal integration, and resource flexibility as the essential strategies of disruption preparedness. Such frameworks recognize the necessity of fostering resilience by means of a mix of technological capabilities (e.g., big data analytics), organizational learning, and collaborative relationships. In particular, big data analytics are instrumental in increasing the capability of an organization to discern early warning

signs and act swiftly in response. Bahrami and Shokouhyar (2022) attest that big data abilities enhance the response to disruption by enhancing data acquisition and processing, which are key dynamic capabilities. Likewise, internal integration, comprising supplier and consumer alignment, helps to enhance organizational learning and resource utilization, recover more quickly, and make more informed decisions (Duong and Ha, 2021; Malik et al., 2024).

Other theoretical approaches were also taken into consideration, like resource-based view (RBV) and contingency theory, but proved to be less holistic. RBV has a limited scope for reconfiguring resources in disruptions, and this restricts its use in highly dynamic environments because it assumes that resources are static but not dynamically reconfigured. Although contingency theory comes in handy in the context of adapting to the situation, it is not process-oriented as the dynamic capability theory and therefore fails to capture the dynamic nature of digital technologies or innovativeness in the leadership. Conversely, the theory of dynamic capability provides a multi-dimensional prism to analyze the ways in which supply chain managers can grow, reorganize, and integrate both human and technological resources into strong systems that can withstand and adapt to disruptions.

That is why dynamic capability theory has been chosen as the most suitable theoretical framework in this research to identify the potential operationalization of transformational leadership and digital technologies, especially big data analytics and inner integration, to develop both operational and workforce resiliency to supply chain disruptions.

The study uses a hybrid framework based on the theory of dynamic capability that involves the capacity of the organization to sense, grasp, and act upon the external disturbance in order to change and guide the data collection process in this qualitative enquiry. The theory will be especially helpful in resolving the determined business issue of insufficient evidence-based

strategies and digital resources of the U.S. supply chain managers to develop operational and workforce resiliency. Every component of the framework that includes technological capabilities, internal integration, transformational leadership, human resource development, and multi-agency collaboration will be addressed with well-crafted interview questions. The questions will be aimed at revealing how managers think, develop, and put these capabilities into practice.

How managers gather and respond to information related to disruptions will be assessed using the first concept, which is technological capabilities, specifically the utilization of big data analytics. Bahrami and Shokouhyar (2022) and Simchi et al. (2014) emphasize the importance of the capability to utilize analytics tools as the core of dynamic sensing and adaptation. Thus, interview questions, including Can you explain how your organization uses data or analytics tools to identify or respond to disruptions, will be incorporated to identify whether the organization is digitally mature and can react to disruptions in real-time. These answers will assist in knowing whether the lack of such tools is a contributor to the resilience gap.

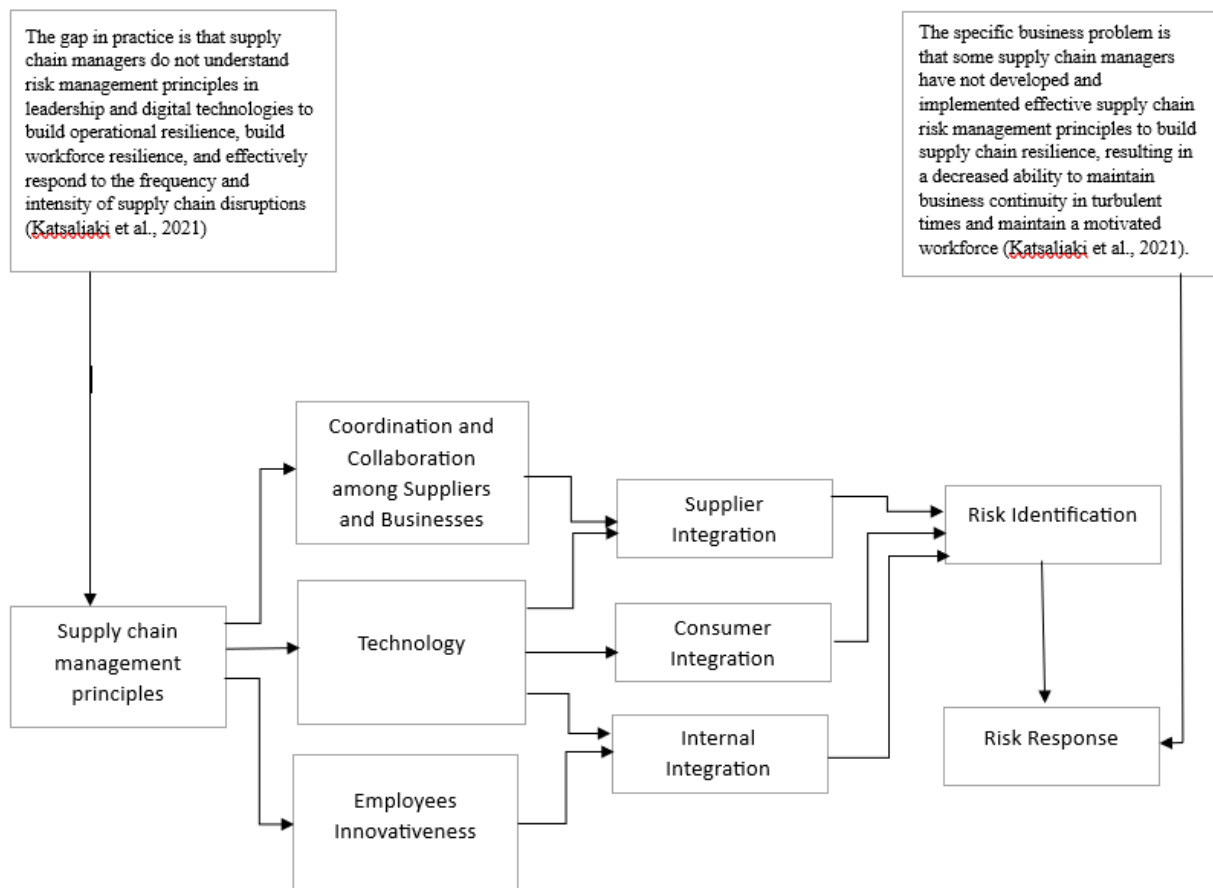
Then, internal integration, as Ersahin et al. (2024) and Duong and Ha (2021) commented, will be researched to comprehend how collaboration between suppliers and their customers helps in resilience. As integration improves sensing and coordinated response capacity, such interview questions as the one listed below will be used to uncover the communication gaps and structural vulnerabilities in the supply chain network: *How does your organization work with its suppliers and customers in times of disruption?* The knowledge gained during this questioning process will also answer the question of whether there is a necessity that external and internal processes will be synchronized at the time of crisis events.

Another important concept, which was informed by Parast et al. (2019) and Ali et al. (2024) and will be discussed to determine the role of leadership styles in employee motivation, innovation, and change-readiness, is transformational leadership. The questions like *How do you encourage your staff to change in the event of disruption in the supply chain?* are meant to elicit the role played by leadership in changing organizational behavior and resilience practices. As resistance to adopting new technologies and practices was deemed to be a critical factor caused by poor leadership, the component directly feeds the transforming capacity in the dynamic capabilities framework.

Simultaneously, the development and training of the human resources will be analyzed as well to determine whether organizations are preparing their employees with the required skills in case of disruption. Riley et al. (2016) and Golgeci and Ponomarov (2013) highlight the importance of training, information sharing, and organizational learning as they contribute to quicker responses. Interview questions like *What kinds of training or development programs are in place to prepare employees to respond to disruption scenarios?* Will evaluate whether the organization is making investments in employee resilience or ignoring key employee development requirements. Lastly, the framework incorporates the collaborative framework with multi-agencies, based on Kamalahmadi et al. (2022) and Fiksel et al. (2014), to evaluate the contributions of partnerships with the government and industry networks, as well as external stakeholders, to seizing the capabilities of the organization. Interview questions, such as " Does your organization work with government agencies, industry associations, or logistics partners in disruption situations will be used to check whether cross-sectoral collaboration fills internal capacity gaps.

Figure 2

Final Research Framework



Note. Created by K. Ta. (Saeed et al., 2022; Taseer & Ahmed, 2022; Munir et al., 2022)

These five elements combined to create a coherent set of elements connected to the dynamic capability theory to understand the underlying causes of the practice gap. All the interview questions are intentionally associated with concepts provided in the literature (Sections 2.3, 2.4, and 2.5) to make sure that the theory is consistent with the data collection. The integrated framework not only organizes the interviews but also informs the thematic analysis, which will allow the study to produce actionable and evidence-based information on how supply chain managers can enhance their ability to counter-disruption risks by incorporating leadership, integration, innovation, and collaboration.

2.7 Discussion of the Gap in Practice

The methodologies and results of the referred authors can be useful in the background of U.S. supply chain risk management, though they differ greatly in the rigor, scope, and relevance to the identified gap in the academic literature, i.e., the absence of evidence-based strategies among supply chain management of U.S. organizations to foster resilience through transformational leadership and digital technologies.

To illustrate this, Golgeci and Ponomarov (2013) used a quantitative design that involved using surveys with senior supply chain professionals to determine the effects of organizational innovativeness on disruption responsiveness. High-quality empirical evidence is presented by employing a properly designed statistical analysis, showing that the more innovative companies are, the more agile and responsive to disruption. The definite operationalization of dynamic capabilities and firm innovativeness is the strength of this study; a weakness is that it puts more emphasis on high-level strategic indicators and less emphasis on actual behaviors or capabilities of managers. In this way, the study proves the concept behind the gap but does not go to the extent of providing managers with actionable solutions.

Chopra and Sodhi (2014) employed the conceptual and case-based approach to creating a strong supply chain model outlining major vulnerabilities and strategies that include regionalization and diversification of suppliers. The research has a strength in that it has practical application and relevance to practitioners in the real world. The empirical validation is, however, not used in the study, thus limiting its generalizability. The study by Bahrami and Shokouhyar (2022) is a mixed-method research, integrating a literature review and interviews with experts to understand the impact of big data analytics on the resiliency of supply chains. The clear connection between risk sensing and big data capabilities that underpin the dynamic capability

framework is a strength of this work. Nonetheless, the sample size is small, and the study is regional, hence limiting the generalizability of the research. Also, the research proves the significance of technology, but does not explore the leadership practices and organizational models that should facilitate digital transformation, indirectly corroborating the established gap.

On the practitioner side, Galer (2023) and Schewnk (2023) adopt the views of Forbes Council, utilizing methods of a focus group and commentary. Its advantage is the provision of up-to-date experience-related insights of the industry leaders, specifically concerning automation and innovation. But these sources do not have as much methodological transparency and empirical rigour, and thus the findings of such sources are more anecdotal than general. Although the perspectives can be traced to the academic literature on the significance of innovation and digital tools, they lack systematic frameworks on how to implement them, as well as exquisite information on managerial competencies, which further promotes empirical research on the managerial competency-driven strategy.

Finally, Ali et al. (2024) and Parast et al. (2019) employ qualitative and quantitative designs, respectively, to research how transformational leadership and collaboration can be used in the management of supply chain risks. The two researchers strongly affirm that leadership can affect the agility of any organization and the staff motivation, which introduces a first-hand concept to the focus of the present research. Nevertheless, Ali et al. (2024) are restricted by the single-industry focus, and the primary measure taken by Parast et al. (2019) is performance outcomes rather than the research of the leadership behaviors per se.

Within the domain of supply chain disruption risk management, different stakeholders can be involved and bring their own views and perspectives that assist in influencing the comprehension and bridging the gap in practice. Supply chain managers are more ground-level

with practical knowledge, based on firsthand experience with the operational issues in disruptions. The authors reiterate that real-time decision-making, digital tools (such as big data analytics) integration, and leadership approaches that increase workforce adaptability are needed. Nevertheless, not all are able to use systematic and evidence-based principles to guide the management of disruption risks, as most people tend to resort to the classic methods that cannot be adapted easily and do not meet the needs of large-scale operations. Instead, researchers offer a deeper theoretical and analytical insight, reveal vulnerabilities in the system, and offer a framework to enhance resilience, including dynamic capabilities, enterprise risk management (ERM), and transformational leadership. Their work contributes to establishing the scholarly base of comprehending the dynamics of complex disruptions, but in most cases, it does not have direct applicability until it is translated into tools. Government agencies and policymakers have a role to play through regulation standards and provision of infrastructure, systems of data sharing, and financing projects that impact how organizations react to large-scale disruptions (e.g., pandemics, geopolitical crises). They also promote wider systemic resilience and inter-organizational coordination, but their policies are not necessarily in line with the realities at the firm level. All of these stakeholders provide a multidimensional perspective of the issue: Practitioners add urgency and realism, researchers provide conceptual clarity, and policymakers provide systemic support. To fill the gap in practice, the collaboration between these groups is needed to develop actionable, empirically based strategies that will be both theoretically sound and practically feasible.

The gap analysis will also trigger the redefinition of the previous gaps to reflect the shift in the conventional strategies into the contemporary strategies and the current restrictions to the successful implementation of the contemporary technology, empowerment of the employees, and

the implementation of the transformational leadership. The first gap identification was used to capture the gap in the skills of the supply chain and human resource managers to lead the technology deployment, coordination, collaboration activities, and the innovativeness of the employees. The revision will reveal the way the competency of the supply chain and human resource managers meets the deployment of technology and the power of employees to provide an effective reaction to disruptions to supply chains.

2.8 Conclusion and Transition

The capstone project included an evaluation of practitioner and scholarly sources, determining a shortcoming in determining a consensus on the best supply-chain disruption risk management principles. This review has revealed that the risk management of supply chain disruptions has undergone a transformation not only in inter-agency collaboration but also in multi-agency collaboration to make firms more innovative, with the final contribution of big data analytics (Kamalahmabi et al., 2022; Parast, 2017; Simchi et al., 2014).

The study has the potential to explore and uncover how big data analysis, multi-agency, and internal integration can be combined to gain real-time data acquisition and analysis (Bahrami and Shokouhyar, 2022; Grotsch et al., 2013; Katsaliaki et al., 2021; Kamalahmadi et al., 2022). Nevertheless, the multi-agency partnerships do not have proper governing principles that would enable proper and complete disclosure of crucial information about supply chains. The research will therefore explore principles that will enable complete disclosure of the supply chain players in order to enhance supply chain visibility. As well, the principles that will enhance the successful incorporation of data analytics to enhance the magnitude and accuracy of data acquisition and processing will be investigated. The analysis will examine how supply chain and human resource managers can interweave the strategies of supply chain disruption risk

management to culminate in the development of principles of supply chain disruption risk management facilitated by the final project framework. The combination of multi-agency coordination, big data analytics, and integration within the company leads to supply chain resilience to maximize the supply chain disruption risk management role (Parast et al., 2019).

The third part of this project will be the proposal for the project. In this section, we will describe the bases of the research design, as well as the justification of methodological decisions. The part starts by giving an introduction to the proposal, then some important terms and definitions that explain some of the core concepts to be used in the study. The validity of the method will justify why a qualitative approach will be used based on the research problem and purpose. The data sources subsection will outline the sampling plan, recruitment methods, and data collection, and the use of an expert panel or pilot test to test tools. Moreover, this section elaborates on the process of collecting data, such as how the data will be collected, stored, and managed. The data analysis plan details how it will be coded and interpreted. Validity, reliability, and trustworthiness considerations will be taken to make the study rigorous. Such ethical protections as informed consent, confidentiality, and IRB compliance will also be introduced. Lastly, there will be a project timeline, which will be a plan of important milestones, including planning and analysis up to reporting.

3.0 PROPOSAL

3.1 Introduction

The fast movement towards globalization and digitalization has made contemporary supply chains more challenging and susceptible (Yeboah et al., 2025). The use of interconnected global chains and just-in-time inventory systems has predisposed the supply chain industry to disruptions caused by geopolitical tensions and pandemics, natural disasters, and cyber threats (Donadoni et al., 2019). To address the intricate issues, leaders have to use transformational leadership strategies and modern technologies to maintain the continuity of operations and stability among employees (Alicke and Foster, 2024; Olowo, 2023). The proposal is concentrated on analyzing the attitudes of U.S. supply chain managers towards the incorporation of the principles of transformational leadership and digital technologies to improve resilience in the face of ever-increasing difficulties.

The overarching business issue is that organizations within the U.S. supply chain kingdom are increasingly losing more business operations and funds as disruptions increase in severity and frequency (Katsaliaki et al., 2021). Many executives were poorly equipped to accommodate the disruptions, and in most instances, they relied on the old risk mitigation models that do not accommodate changing complexities (Gerschberger et al., 2023). Managers do not always find it easy to apply adaptive leadership and digital innovation, which leads to a lack of morale among employees, high rates of absenteeism, and performance decline. The manufacturing and logistics sectors of the U.S. alone note that more than 60 percent of businesses are not effective in deploying resilience strategies, although they recognize the susceptibility to disruptors (Katsaliaki et al., 2021, p. 967). The study points out an acute disjuncture between consciousness and action. Therefore, unless there is a systematic change in

favor of evidence-based leadership and digital structures, the risks will persist in outpacing readiness.

Most of the leaders in the industry had not fully utilized the digital capabilities and empowered teams with effective leadership, which only further increased the risks of operations in the case of a crisis (Yeboah et al., 2025). Communication is essential in enhancing transparency, morale, and effective response in cases of disruption. Communication also creates confidence among employees, role understanding, and corporate integration in times of need. As reported by Donadoni et al. (2019), the inability to handle disruptions in supply chains has been one of the drawbacks of the past due to the absence of organized communication patterns. The key to harmonizing digital strategies with organizational objectives is through effective communication practices that are guided by transformational leadership.

The targeted business issue is that not all U.S. supply chain managers have effective principles of supply chain risk management and digital technologies to develop resilience and have less efficient operations and workforce motivation in the case of disruptions (Deep et al., 2025). The practice gap is that the leaders of the U.S. supply chains do not have evidence-based approaches to combining transformational leadership with digital tools to improve operational resiliency, as well as workforce resiliency (Yeboah et al., 2025). The aim of the qualitative investigation is to understand the views of the U.S supply chain managers in adopting transformational leadership and digital technologies to formulate principles that enhance operational and workforce resiliency in case of disruption of the supply chain. The question of the project is:

PQ1: How do the U.S. supply chain managers see the opportunities to incorporate the principles of transformational leadership and use digital technologies to create resilience in the workforce and operations in the case of supply chain disruptions?

The global supply chains remain fragile due to the recurring disruptions, including the COVID-19 pandemic, as well as the war in Ukraine and inflationary shocks (Alicke and Foster, 2024). Even though some organizations have adopted technology more in some areas, a significant number of organizations still work under the conventional models of management that slow down response time and impede innovation (Olowo, 2023). The gap is bridged with the emphasis on what leaders can do to integrate digital innovation and leadership that motivates, inspires, and equips the workforce with disruption preparedness. The main purpose of the qualitative investigation is to learn more about the way in which the U.S. supply chain managers use leadership and technology to react to disruptions and respond accordingly. The project needs to find actionable, evidence-based strategies that can foster resilience in systems and individuals (Mosadeghrad et al., 2023). Through the completion of the project, the leadership development and technology integration frameworks in the industry are likely to be informed. To begin with, the research will be used in designing training and development programs specific to supply chain leadership. Secondly, the results can be used to inform policy suggestions in the digitalization of operational risk management. Lastly, the project will also be able to contribute to the scholarly literature by answering a gap in practice that is well known but not yet thoroughly researched.

This paper uses the transformational leadership model developed by Bass in 1985 to examine resilience in the context of supply chain management. Bass did not specifically talk about supply chains, but the structure, with its focus on the vision, personal attention, and

innovation, can be applied to high-pressure operations should a leader need to motivate people to respond fast and helpfully to disruption. Transformational leadership promotes a culture of shift and learning, which is essential in establishing resiliency within organizations amidst unpredictable supply chains.

In Section 3, this area covers a detailed explanation of why a qualitative inquiry method is to be used, how data is going to be collected by semi-structured interviews, and the sampling and recruitment method of the participants. The procedures of developing and conducting interviews, the thematic analysis method that will be applied in coding and analyzing transcripts, and ethical considerations, schedule, and the ways to ensure that this research is trustworthy are also described in the section. The methodology guarantees that the information gathered is plausible, the experiences of the participants are presented authentically, and that the research is carried out according to high ethical and academic research standards.

3.2. Terms and Definitions

Thematic Analysis: Thematic analysis is a qualitative data analysis technique that can be applied to identify and interpret patterns in data, and this is commonly applied in organizational research to understand leadership and risk management strategies (Braun and Clarke, 2006).

Supply Chain Resilience: The capacity of a supply chain to foresee, absorb, adapt, and recover from disruptions to ensure continuity of operations (Katsaliaki et al., 2021).

Risk Management: Risk identification, assessment, and mitigation to ensure that operations and financial losses in supply chain systems are minimized (Gerschberger et al., 2023).

Digital Transformation: The supply chain management's integration of digital technologies to enhance operational efficiency and resilience (Katsaliaki et al., 2021).

Transformational Leadership: A management style that empowers and encourages staff to be creative and effective in coping with change, especially in high-risk sectors such as supply chain management (Taseer & Ahmed, 2022).

Supply Chain Disruptions: Supply chain disruptions are unforeseen occurrences or situations that disrupt the smooth movement of goods, services, or information within a supply chain (Deep et al., 2025).

Operational Continuity: Operational continuity refers to the capability of an organization to keep vital business processes and operations going on throughout and following a disruption (Yeboah et al., 2025).

Workforce Resilience: Workforce resilience is the ability of workers to be flexible, recover, and continue working in a state of stress or disturbance (Alicke and Foster, 2024).

3.3 Justification of Technique

The researcher uses a qualitative research method to understand the views of U.S. supply chain managers about integrating transformational leadership and digital technologies to develop the operation and workforce resilience amid supply chain disruptions (Donadoni et al., 2019; Katsaliaki et al., 2021). This design offers specific suitability in gaining insights into lived experiences and adaptive behaviors in dynamic and high-risk settings where the complexity cannot be observed in numeric data alone (Yeboah et al., 2025). Given that the study aims to know how and why some leadership and technological strategies are applied in high-risk settings, qualitative inquiry is suitable. Leaders help in an exploration that is rich and contextual in terms of behaviors, decisions, and attitudes, which cannot be well defined through a numeric representation only (Yeboah et al., 2025). The discussion is directly related to the problem,

purpose, gap in practice, and the research questions that aim to answer the question of the lived experiences and decision-making processes of supply chain leaders amid disruptive events.

Transformational Leadership Theory (TLT) focuses on subjective, behavioral, and relational processes, which are good subjects for qualitative research. The capacity of leaders to motivate, influence, and enable followers through disruption can be best understood based on experiential information and not objective measurement. Although a quantitative approach could be relevant in measuring objective outcomes, it is not the best approach to understand the intricate motivations, decision-making, and leadership behaviors, which are the main focus of the current study (Donadoni et al., 2019). Mixed-method approach was, however, put aside and was not used because the research was exploratory and depth, as opposed to generalizability, was the main requirement (Braun and Clarke, 2006). Quantitative surveys can quantify statistical correlations, yet they are not sufficient to investigate the complexity of the realities of leadership and digital innovation in disruption management (Donadoni et al., 2019). A mixed-method approach was also not considered necessary at the point since the goal is not to generalize the findings widely but to become richly informed in terms of making future practice and theory (Braun & Clarke, 2006).

The research will employ semi-structured interviews with supply chain managers working in the U.S. in different industries to gather data. The research approach will enable the participants to give their views freely with the support of prompts that will ensure alignment with the research focus of leadership behaviors, digital integration, and resilience practices (Braun and Clarke, 2006). Semi-structured interviews provide the flexibility of a certain degree of structure that provides consistency to interviews with different participants. All interviews will be audio-taped, transcribed verbatim, and analyzed through thematic analysis, an approach that assists in

identifying some essential themes and patterns in qualitative data (Nowell et al., 2017). The interpretive objectives of the study are supported through the analytic approach, and it gives insight into the intersection of leadership and technology in practice.

The possibility of creating rich and detailed data, which can be used to understand the ways in which leaders are perceiving, adapting, and managing disruptions in real-world situations, is one of the leading benefits of qualitative inquiry (Mosadeghrad et al., 2023). The complexity is fundamental in revealing the subtle dynamics between leadership and digital adaptation, fundamental elements of supply chain resilience (Alicke and Foster, 2024). Moreover, qualitative research offers the benefit of being flexible, which enables a researcher to be responsive to new themes arising in data collection, which is essential in exploratory research. Nonetheless, there are weaknesses associated with qualitative research, such as subjectivity in the interpretation of data, possible researcher bias, and low generalizability of results. As a way of reducing the risks, the study will use more than one coder in the thematic analysis and member checking, whereby participants of the study will review the initial findings to ensure they are accurate. The strategies aid in enhancing the credibility, reliability, and trustworthiness of the study results.

3.4 Data Sources

In the qualitative study, the data will be gathered by semi-structured interviews of the U.S. supply chain managers who have experienced or managed the supply chain disruption. Semi-structured interviews are an established qualitative approach that is flexible and consistent across interviews (DeJonckheere and Vaughn, 2019). The method allows members to share ideas extensively, which is best when addressing complicated questions like leadership practices and online strategies in disruption times. The semi-structured interviews will correspond to the goal

of the project to investigate the impact of transformational leadership and digital technologies on operational and workforce resilience.

The sampling will be purposive, and the knowledge and experience of the participants with regard to the study will also be a factor. A typical qualitative research technique, purposive sampling, helps researchers to choose information-sensitive cases that resonate with the research goals (Palinkas et al., 2015). The sampling method will aid in ensuring that they will capture insights regarding people who are actually involved in supply chain management and can reminisce about strategic responses to disruption events. The interviews shall be guided by a semi-structured interview guide, which will seek to explore the experiences and views of the participants but will give room to creativity and expression. The interview guide will be developed around the themes of the literature review and the research questions of the project. Kallio et al. (2016) conducted a study to determine that interview guides that are designed well increase the depth and relevance of the qualitative data collection. To verify the correctness and validity of the instrument, a panel of experts will be consulted to discuss and perfect the interview questions. Experts in supply chain leadership, digital transformation, and qualitative research will be involved in the panel.

In order to guarantee ethical behavior, all the participants will be provided with an informed consent form, which will state the purpose of the study, the rights, confidentiality measures, and voluntary participation. Participation will be fully voluntary, and participants will be free to withdraw anytime they wish to. Analysis of the interview data will be based on thematic analysis, which will allow establishing common patterns and themes of leadership practices and digital resilience strategies (Kallio et al., 2016). Thematic analysis is a versatile and

powerful approach to the thematic analysis of qualitative data, especially when it is necessary to comprehend the experienced lives and explain complex phenomena (Braun & Clarke, 2006).

The study will purposively sample participants in section 3.4.1 (sampling strategy) of the study, those actively working in managerial or senior leadership roles in the U.S.-based supply chain organizations. The approach assures the participants of their firsthand experience in the issues of supply chain disruption, resilience, leadership, and digital technologies. Inclusion criteria will center on individuals who have had firsthand experience in dealing with disruptions in the last five years. In section 3.4.2 (recruitment procedures), the participants will be recruited using professional networks such as LinkedIn, supply chain management associations, and industry forums. The eligibility criteria, study purpose, and contact information will be contained in a recruitment flyer that will be shared digitally.

Section 3.4.3 (instrumentation and interview guidelines) will focus on the main data collection instrument, which will be a semi-structured interview guide that will consist of open-ended questions. The guide will address the leadership practices of the participants and how they adopt digital technologies and how they build operational and workforce resiliency. Questions will be set in tandem with the research questions of the study and will be open-ended to allow emerging information that may emanate in the process of the interviews. Probes and follow-up prompts will also form part of the interview guide to further elaborate and discuss pertinent experiences. In section 3.4.4 (expert panel review), an expert panel will be held to look into the case of the interview protocol. The panel is going to be composed of 3 to 5 specialists in the field of supply chain management, transformational leadership, and qualitative research techniques. The relevance, clarity, and comprehensiveness of the interview questions will also be tested by the panelists. There will be a pilot study involving 2-3 supply chain professionals fitting the

inclusion criteria, but not included in the main sample of the study. The pilot and expert panel feedback will be applied to the interview guide, and changes will be inserted to align it with the objectives of the research. The process will increase the content validity of the data collection instrument and its reliability.

3.4.1 Sampling Strategy

The qualitative inquiry sampling will be a purposive sampling technique, which is a non-probability method frequently employed in qualitative research, aiming at choosing the participants depending on their relevance to the research problem (Palinkas et al., 2015). By employing purposive sampling, the researcher will select people who will give comprehensive details to the researcher on their personal experience in supply chain management, especially regarding exposure to disruptions and their adoption of leadership or digital solutions to increase resilience. The research particularly focuses on mid-senior-level managers who are in charge of supply chain management within manufacturing, logistics, retail, and healthcare industries. Includes as well managers who work in logistics companies as well as managers in more general industries in which supply chain management is an important business process. The research methodology will be best suited to answer the research questions entailed in the study, which are aimed at finding out how supply chain managers feel about transformational leadership and digital technologies in disruptions managerial scenario.

The size of the study is justified by the nature of the study, which is qualitative, and the rule of data saturation. Data saturation is when no new themes or insights are added by collecting additional data, which means that the responses are rich and detailed enough (Ahmed, 2025). According to Ahmed (2025), a sample size of 8-15 people is fine in qualitative research since the sample would be saturated, particularly when the participants belong to the same occupation and

have similar experiences. Consequently, the study will consider a target population of 12 to 15 U.S. based supply chain managers, and then a minimum of 10 successful interviews should be expected to guarantee a level of analytical depth and coverage.

To reduce the number of participants who drop out, a few proactive approaches will be employed. The strategies incorporated are flexible scheduling of interviews, pre-interview communication, and reminders came after the scheduled interviews through email or phone. Also, participants will be advised about the estimated time (45-60 minutes) and the voluntary nature of the participation, and the right to withdraw at any time without any penalty. The research will be executed in the US, where a national sample of supply chain managers in different industries, including but not limited to manufacturing, logistics, retail, and healthcare, will be recruited. The geographical area is wide enough to guarantee the confidentiality of participants, as well as to offer a wide range of organizational settings and practices associated with disruption management (Palinkas et al., 2015). The target group comprises all mid- to senior-level supply chain managers in U.S. based companies that manage supply chain activities and risk management.

The target group is 12-15 supply chain managers who are already in the job where they make decisions regarding the disruption response, digital adoption, and workforce leadership. The population has overlapping positions, e.g., CEOs, supply chain directors, or HR executives, especially in small/mid-sized businesses. People will be found in professional circles, industry groups, and social networks, e.g., LinkedIn. The target population makes it possible to check the fit between the objective of the project and that of exploring the lived experiences and strategies of players in the supply chain during disruptions. The study also allows the inspection of

relevance, action, and fit of the research questions by choosing the people who satisfy the criteria, which guarantees the relevance of the generated insights.

3.4.2 Recruitment Procedures

The recruitment consideration will be concerned with the purposive selection of the U.S.-based supply chain managers possessing a high level of knowledge of risk management and resilience-building strategies. Not only will the individuals have leadership positions, but they will also be given practical experience in dealing with the supply chain disruptions. The participants will be identified by their professional background, industry visibility, and experience. In particular, participants are required to have at least 10 years old in terms of experience in supply chain management. The professional networking sites will be used to recruit participants by a multi-step method that incorporates professional networking sites like LinkedIn and peer network referrals. The general population will include all U.S.-based companies with the middle and senior-level professionals in the supply chain. Conversely, the target market includes 12-15 supply chain managers whose leadership roles are in logistics, manufacturing, or retailing companies. The size of the sample is consistent with best practices of qualitative research in finding data saturation.

To recruit the participants, first, potential participants will be identified by searching LinkedIn, targeting outreach in supply chain forums, and existing industry contacts. LinkedIn will be utilized only to make the first outreach to the potential participants who publicly display their position, and nothing will be sent in private where the contact information is not made publicly accessible. Permission from the official sites is not necessary. Secondly, the identified candidates will be invited to the study via an email (see Appendix E) containing the main description of the study, the eligibility criteria, and contact details to show interest. Third, the

prospective participants will be requested to fill out a short screening form to ensure that they fit all the inclusion criteria and none of the exclusion criteria. Any outreach and communication materials to be used in the recruitment and screening procedure will adhere to the protocol as prescribed by the IRB at Capella University, which is provided in Appendix A. Fourth, a Capella IRB-approved informed consent form will be e-mailed to the eligible participants. Respondents will be requested to look through the signed consent and send it back to schedule the interview. After receiving the consent, interviews with the participant will be arranged at their convenience. All the interviews will be held online through the User Interviews platform, which will provide flexibility and privacy. Lastly, emails will be used to remind them of the interview 48 hours prior to the interview to minimize the participants dropping out. An email of thanks will be sent after every interview as well.

The criteria for participation in the project are:

- The participants are required to be at least ten years old in their experience in supply chain management.
- Participants should either be in or have been in a leadership or managerial role within a U.S.-based supply chain role in the current or past.
- Participants have to have direct experience in dealing with disruption events (e.g., natural disasters, pandemics, geopolitical crises).
- The participants should know English.
- Interviewees will have to be online to participate in a 45-60-minute virtual interview in Central Standard Time from 8:00 AM to 6:00 PM.

Participants will have to be ready to give informed consent and will have to consent to be audio-recorded.

The project exclusion criteria will be:

- Those participants with less than 10 years of experience in the relevant field.
- Those who do not currently or recently occupy positions of leadership in the supply chain management.
- Students who have a personal or business connection with the researcher.
- Corporate: Students, faculty, and employees of Capella University.
- Those respondents who do not want to be taped or attend online.

The research will be undertaken with the full compliance of the institutional review board (IRB) of Capella University. Until the IRB approves the study, no participant will be contacted or recruited. No site permissions are needed since data will be collected at an individual level but not at the organization level. Recruitment email to participants (Appendix E), the questionnaire used to screen the eligibility of the participants (Appendix D), the informed consent form, and the interview protocol are all aligned with the IRB standards and pre-approved. Nonetheless, the confidentiality and anonymity of the participants will be guaranteed. The announcement of the recruitment will be in Appendix E. The announcement will contain a short description of the study, eligibility criteria, details of participation, and details of how to indicate enthusiasm. Invitations and follow-up messages will be developed based on the Capella IRB guidelines, with the recruitment script being formulated so that the participants are thoroughly informed and their rights are not violated. The voluntary nature of the study, the option to withdraw at any time, and the safeguards of the personal data will be explained to all participants. The audio files of the interviews will be kept in a digital folder that is password-protected, and the transcripts will be anonymized to exclude any identification. Participants will not be given any financial incentives,

as this is in line with ethical considerations to ensure that there is no form of coercion or unwarranted influence.

3.4.3 Instrumentation/Interview Protocols/Document Review Protocols

A semi-structured interview guide will be the main research tool in the study to extract detailed information on how the U.S. supply chain managers implement transformational leadership and digital technologies in establishing operational and workforce resiliency to supply chain disruptions. The semi-structured interviews are appropriate when the researcher wants to explore the qualitative aspects of a research since it is flexible in the probing process, and also, all participants follow a similar pattern (DeJonckheere and Vaughn, 2019). The interview guide will consist of 10 open-ended questions that will be in accordance with the purpose of the study and the project questions. The guide has been created based on the transformational leadership theory and ideas presented in digital supply chain resiliency literature. Primary constructs to be addressed by questions will include inspirational motivation, individualized consideration, intellectual stimulation, and idealized influence, and how participants use digital platforms, predictive analytics, and automated tools to reduce disruptions. The alignment guarantees that the interview guide is aligned to the research objectives as well as to the theoretical framework to ensure that abundant, relevant, and actionable data are collected (Braun and Clarke, 2006). The complete interview guide in accordance with the TLT dimensions by Bass is in Appendix D.

The interviews will be held online using Zoom, which is a safe video-conferencing system, and each meeting will take 45-60 minutes. The interviews will be audio-recorded with the permission of the participants to be transcribed verbatim, which will be analyzed. Transcription will be done using Otter.ai, which is an automated transcription service. Review of transcripts will be done manually by the researcher in order to ensure transcripts are corrected.

To increase the credibility of the process, every participant has a chance to check his/her transcript in a member-checking process. The Zoom application allows reaching out to the entire country, increasing its accessibility, and helping keep it confidential due to the absence of physical identifiers. All respondents will be asked the same questions of core questions, but the semi-structured option will enable further probing depending on the experiences or outlooks of each respondent. Participants will be able to go over the transcripts as a member-checking to increase the credibility and reliability of the findings.

Recruitment and data collection processes will be followed in line with the IRB recommendations by Capella University. The respondents will be requested to provide their informed consent through the signing of the document electronically prior to the interview. The form will also detail the study objective, confidentiality measures, voluntary involvement, and the participant's ability to withdraw at any point in time. In order to preserve the anonymity of the participants, the transcripts will be de-identified, and the personal information will be kept in a password-protected, encrypted folder to which the researcher will have access only. There will not be any material benefits provided, in accordance with ethical principles, to avoid excessive impact. In Appendix D, a full copy of the interview guide is shown that has the entire list of open-ended questions, consistency with theoretical constructs, and where the researcher prompts and notes can be entered.

3.4.4 Expert Panel (also called Field Test)/Test Runs/Pilot Test

To guarantee the validity, credibility, and reliability of the semi-structured interview guide to be used in qualitative inquiry, two main validation activities will be undertaken before the actual data is collected formally: (1) an expert panel review and (2) a pilot test with non-participating individuals who were eligible. The steps will make sure that the instrument is

precise to the purpose of the project, the project questions, and the applied framework. The professional panel will be made up of two specialists and will possess the following qualifications. To begin with, a minimum of 10 years of experience in managing supply chain risks, qualitative research, or organizational leadership. Second, demonstrated experience in transformational leadership, digital transformation, or research-based interviewing in applied business settings. These persons will not be subjects of the study, but will go through the interview guide to review:

- Relevancy and understandability of questions.
- Correspondence to the research questions and the transformational leadership theory.
- Coverage of the most important constructs, such as leadership practices, digital integration, and resilience strategies.
- Identical: Neutrality and no leading questions.

The expert panel review form (Appendix G) will be used to gauge feedback. The panel will then evaluate the question content of each question in terms of its clarity, relevance, and compatibility with the study objectives and give recommendations on how to improve it. Necessary refinements will be made to the interview guide prior to launching the study. A pretest (not a pilot test) will be done with two supply chain managers, who will qualify for all the eligibility criteria but will not be part of the final sample. The subject matter will be simulated through the experience of the entire interview using Zoom. The sessions will be audio-taped and last about 45 to 60 minutes, and will be followed by a short feedback session. The aim of the tested run is to:

1. Ensure that the questions are clear and understandable.

2. Evaluate the responses produced to rich and relevant insights.
3. Assess the logical flow and sequence of questions.
4. Determine any length, sensitivity, or terminology problems.

The test run participants shall fill a test run feedback form (Appendix F), which shall provide an evaluation of the clarity of the questions, depth, and usability of the questions. There will also be changes to enhance clarity, structure, and correspondence to research objectives to make the instrument appropriate for gathering data. The two validation activities will only be done upon getting the consent of the IRB of Capella University. All participants of the review and test run will be told that the participation will be voluntary and non-binding, and that the feedback will have purely instrumental development purposes.

3.5 Data Collection

Practical gathering of information in this qualitative study will be based on a systematic, multi-step approach to guarantee methodological rigor, transparency, and ethical integrity. The main tool to be used in the collection of the data on the middle- and senior-level U.S. supply chain managers will be semi-structured interviews. The interviews will facilitate an in-depth and profound analysis of the role played by transformational leadership and digital strategies towards building resilience in the face of supply chain disruption. To begin with, the participants are going to be identified via professional networks like LinkedIn and pertinent industry groups. Recruitment script and formal invitation (Appendix E) will be circulated among qualified people. The screening questionnaire will be given to interested individuals to make sure that they fit the inclusion criteria (e.g., at least 10 years of experience in supply chain leadership positions and experience in risk management). Failing to comply with the eligibility requirements, eligible participants will be sent an email with a Capella IRB-approved informed consent form. The form

has to be signed and returned electronically to enable the scheduling of the interview. Consent form provides descriptions of the purpose, procedures, risks, and protection of confidentiality and the voluntary nature of participation as required by the IRB of Capella University.

Should Zoom fail or go offline, interviews will be rescheduled or instead held via a secure and encrypted audio interview via WhatsApp or phone, where privacy and security of recording are guaranteed. In these scenarios, sound files will be downloaded to a secure device and encrypted at once, with AES-256 encryption, and stored within a password-protected, cloud-based solution. Third interviews will be through Zoom, whereby the format allows the flexibility and accessibility of the interviewees spread across the U.S. The duration of each session will be about 45-60 minutes. The semi-structured interview guide will facilitate the consistency of the interviews as well as allow a flexible follow-up probing. Fourth, interviews will be recorded with the permission of the participant on Zoom with the help of the safe recording option.

Transcription of audio files will be performed as-is with the help of the secure and safe AI-driven transcription platform called Otter. The transcripts will be considered correct and will be anonymized by changing names and organizations to pseudonyms. Interviews that will be transcribed will be emailed to the participants to confirm their authenticity. This will be done to guarantee credibility because participants will get to review, edit their answers, or clarify the same, which is consistent with the best practices in qualitative research. Finally, any digital materials such as transcripts and recordings will be stored in an encrypted password-managed cloud storage system that can only be accessed by the researcher. The identities of the participants will remain confidential, and no details that may identify them will be presented when reporting the results.

Member-checking and peer-debriefing will be used in order to facilitate credibility in the study. Member-checking allows participants to confirm the correctness of their transcripts, and peer debriefing with a qualitative advisor guarantees that data are objectively interpreted (Katsaliaki et al., 2021). Reliability will be ensured through keeping a comprehensive audit trail, such as interview notes, coding decisions, and data management steps (Mosadeghrad et al., 2023). The decision-making procedures will be recorded in a research journal during the study. The confirmability will be implemented as the researcher will take part in reflexive bracketing, which implies being able to recognize personal biases and consciously avoiding them when interpreting responses (Palinkas et al., 2015). To curb subjectivity and uphold objectivity, the researcher will use a number of bias-reduction measures. To keep track of the assumptions made by the researcher and possible biases, first notes will be kept. Then the scholar will take note of his/her own perceptions of leadership and supply chain management to prevent the impact on the answers of the participants (Kallio et al., 2016). The employment of open-ended questions is aimed at avoiding a guiding answer and promoting genuine and participant-guided ideas (Ahmed, 2025).

3.6 Data Analysis Plan and Presentation

Thematic analysis will be used in the analysis of the data to determine the patterns in the responses provided by participants and provide meaningful insights into the strategies of supply chain resilience. Thematic analysis is a more systematic and adaptable method of studying qualitative data, which is particularly applicable to the analysis of the rather complex phenomena of leadership and digital transformation (Braun and Clarke, 2019; Nowell et al., 2017). The analysis plan is provided completely in the following section, which will describe the sequence of coding, structuring, interpreting, and presenting the data. The framework selected is suitable

because the objective of the project is to investigate the role of transformational leadership and digital approaches in supply chain resilience in the case of disruption. The framework allows coded, explicit, and reflective coding, which allows meaningful patterns to be identified systematically. The first step in coding will be to analyze semi-structured interview transcripts line-by-line to determine the themes that are related to leadership behaviors, adoption of digital strategies, and operational flexibility (Creswell and Poth, 2018). Braun and Clarke's (2006) six-phase thematic analysis framework will be utilized in this study, and enables the detection and meaning of patterns in a qualitative data set:

1. Familiarization with Data: The verbatim transcriptions of the audio-recorded interviews will be made with the help of the Otter.ai software. Each transcript will be manually read and annotated to allow the researcher to have an in-depth understanding of the content.

2. Initial Coding: NVivo software will be used to code key phrases and text segments using initial codes. Leadership practices, digital strategies, and resilience-building behaviors will be shown in the form of codes. The coding process will be both inductive and deductive and based on the raw information as well as the conceptual framework used to guide the coding process.

3. Theme Development: Based on repeating ideas and patterns (e.g., transformational behaviors, technology integration, adaptive capacity), coded data will be grouped into initial themes. All the themes will echo a major construct or constructs related to the purpose of the project.

4. Theme Refinement: Themes will be streamlined and developed repeatedly until there is coherence and consistency with the research questions and the theoretical framework. Duplicate or redundant themes or themes will be combined or eliminated.

5. Final Interpretation: Final themes will be discussed relative to the problem, purpose, and the transformational leadership framework, relating themes to the literature available on leadership and digital resilience in supply chain management.

6. Discussion of Findings: A summary of themes will be presented in the form of tables, precise quotes of participants, and a description. Thematic maps will be used to visualize patterns and results will be put in context within the business environment at present.

The research questions address the way supply chain managers are using transformational leadership and digital technologies to improve the resilience of the organization. Thematic analysis will help identify the answer to the underlying themes regarding leadership behaviors, strategic decision-making, adoption of technologies, and change management. Such an organized strategy will make each theme significant in providing answers to the primary and secondary project questions. All the interviews will be recorded and will be stored in an encrypted drive with the consent of the participants. Participants will be identified by special numbers to guarantee the preservation of their identity on the transcripts, as transcripts will not be treated together with the consent forms. NVivo will be used to perform manual coding to achieve consistency in developing themes, cross-referencing, and traceability of interpretations.

The codes shall be classified into themes in terms of constant comparison, clustering, or they can be broken down into sub-themes. The themes that arise will be refined over and over again in collaboration with peer reviewers to guarantee credibility and minimize bias. The thematic analysis does not presuppose a predetermined project question and can mutate with the help of coding and the development of themes (Braun et al., 2019). The initial code book will be created with the help of an Excel spreadsheet so that the initial codes of transcripts can be systematized. More themes will be discovered in subsequent analysis rounds and will be

included in the codebook when needed. Once data has been subdivided into themes, they will be checked by peer debriefing and member-checking to finalize them.

The data obtained by the participants will be analyzed to extract the significance and skills (Roberts et al., 2019). Feedback obtained and received through member checking and transcript review will be systematically organized in tables to facilitate interpretation and prove the transparency in theme development (Cloutier and Ravasi, 2021). The demographics are given in Table 2, and codes description in Table 3. The interpretative data obtained as a result of the participants will be recorded in the initial as well as the final code books, which will be located in Table 4 and Table 5, respectively. Table 4 defines the ideas used in the applicable framework.

Table 2

Participant Demographics

Participant	Occupation/Title	Industry	Validated
P1	TBD	TBD	Y/N
P2	TBD	TBD	Y/N
P3	TBD	TBD	Y/N
P4	TBD	TBD	Y/N
P5	TBD	TBD	Y/N
P6	TBD	TBD	Y/N
P7	TBD	TBD	Y/N
P8	TBD	TBD	Y/N
P9	TBD	TBD	Y/N
P10	TBD	TBD	Y/N

Note: This table represents the demographics of the participants.

Table 3*Code Description*

Code description	Words
Transformational Leadership in Disruption	To be disclosed
Resilience through Operational Adaptation	To be disclosed
Adoption of Digital Strategies	To be disclosed
Communication during Supply Chain Crises	To be disclosed

Note. The table shows the definitions of each code, the code, and where it will be transcribed.

This table is a proposal and may change during the analysis.

Table 4*Categories from Codes*

Category	Category definition	Code	Quote from transcript
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Note. This table is a proposal and may change during the analysis

Table 5*Initial Categories, Codes, and Themes*

Codes	Categories	Prospective themes	Definitions
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Note. This table is a proposal and may change during the analysis.

The ultimate code will be determined by importing participant transcripts into an Excel sheet for coding and data analysis, to discover codes and their descriptions within the datasets and arrange the results in Table 5. Code categories will be determined based on the analysis of the transcript. The identified categories will be listed in Table 6.

Table 6

Final Categories, Codes, and Themes

Codes	Categories	Themes
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Note. This table is a proposal and may change during the analysis.

Tables 7 and 8 will provide a detailed explanation of the codes, categories, and themes that have been derived from the transcripts. Table 7 will present the main data obtained from the study, while Table 8 will provide information on the categories, codes, and themes that were identified by the Excel sheet analysis of the transcriptions.

Table 7

Themes Derived from Codes and Categories

Theme	Theme Description	Number of Participants	# of occurrences
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Theme 1			
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Note. This table is a proposal and may change during the analysis.

Table 8

Themes from Analysis

Theme	Participant Quote	Definition
Sample Theme A	P1:	
	P2:	
	P3:	

Note. This table is a proposal and may change during the analysis.

After completing the final codebook, a graphical display of the relationships among the different codes, themes, and categories obtained during the thematic analysis will be added. Repeat analysis of project data will result in disaggregating the data into themes that depict patterns of meaning. The patterns will be in line with the purpose and question of the project (Cassell and Bishop, 2019). A summary of the codes and categories extracted will be given in Table 9.

Table 9

Final Themes and Definitions

Theme	Participant Quote	Definition
Theme 1	P1:	
	P2:	
Theme 2	P1	
	P5	
Theme 3	P2	
	P3	

Note. This table is a proposal and may change during the analysis.

Table 10 will store the themes as a result of the analysis of the collected data. The final themes and their definitions will be presented in Table 11 and will be the result of the analysis of all themes, including the ones acquired using the codes, classifications, and data analytics. The pictorial representation will be a demonstration of subjects that cross several codes. The visualization will aid in the representation of the interdependence of the themes and determine any unexpected deviations.

Table 10

Participant Quotes that Support Themes from Analysis

Participant	Quote
P1:	
P2:	
P3:	

Note. This table is a proposal and may change during the analysis.

The generated tables will include the rigor and depth of the qualitative inquiry into the themes produced as a result of the thematic analysis procedure (Ahtisham and Parveen, 2021). They will enhance the transparency, reproducibility, and traceability of the research findings. Conclusions regarding the role of transformational leadership and digital strategies in operational continuity and workforce resilience in supply chain disruptions will be made based on the data analysis (Crosley, 2021). All elements of the project will be explained in detail in the presentational form, including both written and visual sets of data. The data will be presented using PowerPoint. The report and presentations will assist the stakeholders in understanding and conveying the practical insights to the leaders in the industry. This outline fails to give a detailed description of the contents of the report. The final report will be based on the analysis findings.

In order to improve credibility and minimize the possible bias of the study, there are various strategies that will be used during the analysis process. The practice of reflexivity journaling will be performed on a regular basis concerning the recording of what the researcher assumes, develops as a form of insight, and reflects on personally (Creswell and Poth, 2018). This will assist in keeping transparency and self-awareness. Peer debriefing will be used in which a qualified colleague will be asked to review the coding decisions as well as the emerging themes to provide accuracy and reduce the bias of the researcher. Inviting participants to check and confirm the interpretations of the themes summarized will involve member checking in case they do not agree with the summarized information. There will also be the use of bracketing, where the researcher consciously puts aside his or her past experiences as a professional and will not influence the analysis in any undue way (Moustakas, 1994).

To communicate the findings of the study, a combination of narrative summaries, visual coding matrices, participant quotes, and thematic tables will be used to present the study findings. This multimodal presentation method will emphasise depth as well as clarity of data. It is hoped that the result will be useful to key stakeholders, especially supply chain executives grappling with digital transformation initiatives, risk management experts seeking robust leadership frameworks, and policymakers who want to develop systems capable of surviving disruptions in operations. There will be a focus on offering practical and actionable insights that are relevant to these audiences.

3.7 Trustworthiness

Trustworthiness is the key to valid, credible, and actionable findings in qualitative research. Ahmed (2024) outlines four criteria: credibility, transferability, dependability, and confirmability as the basis of determining trustworthiness in qualitative inquiry. The criteria altogether help in the work of the research to provide a way where the results are accurate, consistent, and, in addition, meaningful and applicable beyond the context of the study at hand. In this study, credibility will be established by thorough planning, the incorporation of professional feedback, self-reflection, and a participant-centered validation method. All these aspects of trustworthiness will be addressed in a systematic manner and outlined as indicated below.

3.7.1 Credibility

Credibility is connected to the trust in the vericity and reality of the data and its explanation (Ahmed, 2024). Triangulation, member-checking, and expert panel reviews will be used as methods of establishing credibility in this study. The triangulation will include data collection in the form of professionals working in different positions and backgrounds in supply

chain risk management to facilitate a rich and multi-faceted comprehension of the phenomenon (Creswell & Poth, 2018). Member-checking will be performed through the return of interview transcripts to participants to verify them, enabling them to clarify or correct their intended meaning (Birt et al., 2016). Moreover, the interview guide will be reviewed by an expert panel comprised of two experienced professionals in order to make sure that it corresponds to the transformational leadership theory and that it is in the right tone and relevance (see Appendix G). To increase the credibility and relevance of the data collected, a pilot test of the interview protocol with non-participating professionals who are eligible will be carried out to receive feedback regarding the clarity, flow, and appropriateness of the questions.

3.7.2 Dependability

Dependability relates to the stability of the research process over time and in different conditions (Ahmed, 2024). To achieve this, an audit trail will be carefully maintained, and all the decisions, notes, coding practices, and theme development processes will be documented. The delay will be used in the code-recoding approach by having a sample of transcripts reviewed with a delay to evaluate consistency and the accuracy of the coding process (Ahmed, 2024). Qualitative research peer debriefing will also be beneficial to further examine the coding framework and thematic groups to achieve analytical rigor and minimize subjectivity (Nowell et al., 2017). An extra supervisory committee will be used to maintain consistency in methods and ascertain compliance with qualitative best practices. All these efforts lead to the repeatability and transparency of the study procedures.

3.7.3 Confirmability

Confirmability is concerned with the objectivity and neutrality of the results, which are based on the answers of the participants and not the bias of the researcher. A detailed audit trail

will record every methodological decision, coding decision, and justification of how the themes were developed (Ahmed, 2024). The researcher will keep a reflexivity journal to record his or her personal biases, assumptions, and reflections to facilitate self-awareness and reduce the likelihood of undue influence on data interpretation (Creswell and Poth, 2018). Also, it can be done by including an external audit by an independent audit reviewer to determine if the conclusions arrived at are supported by the raw data. The measures will help to improve the transparency and defensibility of the study's analytical process.

3.7.4 Transferability

Transferability can be defined as the generalizability of the study results to other contexts or groups. This will be done by giving rich and detailed descriptions that will elaborate on the research setting, population, and methods of conducting the interviews (Shenton, 2004). Such background information will enable the readers to determine whether the findings can be used in other organizational or industry contexts. The involvement of industry experts in the research tool validation and in interviews also testifies to greater relevance. The intentionality in the sample of professionals who are currently engaged in supply chain risk management in digital transformation is also reinforcing the contextual resonance and practical feasibility of the results. These strategies will combine and improve the generalizability and practical implications of the research to similar organizational challenges.

3.7.5. Potential Threats and Mitigation

Possible risks to the credibility of this research are researcher bias, wrong interpretation of participants' responses, and lack of consistency in transcript coding. Peer debriefing, member-checking, a reflexivity journal, and transparent and well-documented analytic procedures will be used to mitigate these risks. Other protective measures involve having a pilot test of the

interview protocol, and involving a supervisory committee to routinely monitor and expert commentaries to test the validity of research instruments. Using data source triangulation will also aid in minimizing single-source bias and enhance the interpretation. The integrity and credibility of the research process will be supported by having a consistent coding framework and audit trail, since both decisions can be traced and repeated.

3.8 Ethical Considerations

The research will conform to the ethical principles of privacy and confidentiality as well as beneficence. The IRB will certify compliance of the study with the ethical codes of confidentiality, privacy, and informed consent. Lim et al. (2023) insisted on the need to safeguard the interests of society as well as the research participants. Voluntary consent is a part of these provisions. In that regard, the participants of the study will be allowed to get involved in the study on a voluntary basis, and at any stage of the study, they will have the right to withdraw. Also, participant identities will be anonymized by use of numerical codes (e.g., Participant 0110). This anonymization approach makes participants unidentifiable in transcripts, reports, or publications. Any information that includes identifiers is going to be locked up in an encrypted, password-protected folder and will be destroyed upon anonymization. Information will be anonymized, and only de-identified data will be stored to be analyzed and reported. The current research will also be conducted in the future, taking into consideration the 3 fundamental ethical principles in the Belmont Report: respect, beneficence, and justice (Chevrier et al., 2019).

- One of the ways in which respect for persons will be demonstrated will be through a comprehensive informed consent process that respects the autonomy of an individual.

- Beneficence will be ensured by limiting the risk of possible consequences and maximizing the benefits with the help of well-developed data protection and confidentiality guidelines.
- The justice will be observed with the help of making the participants, who will be chosen according to the professional knowledge in the sphere of supply chain risks management, but not the convenience or availability (Resnik, 2020).
- There will be no unfair exclusion or burden on any group.

An application will be presented to the Capella University Institutional Review Board (IRB) before any data collection can be done. Until the IRB approves the study, the study will not be carried out. The application will contain information on the research design, participant eligibility, informed consent process, interview protocol, and data handling procedures. These will be discussed by the IRB to ensure that the study complies with the ethical standards regarding a research study involving human participants (Creswell and Poth, 2018). The IRB may request revisions, which will be made as soon as possible in order to get it approved on time.

Each participant will be given a copy of an informed consent form (see Appendix C), which will outline the purpose of the study, the research process, voluntary participation, research period, risks involved, confidentiality issues, and data repositories. The consent form will also contain the contact details of the researchers, the rights of the participants, and the details of the IRB supervision. The participants will have access to ask questions and will either sign the form electronically or physically, and interview times will be arranged. The signed forms will be kept separately from the research data in a digital folder that is encrypted by use of the password in order to ensure confidentiality. Even though the research has minimal risk, the

possible risks are emotional distress during the interview or the violation of confidentiality. In order to curb these risks, the following strategies will be used:

1. The interviews will be professionally oriented and will not interfere with personal and sensitive aspects.
2. Participants will be reminded that they have the option of not answering any question or dropping out without repercussions.
3. In the event that a participant is distressed, he or she will be provided with a break or directed to a professional support resource.
4. No data will be distributed or published. All the data will be anonymized before the analysis and reporting.

Effective data security measures will be adhered to. Raw files of interviews and transcripts will be stored on a device that is encrypted and password-protected. This data will only be accessible to the lead researcher. Immediately after transcription and anonymization, all raw audio files and unprocessed transcripts will be deleted. The de-identified transcripts will be kept for five years as per IRB policy and will be permanently deleted (Yin, 2020). During the analysis and reporting process, participant codes will be utilized instead of names.

Participants can leave the study at any time without repercussions. The researcher can be informed by them through email or in the interview. In case any of the respondents decide to drop out, all the information will be destroyed immediately and irreversibly in the study materials. The consent form will spell out this policy to guarantee transparency and autonomy. There are no known conflicts of interest related to this study. The researcher is not financially or professionally affiliated with any of the participants or organizations. Participants will not

receive any monetary or material rewards, which will reduce the influence of undue influence and make participation entirely voluntary (Chevrier et al., 2019).

To guarantee validity, credibility and reliability of semi-structured interview guide to be employed in this qualitative inquiry, there are two pre-study validation activities that will be carried out, namely: (1) an expert panel review, and (2) a test run with non-partaking individuals who are eligible to be used in this qualitative inquiry. The panel of experts will consist of the professionals having more than 10 years of experience in supply chain risk management, transformational leadership, or qualitative methods. Such reviewers will evaluate the interview questions in terms of clarity, alignment with the research goals, and the ability to cover important constructs. The expert panel review form (Appendix G) will be used to gather feedback. The interview guide will be streamlined, based on their contributions, to make it clear, neutral, and theoretically agreed. Then, two qualified supply chain managers that will not be part of the stable sample will be used to run a test run (not pilot). The aim of this step is to emulate the interview experience and to obtain a real-time feedback through a test run feedback form (Appendix F). The interview sessions will be carried out through Zoom and will take 45-60 minutes, and it will be followed by a debrief. To explain, field test subjects will not be part of the final sample. They will not be re-interviewed and their data will not be included in the results of the study. They will only be involved to test the functionality of the interview guide.

3.9 Timeline for Project

The project schedule is structured to have realistic and effective flow to all of the significant stages such as IRB approval, recruitment of participants, data collection, data analysis, and final reporting. Each stage has been carefully set with an adequate time frame to meet the expectations of the Capella University DBA Capstone process, based on the best

practices in qualitative research and taking into account the possible unexpected delays. This is a systematic plan that facilitates timely work and indicates the feasibility and rigor that need to be undertaken in a doctoral-level project.

The timelines of the qualitative research should provide room to follow iterative processes and interact with data, as it is recommended by Creswell and Poth (2018). In this regard, this study incorporates buffer times to delays that can occur because of IRB approval processes, problems with recruitment of participants or problems in qualitative data transcription and analysis. As Yin (2020) also points out, the feasibility of a case study research should be considered not only based on coherent design but also on a realistic planning and timing.

Table 11

The Timeline for the Project

Project Phase	Estimated (Weeks)	Actual (Weeks)
Expert panel review	1-2 (Including buffer)	TBD
Test run interviews	1-2 (Including buffer)	TBD
IRB approval	3-4 (Including buffer)	TBD
Recruitment	3	TBD
Data collection	6-7 (Including buffer)	TBD
Data analysis	4	TBD
Final write-up in Section 5	2-3(Including buffer)	TBD
Poster presentation	2	TBD
Final approvals	4-5 (Including buffer)	TBD
Total time to completion	23-28	TBD

Note. The table below is the estimated schedule in weeks. The actual (Weeks) column will be filled in the performance phase of the project to monitor progress and compliance with the suggested plan.

The timeline complies with the time-frames that Capella anticipates of developing a doctoral project, and presents achievable timeframes within each stage of the project, assuming advice of past doctoral projects and literature on how a project plan should be developed in the qualitative research field. The IRB review and approval process takes the least amount of time in the project. Such delays may spill over to the recruitment and data collection processes and may affect the entire process. To prevent this risk, all the IRB-related documents such as the research protocol, informed consent forms and interview scripts will be ready and reviewed internally beforehand to be complete and clear. By following the guidelines of Chevrier et al. (2019), an error-free complete IRB application will minimize the chances of stalling in the queue because of revision requests.

Participation recruitment activities including finding and reaching out to potential participants will be initiated earlier in the IRB preparation phase such that, when the IRB clearance is received, then recruitment will commence as early as possible. This proactive measure would aid in a smooth passage towards the data collection period. A potential difficulty also includes delays in entering data or conducting analysis, because of the iterative research process involved in qualitative research. To overcome this, a backup option of transcription service will be adopted in case the in-house transcription takes more time than allocated time. In addition, the NVivo software will facilitate speed in the coding and thematic analysis, which will be efficient and still relevant in providing depth (Creswell and Poth, 2018). The flexibility of the schedule at hand will be evaluated on an ongoing basis. Any changes or delays will be reported

and reported to the mentor. Following the recommendation of research planning researchers, it is crucial to conduct a series of progress checks and proactive adjustment plans that would keep the momentum and guarantee the project is completed on time (Saunders et al., 2019).

The timeline of the project is based on the recommendations of scholars and the evidence-based best practices in the management of the project based on qualitative research. Creswell and Poth (2018) also focus on the criticality of integrating feasibility in the research timelines especially when dealing with real-world subjects and creating an iterative data analysis. Lim et al. (2023) also justify devoting additional time to other activities like participating with partners, ethical review procedures, and member checking. Moreover, Saunders et al. (2019) stated that clear scheduling, in addition to helping to accomplish the research process on time, enhances transparency and accountability. By integrating these principles, this paper offers a practical and coherent plan on how to maneuver successfully on DBA Capstone framework.

3.10 Summary and Conclusion

The given proposal section in detail describes the methodological basis, ethical guidelines and operational procedures of doing the research. The section will provide detailed arrangements on how the data shall be collected with the guiding principles being purposive sampling to enlist knowledgeable individuals who will share rich, high quality information on the research subject matter: how digital transformation affects the leadership ability of SMEs. The issue that is used to direct the study is the absence of qualitative knowledge of the way leaders modify their potential and abilities to succeed in the digitally transforming world. This is meant to understand the strategies and competencies of leadership that can be in line with current digital disruptions in SMEs. The research fills a literature gap in verifiable literature on the development of adaptive

leadership competencies of mid-level leaders in case of organizational digital transformation. In this study, the area of research is connected to leadership and Organizational Strategy.

The qualitative case study instrumentation will entail a semi-structured interview guide and utilizing the audio recording option of Zoom to facilitate proper transcription and analysis. Section 3 also described the method of data analysis that is using the thematic analysis framework described by Braun et al. (2019) and deductive coding. It will utilize a preliminary codebook and build themes in an iterative process of constant comparison, where emergent insights will be allowed (Birt et al., 2016; Cassell and Bishop, 2019). The strategies of trustworthiness are member checking, expert panel feedback and audit trail to guarantee credibility, dependability and confirmability (Chevrier et al., 2019). Guidance is to give ethics priority by following the guidelines of a protocol that has been aligned with the IRB, informed consent, confidentiality, and voluntary participation.

An explicitly designed timeline has been prepared to enable the sound implementation of all project stages, such as IRB approval, participant recruitment and interviews, data analysis and final reporting. All the steps consider the issue of feasibility, possible delays, and the relevant mitigation methods (Lim et al., 2023; Saunders et al., 2019). This schedule helps in realistic scheduling and strict adherence to completion within the DBA Capstone narrative.

At a personal level, the accomplishment of this study will add value to my professional growth as a would-be leader-scholar. The opportunity to gain hands-on experience with real world dilemmas of digital leadership and the ability to explore what they mean in practical implications to SME executives will make me more proficient in leading change in an organization. Moreover, the use of rigorous qualitative methods and ethical research practices has empowered my academic identity and enhanced my knowledge on research-based leadership

enquiry. The process in changing to Section 4 will be the IRB approval and gathering of data. Section 4 will outline findings of the data collection, themes and theme results, the responses of the participants and their implications in terms of leadership theory and practice. It will also contain a synthesis of the meanings by finding the agreement with existing literature and concluding on the research questions.

4.0 IRB APPROVAL AND DATA COLLECTION

Date upon which IRB approval (or NHSR indication) was received: [insert date].

5.0 RESULTS, ANALYSIS, AND REFLECTION

5.1 Introduction

5.2 Data Collection Results

5.3 Data Analysis

5.4 Contribution to Theory, the Literature, and the Practitioner Knowledge Base

5.5 Project Application and Recommendations

5.6 Reflection on Changes from Original Plan

5.7 Reflections on Program Journey and Individual Growth

5.8 Conclusion

6.0 PRESENTATION

[Please link to recorded presentation here.]

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APPENDIX A. PROFESSIONAL DEVELOPMENT FRAMEWORK

Course 1. Your DBA Journey

[text]

Course 5. Teaching Business in Higher Education

[text]

Specialization 3

[text]

Advanced Doctoral Course 1

[text]

Advanced Doctoral Course 4

[text]

APPENDIX B. APPENDIX TITLE

Please include all instruments, permissions, and other important documentation here [as determined by your instructor, mentor, or committee members] until final Dean review, at which time they should be removed. Learner-created interview protocols, surveys, or other original documentation should remain for Dean review and final submission.

APPENDIX C. SKILLS LAB CERTIFICATES

Include screen shots of your Skills Lab completion certificates here.

APPENDIX D. SEMI-STRUCTURED INTERVIEW GUIDE

Part 1: Leadership Style and Experience

1. Can you describe a major supply chain disruption you have faced in your current or past role?
2. How would you describe your leadership style when managing uncertainty or disruption within your supply chain?
3. What specific leadership actions have you taken during a crisis to motivate or support your team?
4. How do you encourage innovation and adaptability among your team during disruptive events?

Part 2: Digital Resilience Strategies

5. What digital tools or technologies have you used to help manage or recover from supply chain disruptions?
6. How have digital technologies enhanced or challenged your leadership effectiveness during crises?
7. Can you share an example where real-time data, AI, or digital dashboards influenced your supply chain decisions?

Part 3: Organizational Learning and Resilience

8. How does your organization capture lessons learned from disruption events? What role do you play in that process?
9. In your experience, what leadership qualities are most critical for navigating future disruptions in digitally connected supply chains?

10. Is there anything else you would like to share about how leadership or digital tools contribute to resilience in your supply chain operations?

**APPENDIX E. RECRUITMENT EMAIL SCRIPT AND SCREENING
QUESTIONNAIRE**

Dear [Participant's Name],

I hope this message finds you well. My name is [Your Full Name], and I am a doctoral candidate at Capella University. I am currently conducting a qualitative research study titled:

“Integrating Transformational Leadership Approach and Leveraging Digital Technologies to Mitigate the Supply Chain Disruption “

This study aims to gain a deeper understanding of how supply chain managers utilize leadership strategies and digital technologies to enhance resilience during disruptions. You are invited to participate in this study based on your professional experience in supply chain management and risk mitigation. Your insights will contribute to advancing practical strategies for enhancing resilience in complex supply chains.

To participate, you must meet the following eligibility criteria:

- Currently working as a supply chain manager in the United States
- Have 10 or more years of experience in supply chain or operations management
- Have experience with risk management and/or resilience-building strategies
- Fluent in English
- Able to participate in a 45–60-minute Zoom interview

If you are interested, please reply to this email, and I will send you a short eligibility screening questionnaire and an informed consent form. Participation is completely voluntary, and your identity will remain confidential throughout the study.

Thank you for considering this opportunity to share your expertise.

Sincerely,

[Your Full Name]

Doctoral Candidate | Capella University

[Your Email Address]

[Your Phone Number (optional)]

Eligibility Confirmation Form

Please answer the following questions to determine your eligibility for participation in the study.

1. Are you currently employed as a supply chain manager in the United States?
☐ Yes ☐ No
2. Do you have at least 10 years of experience in supply chain, operations, or logistics management?
☐ Yes ☐ No
3. Do you have experience managing supply chain disruptions, risk, or resilience-building strategies?
☐ Yes ☐ No
4. Are you fluent in English?
☐ Yes ☐ No
5. Are you available for a 45–60 minute virtual (Zoom) interview scheduled at your convenience?
☐ Yes ☐ No
6. Do you currently work for Capella University or have a personal relationship with the researcher?
☐ Yes ☐ No

APPENDIX F. TEST RUN FEEDBACK FORM

Date of Test Run Interview: _____

Participant ID:

Section 1: Interview Structure and Content

1. Were the interview questions clear and easy to understand?

☐ Yes ☐ Somewhat ☐ No

Comments:

2. Were any questions repetitive or confusing?

☐ Yes ☐ No

If yes, which ones and why?

3. Did the questions allow you to fully express your thoughts and experiences?

☐ Yes ☐ Partially ☐ No

Comments:

Section 2: Interview Experience

4. How was the pacing of the interview?

☐ Too fast ☐ Appropriate ☐ Too slow

Comments:

5. Did you feel comfortable sharing your responses during the interview?

☐ Yes ☐ Somewhat ☐ No

Comments:

6. Were there any technical issues (e.g., Zoom connection, audio)?

☐ Yes ☐ No

If yes, please describe:

Section 3: Suggestions for Improvement

7. What suggestions do you have to improve the interview guide or process?
8. Do you think this interview guide will effectively gather the intended insights from participants?

☐ Yes ☐ Unsure ☐ No

Why or why not?

APPENDIX G. EXPERT PANEL FEEDBACK FORM

Reviewer Name: _____ Date: _____

Area of Expertise: _____

Section 1: Interview Guide Assessment

1. Do the interview questions align with the research questions and conceptual framework (Transformational Leadership Theory)?

☐ Yes ☐ Somewhat ☐ No

Comments:

2. Are the questions clearly worded and free from ambiguity?

☐ Yes ☐ Somewhat ☐ No

Please identify any problematic questions:

3. Are there any key areas or themes missing from the interview guide?

☐ Yes ☐ No

If yes, what would you suggest adding?

Section 2: Instrumentation and Flow

4. Does the order of questions promote a logical flow for the participant?

☐ Yes ☐ Somewhat ☐ No

Suggestions for improvement:

5. Are the questions appropriately open-ended for qualitative exploration?

☐ Yes ☐ Somewhat ☐ No

Comments:

Section 3: Overall Feedback

6. Overall, how would you rate the quality of the interview guide?

☐ Excellent ☐ Good ☐ Fair ☐ Poor

7. Additional comments or suggestions:

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Capella University's Academic Honesty Policy ([3.01.01](#)) holds learners accountable for the integrity of work they submit, which includes but is not limited to discussion postings, assignments, comprehensive exams, and the dissertation or capstone project.

Established in the Policy are the expectations for original work, rationale for the policy, definition of terms that pertain to academic honesty and original work, and disciplinary consequences of academic dishonesty. Also stated in the Policy is the expectation that learners will follow APA rules for citing another person's ideas or works.

The following standards for original work and definition of *plagiarism* are discussed in the Policy:

Learners are expected to be the sole authors of their work and to acknowledge the authorship of others' work through proper citation and reference. Use of another person's ideas, including another learner's, without proper reference or citation constitutes plagiarism and academic dishonesty and is prohibited conduct. (p. 1)

Plagiarism is one example of academic dishonesty. Plagiarism is presenting someone else's ideas or work as your own. Plagiarism also includes copying verbatim or rephrasing ideas without properly acknowledging the source by author, date, and publication medium. (p. 2)

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Learners failing to abide by these policies are subject to consequences, including but not limited to dismissal or revocation of the degree.

Acknowledgments:

I have read, understand and agree to this Capella Publishing Agreement. I have read, understood, and abided by Capella University's Academic Honesty Policy ([3.01.01](#)) and Research Misconduct Policy ([3.03.06](#)).

I attest that this dissertation or capstone project is my own work. Where I have used the ideas or words of others, I have paraphrased, summarized, or used direct quotes following the guidelines set forth in the APA Publication Manual.

(Print Name)_____

REQUIRED Author's signature_____ **Date**_____

(by typing your name, you agree that this is your signature).