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Digital Technological Strategies to Reduce the Impact of a Crisis on Supply Chain Business Operations

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Walden University

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Walden University

College of Management and Human Potential

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Roderick Williams, Sr.

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the review committee have been made.

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Walden University
2024

Abstract

Digital Technological Strategies to Reduce the Impact of a Crisis

on Supply Chain Business Operations

by

Roderick Williams, Sr.

MS, Walden University, 2022

BS, Walden University, 2016

Research Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Business Administration

Walden University

July 2024

Abstract

Supply managers are concerned with effective strategies to minimize the impact on operations and profitability during unprecedented occurrences because they can incur millions of dollars in losses, interrupt flows of goods, and face customers' dissatisfaction. Grounded in the resource dependence theory, the purpose of this qualitative pragmatic inquiry was to identify and explore the effective digital technological strategies supply chain managers in the southeast region of the United States used to reduce the impact of crises on business operations and profitability. Data were collected using semistructured interviews with seven supply chain managers who had successfully digitalized their operations and a review of publicly available documents. Data were analyzed using thematic analysis and four themes emerged: (a) the use of inventory and financial management technologies, (b) the use of converging technologies, (c) the use of e-commerce, and (d) the use of communication technologies. One key recommendation is that supply chain managers should stay abreast of advanced integrated digital technologies to enhance resilience and minimize the impact of a crisis on business operations and profitability. The implications for social change include the potential for supply managers to provide uninterrupted access to goods and services, reduced international trade barriers, and uninterrupted employment in the communities they serve.

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Dedication

This research paper is dedicated to my parents, who inspired me to never fall short of my dreams and aspirations. They always encouraged me to do my best because the journey would be a rigorous one, but never give up. Without their encouragement, this research would not have been possible.

Moreover, I dedicate this research paper to my chairperson, Dr. Kim Critchlow, who constantly prepared and guided me throughout this entire project. I could not have done this without you, Dr. Critchlow, thank you! To my wife and kids for cheering me on every day, I cannot thank you enough. To my friends who have encouraged me every step of the way and provided moral support, I appreciate it. To my siblings who have cheered me on and provided moral support from day one of this journey, I thank you.

Lastly, I dedicate this research paper to the Almighty God who provided me strength, thinking power, wisdom, competence, good health, and guidance each day during this journey. All of these, I offer to you.

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To my wife, who served as my inspiration. For keeping me inspired to push myself to the limits and to make the best out of everything.

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Section 1: Foundation of the Project

Background of the Problem

Rapidly evolving business landscapes, such as emerging crises, economic downturns, natural disasters, and global pandemics, present significant challenges to organizations worldwide. Such crises often disrupt traditional business operations, threatening profitability and sustainability. Zhao et al. (2023) found that the COVID-19 pandemic caused major business setbacks, and as much as it was beyond human control, some of the disruptions or the degree of impact could have been minimized. The supply chain industry suffered, particularly multinationals. The national lockdowns temporarily slowed down or stopped the flow of goods, and business operating costs were negatively impacted due to the disruption of manufacturing and delivery of finished goods to consumers.

During the COVID-19 pandemic, more than 50% of multinationals faced challenges to remaining resilient amidst the unprecedented disruption of the supply chain, making it difficult to minimize costs and control the flow of goods (Zhao et al., 2023). According to Moosavi et al. (2022), the pandemic caused up to a 50% drop in the interborder movement of goods, leading to a loss of revenue and shareholders' wealth. Digitalizing the supply chain could help multinationals cope with and minimize the impact of disruption to the supply chain (Ning et al., 2022).

Business Problem Focus and Project Purpose

The specific business problem was that some supply chain managers in the southeast region of the United States lack effective digital technological strategies to

reduce the impact of a crisis on business operations and profitability. Therefore, the purpose of this qualitative pragmatic inquiry was to identify and explore the effective digital technological strategies supply chain managers in the southeast region of the United States use to reduce the impact of a crisis on business operations and profitability. The target population for the project comprised five supply chain managers, identified using the purposive sampling method, who had used effective digital technological strategies to reduce the impact of a crisis on business operations and profitability. For this research project, the data sources comprised (a) semistructured interviews with the supply chain managers in the southeast region of the United States for primary data, as well as (b) professional associations and social networks, (c) open-access publications relevant to the project, (d) public websites and artifacts, and (e) testimonials for secondary data. The conceptual framework for this project was the resource dependence theory (RDT) developed in 1978 by Pfeffer and Salancik.

Research Question

The overarching research question for this research project was the following:
What digital technological strategies do supply chain managers use to reduce the impact of a crisis on business operations and profitability?

Assumptions and Limitations

Assumptions

Assumptions refer to what a researcher believes to be true about a study, even without concrete truth (Ellis & Levy, 2009). Even though identifying assumptions can be challenging, Ellis and Levy (2009) noted that every qualitative study has a set of

assumptions. For this research project, one of the assumptions was that the identified supply chain managers in the southeast region of the United States would participate in the interview and provide truthful responses free from any bias. The second assumption was that the interview questions would help collect relevant data sufficient to determine the effective digital technological strategies supply chain managers can use to reduce the impact of a crisis on business operations and profitability. The third assumption was that the participants would be knowledgeable and had practical experience in effective digital strategies in the supply chain.

Limitations

Limitations refer to uncontrollable weaknesses or problems within a study that can threaten its internal validity and reliability (Ellis & Levy, 2009). One limitation of this project was that the sample comprised only five supply chain managers. A larger sample might result in different findings. Andrade (2020b) stated that a larger sample will provide more reliable results. The second limitation was that it was challenging to locate participants willing to take part in the project from the approved sources. The third limitation was that even though some participants responded fully to the questions, they withheld some information that could be more beneficial to the research for fear of releasing too much information that might benefit the competitors. The last limitation was that most participants might have busy working schedules, which could disrupt their diligence when responding to the interview questions, thereby affecting the quality of their responses.

Transition

In Section 1, I introduced the background of the problem, the business problem focuses and project purpose, the research question, and finally, the assumptions and limitations of the project. Section 1 also included a brief description of RDT as the conceptual framework. Section 2 includes a review of academic literature. Section 3 includes ethical considerations in research, the nature of the project, the sampling method, the data collection techniques, the interview questions, data analysis, and reliability and validity. Section 3 also includes a justification for using the qualitative pragmatic inquiry research design and Yin's five-step approach to analyze data. Finally, Section 4 includes a presentation of the findings, business contributions and recommendations for professional practice, implications for social change, recommendations for further research, and a conclusion.

Section 2: The Literature Review

Review of the Professional and Academic Literature

Literature Review Opening Narrative

Through this literature review, I aimed to analyze and synthesize scholarly research on effective digital technological strategies that supply chain managers use to reduce the impact of a crisis on business operations and profitability to evidence the existence of the problem and to convince the readers of the breadth, depth, and scope of research inquiry. According to Snyder (2019), a literature review is a powerful way to synthesize research findings and show evidence at a more advanced level. Through the review, I also sought to unearth areas that need more research, a critical aspect in developing theoretical and conceptual frameworks.

The literature review comprised a critical analysis and synthesis of the sources, articles relevant to my project found in various academic databases at the Walden University Library and Google Scholar. Databases used for the literature review included ProQuest, Emerald, SAGE, ScienceDirect, and Business Source Complete (EBSCO). I used keywords and phrases such as *supply chain*, *digitalization*, *business disruptions*, *supply chain efficiency*, *managing crisis*, and *crisis resilience* to find relevant articles from the databases. The literature review comprised a critical analysis and synthesis of literature pertaining to the conceptual framework and themes and phenomena, and the comparisons and contrasts of different points of view, and the relationship of this project to previous research and findings.

Application to the Applied Business Problem

The purpose of this qualitative pragmatic inquiry was to identify and explore the effective digital technological strategies supply chain managers in the southeast region of the United States used to reduce the impact of a crisis on business operations and profitability. The RDT was the lens through which I studied the phenomenon.

Conceptual Framework

The conceptual framework for this qualitative pragmatic inquiry research was RDT. RDT is a distinguished theoretical framework inside the discipline of organizational research that focuses on the impact of external assets on organizations' conduct and overall performance. Developed in 1978 by Pfeffer and Salancik, RDT posits that businesses are no longer self-contained entities but, as a substitute, depend on external resources to continue to exist and thrive. RDT involves the assumption that some of the organization's highly valuable resources are uncertain and limited. Hence, organizations must constantly contact other entities to manage the environmental uncertainty linked to limited internal resources (Celtekligil, 2020). Through these actions, businesses are driven to establish relationships and dependencies with external entities such as suppliers, customers, and regulatory bodies to access indispensable resources (Pfeffer & Salancik, 2003). These assets include monetary capital, raw materials, information, technology, expertise, and social connections. The principle emphasizes that agencies' potential to be impervious and manage key sources immediately influences their power, strategic choices, and performance.

One of the central tenets of RDT is the thought of interdependence between groups and their external environment. Organizational leaders attempt to reduce uncertainty and dependence on external sources by organizing relationships and acquiring external resources (Celtekliligil, 2020). This interdependence gives upward thrust to a range of strength dynamics as businesses rely on useful resource vendors and need to negotiate and manipulate these dependencies to keep their right of entry to resources (Kumar & Sharma, 2021). RDT additionally highlights the function of environmental factors in shaping organizational behavior. Organizations operate in complicated, dynamic environments characterized by scarcity, competition, technological advancements, and institutional pressures (Cedilnik, 2013). These environmental factors influence the availability, accessibility, and price of resources, thereby shaping organizations' strategic decisions and moves. For example, during a financial strain, businesses may additionally face elevated opposition for restricted resources. Ideally, the supply chain is the integral part that controls the movements of goods from the producer to the consumers. Therefore, according to Pfeffer and Salancik (1978), supply managers can utilize external resources, such as digital technologies developed by other entities, to enhance business continuity and minimize the risk of uncertainties.

RDT provides a very realistic management role in controlling resources and managing crises. Management is perceived to be able to utilize existing limited resources (Nienhüser, 2017). Pfeffer and Salancik's (1978) primary basis of the RDT was the recognition that external factors are constrained, and managers ought to minimize the contingencies and dependence on those factors. Notably, firms rely heavily on the

availability of resources and internal control that stabilizes activities and patterns of behavior to streamline their business operations for success (Sherer et al., 2019).

According to Nienhüser (2017), RDT can affect different organizational structures depending on the control of essential resources, as behaviors can be traced back to the managerial decisions influenced by external and internal contingencies on the availability of critical resources. Therefore, RDT provides elaborative information on how supply chain managers can align the business structures and processes to minimize the impact on operations during a crisis.

The theory also emphasizes that companies interact in useful resource acquisition, resource allocation, and resource utilization, things to do to manipulate their aid dependencies correctly (Hillman et al., 2009). Resource acquisition involves identifying and establishing relationships with useful resource providers, negotiating contracts, and regularly supplying resources. Resource allocation refers to the inside distribution of sources inside the employer to help several functions and activities. Resource utilization entails using assets efficaciously and efficaciously to achieve organizational desires and preserve competitive advantage (Pfeffer & Salancik, 1978). RDT has been widely utilized in several research contexts, including studies on executive power, strategic management, interorganizational relationships, and public policy (Hillman et al., 2009). RDT has offered vivid and broad exploratory research on how organizations minimize organizational contingencies and the negative impacts of uncertainties. Nonetheless, Hillman et al. (2009) acknowledged that overdependence on external resources can be risky, suggesting that companies strategize to reduce useful resource dependence through

diversification, vertical integration, executive succession, alliances, and mergers and acquisitions.

Additionally, RDT has been used to examine the effect of resource dependencies on organizational outcomes. According to Kim et al. (2020), firms continue to utilize cooperative linkages to enhance their competitive edge, which is highly emphasized by Pfeffer and Salancik's (1978) RDT. Through resource dependence on other firms, supply chains are prompted to develop positive attributes like trust, commitment, and satisfaction in logistic integration between the manufacturers and service providers (Roundy & Bayer, 2019). Kim et al. argued that considering RDT, these firms build positive relationships that help improve the supply chain's business and operations performance. Furthermore, Jiang et al. (2022) posited that multinational corporations (MNCs) have recently embraced several resource-dependence actions to manage adverse business impacts in different situations. In international business, these entities recognize the significance of utilizing external resources from other firms to enhance operational efficiency and manage business disruption, especially when operating in various foreign markets.

Despite its contributions, RDT has additionally faced criticisms and limitations. According to Hillman et al. (2009), one of the criticisms of RDT is that it oversimplifies the complicated nature of useful resource dependencies and fails to account for the company and initiative-taking behavior of organizations. Consequently, RDT is perceived to lack in-depth insight into addressing the position of inside resources, organizational capabilities, and dynamic abilities in managing useful resource

dependencies. According to Ozturk (2020), RDT is only limited to strategic options rather than the theory's posited assumptions and main concepts. Regardless of these critics, RDT was appropriate for this project as it provides significant insights into strategies supply chain managers can adopt to minimize the negative impacts of uncertainties in their working environment.

Supply Chain Management

Supply chain management (SCM) is the strategic coordination and integration of everything done within a supply chain. It encompasses planning, execution, control, and monitoring to optimize the flow of sources and obtain the preferred outcomes (Orbitt, 2021). SCM aims to maximize patron value, enhance operational efficiency, and achieve competitive gain in the market. In a usual supply chain, there are numerous vital components. Suppliers play a necessary position by importing the basic uncooked materials, features, or services required for production. Manufacturers or producers change these inputs into completed products or gather components to create the ultimate goods (Lezoche et al., 2020). Distributors or wholesalers facilitate the motion of products from manufacturers to outlets or end customers. Retailers are the entities that immediately promote products to consumers, and customers are the folks or groups that purchase and use the products or services. Effective SCM includes more than a few activities. Planning is crucial for developing strategies, forecasting demand, and optimizing inventory stages to meet purchaser requirements efficiently (Basheer et al., 2019). Sourcing entails identifying and deciding on suppliers, negotiating contracts, and managing relationships to ensure a reliable grant of materials and services. Procurement

entails acquiring materials, goods, and services from suppliers through techniques such as order placement, dealer evaluation, and charge processing.

Before the outbreak of the COVID-19 pandemic, supply chain managers relied on just-in-time inventory management to enhance the efficient flow of goods. Following the pandemic outbreak, the approach failed to help the global supply chain mitigate the extreme shock (Raj et al., 2022). SCM has become the backbone of a complete strategy involving the efficient flow of material, information, and money (Cagri Gurbuz et al., 2022). The COVID-19 pandemic challenged supply chain managers to rethink their strategies to avoid future disruptions. In modern-day SCM, the planning stage is a critical phase of operations. Planning involves making short-term and long-term goals to mitigate the pandemic and similar disruptions in the future (Raj et al., 2022). Activities within the COVID-19 planning phase defined how successful each step along the supply chain was. Precisely tailored strategies are formulated, future demands are envisioned, and optimal inventory levels are achieved.

During the post-pandemic period, sourcing was an integral part of the SCM repertoire, which was a successor to the planning overture. Supply chain managers have reshaped their global sourcing strategy into a local strategy to enhance their interconnectedness within the vicinity of their manufacturing premises (Raj et al., 2022). The local sourcing strategy has been a necessity due to a significant shift in the interconnected supply chain. Neill and Bowen (2021) noted that this phase will depend on having excellent and tactical suppliers who work collectively for the best result to be achieved by the overall supply chain despite the COVID-19 effect. In this way, SCM

performance smoothly continues from local sourcing to procurement, which centers on acquiring materials, goods, and services. The complex issues include order placement, review of vendors, and payment issuance so that the supply chain performance continues to move seamlessly (Raj et al., 2022). The movement from planning techniques to sourcing and procurement in SCM shows orchestrated flawlessness. Each stage plays a specific role in the grand production's dazzling ballet of supply chain operations. When the SCM is at play, the audience can see how these activities are expertly aligned to create other performances in the supply chain and in SCM performance.

The production phase becomes the focus in this big production as the SCM performance unravels downstream. Here, these carefully sorted and selected raw materials are transformed in a new way (Ye et al., 2022). In this stage, raw materials are transformed into processed goods using production, assembly, and testing activities. Precision and quality are vital; the product can only be accepted into the glorious supply chain scheme after being scrutinized for perfection. Logistics is the sequential component of a coordinated sequence following the production crescendo during and after COVID-19. This stage involves careful handling, transport logistics, warehousing complexities, order fulfillment, and inventory management techniques. Fulfillment and logistics dance to ensure that each part is in tune with the beat of the supply chain for harmonious movement.

There is also distribution, where products are channeled to customers' final destinations as end users. It is where transport logistics takes up; the ordering process becomes an exquisite practice, and stock replenishment becomes a subtle play (Raj et al.,

2022). In the distribution phase, the finished goods are delivered to the customers signifying the successful flow of goods from manufacturing to the end users. The process is characterized by responsiveness, active listening, and carefully handling any product returns, to enhance customer satisfaction (Dutta et al., 2020). The last act demonstrates that this is more than delivering products; it should form a positive experience—leaving the audience as satisfied as the customers. Within a vast landscape, SCM acts as a maestro that focuses on the importance of downstream activities for an effective and efficient supply chain symphony. Implementing SCM is a comprehensive process that ensures that each note and stage is geared towards optimizing consumer satisfaction, gaining an edge over competitors (Durugbo & Al-Balushi, 2022). SCM sections uncover the complexities of supply chain resilience, disruption, adaptation strategies, and digitalization in SCM.

Supply Chain Resilience

Supply chain resilience refers to a supply chain's capacity to respond, adapt to, and recover from disruptions while retaining operations and purchaser service continuity. It involves the potential to count on plausible risks, efficiently manage disorders, and rapidly restore normal functions. A resilient grant chain is characterized by flexibility, redundancy, and agility. It contains strategies and practices to mitigate risks and decrease the influence of disruptions (Zhao et al., 2023). This may also encompass diversifying suppliers, developing alternative sourcing options, retaining security stock, enforcing sturdy chance administration processes, and leveraging technological knowledge for real-time visibility and facts analytics. Supply chain resilience is quintessential in today's

dynamic and uncertain business environment (Lezoche et al., 2020). Disruptions can occur from various sources, such as health disasters, geopolitical events, supplier failures, or demand fluctuations. According to Laorden et al. (2022), organizations with resilient supply chains are better outfitted to manipulate these disruptions, mitigate financial losses, protect their reputation, and ensure patron satisfaction.

It was beyond sure that supply chain resilience was below the desired expectations during the COVID-19 pandemic. Much improvement in the supply chain's resilience came from the lessons learned from the pandemic (Kiers et al., 2022). Supply chain resilience is the ability to mitigate disruptions by responding quickly through adopting flexible contingency planning disruptions (Zhao et al., 2023). Flexibility is one of the critical components of resilience in supply chains (Faruquee et al., 2021). Kiers et al. (2022) noted that flexibility plays a role in changing requirements on the supply side and unforeseen changes in the external pandemic environment. The supply chain is a flow solution whose tune is dictated by demand (it may change suddenly). Flexibility characterizes a more adaptable supply chain that graciously adapts its movements to these swings in direction (Shukor et al., 2020).). Agility, closely related to flexibility, is the ability to quickly tackle unexpected situations (Shukor et al., 2020). In other words, it means quickness in responding to an unanticipated beat, while flexibility is the ability to conform to different motions (Ning et al., 2022). Resilient supply chains are ones that can be agile even when there is some form of disruption (Zhao et al., 2023). Agility includes quick responses, informed decision-making, and being ahead of problems.

The flexibility and agility of resilience ensure a responsive supply chain. While flexibility allows supply chain movement to be flexible, agility enables those adjustments to be precise and timely. A flexible and agile supply chain allows the supply chain manager to be prepared for the next move or obstacle (Zhao et al., 2023). Instead of simply surviving during disruptions in its supply chain, this dynamic shift ensures that it flows elegantly through these disruptions while retaining agility and composure. Redundancy approaches function like an aggressive guard, defending a resilient supply chain against unexpected disruptive events. According to Wang et al. (2021), redundancy approaches involve doubling essential elements in the supply chain, analogous to putting safety nets in various places in the process. The duplication goes beyond having numerous suppliers, maintaining double stocks, or setting up alternative plants. The goal is plain and involves not letting one point of failure lead to a domino effect over an entire supply chain. The safety nets come in handy through redundancies, allowing for continuity even during interruptions. For example, a resilient supply chain includes multiple suppliers; thus, another supplier can be found for an organization when a primary supplier experiences a challenge (Kiers et al., 2022). It also ensures a secure supply of essential supplies or components, which lowers vulnerabilities and achieves competitive advantages.

Diversification and collaboration are as crucial as synchronized moves in supply chain resilience. According to Shukor et al. (2020), the diversification of suppliers and physical locations provides a way of spreading production processes and outsourcing across different areas, thus reducing the effect that resultant local breakdowns can cause.

Communication and information exchange among stakeholders in the supply chain ecosystem will engender a collaborative endeavor of constructing resilience (Durugbo & Al-Balushi, 2022). Such a joint approach also helps make the SCMs highly versatile and able to respond uniformly to COVID-19 problems. A perfect supply chain comprises agility, flexibility, technology, and collaboration (Shukor et al., 2020). The complex approach helps in overcoming the disruptions rather than only surviving them. It aims to maintain the company's operations in the long run and achieve customer satisfaction.

Supply Chain Disruptions

Supply chain disruption is any event that alters the production and distribution of products. Natural disasters and environmental factors, such as earthquakes, hurricanes, and floods, are significant causes of supply chain disruptions. These events can severely damage the infrastructure, halt production, and interrupt the transport networks (Kaur et al., 2021). A health crisis like the COVID-19 pandemic can also disrupt the supply chain. As witnessed during the pandemic, there were widespread closures of factories, labor shortages, and drastic changes in customer consumption patterns, which caused a significant impact on the global supply chain networks. Supply chain managers must understand the vulnerabilities and ways to enhance value or strengthen facilities in risky areas.

Some regions' laws and enforcement made their supply chain challenging to enhance operational efficiency. According to Khan et al. (2022), these policies can sometimes be revised in one night via a quick policy shift or an argument on trade issues. The unquestionable regulations and enforcements, such as temperature checks, safety kits

in the workplace, and controlled working hours, alongside social issues during COVID-19, could result in higher tariffs and port delays, translating to more cost and inefficiencies through SCM (Khan et al., 2022). In the worst-case scenario, operational zones are shut down in areas of a pandemic such as COVID-19. Another disruption due to COVID-19 was the labor shortage (Rahman et al., 2023). Also, the bankruptcy of a vital vendor would be a big shock, constituting a surprise and a significant disruption in the supply chain. The path to successfully maneuvering through these stormy uncertainties is marked by the vision and a well-plotted course among supply chain managers (Rahman et al., 2023). Understanding the intricacies of these supply chain disruptions is essential to make a supply chain robust enough to overcome them (Roy et al., 2020). Supply chain managers should be able to foresee them and preempt the turbulence through appropriate precautions.

Anticipating likely supply chain disruptions is a significant aspect of effective SCM. Risky assessments, scenario analysis, and preparing specifically for different disorders are a part of initiative-taking planning (Nicholls et al., 2021). The supply chain managers need to be aware of potentially vulnerable points and plan for them in advance so that as many cracks as possible are covered before a crash occurs and they stand firm amid the COVID-19 shock. Companies need to identify risks to minimize them by assessing their impact and then prioritizing them for the supply chain line to be effective (Mzougui et al., 2020). Some crucial elements for solid risk management are acquiring insurance coverage, multiple suppliers, and a recovery plan. This is handy when responding promptly and adapting to changing circumstances during disruptions. Agile

response strategy involves real-time decision-making, supply chain re-engineering, and proper communications with all critical stakeholders' parties (Neill & Bowen, 2021). Developing elegant response mechanisms allows supply chains to cope with disruptions in a versatile way that limits overall impacts.

Analyzing cases of supply chain disruptive conditions gives critical information on remedial actions. Supply chain managers can investigate real-life cases and identify how they respond to the occurrence of previous disruptions (Kumar & Sharma, 2021). Initiative-taking planning, robust risk management, and agility in response helped minimize the disruption in business operations, as illustrated by case studies. Experienced supply chain managers can learn from such incidents to improve their resilience strategies.

Supply Chain Strategies

Developing an effective strategy is pivotal in everyday business settings. Supply chain managers can leverage strategic alliances as these positive relationships not only help create a competitive advantage but also aid in improving supply chain efficiency. These alliances, in the form of partnerships and joint ventures, allow businesses to share resources and information, reduce costs, and leverage each other's strengths (Mzougui et al., 2020). Supply chain managers can tap into new markets and better navigate cultural diversity through these alliances (Moosavi et al., 2022; Mzougui et al., 2020). Such partnerships also foster innovation by combining diverse expertise to accelerate the development of new products and technologies. Strategic alliances also help in risk mitigation by distributing financial and operational risks among partners, allowing them

to undertake larger projects with reduced individual exposure. Improved supply chain efficiency is another significant benefit, as better coordination and integration among partners streamline inventory management, production scheduling, and distribution. As global supply chains become increasingly complex and interconnected, the role of strategic alliances will continue to grow, making them a vital strategy for maintaining competitive advantage and resilience in supply chain management.

Selecting the most suitable supplier is crucial to developing effective supply chain strategies. In this domain, the strategies are diverse, including elaborate pre-qualifying assessments with potential suppliers. Faruquee et al. (2021) stated that maintaining positive relationships with suppliers is vital in facilitating the success of the supply chain systems based on the supplier's reliability, production capacity, location, and financial strength. Therefore, supply chain managers are tasked to be keen on designing strict criteria for assessing potential suppliers. The ability to select the appropriate suppliers that are less prone to causing business disruption or operational inefficiency shows the managers' prudence in making strategic decisions. While selecting partners is considered a primal factor in effective supply chain strategies, Mzougui et al. (2020) argued that some factors, such as natural disasters, are unavoidable, and regardless of the best suppliers, the business is still at risk of disruption. Moosavi et al. (2022) also noted that during the COVID-19 pandemic, the interborder closure caused a massive interruption in food supply, automobiles, and other European products. Such an encounter does not mean the affected companies lacked in selecting suitable suppliers but were victims of the unavoidable natural disaster. Therefore, Moosavi et al. suggested that supply chain

managers redesign their supply chains to accommodate local, near shore, and, more importantly, diversify their suppliers. The managers can make the supply chain more resistant to risks and help make operations more robust by using a strategic approach toward the suppliers.

Effective inventory management is another pivotal supply chain strategy that supply chain managers can adopt to minimize disruptions. Effective inventory management is the backbone of the supply chain, which depends on accurate demand forecasting. Raj et al. (2022) noted that during the pandemic, some companies faced a massive spike in demand while others had a decline in demand, and this imbalance was a significant contributing factor to disruption in most supply chain networks. Raj et al. further argued that before the pandemic, most supply chain managers relied on the just-in-time inventory management system, which helped minimize costs and increase efficiency. As such, the global supply chain disruption during the COVID-19 pandemic increased the significance of supply chain risk management and mitigation strategies. Therefore, Oliveira-Dias et al. (2022) noted that supply chain managers can utilize big data analytics and block to forecast demand accurately. It helps to manage inventory effectively and prevent potential disruptions.

Collaborating with relevant players along the supply chain improves the decision-making process. Successful organizations in demand forecasting have managed to maintain optimal inventory levels, lower storage expenses, and respond swiftly to changes in market trends. These strategies have enabled supply chain managers to adopt initiative-taking responses to their SCM's issues by utilizing integrated technology and

collaborative methods for forecasting (Mzougui et al. 2020). Inventory management strategies seek to maintain the appropriate stock levels and the necessary quantities (Raj et al., 2022). Modern inventory management systems allow real-time observation of stock levels, automatic reordering procedures, and predictive capabilities for demand forecasting. Adopting an inventory management strategy based on lean supply chains or just-in-time inventory will help minimize inventory carrying costs, stock out risks, and improve operational efficiencies. The responsiveness and flexibility of a supply chain depend on its ability to find the optimum point in inventory management.

Optimizing logistics is another essential supply chain strategy for improving the efficiency of the movement of goods across the supply chain network. In addition to the supply and demand shortfalls, Raj et al. (2022) argued that creating an efficient logistics system is a pivotal strategy for a resilient supply chain system. Paciarotti and Torregiani (2020) noted that the plans include determining the best routes to enhance warehouse efficiency. Supply chain managers can use WMS solutions to optimize logistical operations, increasing supply chain transparency (Sytch et al., 2022). Through constant improvement in logistics optimization processes, managers can respond to the complexity of supply chain dynamics by supplying their commodities to consumers on time and at a minimum cost.

Supply chain strategies are, therefore, crucial in improving the supply chain's effectiveness and efficiency. The process consists of proper supplier selection, efficient demand forecast, intelligent inventory management, and strategic logistics optimization, allowing businesses strength, flexibility, and continuous productive operation. These

strategies are good examples of how companies successfully reinforce their supply chain against disruption and uncertainties. Holding enough inventories to satisfy consumers' demands without paying for unnecessary overstocking can be challenging. The strategy primarily applies just-in-time inventory in which goods are not stored until needed, thus reducing carrying costs and chances of obsolescence. The safety stock management acts as a buffer that takes care of unexpected fluctuations in demand and the disruptions of the COVID-19 pandemic in the supply chain for stronger resilience. Supply chain managers ought to monitor stock levels in real-time through primarily inventory management systems, automated replenishment, and demands.

Supply Chain Digitalization

Supply chain digitalization refers to the adoption of digital technologies that enhance the optimum interconnectedness of logistical and inventory management. In recent years, supply chain digitalization has gained popularity in its ability to enhance resilience and risk mitigation (Bigliardi et al., 2022). These digital technologies in the supply chain enhance optimum planning and procurement strategies (Bigliardi et al., 2022). Several digital technologies have been initiated into the supply chain digitalization processes, which have transformed the traditional supply chain into a new era characterized by efficiency. Among the leading digital technologies are the IoT, blockchain technologies, machine learning, virtual reality, and artificial intelligence (AI) (Bigliardi et al., 2022). Supply chain managers utilize these technologies to improve efficiency and position their systems to remain resilient during a crisis.

Supply chain technologies embody a broad range of software functions and hardware devices that support distinctive elements of the supply chain. Enterprise resource planning (ERP) systems are built-in software program solutions that help manipulate core commercial enterprise strategies such as inventory control, production planning, and order management (Basheer et al., 2019). These systems give companies a centralized view of operations and make data-driven choices to improve efficiency and coordination. The IoT has offered a new dimension of a network of digitally connected objects to facilitate interaction and monitor the status and progress of goods. Companies leveraging the IoT in their supply chain offer real-time tracking of goods, enhancing timely controls, planning, and coordination of the logistics processes (Bigliardi et al., 2022; Laorden et al., 2022). IoT has been a practical tool utilizing agility, visibility, and information sharing to influence supply chain performance (Ning et al., 2022). AI, blockchain, and predictive analysis are other digital technologies destined for the spotlight (Javaid et al., 2021). Blockchain technology in the supply chain enhances transparency and data efficiency and minimizes risks to the supply chain (Ning et al., 2022). Like AI, the conceptualization of blockchain technologies allows supply chain actors to track products, minimizing fraud risk (Javaid et al., 2021). It keeps the supply chain actors updated and increases the sense of accountability and responsibility.

Undoubtedly, digital technologies have become prominent in the warehousing, freight, and shipping industry. The adoption of digitalization of the supply chain in this industry is significantly growing (Bigliardi et al., 2022). Concerning the digital age, the warehouse management system (WMS) is considered one of the primary ways of

promoting functionalism in warehousing systems (Harb & Trad, 2023). These programs are not limited to inventory tracking; they also incorporate shipments, plus additional functionalities such as workstation monitoring of employees. Various real-world case studies demonstrate how WMS enhances inventory accuracy and reduces errors during COVID-19 while increasing efficiencies within a warehouse (Sytych et al., 2022). It provides security of sufficient goods at their demand and increases labor effectiveness. Warehouse processing that is automated and fast cuts down fulfillment time, reduces cost, and guarantees reasonable client satisfaction (Laorden et al., 2022). The significance of WMS, in this case, is that it plays a vital role in helping make accuracy possible and preparing firms to tackle current problems in the supply chain.

Inventory management systems (IMS) are software program options that aid in monitoring and controlling stock levels. They supply real-time visibility into inventory, automate replenishment processes, and facilitate demand forecasting (Ning et al., 2022). Inventory management systems help corporations optimize inventory, conserve costs, decrease stockouts, and improve order success rates. Supplier relationship management (SRM) systems are technologies that support collaboration and verbal exchange with suppliers. These systems allow companies to manipulate provider information, song dealer performance, and streamline procurement processes (Laorden et al., 2022). SRM systems provide visibility, ensure contract compliance, and foster better relationships with key suppliers. Transportation management systems (TMS) are tools designed to support transportation planning, execution, and optimization (Sytych et al., 2022). They help in route planning, carrier selection, freight consolidation, and shipment tracking.

TMS permits corporations to optimize transportation costs, beautify shipping performance, and improve patron service.

Digital technology transformation has ushered in a new era of communication between supply chain partners. Digitalization has helped break down communication barriers, thus promoting a collaborative environment to create a more responsive and interconnected supply chain network.

Transition

Section 2 included a review of academic literature regarding the digital technologies supply chain managers can utilize to reduce the impact on business operations and profitability during a crisis. Section 2 also offered a comprehensive analysis of the use of RDT in helping supply chain managers acquire, share, control, and manage internal and external resources. Section 3 includes the ethical considerations in research, the nature of the project, sampling method, data collection techniques, interview questions, data analysis, and reliability and validity. Section 3 also includes a justification for using the qualitative pragmatic inquiry research design and Yin's five-step approach to analyze data. Finally, section 4 consists of a presentation of the findings, business contributions and recommendations for professional practice, implications for social change, recommendations for further research, and a conclusion.

Section 3: Research Project Methodology

Project Ethics

Researchers are the primary data collection instrument. They are obliged to adhere to ethical considerations when conducting research to maintain the dignity of the participants and the integrity of the data collected. According to Collins and Stockton (2022), researchers are significant instruments that play a central part in research and, hence, guide and control the entire process. As such, in qualitative research, researchers have the role of protecting the identity of the participants.

I did not have any relationship with the participants targeted for inclusion in the research. The research topic was new to me, and I had not performed any prior research on it.

It was my role as the researcher and primary data collection instrument to inform the participants of the time, date, scheduling, duration, and purpose of the interviews. Adhering to ethical considerations is important as it protects the participants and enhances the quality of the data (Wexler & Largent, 2023). Some of the ethical considerations required when conducting research include voluntary participation, informed consent, confidentiality, and anonymity (Sng et al., 2016). In addition to these guidelines, I complied with Walden's and the Belmont Report's ethical guidelines—which Nagai et al. (2022) identified as respect for persons, justice, and beneficence. To adhere to these ethical considerations, I informed the participants of the purpose of the project and emphasized that there would be no incentives for participating. Therefore,

they had a right to withdraw from the project without any obligation to give reasons at any point of their liking by just informing me through a text message or email.

To start, I issued the participants an informed consent form to show that they fully understood their responsibilities in the project as well as the risks, and that their participation was voluntary. Therefore, to show their commitment and agreement to participate, I requested that the participants sign the informed consent form. Nagai et al. (2022) noted that to adhere to the privacy and confidentiality of the participants, the names of the participants and the companies they represent should be anonymous. Therefore, I did not include the names of the supply chain companies or the names of the participants. Instead, I used identification pseudonyms such as P1 for Participant 1, P2 for Participant 2, and so on. My Walden Institutional Review Board (IRB) approval number is 04-04-24-06138399.

Nature of the Project

For this research project, I used the qualitative research method. This approach was appropriate for this project because the qualitative research method is recommended in exploratory research as it explores narrative and visual data guided by research questions developed to address an underlying problem (Borgstede & Scholz, 2021; Noyes et al., 2019). It fit the objective of the project because I intended to identify and explore the digital technological strategies supply chain managers use to minimize the impact of a crisis on business operations and profitability. For the research design, I used qualitative pragmatic inquiry, which allows researchers to produce desirable and actionable knowledge of a complex phenomenon within a given organizational setting (Kelly &

Cordeiro, 2020). Using this research design, a researcher can comprehend effective strategies and use the knowledge to construct potential solutions to underlying indeterminable situations. According to Dźwigoł and Trzeciak (2023), pragmatic inquiry is recommended when researching business processes and management-related concerns.

Population, Sampling, and Participants

The population for this qualitative project was supply chain managers in the southeast region of the United States. I gained access to the participants via their LinkedIn profiles or through professional associations. I emailed them, and if they were able, I had a short conversation with them in the effort to establish a potential working relationship with them. According to Campbell et al. (2020), purposive sampling is the most sought technique in qualitative research as it better matches the sample to the aims and objectives of the research, enhancing the rigor and trustworthiness of the data and findings. Andrade (2020a) also noted that purposive sampling allows the researcher to study only the specific group that is of interest to the research objectives. Therefore, data were collected from five purposively sampled supply chain managers.

To meet the eligibility criteria, the participants needed to have success in implementing digitalization strategies to mitigate supply chain disruptions. After interviewing the initial five participants, I did not reach data saturation; I continued to interview the other candidates already vetted and available as part of the target population until the seventh participant, when I did reach data saturation. Andrade (2020b) argued that a sample that is too small can be insufficient while a large sample can be unnecessary. Therefore, the sample is sufficient as it helps to develop a deeper

understanding of the phenomenon with the richest evidence available (Campbell et al., 2020). To control the sample size and achieve data saturation, I asked the participants the same questions.

Data Collection Activities

In qualitative research, the researcher is the primary research instrument. Therefore, I was the primary research instrument responsible for collecting relevant data to achieve the research objectives. As a researcher, I had the role of remaining unbiased in the data collection process. Knott et al. (2022) noted that using semistructured interviews is a common strategy in qualitative research that allows the researcher to explore lived experiences relating to the phenomena. Adopting a flexible conversational tone offers interviewers an opportunity to collect rich data from study participants (Buys et al., 2022). Dubey et al. (2023) used semistructured interviews to determine how executive managers in manufacturing firms maintained supply chain resilience during the COVID-19 pandemic. Likewise, Raassens et al. (2021) used semistructured interviews to determine the crisis mitigation strategies that managers use to maintain supply chain resilience during the initial stages of the COVID-19 pandemic. Similarly, I also used semistructured interviews to determine the digital technological strategies that supply chain managers use to minimize the impact of a crisis on business operations and profitability.

The semistructured interviews were conducted via Zoom videoconferencing and Microsoft Teams, depending on the participants' preferences. The interview followed a detailed interview protocol located in Appendix A. The interview protocol defines the

steps that taken during the actual interview session: (a) introducing myself and the purpose of the interview; (b) obtaining consent from the participant; (c) asking the participant for permission to record the interview; (d) beginning recording if permission was granted; (e) asking the open-ended questions; (f) asking follow-up questions, if needed; and (g) thanking the participant for taking part in the interview.

After the interview, I emailed the participants a transcription of the session as well as my interpretations of their responses. I asked the participants to confirm the accuracy of my interpretations, which is referred to as member checking. I used this technique, in addition to data triangulation and audit trails, to enhance the reliability and validity of the project findings.

Interview Questions

1. What strategies did you use to minimize disruptions to business operations and profitability?
2. What digital technological tools did you choose to enhance supply chain resilience?
3. What were the criteria used to identify and select these tools?
4. What challenges did you face when implementing these strategies?
5. How did you address these challenges when implementing the digitalization strategies?
6. How did you measure the effectiveness of these digitalization technologies on your supply chain performance?

7. What other information would you like to share about the digital technological strategies you used during a crisis?

Data Organization and Analysis Techniques

The informed consent forms and other data collection logs, including my reflective journals, were stored on a password-protected computer to ensure the safety of the data collected and maintain the rights, anonymity, and confidentiality of the participants. In addition, the files were password protected. Other documents and flash drives with the data were stored in a locked cabinet, and I was the only one with access to the key. All these will be secured for five years, after which I will delete all the files on the computer and flash drives and shred the documents.

Data analysis involves the process of organizing interview transcripts, secondary data, and other data sources to develop themes and derive meaningful interpretations of the phenomena under study (Castleberry & Nolen, 2018). For this project, I used Yin's five-step thematic and coding analysis method. The five steps consist of compiling, disassembling, reassembling, interpreting, and concluding the data (Castleberry Nolen, 2018; Yin, 2017). In this process, I transcribed the interview, organized the data into codes, used the codes to identify patterns and themes, and finally used the common themes to interpret and derive conclusions. Using thematic analysis is vital in minimizing the volume of data and deriving logical meanings from the data (Bingham, 2023). Notably, I used NVivo, a coding tool, to aid me with coding and analyzing the data. The software is resourceful in qualitative data analysis as it allows researchers to develop codes, identify patterns and themes, and, more importantly, interpret the relationship

between the identified codes (Dhakal, 2022; Elliott-Mainwaring, 2021; Zamawe, 2015).

The software also helped with data triangulation.

According to Valencia (2022), data triangulation is categorized into four categories: data triangulation, methodological triangulation, theory triangulation, and investigator triangulation. For this project, I used data triangulation, as I used not only primary data from interviews, but also secondary data such as government sites, published articles, and artifacts. Through this, I correlated the identified key themes to the existing literature.

Reliability and Validity

Reliability and validity parameters in qualitative research represent key aspects of assuring the reader that the research findings are credible and trustworthy. The two concepts are constructs of measure that determine whether research findings are fit for the project or not. Reliability is a measure of whether responses from multiple coders of data sets are free from bias (Kamper, 2019). Reliability and validity are fundamental domains for measuring methodology in data collection (Ahmed & Ishtiaq, 2021). The two concepts are used to persuade the audience that the research findings support the project.

Reliability

Reliability measures concern the trustworthiness and dependability of the data set obtained, for which any measuring tool is free from error. Yin (2017) defined reliability as the extent of replicability and consistency of the project findings. To achieve reliability, I used audit trails and data triangulation to enhance the replicability and

dependability of the project. I defined my codes and themes thoroughly so that another researcher could replicate the project with ease. More importantly, I made sure to be as accurate in the coding, data classification, and interpretation of the patterns as possible and avoid any areas that might threaten the trustworthiness of the findings.

Validity

Validity in qualitative research is the extent to which a measure reflects the construct it is supposed to measure. Validity refers to the credibility, transferability, and confirmability of qualitative research findings (Ahmed, 2024; Johnson et al., 2024; Nyirenda et al., 2020). The concept of ensuring credibility can be achieved through a great extent of involvement, triangulation, and persistent observation. In this project, credibility was achieved through triangulation and member checking. Here, I issued the interview participants the interpretation of the transcribed interview responses and asked them to indicate whether the interpretation was accurate. Member checking allows participants to actively participate in the research process, increasing credibility and validity (Nyirenda et al., 2020).

Transferability in qualitative rigor can be achieved through a detailed and comprehensive explanation of phenomena (Ahmed, 2024). Here, I achieved transferability by providing a detailed explanation of the project participants, interview protocol, and data collection method to ensure that another researcher can accurately conduct the same project in a different setting.

Confirmability relates to the extent to which the project findings can be confirmed and ascertained by others (Johnson et al., 2024). It can be achieved through member

checking and peer debriefing. For my project, I achieved confirmability by organizing all the research documents in an orderly manner. I ensured that I documented and explained all the procedures so that anyone could read and evaluate them and confirm that the findings accurately reflect the truth about the phenomena under study.

Transition and Summary

Section 3 included ethical considerations in research, the nature of the project, the population and sampling method, the data collection techniques, the interview questions, data analysis, and reliability and validity. Among these were the ways I accessed the participants, eligibility criteria, data collection protocol, and ways to achieve data saturation. In Section 3, I also justified using the qualitative pragmatic inquiry research design and Yin's five-step approach to analyze data. Section 4 includes a presentation of the findings, business contributions and recommendations for professional practice, implications for social change, recommendations for further research, and a conclusion.

Section 4: Findings and Conclusions

The purpose of this qualitative pragmatic inquiry was to identify and explore the effective digital technological strategies supply chain managers in the southeast region of the United States used to reduce the impact of a crisis on business operations and profitability. I conducted semistructured interviews with seven supply chain managers in the southeast region of the United States who had effectively used digital technologies to minimize the impact of the COVID-19 pandemic on business operations and profitability. I also utilized publicly available documents, including success stories of implementing supply chain digital technologies, to support my data analysis in determining the effective digital technologies supply chain managers used to minimize the impact of a crisis on operations and profitability.

I conducted the one-on-one interviews via Zoom and recorded the audio for transcription. Data validation was conducted through member checking while the data coding was done using data analysis software, following Yin's five-step coding and thematic analysis framework. The analysis uncovered four themes concerning the digitalization technologies that supply chain managers can use, including (a) inventory and financial management technologies, (b) converging technologies, (c) e-commerce, and (d) communication technologies.

Presentation of the Findings

The overarching research question was the following: What digital technological strategies do supply chain managers use to reduce the impact of a crisis on business operations and profitability? I used semistructured interviews as the main data collection

technique to gather primary data. Therefore, I conducted seven one-on-one interviews via Zoom, asking the participants the seven interview questions in Appendix B. After the seventh participant, I had achieved data saturation, as I kept getting similar responses with no new information. I strictly adhered to all the data collection guidelines for all participants.

The main secondary data source used consisted of publicly available general company documents documenting success stories of implementing digital technologies in SCM. Additional beneficial information was acquired when participants offered detailed answers to follow-up questions. I used pseudonyms (P1–P7) to protect the identity of the participants and maintain anonymity. The primary and secondary data were stored in separate files and labeled appropriately. The interview recordings and transcriptions were also assigned pseudonyms, each matching the appropriate participant, and were stored in a password-protected computer drive, where they will be kept safe for the next five years.

After each interview, I validated the data by inviting each participant to review their transcript. I also shared with each participant a summary of the themes and final interpretation of their respective interview to confirm the accuracy of my interpretations. During this same time, the participants were allowed to add more information or seek clarification. I then uploaded the documents in a data analysis tool while following Yin's five-step thematic and coding analysis method to organize and analyze the data. From the analysis, the following themes emerged: (a) inventory and financial management technologies, (b) converging technologies, (c) e-commerce, and (d) communication

technologies. Table 1 shows the frequencies of the themes from the participants' responses.

Table 1

Emerging Themes Frequency

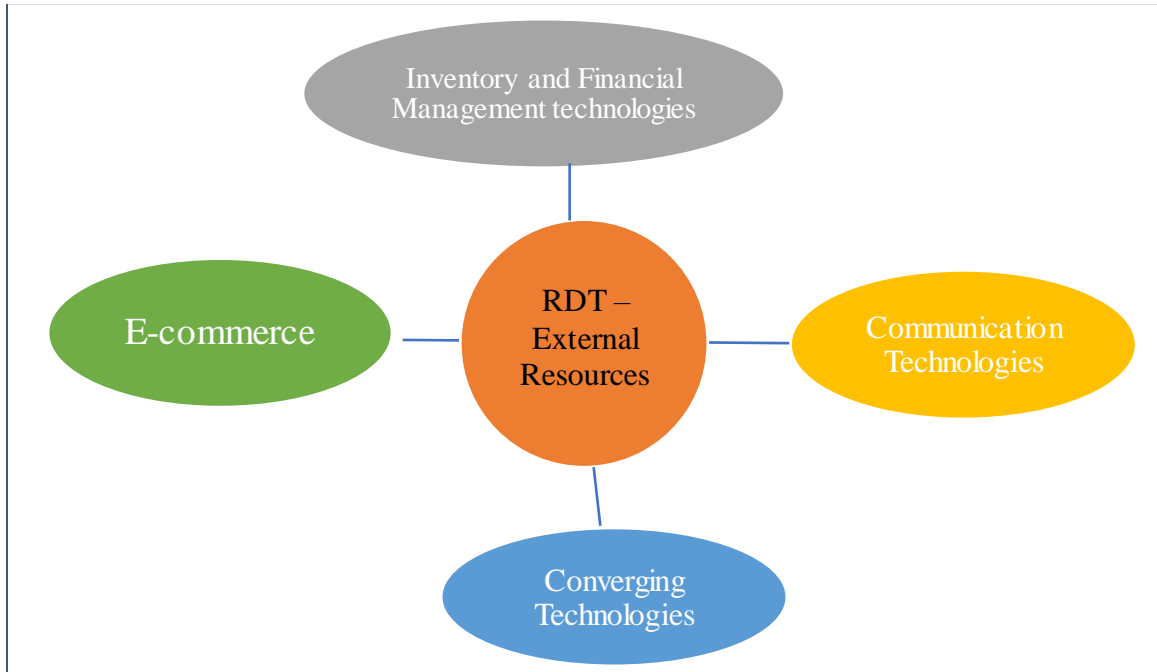
Participant	Theme 1	Theme 2	Theme 3	Theme 4
P1	20	11	13	9
P2	13	10	14	13
P3	10	4	18	9
P4	2	11	2	15
P5	5	12	8	3
P6	18	7	3	2
P7	32	12	7	4
Total	100	67	65	55

The themes were aligned to RDT, which was the conceptual framework of this project. According to Pfeffer and Salancik (1978), the organization's highly valuable internal resources are limited and uncertain. Therefore, it is recommended that organizations constantly partner with other entities to acquire external resources as a key strategy to enhance organizational performance. The above themes are, therefore, organized as digitalization strategies that reflect the external resources that organizations can acquire to reinforce their limited internal resources to continue thriving in uncertain

business environments, as shown in Figure 1. Notably, these external resources in the form of digital technologies can help organizations thrive in a crisis.

Figure 1

A Summary of the Themes



Theme 1: Inventory and Financial Management Technologies

One of the emerging themes from the participant responses was the use of inventory management technologies to prevent supply chain disruptions. According to Raj et al. (2022), inventory management is the backbone of the supply chain system as it accurately matches demand to supply. As shown in Table 1, inventory management was the highest referenced digital strategy that supply managers utilized to minimize the impact on business operations. The participants recognized the need to integrate digital technologies to automate inventory management systems. P1, P5, P6, and P7 leveraged digital technologies to track their inventory and have real-time visibility of products and

services availability. These participants attributed their ability to navigate through the crisis to the integration of these technologies by ensuring consistent and uninterrupted availability and flow of goods to their customers. P5 emphasized that using these technologies to manage inventory helped the company tremendously to “improve customer service and reduce costs.”

The general company reports also documented success stories where companies leveraged digital technologies to accurately forecast demand and manage their inventories, potentially reducing the potential supply chain disruptions. P2 utilized material resource planning (MRP) and enterprise resource planning (ERP) software to understand the minimum and maximum inventory requirements. P2 reiterated that digitalizing the supply chain was invaluable in streamlining the demand versus supply requirements. The findings align with Bigliardi et al.’s (2022) insights that effective planning is vital and digital technologies help managers achieve this by facilitating effective inventory management. They also help to optimize the company’s logistics and procurement processes. Basheer et al. (2019) also noted that ERP is a digital resource tool that helps managers control inventory, plan production, and manage orders.

P1 and P7 further noted that they linked their inventory management efforts with financial management to understand the company’s financial performance and develop responsive strategies. P1 mentioned that the integration “helped us understand from a financial standpoint where we were, and QuickBooks allowed us to process and understand where we were going. So effectively giving us the means to look at financial performance and how do we enhance it.” In support, P7 stressed that the integration

helped the company to forecast demand and optimize inventory. The data analysis generated from the financial information allowed them to “analyze sales trends, stock levels, and identify potential disruptions in the supply chain.” Central to a resilient supply chain is proper planning and preparedness to continue business operations amidst a crisis. These tools allowed these supply chain managers to quickly make informed strategic decisions, which were abreast of the changing market trends. Adopting inventory management technologies emerged as a proven external resource that managers utilize to minimize disruption and supply chain resilience.

Theme 2: Converging Technologies

The supply chain managers in the project also expressed the contribution of converging technologies like artificial intelligence, Internet of Things (IoT), machine learning, and blockchain to enhance their supply chain resilience during the COVID-19 pandemic. Companies utilize these converging technologies to have a real-time view of their logistics processes by offering the status and progress of the movement of goods (Laorden et al., 2022). The technologies provide valuable information to enhance supply chain performance (Ning et al., 2022). P1, P2, and P3 acknowledged that they had partnered with several software companies to test and integrate different supply chain visibility technologies to reinforce their strategic decision-making. P1 and P3 noted that they witnessed remarkable growth in emerging technologies, and the company invested in testing the most suitable tools compatible with their business nature. P1 noted that “it was an experimentation into new technology. So, for example, we had to leverage third-party software.” P3 said,

With the availability of AI like Chat GPT and all these other artificial intelligence machines that they're starting to incorporate some of those to where you just plug in what you want, and it will tell you this is the best choice.

Given the restriction of movement at the time, P7 utilized robotics and automated pick-up systems to compensate for the staff shortage, as most staff were working from home, yet some tasks could not be performed remotely. According to P7, automation has helped to "improve warehouse efficiencies and reduce reliance on manual labor, ensuring smooth operations amid a labor shortage and social distancing requirements." P7 further noted that they also utilized the transportation management system (TMS). According to Sytch et al. (2022), TMS is a resourceful digital tool that helps optimize transportation costs and enhance overall supply chain performance. P6 utilized IoT devices "for monitoring temperature and humidity and storage facilities to ensure product quality." More importantly, these devices helped to monitor the inventory levels and forecast demand. Bigliardi et al. (2022) noted that IoT is a practical tool in SCM that allows real-time tracking of goods and facilities for timely controls, planning, and coordination of logistic processes.

P5 utilized blockchain AI and machine learning technologies "to improve traceability, reduce inefficiencies, and enhance product quality control." In collaboration, the tools further helped to improve supply chain efficiency by ensuring that the organization met market demand. Reports from the secondary source also confirmed that many companies successfully utilized predictive analytics and AI to forecast demand and fulfill market requirements. Consequently, they facilitate data analytics that offer the

company beneficial insights into the current and future steps of the supply chain processes. The analysis shows that converging technologies are proven digital tools managers can use to leverage their supply chain processes during a crisis.

Theme 3: E-Commerce

E-commerce was another theme that emerged from the participants' responses. The participants noted that embracing e-commerce software by automating the purchase and sale of products was a key digitalization strategy that helped in navigating potential disruptive events. RDT embraces the influence of the external environment in regulating the availability and accessibility of resources, guiding the company's strategic decisions (Pfeffer & Salancik, 1978). P7 noted that the expansion of the company's e-commerce was a key strategy they used to increase the supply chain's resilience. P7 stated, "We had to make sure the online ordering and delivery services were up to par to accommodate all the contactless shopping, everything that needed to be done there." The strategic move implied that supply chain managers ought to be prepared to foster business continuity in the event of a crisis. Improving the e-commerce system by partnering with third-party companies that develop these systems was a valuable step for companies striving to navigate potential disruptions. P4 also noted that they heavily capitalized on online shopping as it occurred as the only digital tool compatible with the nature and size of the business. P4 noted, "We didn't have the advantage to use like the in-store pick-up or the, I would say, the store-to-home delivery."

The general company documents also revealed that creating a unified e-commerce system was an innovative technology that helped many supply entities orchestrate a

seamless consumer experience across various channels. E-commerce manifests the immense contribution of digital technologies to businesses as it allows companies to go beyond web presence and enhance their sales processes and supply chain integration (Mashalah et al., 2022). P1 also stressed the significance of an integrated online shopping system in creating a seamless flow of goods amidst the crisis. P1 noted, “we had to learn and integrate payment processing software like Stripe so we can manage month-to-month payments and create invoices.” Evidently, the availability and integration of other digital technologies on the company’s website are valuable in mitigating disruptions.

Theme 4: Communication Technologies

The fourth theme from the interview responses was the integration of communication technologies. Diversifying information sources and synchronizing the communication platforms are pivotal in supply chain resilience as communication breakdowns occur that can negatively affect the smooth flow of operations (Durugbo & Al-Balushi, 2022; Ning et al., 2022). P1 and P2 relied heavily on communicative software to link with suppliers, customers, and staff who were working remotely. The digital tools facilitated effective communication, which they stressed was vital to the smooth operation of the supply chain processes. P3 stated, “So we did have, of course, with computers and Zoom and everybody now has cell phones, all management has them, all leadership has them, their own computers and all, everybody has those.” Digital technologies help to transcend communication barriers by fostering collaboration and information sharing among people in diverse locations (Ning et al., 2022; Romagnoli et

al., 2023). P3 and P1 leveraged these technologies to connect with virtual and remote workers in different locations, fostering continuity of business operations.

Connecting with key stakeholders in the supply chain offers a versatile approach to dealing with disruptions by keeping abreast of what is happening at every step (Neill & Bowen, 2021). P5 confirmed this by stressing that the digital communication tools and platforms enable them to communicate, collaborate, and communicate with suppliers and business partners. The tools enhance supply chain resilience by allowing the key players to make real-time decisions while accommodating communicative support from all members. P6 noted that digitalizing communication allows the organization to connect with suppliers and customers and adapt quickly to “changing circumstances and ensure continuity of operations.” P7 conveyed a similar insight by stressing the significance of real-time communication and information sharing in coordinating and planning supply chain activities. Thus, digitalizing communication systems proved to be a successful tool for reinforcing supply chain resilience and minimizing the possibility of disruptions and tentative effects on business operations and profitability.

Business Contributions and Recommendations for Professional Practice

This project is significant because the results may provide additional information to the body of knowledge, offering insights into the effective digitalization strategies multinational managers can adopt to enhance the flow of goods. There is little research on the digitalization of supply chains and how it impacts the flow of goods for multinationals (Laorden et al., 2022). The findings of this project can inform the decisions of organizational managers of U.S.-based multinational firms looking to reduce

costs and increase supply chain competitiveness by digitizing their networks (Zhao et al., 2023). Also, depending on the companies, they can select the technology that is easily accessible and compatible with already existing systems. Technology developers can use the project findings to determine the gaps in the market. Especially for companies that have not digitized the supply chain, developers can improve existing technology or devise new tools to meet their needs.

Implications for Social Change

The project's results may help bring about beneficial social change by lowering barriers to international trade, which may help stimulate economies. By adopting strategies related to companies in the project, managers can lower operational costs and boost international trade by understanding the technologies available and their applications. Besides, communities would benefit greatly from the interrupted flow of goods (Moosavi et al., 2022). With proper digital technologies, multinational managers would ensure business continuity, giving consumers timely access to their needs, such as food (Laorden et al., 2022). Also, with minimal or no disruption, it reduces operational costs, creating a cost-saving mechanism for the end consumers. Overall, these digital technologies support improved business performance by yielding more profits, encouraging others to open businesses poetically, and creating employment opportunities for the surrounding communities.

Recommendations for Further Research

I recommend that future researchers expand the scope by accommodating a larger sample to gather diverse ideas from a wider range of participants. Considering a wide

perspective will provide the researcher with a richer array of themes and resourceful strategies for supply chain resilience. Since the focus of this project was on supply chain managers in the Southeast region of the United States, I recommend future researchers expand the geographical scope and explore other locations. This will help to develop an expansive and comparative view of the problem.

Conclusion

Many supply chain managers lack sufficient information on the effective strategies they can use to foster resilience during unprecedented times. Yet, these occurrences cost these companies millions of dollars of lost annual revenue, affecting profitability if proper measures are not in place. The purpose of this qualitative pragmatic inquiry was to identify and explore the effective digital technological strategies supply chain managers in the southeast region of the United States used to reduce the impact on business operations and profitability during a crisis. The findings of this project offer the various digital technologies that managers can use to reduce the impact of operations.

Pfeffer and Salancik's (1978), RDT, which is the project's conceptual framework, emphasizes that entities should collaborate with other organizations to acquire external resources, like digital technologies, which can help offset the limitations and uncertainties of relying on internal resources. The project uncovered four key themes: inventory and financial management technologies, converging technologies, e-commerce, and communication technologies. They encapsulated the different digital technologies supply managers can use to streamline operations. The findings provide significant insight into the effective digitalization strategies multinational managers can adopt to

enhance the flow of goods, potentially minimizing barriers to international trade and helping supply chain managers foster business continuity and profitability amidst a crisis.

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Appendix A: Interview Protocol

Interview Protocol	
Introduce the interview and set the stage. Introduce myself and the purpose of the interview thereby setting the stage.	Hello, my name is Roderick Williams. I am a Doctoral Candidate at Walden University. The purpose of this interview is to identify and explore the effective digital technological strategies supply chain managers in the southeast region of the United States use to reduce the impact on business operations and profitability during a crisis. I am going to ask you seven questions to which I would like your responses to. Then, I will conclude the interview. Do you have any questions?
Watch for nonverbal cues. Paraphrase the participant response. Ask follow-up probing questions to get more in depth	<p>Interview Questions:</p> <ol style="list-style-type: none"> 1. What strategies did you use to minimize disruptions to business operations and profitability? 2. What digital technological tools did you choose to enhance supply chain resilience? 3. What were the criteria used to identify and select these tools? 4. What challenges did you face when implementing these strategies? 5. How did you address these challenges when implementing the digitalization strategies? 6. How did you measure the effectiveness of these digitalization technologies on your supply chain performance? 7. What other information would you like to share about the digital technological strategies you used during a crisis?
Wrap up the interview thanking the participant.	Thank you for participating in the interview, an integral part of my research project.

Schedule a follow-up interview to perform member checking with the participant.	I will contact you in a week to schedule a time for us to review the accuracy of my interpretations of your interview responses.
<p style="text-align: center;">Follow-up Member Checking Interview</p> <p style="text-align: center;"><i>Graphic adopted from DBA Qualitative Pragmatic Inquiry Research handbook (2023). Not needed in proposal or research project. A visual reminder during proposal stage when creating interview protocol</i></p>	
Introduce myself and purpose of the follow-up interview to set the stage.	<p>Hello Interviewee,</p> <p>Thank you for taking this time to meet with me again to review the accuracy of my interpretations of your interview responses.</p>
<p>Share a copy of the succinct synthesis for each individual question.</p> <p>Bring in probing questions related to other information that I found – note the information must be related so that you are I am probing and adhering to the IRB approval.</p> <p>Walk through each question, read the interpretation, and ask: Is my interpretation correct? Did I miss anything? Or Would you like to add anything?</p>	<p>I will read the questions one at a time and my interpretations of your responses to them and ask you if my interpretation is correct.</p> <ol style="list-style-type: none"> 1. Question and succinct synthesis of the interpretation—perhaps one paragraph or as needed 2. Question and succinct synthesis of the interpretation—perhaps one paragraph or as needed 3. Question and succinct synthesis of the interpretation—perhaps one paragraph or as needed 4. Question and succinct synthesis of the interpretation—perhaps one paragraph or as needed

Appendix B: Interview Questions

1. What strategies did you use to minimize disruptions to business operations and profitability?
2. What digital technological tools did you choose to enhance supply chain resilience?
3. What were the criteria used to identify and select these tools?
4. What challenges did you face when implementing these strategies?
5. How did you address these challenges when implementing the digitalization strategies?
6. How did you measure the effectiveness of these digitalization technologies on your supply chain performance?