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# Manufacturing Companies' Strategies to Mitigate Supply Chain Disruptions

Vanessa Kaye Benton
*Walden University*

# Walden University

College of Management and Technology

This is to certify that the doctoral study by

Vanessa K. Benton

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Dr. David Blum, Committee Chairperson, Doctor of Business Administration Faculty

Dr. John Bryan, Committee Member, Doctor of Business Administration Faculty

Dr. Robert Banasik, University Reviewer, Doctor of Business Administration Faculty

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Sue Subocz, Ph.D.

Walden University
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Abstract

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MBA, Columbia Southern University, 2012

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## Abstract

Supply chains have become increasingly unstable due to unanticipated disruptive events, which undermines a firm's capacity to achieve a competitive market advantage and increase profitability. The disruption of a supply chain is essential to supply chain managers, as the interruption can be expensive, and the goods and services lost can negatively affect the entire supply chain. The purpose of this qualitative multiple case study was to explore strategies that manufacturing firm managers use to mitigate supply chain disruptions to remain profitable. The population consisted of 4 supply chain managers from 2 manufacturing firms located in the southern region of eastern Virginia. The conceptual framework for this study was the contingency theory of fit. Data were collected from semistructured interviews, company documents, and publicly available information. Based on the thematic data analysis, 3 emergent themes developed as collaboration and information sharing, information technology and supply chain risk, and use of multiple suppliers. The implications for positive social change include potential increased employment opportunities and salaries, investments in community projects, and enhanced consumer spending in the local community, thereby raising the standard of living and social well-being of local community residents.

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# Dedication

First and foremost, I thank my Lord and Savior, Jesus Christ, without him, I am nothing!!! Thank you, Lord, for giving me the strength to see this journey to completion. I dedicate this paper to my Great-Grandmother, the late Mary Elizabeth 'Lizzie' Stovall. From the time I was able to comprehend the things going on around me, she began sewing the seed of education not only into my young mind but also into the minds of all 10 of her Great-Grandchildren. I thank her for that and although she is no long here in this physical life, I know she is with me in spirit and hope that I have made her proud. I also dedicate this paper to my parents the late James and Elizabeth Benton. My only regret is that I was not able to complete all phases of my higher education before you left this earthly realm. I love and miss you and hope that I also made you proud. To my aunt Linda Jean Benton-Brewer, don't worry I will be moving back home soon. Finally, to my uncle and aunt, the late John and Jeanette Benton, thank you for providing my new wardrobe my freshman year of college. I think the shopping trip was more fun for you than it was for me.

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Sincere thanks to my chair, Dr. David Blum. Thank you for your time, commitment, and most of all your patience (I know it wasn't easy) in assisting me on this journey. As written in all my surveys, you are a Godsend. I would also like to thank the rest of my committee, Dr. Jorge Gayton, Dr. Robert Banasik, Dr. John Bryan and Dr. Susan Davis for their support, feedback, and encouragement. To my best friend Ms. Deborha A. Parsley, thank you for your understanding and cultivating the seed that was planted by my Great Grandmother so long ago. To my Soror, friend, and soon to be Doctor, Ms. Stephanie Williams, this 'little schoolgirl' thank you for your hospitality and encouragement. To Mr. John Bolton and Dr. Legena Roberts-Kpinkpin, thank you for the advice and reviewing my work. To my children Anthony and Jasmine, my siblings, extended family, and coworkers, I also thank you for your understanding. Thank you to the participants for their time and my classmates who proofread my work and helped me reach my goal. Finally, to all the skeptics, ill-wishers, and naysayers I say thank you, for it has been said that a flower needs rain to grow.

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# Section 1: Foundation of the Study

Supply chains are long and complex, which means supply chains are vulnerable to disruptions. Mitigating disruptions in the supply chain is essential for a manager's risk management strategy in a manufacturing firm (Talluri, Kull, Yildiz, & Yoon, 2013). The disruption of a supply chain can be expensive, and the goods and services lost can negatively affect the entire supply chain. Sudden and unexpected changes in the internal and external environment make designing a flexible supply chain complex and challenging (Hallavo, 2015). My purpose in this study was to explore strategies that manufacturing companies can use to mitigate supply chain disruptions to remain profitable.

## Background of the Problem

Globally, 90% of 600 firms surveyed experienced supply chain disruptions, yet only 60% of managers have adequate knowledge about the risks and strategies to mitigate the disruptions (Chowdhury, Lau, & Pittayachawan, 2016). Management's aim is to improve supply risk management (SRM) practice by increasing the firm's preparedness for supply chain disruptions to improve the firm's operational performance (Gualandris & Kalchschmidt, 2015). Lii and Kuo (2016) and Zhu, Krikke, and Caniels (2016) focused on the creation of an effective and efficient supply chain using various approaches that included (a) reducing costs, (b) funding, (c) company infrastructure, (d) supply and customer integration, and (e) collaborative information sharing to provide incentives for all supply chain members. Supply chain risk mitigation not only reduces disruptions in

the supply chain, but can lower company cost, increase profits, and improve the company's competitive advantage (Walker, 2015).

## Problem Statement

Supply chains have become vulnerable to unexpected catastrophic events, which interrupt the flow of goods and affect profits (Shau, Datta, & Mahapatra, 2016). In 2016, supply disruptions cost a specific manufacturing firm more than $17 billion in lost revenues (Wang, Xue, & Sun, 2017). The general business problem that I addressed in this study was supply chain disruptions reduce profitability. The specific business problem that I addressed was some manufacturing firm managers lack strategies to mitigate supply chain disruptions to remain profitable.

## Purpose Statement

My purpose in this qualitative exploratory multiple case study was to explore strategies that some manufacturing firm managers use to mitigate supply chain disruptions to remain profitable. The targeted population for this study consisted of four supply chain managers from two manufacturing companies located in the southern region of eastern Virginia who have successfully implemented strategies to reduce the effects of supply disruptions on profitability. The implications for positive social change might include manufacturing firm managers increasing profits that might attract investment capital for business expansion creating employment opportunities, investment in community projects, and enhance consumer spending in the local community.

## Nature of the Study

The three research methods that I used in this study were (a) qualitative, (b) quantitative, and (c) mixed methods (Yin, 2018). Qualitative researchers explore the phenomenon from the perspective of participants and interact with the participants in their natural setting to understand participants' experiences associated with the phenomenon (Bristowe, Selma, & Murtagh, 2015). I selected the qualitative method. Quantitative researchers use hypothesis, numerical data, and variables to test relationships and group differences in controlled conditions (Park & Park, 2016). The quantitative method was not appropriate for this study because I did not measure variables nor test hypotheses about variables, relationships, or group differences. Mixed methods is the combination of qualitative and quantitative approaches in the same study to integrate, converge, and replicate research findings when a single method is not sufficient to address the research problem (Park & Park, 2016). As a consequence of the quantitative component, mixed methods was inappropriate for this study.

The qualitative research designs that I considered were (a) case study, (b) phenomenological, and (c) ethnography. Case study includes one or more bounded cases by time and place in a real-life context (Yin, 2018). I chose the multiple case study design to allow a wider exploration of the *how, why,* and *what* of the phenomenon being studied. The phenomenological design is the study of individual lived and shared experiences (Hannon, Woodside, Pollard, & Roman, 2016). Phenomenological design was not suitable for this study as I did not explore individual lives or shared lived experiences. The ethnographic design involves studying the patterns of a culturally defined population

(Dodgson, 2017) and was inappropriate for this study because I did not study a cultural group during an extended period.

## Research Question

What strategies do manufacturing firm managers use to mitigate supply chain disruptions to remain profitable?

## Interview Questions

1. What strategies do you use to mitigate supply chain disruptions to remain profitable?
2. What key barriers have you overcome in the development of strategies to mitigate supply chain disruptions?
3. What type of resources, if any, were used to implement strategies to mitigate supply chain disruptions?
4. What challenges have you overcome to implement strategies to mitigate supply chain disruptions to remain profitable?
5. How did implementing the strategies help to mitigate the supply disruptions?
6. How did you measure the effectiveness of selected strategies to mitigate supply disruptions?
7. Do you have any additional information that you would like to add about strategies you use to mitigate supply disruptions?

## Conceptual Framework

The conceptual framework was the contingency theory of fit (CTF), which was introduced by van de Ven and Drazin (1985). A disruption in the supply chain means

there is a lack of fit. Researchers use a variety of approaches that focus on the effectiveness of fit and the adaptation processes by which manufacturing firm managers can achieve fit in their environments (Jiang, Guo, Wei, & Wang, 2018). Built on the key tenets of (a) agility, (b) flexibility, (c) leanness, (d) operational efficiency, and (e) operational responsiveness, an outcome is a fit and is a result of multiple factors (Hallavo, 2015). van de Ven and Drazin (1985) examined three approaches to test and define fit as (a) selection, (b) interaction, and (c) systems approaches. A one-size-fits-all strategy is not applicable as an appropriate strategy depends on events occurring inside and outside of the firm's control (Fusch & Ness, 2015). CTF was the appropriate conceptual framework for explaining how manufacturing company managers can achieve fit to mitigate supply chain disruptions to remain profitable.

## Operational Definitions

*Contingency theory of fit* (*CTF*): Organizational outcome is a consequence of a fit or match between two or more factors (van de Ven & Drazin, 1985).

*Risk management*: A proactive approach business managers use to identify, analyze, and manage risks and uncertainties (Cagnin, Oliveira, Simon, Helleno, & Vendramini, 2016).

*Supply chain collaboration*: A close long-term partnership where two or more partners work together to align supply chain operations, share information, and build a value-added process (Prasanna & Haavisto, 2018).

*Supply chain disruption*: An unexpected event that interrupts the flow of goods and services and has negative consequences in supply chain operations (Tse, Matthews, Tan, Sato, & Pongpanich, 2016).

*Supply chain management*: Activities essential for designing, planning, and executing supply chain operations to deliver value to the customer and improve business performance (Aggarwal & Srivastava, 2016).

*Supply chain relationships*: Collaborative information sharing between stakeholders that lead to supply chain agility and responsiveness (Teller, Kotzab, Grant, & Holweg, 2016).

## Assumptions, Limitations, and Delimitations

### Assumptions

Assumptions are statements accepted by the researcher as true without verification (Schoenung & Dikova, 2016). My first assumption for this study was that participants were knowledgeable of the aspects of mitigating disruptions within the supply chain. My second assumption was that participants were honest and forthcoming in responding to interview questions. My third assumption was that I would have access to company records. My fourth assumption was that company records were current regarding the management of supply chain disruptions. My assumption was that the analysis of data collected from interviews and company documents would lead to themes for strategies to mitigate supply chain disruptions.

### Limitations

Limitations are potential weaknesses affecting the study outside of the researcher's control (Marshall & Rossman, 2016). I identified two limitations for this study. The first limitation was that selected participates would reply to the invitation to participate in the study. A second limitation was that selected participants might misrepresent or provide biased responses to influence study findings for self-interest.

### Delimitations

Delimitations are a set of boundaries on what the researcher intends to do or not do in a study (Snelson, 2016). A delimitation of the study was (a) sample population, (b) sample size, and (c) geographical location. Selected participants for this study included four supply chain managers, because they had the requisite experience for the scope of this study. Operation and production managers were excluded as their experiences are outside the scope of the study. I restricted findings to interviews of four manufacturing firm supply chain managers in two manufacturing firms in the southern region of eastern Virginia might not apply to other manufacturing firms within and outside the geographical location.

## Significance of the Study

### Contribution to Business Practice

The findings from this study might be of value to manufacturing firms and supply chain managers by providing information on strategies to mitigate supply chain disruptions. By managing disruption risks, manufacturing firm managers can make their firm more resilient and competitive (Ambulkar, Blackhurst, & Grawe, 2015).

Successfully managing supply chain disruptions can lead to improved business performance (Behzad, O'Sullivan, Olsen, Scrimgeour, & Zhang, 2017). The information provided in the findings of this study could contribute to improving business practices of manufacturing firms and increase manufacturing firm managers' understanding of strategies to mitigate supply chain disruptions.

**Implications for Social Change**

Managers can contribute to the improvement of human and social conditions by creating jobs, investing in the community, and catalyzing economic growth (Polonsky, Grau, & McDonald, 2016). Implications for social change might include the potential for manufacturing firm managers to increase profitability thus attracting investment capital for business expansion and creating employment opportunities by investing in social service projects that facilitate improvements in housing for low-income families and child nutrition programs. Positive social change for community residents include the potential for an increase in employment opportunities, higher salaries, and the offer of quality goods and services to consumers at affordable prices. An increase in employment opportunities and higher salaries can lead to an increase in consumer spending in the local community, thereby raising the standard of living and social well-being of community residents.

## A Review of the Professional and Academic Literature

The degree of interconnectedness and interdependency among businesses has significantly increased. Many companies have embraced the philosophy of lean production, which means reduced inventories and an increase in efficiency (Kroes,

Manikas, & Gattiker, 2018). The implication of these changes is that manufacturers have become vulnerable to disruptions in the supply chain and a failure by any party in the supply chain or a natural disaster affects the entire network (Siba & Omwegna, 2015). For example, if a flood destroys the warehouse of a supplier that provides critical parts, those depending on the parts are affected and production slowed or stopped until a new supplier is located, or the previous supplier's operations are restored. To reduce or mitigate risk in the supply chain, van de Ven and Drazin (1985) suggested CTF as a useful framework managers can use to address the problems of disruptions within the supply chain.

My purpose in this qualitative exploratory case study was to explore strategies that manufacturing firm managers use to mitigate the effects of disruptions in the supply chain to remain profitable. The research question was: What strategies do manufacturing firm managers use to mitigate supply chain disruptions and remain profitable? Through a review of the literature, I provided a comprehensive approach to explore the strategies manufacturing firm managers are using to mitigate supply chain disruptions and remain profitable. The topics in the literature review include studies on (a) CTF, (b) supply chain disruptions, (c) supply chain risk management, (d) supply chain design and fit, (e) firm performance, (f) supply chain resilience, and (g) profitability and the application of the theory to mitigate disruptions in the supply chain, and contrasting theories.

Academic databases that I used included ABI/INFORM Global, EBSCOhost, ERIC, and ProQuest Central to search for articles related to this study. Academic journals used for this study included *Decision Science, Emerald Management Journals,*

*International Journal of Production Research, Journal of Business Ethics, Journal of Educational Administration, Journal of Logistics Management, Journal of Operations Management, Management Decision, Organization Science, and Supply Chain Management: An International Journal*. Keyword search included *contingency theory, contingency theory of fit, supply chain, supply chain collaboration, supply chain risk management, supply chain disruptions, mitigating supply chain disruptions, minimizing supply chain disruptions, preventing supply chain disruptions,* and *reduce disruptions.* The 254 references that I included in the study were 238 scholarly peer-reviewed articles representing 97% of the total, one dissertation representing .003%, five books representing .02%, four government websites representing .02%, two papers presented at conferences representing .08%, and one BCI corporate supply chain resiliency report representing .003%. The total scholarly peer-reviewed references published from 2015 to 2019 are 220. The literature analysis begins with an overview of CTF, which I used as a lens to review the research question to support the conceptual framework.

## Contingency Theory of Fit

**Background.** van de Ven and Drazin (1985) introduced CTF to gain an understanding of strategies used to mitigate the effects of supply chain disruptions. A disruption in the supply chain means a lack of fit exists (van de Ven & Drazin, 1985). van de Ven and Drazin defined *fit* as aligning or matching the firm's operations to the internal and external environmental factors. CTF was used as the conceptual framework for this study. van de Ven and Drazin stated CTF originated from the structural contingency theory developed by Lawrence and Lorsch (1967). Lawrence and Lorsch (1967)

developed structural contingency theory to understand organizational subsystems, their environments, and how the environment could affect organizational performance (van de Ven & Drazin, 1985).

Optimal integration and differentiation depend on obtaining equilibrium between the internal and external environments (van de Ven & Drazin, 1985). A firm's internal environment consists of factors that the organization controls such as personnel, equipment, and operational strategies (Sayilar, 2016). External factors include political, regulatory, and economic changes, which firms cannot control (Gaudenzi, Zsidisin, Hartley, & Kaufmann, 2018). Political, economic, social, technological, legal, and environmental (PESTLE) uncertainties can reduce an organization's capability for devising and seeking strategic choices (Gaudenzi et al., 2018). A decline in the economy can be a source for uncertainty in employment, reduction in customer shopping habits and a reduction in manufacturing and distribution.

Stonebraker and Afifi (2004) provided a comprehensive background of CTF by focusing on the overall supply chain emergence history. Stonebraker and Afifi reviewed four phases of historical evolution of management practices as (a) traditional, (b) integrated just-in-time (JIT), (c) expanded JIT, (d) agile, and (e) theoretical contingencies of the supply chain. The traditional management practices that began after World War II consisted of a rigid, systematic, hierarchical management structure where antagonistic relationships between internal functions, suppliers, and customers could develop (Stonebraker & Afifi, 2004). Control processes required large transitional staffs and large-lot production performed by untrained employees (Stonebraker & Afifi, 2004).

Stonebraker and Afifi postulated integrated JIT/phase II was used in the rebuilding of Japanese, German, Asian, and European manufacturing and distribution systems. JIT, developed by Ford in 1926, was implemented in rebuilding manufacturing and distribution systems in resource-poor and space restricted environments (Stonebraker & Afifi, 2004). Stonebraker and Afifi explained managers using JIT could regulate product flow using visual controls that expanded to suppliers.

Stonebraker and Afifi (2004) found that expanded JIT/phase III applications contained broader processes and facilities to include extensive external collaboration and flexibility improvements in lean manufacturing, which minimize resources and accentuates customer value. Theoretical contingencies or phase IV supply chains were integrated to lower delivery times by fine-tuning technologies in business processes, which allowed total cost based focusing on stock and scheduling tradeoffs (Halley & Nollet, 2002; Stonebraker & Afifi, 2004). Stonebraker and Afifi indicated that management efforts in supply chain risk management (SCRM) must be multifaceted, differentiated, and fully integrated into the varying nature of supply chains. Stading and Kauffman (2007) postulated CTF was used to establish the foundation in developing long-term responses to disruptive events in the supply chain. Synergy between the internal and external environments in which a company operates is an important factor of CTF (Stonebraker & Afifi, 2004).

Tarter and Hoy (1998) considered CTF to be narrow with weak empirical support, whereas Tosi and Slocum (1984) recommended further research on three factors of the theory: (a) effectiveness, (b) environment, and (c) congruency. Pfeffer and Salancik

(1978) described *effectiveness* as a firm's activities for the production, warehousing, and transportation of goods needed to meet customer demands. Production effectiveness is achieved when a firm does not experience idle time or work stoppage (equipment and process failures) on the production line (Hooi & Leong, 2017). Environment consists of the internal and external structure or conditions (facilities, economic, market, and geographic location) in which a firm operates or conducts business (van de Ven & Drazin, 1985). For example, an increase in interest rates (external environment) can lead to a reduction in customer spending, which could lead to a decrease in business revenues. However, lower interest rates could attract business investments and increase production. Organizations interrelate in different environments, and certain environmental characteristics affect all organizations (van de Ven & Drazin, 1985). van de Ven and Drazin (1985) described *congruency* as environmental niches and organizational designs joined or fitted together to achieve completeness.

Contingency theory studies were first introduced to the field of organizational management (OM) in studies by Skinner (1969), which led to the contingency model of manufacturing strategy. Skinner posited a firm will increase organizational performance if the external and internal consistency of manufacturing strategy decisions exists. The Bureau of Labor Statistics (2018) characterized manufacturing as the use of power-driven machines and material handling equipment to transform available resources (raw materials) to produce new goods. Contingency theory was a factor in organizational practice in the 1970s (Omoluabi, 2016). Skinner (1969) connected organizational structure and operating conditions using empirical comparative analysis.

CTF could be considered a valuable framework for organizational design. Hallavo (2015) noted that CTF serves as the basis to prepare for, prevent, and mitigate the effects of supply chain disruptions. Mitigating risk in the supply chain is critical to an organization's risk management strategy (Talluri et al., 2013). Understanding the application of CTF can prevent or reduce risks in the supply chain to increase business performance (Talluri et al., 2013). Supply chain managers striving to enhance resource efficiency in the supply chains should develop a set of resource indicators, implement flexible production systems, and implement supply chain management practices (Matopoulos, Barros, & Van Der Vorst, 2015).

**Contingency Theory of Fit Tenets**

CTF is useful in the development of long-term responses to disruptions to achieve stability in the supply chain (Grotsch, Blome, & Schepler, 2013). Supply chain disruptions are minimized when supply chain managers develop effective responses (Grotsch et al., 2013). Supply chain managers use key tenets and factors of CTF to develop effective supply chain responses, which include (a) agility, (b) flexibility, (c) leanness, (d) operational efficiency, and (e) operational responsiveness.

**Agility.** Gligor (2016) investigated how the role of agility helped firms achieve supply chain fit (SCF). Gligor referred to *agility* as a firm's capacity to promptly adjust tactics and operations in the supply chain to respond to changes in the operating environment. Agility is an enabler of responsiveness by facilitating quick responses, and is an essential strategic element (Gligor, 2016; Tse et al., 2016). Like leanness, agility was introduced to be applied to manufacturing as part of a production system; however,

agility is now applied to the whole supply chain as a way of doing business (Eltawy & Gallear, 2017).

Gligor (2016) discussed five dimensions to supply chain agility: (a) quick detection of changes, opportunities and threats, (b) immediate access to data, (c) ability to make a decision using available data, (d) quick implementation of decisions, and (e) flexibility to modify tactics and operations to implement strategies. Walker (2015) indicated that an agile supply chain could help firms mitigate disruptions and achieve fit in an uncertain environment. Walker noted that supply chain agility created a competitive advantage for firms, which can indirectly increase a firm's financial performance. Agility reduces the likelihood of supply chain disruptions (Eltawy & Gallear, 2017) and enables a firm to obtain superior firm performance (Hallavo, 2015).

**Flexibility.** Rojos, Stevenson, Montes, and Perez-Arostequi (2018) described *flexibility* as a firm's ability to rapidly redesign key supply chain resources to maintain competitiveness. With the possibility of natural disasters, union strikes, fluctuating demands, and regulatory changes, managing flexibility is critical. Behzad et al. (2017) advised that manufacturing managers should ensure a firm's supply chain is properly aligned and integrated with other business units and suppliers. Proper alignment and integration enable a firm to adapt to changes in the operating environment and recover from disruptions in the supply chain to maintain a competitive advantage (Behzad et al., 2017). Supply chain managers who implement flexibility into their supply chain risk management (SCRM) strategies can quickly respond to fluctuations within the supply

chain, effectively work with suppliers and other business units, and provide efficient JIT services to customers.

**Leanness.** Leanness involves measures taken in the supply chain value stream to reduce waste, minimize lead time, and reduce costs (Lotfi & Saghiri, 2018). The lean concept was first introduced as a production system to help reduce waste in the manufacturing industry; however, the term is now applied to the entire supply chain as a holistic way of doing business and a way of improving supply chain performance (Eltawy & Gallear, 2017). Birkie (2016) posited that lean practices could be used to leverage agility to mitigate supply chain disruptions. Leanness helps reduce waste, enhances information sharing, and standardizes work (Eltawy & Gallear, 2017; Lotfi & Saghiri, 2018).

**Operational efficiency.** Masson, Jain, Ganesh, and George (2016) defined *operational efficiency* as the utilization of capital (e.g., property, money) to deliver quality service. Operational efficiency can be achieved by using the latest technologies to streamline communications with suppliers and customers, simplify a firm's supply chain processes, lower costs, and increase growth and profitability (Walker, 2015). Masson et al. (2016) suggested higher quality service and lower cost assets equate to increased operational efficiency.

**Operational responsiveness.** Like agility, *operational responsiveness* is described as management's immediate adaptability to changing environmental events and customer requirements with the least possible steps and minimal disruptions to business (Shin, Lee, Kim, & Rhim, 2015). Ivanov, Dolgui, Sokolov, and Ivanova (2016) found

that in most situations, firms require analysis tools to assess the effects of recovery measures, which is subject to various performance indicators and disruptions. Managers who incorporate recovery elements into proactive models need synchronized attention to execution dynamics and static structural characteristics of supply chain disruption (Ivanov et al., 2016). Implementing key tenets of CTF is essential in reducing the effects of disruptions in the supply chain.

## Contingency Theory of Fit Factors

**Supply chain disruption.** Supply chain disruptions can be singular or a combination of unforeseen events such as fire, flood, accidents, and supplier bankruptcy, any of which jeopardize the flow of material and interfere with normal business activities (Bugert & Lasch, 2018). Supply chain disruptions can be costly in terms of interrupted production, operational processes, and loss in sales. A supply resilience survey report conducted by BCI found 65% of the 400 companies participating in the survey had experienced at least one supply chain disruption in 2017 (Alcantara, Riglietti, & Aguada, 2017).

Konig and Spinler (2016) explained that supply chain disruptions could be a result of supply chain management activities including (a) outsourcing, (b) technological innovations, (b) fluctuations in demand, and (c) reduction in inventory. Outsourcing of global business and inventory management methods, such as JIT, may make firms vulnerable to unpredictable disruptions (Tse et al., 2016). Manufacturing managers could conduct a strategic review of outsource options and assess whether vendors use the right people, processes, and technology to support the firm's business functions (Tse et al.,

2016). Implementing CTF tenets of flexibility and agility to the supply chain helps organizational managers adapt to and recover from various disruptions in the supply chain (Behzad et al., 2017).

Manufacturing companies rely on suppliers in the logistics industry for distribution of their services and products to the customers (Zhu et al., 2016). However, not all suppliers can guarantee disruption-free services. Poor management of a single supplier or lack of financial support could have a disruptive effect on an organization (Dellana & West, 2016). For example, in 2018, the distributor of dual sensor smoke alarms recalled approximately 500,000 units of product in the United States and Canada (CPSC, 2018). During manufacturing, a cap covering one of the two sensors was left on, which compromised the alarm's ability to detect smoke, posing a risk to consumers of not being alerted in the event of a fire (CPSC, 2018). Recalling the product cost approximately $9 million to replace nearly a half million devices. In 2001, the exclusive supplier of the chassis frame for an automotive company declared bankruptcy and cost the automobile company $35 million to manage the disruption (Dellana & West, 2016). Decisions to manage uncertainties, risk, and the firm’s performance are contingent on internal and external issues and how well organizational resources match the specific business environment (van de Ven & Drazin, 1985).

Clemons and Slotnick (2016) found recovery from a disruption affects shareholder wealth, stock performance, and equity risk; such disruptions are associated with collateral damages that result from weakened stock performance and reduced equity. Zhang, Xiong, and Xiong (2015) posited manufacturers marketing their products through

traditional and direct online retail channels (dual-channel supply chain business) have increased risks of disruption in the supply chain. For example, an external disruption (global financial crisis, warehouse flood) or internal disruption (personnel shortage, damaged equipment) can simultaneously compromise both distribution channels resulting in a doubled loss of profits. Disruptions such as a decrease in demand or increase in production cost require adjustments of coordination contract to be implemented, which implies the manufacturer must have different strategies (growth, stability, retrenchment) developed and ready for implementation (Zhang et al., 2015). Projected revenues and the success of strategies aimed at increasing or maintaining profits may be compromised due to a disruption in the supply chain (Ho, Zheng, Yildiz, & Talluri, 2015).

Lee and Rha (2016) applied dynamic capabilities, and organizational ambidexterity to supply chain management (SCM) to examine mitigation strategies for supply chain disruptions. Rojos, Llorens-Montes, and Perez-Arostequi (2016) used a structural equation model methodology to determine whether organizational supply chain ambidexterity enhanced supply chain flexibility (SCF) and the effect on supply chain competence and firm performance. Rojos et al. and Tuan (2016) defined *organizational ambidexterity* as the firm's capability to simultaneously refine current knowledge and competencies while exploring for more knowledge and new market opportunities. In developing the proposed model, Rojos et al. made allowances for the requirements of the environment and the relationship with supply chain flexibility. Organizations can achieve adaptation, fit, and ambidextrous competence with the environment through shared learning attained via exploration and exploitation (Rojos et al., 2016; Tuan, 2016).

Lee and Rha (2016) indicated that supply chain ambidexterity is essential to manufacturing firms as an aid in mitigating the negative effects of supply chain disruptions and enhancing firm performance. To minimize the effects of supply chain disruptions and maximize firm performance, firms consistently seek creative means to satisfy new market needs and adapt to the fast-changing business environment (Lee & Rha, 2016). According to Rojos et al. (2016) adapting to the environment requires flexibility. Ambidexterity reinforces flexibility and permits implementation of operations based on efficacy (exploitation) and innovation (exploration).

High levels of exploitation and exploration in the operating process help manufacturing firms to achieve the optimal level of SCF in the operating environment (Rojos et al., 2016). Rojos et al. (2016) posited that developing exploration and exploitation practices in the supply chain improve general efficacy in achieving flexibility, while improving competence and increasing the firm's performance index and survivability prospects. Ambidexterity has a positive effect on firm's performance and contributes to the implementation of strategies that facilitates the firm's survival (Rojos et al., 2016). Lee and Rha (2016) noted organizational ambidexterity is needed to successfully combine exploitation and exploration to meet the challenges of environmental uncertainty and technological advancements. Ambidexterity within a firm's supply chain could also be developed using a dynamic capability building process which can mitigate the negative effects of supply chain disruptions and improve firm performance (Lee & Rha, 2016). Lee and Rha's findings are useful in the decision-making process to improve the competence of the supply chain. Supply chain managers

may perform practices of refinement, reuse of routines, and practices of experimentation and innovation to achieve optimal SCF (Rojos et al., 2016). Although survival may be at different levels, mangers who accept their environments are effective and enhance organizational survival (Rashidirad, Salimian, & Soltani, 2018).

**Supply chain risk management.** Supply chains are inherently risky, and organizations cannot avoid all supply chain disruptions (Pournader, Rotaru, Kach, Hossein, & Hajiagha, 2016). SCRM is a key element to the successful implementation of optimal strategies in dealing with unexpected disruptions, catastrophes and uncertainties associated with risk. SCRM strategies include agility, flexibility, and leanness to reduce the likelihood of supply chain disruptions, and minimize the effects of the disruptions (Birkie, 2016; Eltawy & Gallear, 2017; Mohammaddust, Rezapour, Farahani, Mofidfar, & Hill, 2017). Bugert and Lasch (2018) found designers of supply chain disruption risk models focused on assessing disruption risks, studying interdependencies between risks and exploring the dynamic behavior of risks circulating through the network.

van de Ven and Drazin (1985) argued that alignment, which is an element of contingency theory, is crucial in a contingency theory-based model. Skipworth, Godsell, Wong, Saghiri, and Julien (2015) defined *alignment* as a consistent connection of strategic goals, methods, and activities that result in the fitness of objectives, structures, and processes between functions and supply chain members. Organizations should develop strategies that align operational choices with environmental needs (Hallavo, 2015). Considering the competitive business environment, it is critical for supply chain

managers to align supply chain activities with the competitive strategy and strategic objectives of the organization (Stevens & Johnson, 2016).

Chowdhury and Quaddus (2016) reviewed supply chain disruptions in the domain of supply chain readiness, response, recovery, and resilience and analyzed the aspects of SCRM that are activated during different stages of crises. Chowdhury and Quaddus developed and identified various fundamental phases of supply chain resilience and capabilities. Phases and capabilities included (a) proactively and reactively detecting the crisis and repairing the after-effects; (b) pre-crisis recovery; and (c) post-crises or stages preventing the crisis, recovering from a crisis, and learning from the crisis (Chowdhury & Quaddus, 2016). Chowdhury and Quaddus designed a programming model for integrated decisions in pre- and post-disaster processes. Manopiniwes and Irohara (2016) focused on key emergency logistics concepts (facility and stock prepositioning, evacuation, and relief vehicle planning) when developing a model for responding to disasters while maintaining cost and equity.

Considering supply chain risk can be generated by multiple sources or contexts, Chang, Ellinger, and Blackhurst (2015) proposed a firm's supply chain risk mitigation strategies could be tailored to accommodate the specific characteristics of risk contexts. Analyzing risk context (i.e., risk probability and severity) is important for assessing appropriate supply chain risk mitigation strategy and as per contingency theory, risk contexts can determine appropriate approaches for mitigation (Chang et al., 2015). Chang et al. (2015) posited supply chain managers are responsible for discerning when risk situations exist and when the risk necessitates action. Due to internal and external

environmental uncertainties, supply chain managers need to analyze and understand risks before selecting an appropriate risk mitigation strategy. The framework developed by Chang et al. is useful to supply chain managers because the framework illustrates how managers can choose relevant risk mitigation strategies based on the context and structure of the risk.

Sawik (2016) introduced a portfolio approach to supply chain risk management that focused on the optimal selection of primary and recovery suppliers and combined decisions made before, during, and after the disruption. Supply chains demand response and recovery strategies to reduce the effect and overcome a disruptive state (Sawik, 2016). Sawik suggested cost minimization should not always be the priority; instead, the selection of primary and recovery supply and demand portfolios can drive the decision-making process under disruption risks. Contingency theory can be used in the construct of distribution flexibility. Distribution flexibility is characterized as a capability inserted in the supply chain to modify distribution processes (physical, demand) to align with the needs of customers (Tosun & Uysal, 2016). In accordance with CTF, organizational managers can select a distribution flexibility strategy that is compatible to the supply chain conditions and context, thereby achieving a fit in the supply chain resulting in the logic of gestalts (Srivastava, 2018; Tosun & Uysal, 2016). Advertisers use gestalts (logos, slogans, themes, jingles, colors, product placement) when marketing a product to gain the attention of potential consumers (Srivastava, 2018).

Paul, Sarker, and Essam (2017) studied disruption mitigation; however, the researchers targeted a three-stage supply chain network rather than a linear buyer-

supplier chain. Paul et al. generated a predictive and reactive mitigation plan for a three-stage supply chain and proposed an inclusive and flexible plan, which had the potential of being utilized for supply chain risk mitigation and could be quickly revised. Managers can select different sets of strategies at different times to minimize disruptive risk in the supply chain.

Gualandris and Kalchschmidt (2015) developed a model to address the incongruence between the level of preparedness and the level of risk for supply chain disruptions. Gualandris and Kalchschmidt's goal was to show managers how to improve supply risk management (SRM) practice by increasing preparedness for supply chain disruptions and improve firm performance. The model serves as a control tool for evaluating external risks and resources in order to design SCRM practices that could improve the firm's performance, increase customer satisfaction, and reduce the probability of supply risk (Gualandris & Kalchschmidt, 2015).

Kumar, Liu, and Scutella (2015) took a culturally-specific approach to examine and compare the effects of supply chain disruptions on the United States and India. Kumar et al. found supply chain management practices in developing countries remain underdeveloped, while developed economies enjoy more efficient and reliable supply chains. Developing countries like India suffer greater economic consequences from supply chain disruptions, whereas Western supply chain responsiveness and efficiency is a result of competitive pressure and sufficient economic resources for the development of optimal SCRM strategies (Kumar et al., 2015).

Durach, Glasen, and Straube (2017) also took a culturally-specific approach by examining the supplier factor of disruption management between Western buyers and Chinese suppliers. Durach et al. (2017) identified 22 possible disruption causes for Western firms and 43 relationship-specific mitigation strategies. Durach et al. (2017) paid considerable attention to the cultural characteristics of supply chain risk management practices. Durach et al. found that *guanxi*, a network of close business relationships that facilitates for differential treatment, is the cornerstone of business operations in China. A Western buyer who engages in a buyer-supplier relationship with a Chinese supplier must be aware that mutual obligations and information sharing will help ensure success (Durach et al., 2017). Durach et al. found guanxi has many complexities and Western buyers should be prepared to distinguish between the traditionally impersonal Western business relationships and highly personal business relationships in China. Western buyers' willingness to commit to the model of business relationships cultivated in China would warrant better risk management-related outcomes.

Kim, Han, and Kim (2016) reviewed the internal fit perspective of CTF. Kim et al. (2016) analyzed data collected from South Korean manufacturing organizations to establish how involvement oriented and equity oriented practices effect and improve performance. The choice between involvement and equity oriented organizational practices s be based on the careful analysis of labor and the working environment, as labor and working environment have a direct effect on beneficial participation from employees and improved financial performance (Kim et al., 2016; Ordriozola, Martin, &

Luna, 2018; Walker, 2015). Firm managers who passively accept risk allow themselves to be exposed to substantial financial and market losses (Kim et al., 2016).

**Supply chain fit and design.** Supply chain design is the definitive foundation of an organization and supply chain managers could design and redesign their supply chains to achieve competitive advantage (Kraegpoth, Stentoft, & Jensen, 2017). Hallavo (2015) noted supply chain managers can design or redesign their supply chains to be (a) agile, (b) flexible, (c) lean, and (d) responsive. Supply chain design is characterized as a strategic management action aimed to procure, develop, and configure supply chain resources (i.e., funds, raw materials, facilities, transportation) that allows a firm to successfully compete in the market (Kraegpoth et al., 2017). Matching or fitting the external environment with internal operational procedures is imperative to ensure supply chain characteristics are congruent with customer preferences and demands (Luo & Yu, 2016). To better accommodate customer expectations, product characteristics can be fitted to an appropriate supply chain design (Luo & Yu, 2016).

Researchers have examined the concepts of fit and misfit including the effect on performance and the identification, analysis, and management of contingency theory; other variations of fit and misfit exist. The variations include factors that affect how pursued strategies fit contextual and structural characteristics of the organization (Ambulkar et al., 2015; van de Ven & Drazin, 1985). van de Ven and Drazin (1985) posited the focal point of CTF is the situational influence on the management of organizations. CTF theorists challenge the existence of a single, best approach to manage or organize a corporation (van de Ven & Drazin, 1985). Chang et al. (2015) utilized CTF

to examine alternative supply chain risk mitigation strategies with specific risk contexts. In accordance with Fisher's (1997) work for matching fit between product type and supply chain configuration, the goal of Chang et al. (2015) was to align well-established aspects of supply chain risk management to develop and introduce a heuristic method for adopting the appropriate supply chain risk mitigation strategy for specific risk contexts.

Eriksson (2015) asserted supply chains are multi-dimensional constructs consisting of strength, scope, duration, and relational aspects, which include physical activities and behavioral dimensions. Avoiding the traditional contingency fit model, Gresov (1989) attempted to reevaluate the complexity of operational design and focused the research on different aspects of the multiple-contingencies model. Gresov focused on general aspects of multiple contingencies and identified task uncertainty and dependence as two key problematic situations under which work units operate. Gresov argued multiple-contingency models were better tools than the traditional contingency model because the aforementioned presented more patterns of the relationship between context and work unit performance.

Chavez, Yu, Jacobs, and Feng (2017) explored the benefits of supply chain contingency fit on the Chinese manufacturing industry by studying entrepreneurial orientation as the moderating variable of such capabilities as flexibility and organizational performance. Chavez et al. (2017) noted entrepreneurial orientation is positively associated with flexibility and cost capabilities, which are positively associated with improved organizational performance. Entrepreneurial orientation moderates the link between understanding changing and catering to market needs. The resulting

flexibility allows producers to fit product to customer needs, while cost capabilities allow producers to maintain competitive prices and win a larger share of the market (Chavez et al., 2017).

Supply chains are not static and vary in size, shape, and configuration due to factors such as technological changes, emergence of new products, new market niches, and geographical markets; therefore, supply chain managers should recognize how globalization, technology, and changing markets affect the performance of the organization and supply chain (MacCarthy, Blome, Olhager, Srai, & Zhao, 2016). Walker (2015) reflected on the importance of supply chain fit in the manufacturing sector, emphasizing the idea of following and operating the most recent technological advancements and innovations to retain a competitive advantage. Zhang (2015) described *technological innovations* as advancements and improvements in current technology to enhance supply chain performance and competitiveness. Sundram, Chandran, and Bhatti (2016) defined *supply chain performance* as a systematic process supply chain managers use to measure the effectiveness of supply chain operations.

Proactive and creative approaches to supply chain operations, as well as a high level of supply chain fit, ensured a firm would not miss out on numerous opportunities presented by technological advancement (Walker, 2015). Tripathy, Aich, Chakraborty, and Lee (2016) analyzed the structural relations between information technology (IT), logistic effectiveness, operational efficiency, customer relationship, supplier relationship, and competitive advantage of small and medium enterprises in India. Tripathy et al. found that IT is essential to achieving a competitive advantage in SCM practices and

recommended companies update the technology throughout the supply chain and make IT-based ordering systems part of the suppliers' IT strategy.

Magutua, Adudab, and Nyaogac (2015) established the relationship between supply chain technology, supply chain strategies, and performance. Magutua et al. (2015) discovered over 88% of positive changes in an organization's performance was associated with supply chain technology and supply chain strategies. Supply chain managers can use IT applications to improve customer service and reduce inventory cost, to help achieve competitive advantage (Sook-Ling, Ismail, & Yee-Yen, 2015). Walker (2015) claimed CTF is recognized as favorable and desirable for a firm's performance and growth.

Kach, Busse, Azadegan, and Wagner (2016) studied the external factors of CTF. Kach et al. (2016) focused on hostile environments and examined the environmental effects on product and process innovativeness. Kach et al. analyzed data collected from manufacturing plants and categorized the hostile environments into four groups: (a) market declination of annual industry revenue, (b) restriction or prevention of new business from entering the market, (c) competition of new entities vying for customers, and (d) lack of necessary funds, raw material, facilities to operate. Managers can analyze the hostility of the external environment to help suppress the detrimental effects (Kach et al., 2016). The implications of these findings are that managers using the methods mentioned above can investigate the strategic fitness of manufacturing firms. Manufacturing managers could pursue tailored supply chain practices to improve supply chain performance.

**Firm performance.** CTF is considered valuable in the assessment of firm performance, supply chain integration, innovation, and improving competitive capabilities (Hallavo, 2015). Hallavo (2015) noted that a firm operating in a high uncertainty business environment can obtain superior firm performance if the supply chain is designed and managed with a focus on the key CTF tenets of operational responsiveness, agility, and flexibility. However, a firm operating in a low uncertainty business environment could obtain superior firm performance by focusing on operational efficiency and leanness.

Yuen and Thai (2017) proposed a contingency model specifying and contrasting the correlation between (a) internal integration (II), (b) external integration (EI), and (c) operational performance (OP) in product supply chains and service supply chains. Graham (2018) defined *II* as the level of interaction and collaboration among various functional groups within an organization. Individuals evaluate II on how a firm structures organizational strategies and practices to facilitate collaborative processes to fulfill customer demands (Graham, 2018). Graham characterized EI as an extension of interaction and collaboration efforts of a firm with key supply chain members (customers and suppliers) to structure inter-organizational strategies and practices into attainable processes that comply with end-user requirements. *OP* was described as the alignment of a firm's operation management procedures (Yu, Luo, Feng, & Liu, 2018), and productivity as the ability to supply products and services to meet customer expectations and achieve business goals (Shobayo, 2017).

Using multi-sampling, Yuen and Thai (2017) analyzed data collected from product firms and services companies in Singapore to test the contingency model. Yuen and Thai discovered a greater operational fit occurs when implementing EI in service supply chains than product supply chains, whereas a greater operational fit occurs when implementing II in product supply chains than service supply chains. Managers from firms with product and service supply chains should accrue sufficient internal integrative capabilities prior to integrating external supply chains (Yuen & Thai, 2017). Yuen and Thai suggested adopting a contingency approach rather than a universalistic approach in the management of the firm's internal and external integrative capabilities to maximize OP. Yuen and Thai recommended managers should adjust their II and EI efforts to achieve fit to the type of supply chains being used.

Prajogo (2016) viewed contingency theory as the cornerstone of achieving a strategic fit between business environments and various strategies of innovation. However, Eckstein, Goellner, Blome, and Henke (2015) viewed CTF as the cornerstone of understanding the environment and recommended applying the understanding to the development of supply chain agility and adaptability strategies. Prajogo collected and analyzed data to determine how external contingency factors (dynamism and competitiveness) influenced internal innovation strategies regarding product and process. Prajogo indicated dynamic environments prompted managers to emphasize product and process innovations. Prajogo suggested concentrating on process rather than product innovation in a competitive environment.

Lii and Kuo (2016) focused on firm performance and examined the potential of innovation orientation, supply chain integration, and how to improve competitive capabilities. Lii and Kuo concluded that innovation orientation is positively linked with supply integration and customer integration, indicating that innovation-oriented firms are more likely to achieve favorable performance levels as responding to customer demands creates a competitive advantage (Lii & Kuo, 2016). The combination of a firm's competitive capabilities enables a firm to attain sustainable management, translating into a productive coordination with supply chain partners.

Ng, Rungtusanatham, Zhao, and Ivanova (2015) discussed the structural contingency theory and the concept of fit between a firm's total quality management (TQM) and external environment. Sayilar (2016) posited that structural contingency theory is focused on how a firm's performance depends on the degree of alignment between the firm's competitive strategy and design. Structural fit equates to success, whereas lack of structural fit equates to failure (Sayilar, 2016). Structural contingency theory was emulated in van de Ven and Drazin's (1985) concept of fit in cases where internal fit indicated congruency of the structural characteristics and the external fit indicated congruency between the firm's structural characteristics and competitive strategy in connection with the external environment. Ng et al. (2015) proposed manufacturing organizations could implement TQM in accordance with the external environment, a crucial element to long-term success and sustainability. Ng et al. (2015) indicated manufacturers must incorporate consideration of environmental trends and

benchmark best performers to develop a normative TQM profile and pursue TQM to prevent deviations from normative profit when operating in a volatile environment.

Implementing an information and material flow system can help reduce uncertainty and improve the performance of the supply chain (Riley, Klein, Miller, & Sridharan, 2016). Talluri et al. (2013) explained that CTF is the foundation for building a collaborative communications network to manage and mitigate the disruptive effect on business performance efficiently. Riley et al. (2016) collected data from 231 supply chain managers and found managing information flow can bolster risk management capabilities of firms. Managers could build collaborative communication networks to manage and mitigate risk in the supply chain (Riley et al., 2016).

Referencing drivers and patterns of supply chain collaboration in China's pharmaceutical industry, Huang, Lin, Ieromonachou, Zhou, and Lou (2015) found business managers engage in collaborative activities to save costs, pool and spread risk, and maintain flexibility to respond to market requirements. Supply chain collaboration is an important tool, which can reduce uncertainty, lead to superior performance in companies based on the capitalization of resources, capabilities, and processes of supply chain partners (Aggarwal & Srivastava, 2016). Supply chain collaboration refers to an inter-organizational relationship where two or more supply chain partners are working together to align supply chain operations, share information, build a value-added process, and create sustainability (Chen et al., 2017).

The basis of collaboration is mutual trust, shared rewards, and risks resulting in greater profitability and better performance (Soosay & Hyland, 2015). In a collaborative

inter-firm relationship, trust and communication are significant factors for supply chain agility (Durach et al., 2015), and the level of trust buyers develop towards suppliers is a result of effective communication, positive past collaboration, and the existence of personal bonds (Revilla & Knoppen, 2015). Arora, Arora, and Sivakumar (2016) examined the relationship between supply chain strategies and the operational and relational outcomes of organizational performance. Arora et al. (2016) concluded the supply chain mix affects the internal environment of the focal firm and the external environment of customers, competitors, suppliers, and supply chain partners. Results of the supply chain mix can lead to enhanced chain management effectiveness, organizational performance, and sustainable competitive advantage (Arora et al., 2016).

Fawcett, McCarter, Fawcett, Webb, and Magnan (2015) conducted a study of 15 companies to explore why collaborative strategies fail. Fawcett et al. (2015) found conflicts between supply chain partners, misalignments, information hoarding, distrust, and resistance to change can lead to poor collaboration between supply chain members. Supply chain collaboration and integration practices based on relational ties can result in trust and better coordination among supply chain partners (Arora et al., 2016).

By using supply chain performance measurements, supply chain managers can promote collaborative integration among supply chain partners and ensure continuous improvement of the supply chain. Supply chain partners collaborate to maximize learning opportunities, enhance shared values, develop new competencies, create better position in the market, and improve the agility and performance of the supply chain (Li, Wu, Zong, & Li, 2017). Odongo, Dora, Molnar, Ongeng, and Gellynck (2016) posited mutual

relationships, and information sharing among supply chain members is essential in achieving a fully integrated supply chain. No optimal collaboration strategy exists that has methods to tackle various types of disruptions at once; therefore, risk managers must be flexible in decision-making processes and select strategies to ensure timely delivery of products (Zhu et al., 2016).

Eckstein et al. (2015) indicated product complexity positively facilitates the link between supply chain agility, adaptability, cost, operational performance strategies, and helps control internal and external threats. Although supply chain adaptability is less effective under low product complexity, supply chain agility resulted in enhanced cost and operational performance under high and low product complexity creating more overall benefits (Eckstein et al., 2015). Eckstein et al. strengthened the idea that manufacturing managers who develop capabilities at the supply chain level can expect improved firm-level performance. A better understanding of performance implications of supply chain agility and adaptability contributes to building and refining theories of supply chain agility and adaptability (Eckstein et al., 2015). Studies by Eckstein et al. and Prajogo (2015), served as a platform for empirically tested managerial implications. Eckstein et al. and Prajogo placed considerable focus on internal and external factors and fit or misfit on firm performance.

Netland (2015) obtained data from manufacturing firms and analyzed the influence of contingency variables regarding the implementation of lean production. Lean production is a product improvement strategy that encompasses various factors and serves to improve timely production, quality management, product maintenance, and

resource management practices (Netland, 2015). Netland viewed contingency theory as superior than interdependent fit when explaining internal and external factors of production to the extent in which managers strive to achieve organizational and operational alignment. Netland argued contingency variables defined what managers considered to be success factors for the implementation of lean production instead of why managers considered lean production to be desirable. Any organization interested in supply chain development would consider achieving a strategic fit between external and internal environments vital, but the degree to which an organizational manager should engage would vary based on multiple factors (Netland, 2015).

Like Netland (2015), Karim, Carroll, and Long (2016), extended contingency theory beyond the idea of why contingent alignment is necessary. Karim et al. analyzed data collected from pharmaceutical companies in the United States and reviewed theories of decision avoidance and delay in pursuing structural realignment. Karim et al. focused on different contingencies that helped moderate the progress of structural change and postponed or avoided decisions if industry turbulence occurred. Environmental uncertainty is not always an external factor that moderates the implementation of structural change for improving contingency fit, but at times it is indicative of the need to delay or avoid making structural change decisions (Karim et al., 2016).

**Supply chain resilience.** Birkie (2016) postulated CTF tenets of leanness, flexibility, and operational responsiveness enhances resilience. Hohenstein, Feisel, Hartman, and Giunipero (2015) referred to *supply chain resiliency* as a flexible capability of managers to prepare for, respond to, and recover from supply chain disruptions.

Thomas, Pham, Francis, and Fisher (2015) evaluated data from manufacturing companies in the United Kingdom to establish business resiliency techniques that would withstand increasing turbulence in business performance. Based on the findings, Thomas et al. developed a fit operational model (FOM) to integrate the main business improvement paradigms into an approach for achieving manufacturing resilience. FOM is similar to CTF as the goal is to synthesize the firm's operational (internal) and strategic (external) capabilities.

Hallavo (2015) tested CTF in the context of supply chain uncertainty by aligning firm operations with the internal and external environment. Using a hierarchical regression model, Hallavo analyzed data collected from Russian manufacturing firms and found matching the level of operational effectiveness with the external and internal environment leads to superior company performance. Although Thomas et al. (2015) argued that the model applies to all sizes and types of industries, Hallavo, hypothesized national culture is a weaker driver of typical operational performance than organizational culture. The results of studies by Thomas et al. and Hallavo do not discredit the universal applicability of CTF.

**Profitability.** A variety of uncertainties presented in a firm's internal and external operating environment prompts supply chain managers to invest a considerable amount of money and effort into supply chain risk management (Ho et al., 2015). The topic of how supply chain disruptions affect a firm's profitability and related strategies are not abundantly covered in literature as compared to demand and supply chain risk management (Ho et al., 2015). Bidhandi and Valmohammadi (2016) explored how theory

tenets of agility, flexibility, and operational responsiveness affected a firm's profitability. Although agility and responsiveness positively affected a firm's profitability, flexibility had the greatest effect on improving a firm's profits (Bidhandi & Valmohammadi, 2016).

Han, Wu, Yang, and Shang (2016) suggested by reconfiguring the supply chain, a firm can improve economic benefits. Han et al. (2016) indicated remanufacturing or refurbishment is one of the reconfiguring strategies for improving a firm's profitability. Collecting and purchasing used products (reverse channels) such as cellular phones and computers from customers to remanufacture, refurbish, and later resell to consumers can help minimize supply demands, financial risk, and improve profitability (Han et al., 2016). Reverse channels have risks of uncertainty and strategies to increase or maintain profits are subjected to the same disruption risk as in a regular supply chain flow (Han et al., 2016).

The effects of supply chain disruptions on profitability go beyond direct financial losses and may be associated with supply and demand risk mitigation strategies. Effects of supply chain disruptions on profitability and strategies used to maintain or increase profits occur on various levels (Rezapour, Farahani, & Pourakbar, 2017). For example, experiencing a supply chain disruption on a macroeconomic level lessens the firm's ability to remain competitive (Rezapour et al., 2017). A disruption that occurred in the upstream level of the supply chain can result in the inability to meet expectations downstream leading to lost market shares (Rezapour et al., 2017).

Zahran, Jaber, and Zanoni (2017) considered a three-level (supplier–vendor–buyer) supply chain system with a consignment stock (CS) agreement to determine

whether CS was beneficial in increasing business profits. In a CS contract, goods are owned by the vendor, stored by the buyer and buyer pays for goods removed from the inventory when purchased by the consumer (Zahran et al., 2017). Zahran et al. defined *CS* as a coordination mechanism (ordering and shipping) used to increase customer level performance, reduce supply chain costs, and increase the profitability of each supply chain member.

CS and traditional coordination policies were combined, and a sensitivity analysis was performed to examine four coordination models each having nine cases representing storage costs (Zahran et al., 2017). Sensitivity analysis was implemented to show the effects of different cost factors on the developed models. Zahran et al. suggested the best scenario for the system might be different from those preferred by a supply chain member as the situation depends on the storage-holding cost. Coordination may shift savings and profits to some but not all supply chain members (Zahran et al., 2017). Zahran et al. did not recommend consignment agreement between the vendor and the buyer when the storage-holding cost of the latter is higher.

Sensitivity analysis was also performed to determine the parameters that had the most positive effect on the system's profitability. Although adopting a traditional coordination policy among supply chain members produced profits, a combined policy followed by a consignment agreement among all supply chain members resulted in higher profits (Zahran et al., 2017). Changes in the demand rate, interest rate, vendor's set-up, and buyer's ordering costs can affect profits and ordering policies demonstrating

the importance of having all information regarding the values for input parameters of supply chain members (Zahran et al., 2017).

Zahran et al. (2017) posited adopting a CS agreement will help ensure better management and services, enhance collaboration, and assure product availability, particularly when demand fluctuates. Jabbarzadeh, Fahimnia, and Sheu (2017), defined *fluctuation* as variations (increase and decrease) in purchasing goods and services subject to factors such as seasonal, cyclical, and product availability. As payments are delayed, downstream members can invest sales revenue whereas upstream members benefit from adopting the CS agreement if they have insufficient space to store products and want to reduce storage-holding costs (Zahran et al., 2017). Collaborating and coordinating orders and shipments among members in the supply chain can substantially reduce supply chain costs and increase the profitability of supply chain members.

Collaboration for recovery is an important strategy manager's use for responding quickly to supply chain disruptions and mitigating harmful effects (Zhu et al., 2016). Singh, Garg, and Sachdeva (2018) conducted a systematic literature review of the drivers of retailer-supplier collaboration and the effect on supplier and retailer. Singh et al. (2018) explained customer orientation and more supplier-specific relationships lead to greater retailer-supplier collaboration. Singh et al. found the greatest benefit of retailer-supplier collaboration is cost savings, which is shared by all supply chain members. Manufacturing managers can strategically use supply chain collaboration to create new revenue opportunities. CTF is useful for managers in the development of long-term responses to disruptions to achieve stability in the supply chain (Grotsch et al., 2013).

Supply chain disruptions are minimized when supply chain managers develop effective responses (Grotsch et al., 2013).

## Contrasting Theories

**Normal accident theory.** Nunan and Di Domenico (2017) postulated organizational and strategic practices that stem from aligned relations between internal and external environments under which businesses operate is the primary focus of CTF. Nunan and Di Domenico noted that theorists of supply chain risk management focus on accidents and failures resulting from big data in data-centric organizations. One opposing theory to understanding and implementing strategies to mitigate supply chain disruptions is normal accident theory (NAT). Normal accident theorists view accidents as inevitable due to interactive complexity in organizational systems that are complex and tightly coupled (Nunan & Di Domenico, 2017).

Developed by Perrow (1984), described *NAT* as conditions which contribute to risk situations. The key concept of NAT is accidents are normal (Perrow, 1984). Most accidents, including complex accidents involving multiple failures, are preventable; however, accidents are inescapable in systems that are complicated and tightly connected (Perrow, 1984). To prevent malfunctions, managers need to reduce the complexity of the system (Perrow, 1984). Conditions of interactive complexity and tight coupling are antecedents to supply chain disruptions (Grant, Salmon, Stevens, Goode, & Read, 2018; Scheibe & Blackhurst, 2018).

Le Coze (2015) suggested a greater number of accidents are creations of organizational failures identified as DEPOSE (design, equipment, procedures, operators,

supplies, and equipment). However, an organizational failure is not considered a system accident, but a breakdown of components related to improper organizational management that includes taking calculated risks (Le Coze, 2015). Recognizing the precursors and understanding how interactive complexity and tight coupling influence disruption occurrence is useful to supply chain managers in choosing alternative mitigation strategies.

Scheibe and Blackhurst (2018) focused on the supply chain triad, which include the manufacturer, supplier, and customer. Scheibe and Blackhurst argued greater integration and connectivity within the triad could help recognize the effects of and prevent disruptions. Scheibe and Blackhurst noted NAT highlights issues and risks that persist along the supply chain but found that the lack of internal focus on supply chain mechanisms and propagation could be disastrous. SCRM demands a more hands-on approach to mitigating supply chain disruptions rather than simply understanding that accidents are inevitable. Applicability of NAT is limited as the theory applies to a small category of accidents, has not been tested on how to reduce accidents in complex and tightly coupled systems, is unclear as to what concepts the theory covers, and addresses safety in the context of organizational structure of complex industrial systems (Nunan & Di Domenico, 2017).

**Resource dependence theory.** A second theory to mitigating supply chain disruptions is the resource dependence theory (RDT) developed by Pfeffer and Salancik (1978). Klein and Pereira (2016) noted RDT theorists surmise a firm's strategic options are determined by the external environment. RDT theorists suggested that organizations

are dependent on the environment as a source of survival (Kalaitzi, Matopoulos, Bourlakis, & Tate, 2018). Early studies of resource dependence led to the concept that an organization is an open system dependent on contingencies in the external environment (Pfeffer & Salancik, 1978). Three factors that influence the organizations' level of dependence on certain resources are overall importance of the needed resource; scarcity of the resource, the scarce the resource the greater the firm's dependence; and competition for control of the resource-rivalry for dominance (Kalaitzi et al., 2018).

Bell, Mollenkopf, and Stolze (2013) noted the lack of resources in organization and industry supply chains significantly affect risk management strategies. Kalaitzi et al. (2018), indicated other factors that present problems with RDT as pertaining to the effect of resource scarcity on supply chain strategies. The factors included absence of discrimination involving an imbalance of power and mutual dependence, uncertainties surrounding its boundary conditions, and factual work that focuses on dependence of one participant on another versus reciprocal interdependence (Kalaitzi et al., 2018). Theorists conducted studies on how supply chain managers can collaborate with external organizations and build relationships with suppliers to increase performance (Klein & Pereira, 2016; Schiele, Ellis, Ebig, Henke, & Kull, 2015; Soosay & Hyland, 2015). From the RDT perspective, the challenge in building relationships with suppliers is dealing with the uncertainty of whether suppliers will follow the firm's sustainability agenda (Schnittfeld & Busch, 2016).

## Transition

In the study, I explored manufacturing companies' strategies to mitigate supply chain disruptions and remain profitable. In Section 1, I provided a background of the problem of supply chain disruption to include the definition of a disruption, vulnerabilities of the supply chain, and how disruptions can negatively affect the flow of products, services, and revenue. The literature review contains information from studies pertaining to relevant and contrasting theories to mitigating supply chain disruptions and studies providing different perspectives of disruptive events and possible disruption risk strategies. Section 2 contains (a) role of the researcher, (b) data collection techniques, (c) interview and ethical protocol, and (d) research methods and design, (e) data analysis, (f) data organization techniques, and (g) population and sampling. Section 2 contains criteria used in selecting and gaining access to participants and establishing a relationship with the selected participants. Section 2 also contains a discussion on reliability and validity including (a) dependability, (b) credibility, (c) transferability, (d) confirmability, and (e) data saturation. In Section 3, I presented the findings and results of the study, discussed the implications for positive social change, and provided recommendations of topics requiring further research. Section 3 also included applicability of the study, reflections, and the conclusion.

# Section 2: The Project

## Purpose Statement

My purpose in this qualitative exploratory multiple case study was to explore strategies that manufacturing that firm managers use to mitigate supply chain disruptions to remain profitable. The target population for this study consisted of four manufacturing firm managers at two manufacturing companies located in the southern region of eastern Virginia who have successfully implemented strategies to reduce the effects of supply disruptions on profitability. The implications for positive social change might include manufacturing firm managers increasing profits that attract investment capital for business expansion creating employment opportunities, investment in community projects, and enhance consumer spending in the local community.

## Role of the Researcher

In qualitative research, the researcher's primary role is the instrument for collecting, organizing, and analyzing data (Clark & Veale, 2018). For this study, I was the instrument for collecting data by interviewing participants and gathering company information, such as activity reports of work disruptions and solutions. I also assembled and analyzed data to present findings. Qualitative researchers have the responsibility to disclose their experiences, values, assumptions, and biases regarding the research topic, participants, and location (Marshall & Rossman, 2016). Although I work in the logistical field of property management, requisitioning, shipping and receiving, and storage, I did not have a relationship with the manufacturing firms or participants used in this study.

Researchers should adhere to the ethical guidelines and fundamental principles of respect, beneficence, and justice per the *Belmont Report* to protect research participants (U.S. Department of Health and Human Services [USDHHS], 1979). I adhered to the fundamental principles by treating participants autonomously and with respect, protecting their privacy while enhancing their well-being, obtained informed consent, and assessed risks and benefits when selecting subjects for data collection. Prior to conducting the study, I completed the web-based National Institute of Health (NIH) training. Celestina (2018) and Franks (2017) claimed participants are more agreeable to disclose information if they feel their privacy and confidentiality will not be breached. To ensure privacy and confidentiality, I conveyed to all participants that their privacy and confidentiality would be protected, and the information provided would only be used for research purposes.

Bias is a significant issue that can distort study results and can influence the quality of research findings (Raza, 2016). To guard against bias, researchers should remain objective, recognize that personal bias exists, journal perceptions, and be mindful and self-reflective of one's bias (Chamberlain, 2016; Poos, van den Bosch, & Janssen, 2017; Raza, 2016). To mitigate bias, I remained objective, allowing participants to freely express their views and beliefs without interrupting and imposing or focusing on my ideas and beliefs. I self-reflected and journaled thoughts I had about my interactions with participants. I adhered to the interview protocol, carefully constructed interview questions, and reviewed transcripts to mitigate my personal biases. Qualitative researchers employ interview protocol, transcript review, and member checking to

separate their perspectives, experiences, and beliefs from the collected data (Sorsa, Kiikkala, & Astedt-Kurki, 2015).

Researchers use interview protocol to collect data to address the overarching research question, increase the reliability of the case study, and minimize the inconsistencies in the research interview process (Jansen, 2015; Yin, 2018). Interview protocol extends to the procedural level of interviewing and includes a script of what the researcher will say before and at the end of the interview, prompts for the collection of consent forms, and standardizes data collection which makes the process more organized and consistent (Castillo-Montoya, 2016). As the researcher, I followed the interview protocol to increase the reliability of the study, minimize inconsistencies in the interview process, and achieve consistency and organization. I adhered to the ethical guidelines for conducting credible research and treated each participant in accordance with the *Belmont Report*.

## Participants

I used purposive sampling to recruit participants. Researchers should recruit participants with relevant experience, knowledge, and insight into the research question (Palinkas et al., 2015). Selection of participants and collection of data depends on whether participants are willing to give consent to participate in the research (Celestina, 2018). Researchers should exhibit a variety of interpersonal skills and capabilities (e.g., trust, rapport, knowledge, and experience) to gain access to participants (Celestina, 2018; Ibrahim & Edgley, 2015).

I gained access to participants by using LinkedIn found at https://www.linkedin.com and using the Trustoria National Professionals Directory database found at http://trustoria.com. LinkedIn is a business and employment-oriented service used by business professionals to network and recruit potential employees. Trustoria National Professionals Directory contains a list of names, email addresses, professions, and telephone numbers of prospective participants. I contacted participants via email and LinkedIn messaging. I explained my goal in this study, the intended use of data being collected, and how the findings of the study might provide additional insights related to the firm's overall supply chain and firm performance. I answered all questions participants had and provided a brief overview of my experience in the logistical field.

The second strategy that I used was snowball sampling. Rao et al. (2017) and Penn (2016) suggested researchers ask participants for recommendations of those inside and outside the firm who might meet the selection criteria as well as gain access to participants who are difficult to reach. I asked participants for referrals of potential candidates who met the selection criteria. I received a few referrals for potential candidates; however, the referred candidates did not reply or declined the invitation.

According to Saunders and Townsend (2016), sample selections should represent the characteristics of the targeted population, as eligibility requirements apply to all empirical studies to ensure selected participants meet the criteria to help the researcher answer the overarching research question for a study. Morgan, Occa, Potter, Mouton, and Peter (2017) and Saunders and Townsend (2016) recommended selecting a percentage of the targeted population having the most experience and knowledge of the phenomenon

under investigation. For example, if 20% of a sample has two years or more experience, and 40% have two years or less experience, the researcher can select 20% of the more experienced group.

My sample consisted of four supply chain managers from two manufacturing firms located in the southern region of eastern Virginia. The eligibility criteria for prospective participants were as follows: (a) served as middle-to-senior level supply chain managers; (b) ability to provide detailed information pertaining to supply chain disruptions; (c) have at least 2 years of experience successfully implementing strategies to mitigate supply chain disruptions; and (d) conducted business operations located in the southern region of eastern Virginia. Yin (2018) indicated that participant criterion should result in the selection of participants having characteristics that align with the overarching research question. Cruz, Sabourin, and Cavalcanti (2018) and Hagaman and Wutich (2017) posited that researchers should recruit participants endowed with the competence, experience, and knowledge of the phenomenon. The rationale for the eligibility criteria supporting the study was to align with the research question: What strategies do manufacturing firm managers use to mitigate supply chain disruptions to remain profitable? By using purposive and snowball sampling, I selected supply chain managers who had the competence, knowledge, and experience in implementing strategies to mitigate supply chain disruptions. The selected participants had 3 to 5 years' experience in the supply chain management field.

The qualitative researcher should establish a trusting relationship with participants (Yin, 2018), but establishment of trust is not a straightforward process (Celestina, 2018).

Celestina posited that trust depends on direct interaction; that is, people's actions with others influence their trustworthiness and reputation. I contacted each participant via LinkedIn messaging and email, inviting individuals to participate in the study. I built a working relationship by explaining the importance and value of the participant's contribution. I created a sense of trust by responding to all questions and concerns politely and honestly. I was flexible in scheduling initial interviews and follow-up appointments. I respected and gave each participant my undivided attention ensuring there were no distractions such as turning off my cell phone. Morgan et al. (2017) postulated that researchers could build a trusting, work relationship with participants by (a) being truthful, (b) showing respect and politeness, (c) paying attention to what was being said, (d) being flexible in scheduling interviews and follow-up appointments, and (e) acknowledging the value of the participants' contributions to the research.

## Research Method and Design

### Research Method

The research method that I selected was the qualitative method. Yates and Leggett (2016) and Barnham (2015) professed that qualitative research allows the researcher to attain the *how*, *why*, and *what* questions about the phenomenon. Anderson (2017) and Park and Park (2016) posited that qualitative research is identified by the comprehensive, naturalistic, and interpretative inquiry into the phenomenon being studied. Researchers choose the qualitative method and collect data via historical records, interviews, and direct observations (Anderson, 2017; Marshall & Rossman, 2016). Researchers used collected data to investigate and understand the observed behaviors, attitudes, and

opinions of the targeted population linked to studies conducted in natural settings to discover new trends and patterns of the phenomenon (Anderson, 2017; Barnham, 2015; Bristowe et al., 2015; Marshall & Rossman, 2016; Park & Park, 2016). The qualitative method was optimal for this study, because I explored and gained an understanding of the phenomenon from the participants' perspective and explored the strategies supply chain managers use to mitigate disruptions to remain profitable.

Researchers use quantitative research to test hypotheses, measure variables, and analyze statistical data (Barnham, 2015; McCusker & Gunaydin, 2015; Park & Park, 2016). The quantitative method was not appropriate for my study, because I did not examine the relationship between variables nor test hypotheses. Bolton (2015) and Molina-Azorin (2016) explained that mixed methods research combines qualitative and quantitative methods. Researchers use mixed method research to measure, evaluate, integrate, converge, and replicate research findings when a single research method is not sufficient to fully understand the research problem (Park & Park, 2016). Mixed methods research was not suitable for my study, because I did not require the integration of quantitative data.

**Research Design**

I considered (a) case study, (b) ethnography, and (c) phenomenological research designs for my study. Aczel (2015), Larrinaga (2017), and Yates and Leggett (2016) described *case study design* as an empirical inquiry, which researchers use to investigate, describe, or explain one or more bounded cases within their real-life context. Case study

design is beneficial when answering what, how, and why questions about events the researcher has little to no control (Dasgupta, 2015; Yates & Leggett, 2016; Yin, 2018).

Case study research is not limited to a single source of data. Ridder (2017) and Dasgupta (2015) posited researchers triangulate data obtained through a combination of (a) open-ended questions; (b) direct observation of participants in their work environment; (c) archived records; (d) physical artifacts; and (e) documentation. Ridder (2017) and Dasgupta (2015) contended collected data should result in a detailed case description that enhances the understanding of the phenomena. I selected the case study design, as I investigated and analyzed multiple cases within real-life contexts regarding strategies used to mitigate supply chain disruptions to remain profitable.

Gammelgaard (2017) and Pluye, Hong, Bush, and Vedel (2016) described *ethnographic design* as the exploration of interpreting human behavior within a cultural group. The researcher becomes immersed in the community and culture while observing the lives of community members (Pluye et al., 2016). Ethnographic design was not appropriate for my study because I did not study cultural groups.

Researchers using phenomenological studies focus on individual lives or lived experiences (Hannon et al., 2016). Phenomenological researchers investigate the essence of the participants' lived experiences through individual stories, interviews, and observations (Yin, 2018). Phenomenological research design was not appropriate for this study because my objective did not encompass the collection of information concerning individuals’ lives or shared lived experiences.

Data saturation is a component of rigor used in qualitative research to ensure highly descriptive quality data is collected (Fusch & Ness, 2015; Morse, 2015; Saunders et al., 2018). No one-size-fits-all method is feasible for obtaining data saturation as saturation is dependent on the sample size (Fusch & Ness, 2015). Data saturation occurs when data collected from different cases, archives, observations, and interviews results in gathering repeated information and additional coding is no longer feasible (Dasgupta, 2015; Fusch & Ness, 2015; Morse, 2015).

Failure to obtain saturation affects the quality of the research and compromises the validity of the content (Fusch & Ness, 2015). I collected data via interviews, publicly available historical archives, and business reports referencing supply chain disruptions. I continued collecting data through follow-up interviews, reviewing additional cases, and historical archives until no new relevant ideas or patterns emerged, gathered information was replicated, and additional coding was no longer beneficial.

## Population and Sampling

The targeted population of this study consisted of four supply chain managers selected from two manufacturing companies located in the southern region of eastern Virginia. The selection of four middle-to-senior level participants from each company enabled me to obtain detailed, rich information representing the opinions and perspectives of each participant, as relating to supply chain disruptions and mitigation strategies. Hagaman and Wutich (2017) and Nilsson et al. (2016) posited qualitative researchers should define sample size by considering the purpose of the study and the assessment of the diverse opinions and perspectives offered by the participants.

Researchers should ensure selected participants representing the targeted population have the competence, experience, and knowledge of the phenomenon to address the research topic (Cruz et al., 2018; Saunders & Townsend, 2016).

I chose purposive sampling as my method to select potential participants. Purposive sampling is a nonprobability sampling technique which is suitable for case study research and may be useful when resources, time, and workforce are limited (Etikan, Musa, & Alkassim, 2016). Palinkas et al. (2015) suggested purposeful sampling is used in qualitative research to facilitate the selection of participants who can provide information about the phenomenon while ensuring efficient use of limited resources. Purposive sampling enables researchers to identify the population sample having knowledge and experience of the research topic (Hagaman & Wutich, 2017; Palinkas et al., 2015). Benoot, Hannes, and Bilsen (2016) and Etikan et al. (2016) indicated that purposeful sampling has been used in qualitative research to ensure in-depth information is collected from information-rich participants who can provide insight and comprehensive knowledge regarding the research topic. Purposive sampling aligns with the stated intent of the case study design and ensures the selection of participants have in-depth knowledge and experiences who can provide detailed descriptions about the phenomenon (Elman, Gerring, & Mahoney, 2016). Benoot et al. (2016) posited the objective of the researcher is not to realize a single correct answer to a study question, but rather to facilitate the synthesis of adequate evidence necessary to explore emerging patterns.

A second sampling method I used to select participants was snowball sampling. Snowball sampling is a recruitment technique in which the researcher asks selected participants for recommendations of other potential participants internal and external to the firm who meet the selection criteria, and to help gain access to potential participants difficult to reach (Holloway, Toye, McConigley, Tieman, Currow, & Hegarty, 2015; Penn, 2016; Rao et al., 2017). Blaikie (2018) and Roy, Zvonkovic, Goldberg, Sharp, and LaRossa (2015) argued that in qualitative research, there are no set rules in determining sample size as the size depends on (a) what the researcher wants to know; (b) credibility of the participants and collected data; and (c) what information is useful to answer the research question.

Boddy (2016) and Fusch and Ness (2015) contended data saturation is critical in considering the selection of a qualitative sample and at least two participants are required to obtain data saturation. Obtaining data saturation from a single interview or case study cannot produce adequate findings to address the research problem (Boddy, 2016). Researchers should address the scope of data saturation, which encompasses the comprehensiveness, depth, and unique aspects of the study (Morse, 2015; O'Connor, 2015). Replication is an essential aspect of data saturation (Yin, 2018). Morse (2015) described the *concept of replication* as the condition where data from several cases have the same or similar essential features (Morse, 2015). Although the details may be different, participants may give common responses to situations with shared characteristics (Morse, 2015).

Boddy (2016) noted that given the nature of the study a sample size of four to 10 might be sufficient in sampling a homogenous population, such as the same type of employment; whereas van Rijnsoever (2017) noted that some scholars have indicated a sample size of 15 to 30 is adequate to obtain data saturation in case studies. A sample size of four participants from two manufacturing firms would be considered adequate in obtaining extensive information necessary for data saturation, enhancing replicability, and arrive at conclusions and recommendations linked to supply chain disruptions in the manufacturing sector due to the homogeneity of the population (Boddy, 2016; Penn, 2016). Gile, Johnston, and Salganik (2015) posited that researchers choose participants based on the study criteria. The objective of facilitating the collection of relevant and comprehensive information, and selection of participants depends on specific inclusion criteria. Selected participants should represent the targeted population and have the competence, experience, and knowledge of the phenomenon to address the research topic (Cruz et al., 2018; Saunders & Townsend, 2016).

To participate in the study, individuals should (a) be middle-to-senior level supply chain managers, (b) have at least two years' experience implementing strategies to mitigate supply chain disruptions and remain profitable, and (c) have the knowledge to provide detailed information pertaining to supply chain disruptions. The expertise and competence of the participants can provide breadth and in-depth knowledge of the case under study, and ensures respondents are aware of the organizational culture and of influences on supply chain disruptions (Hagaman & Wutich, 2017; Yin, 2018). Said, Amir, and Maelah (2017) indicated individuals possessing middle-to-senior level supply

chain management experience in the manufacturing industry for at least one year are aware of their organizational culture and its influence on supply chain operations. The selection criteria enabled me to obtain comprehensive information and reliable insights into the study topic.

I selected middle-to-senior level supply chain managers who had three to five years' experience in supply chain management. Middle-to-senior level managers participate in the decision-making process to address issues affecting their companies and might have access to data relating to organizational issues (Rojos et al., 2016). Palinkas et al. (2015) noted that participants should be selected according to their role within the firm in the implementation process. Middle and senior level managers were likely to provide relevant information about the research topic. By adhering to the criteria, I was able to identify experienced participants, obtain credible and detailed information to address the research question, and generate overall findings to address the study phenomenon.

Researchers should select interviewing sites that are accessible, convenient, comfortable, quiet, private, and free from distractions to allow participants to share information freely (Fusch & Ness, 2015). Drabble, Trocki, Salcedo, Walker, and Korcha (2016) indicated that conducting telephonic interviews is convenient and protects the privacy of the participants. Morgan et al. (2017) noted that using a flexible strategy to schedule interviews demonstrates professionalism. Marshall and Rossman (2016) suggested that the comfort level of interviewees could influence how they respond. I interviewed each participant separately via Skype voice and was flexible in scheduling

interviews so not to interfere with participants' work and family schedules. To avoid distraction, I turned off my cellular telephone and asked participants to do the same.

## Ethical Research

Informed consent is a principled, lawful prerequisite in conducting research involving human participants and is crucial to ethical research and study credibility (Lie & Witteveen, 2017; Wallace & Sheldon, 2015). The informed consent form outlines the requirements of the IRB to comply with ethical standards in research and fulfillment of the guidelines of *The Belmont Report* (U.S. Department of Health and Human Services [USDHHS], 1979). Informed consent encompasses procedures used to provide participants with risks, benefits, right to confidentiality related to the study, which will enable participants to make an informed decision to voluntarily confirm their willingness to engage in the research (Kaye et al., 2015).

Prior to engaging participants in a research project, researchers have the legal and ethical responsibility to obtain participants' informed consent (Largent, 2016). Miller (2015) and National Institutes of Health [NIH] (2011) explained that informed consent forms should contain a statement that (a) subjects' participation is voluntary, (b) participant can withdraw at any time, (c) refusal to participate or withdrawal will not result in penalties or loss of benefits, and (d) a confidentiality pledge. Protecting research participants is an essential element of ethical research, and the researcher has a responsibility to protect the welfare and rights of research participants throughout the study (Donges, 2015; Miller, 2015; Wallace & Sheldon, 2015).

After explaining all aspects of the study and receiving an acknowledgment from each participant, I obtained their signatures on the informed consent form prior to conducting interviews. Participation in the study was voluntary, and participants were free to leave the process at any point. Participants have the right to withdraw from the study at any time with or without written notification, without providing a reason, and without negative recourse (Holm & Ploug, 2017). Participants could have submitted their written withdrawal notices to my Walden University email account. To mitigate withdrawal, I explained to selected participants the aspects of the study including their right to confidentiality, risks and benefits related to the research project. The same information was included in the consent form. I did not have any participants withdraw from the study.

Although compensation to research participants is ethically sound and serves as an incentive to gain access, offers of incentives to participate can contribute to concerns of coercion or undue influence on participants and affect research credibility (Largent & Lynch, 2017; Lie & Witteveen, 2017). Researchers should be cautious to avoid crossing ethical boundaries as payments could negatively affect the role of the informed consent process (Devine et al., 2015). I did not offer any compensation. Tokens of gratitude for participation are generally not controversial and are offered in a way that would not influence decisions to participate (Largent & Lynch, 2017; Lie & Witteveen, 2017). In return for participating, I provided a copy of the summary to the participants after publication. Copies of the findings were disseminated via email or postal service.

Kirilova and Karcher (2017) indicated that researchers have a primary duty to protect the privacy and confidentiality of participants. Confidentiality is a professional duty that the researcher should maintain throughout the study process (Lancaster, 2017; Winkler, Villarroel, & Pasmanik, 2018). Ross, Iguchi, and Panicker (2018) and Kirilova and Karcher (2017) explored the anonymization strategy to protect human participants. Anonymization strategy is the use of pseudonyms to identify respondents, thereby removing any information that may serve as direct or indirect identifiers (Kirilova & Karcher, 2017; Ross et al., 2018). Based on the need to maintain the privacy of the subject's identity, participants in the study were not identified by name, location, or the organizations for which they worked.

Researchers must uphold confidentiality is an essential principle, which is a major component of participant protection (Jeanes, 2017). In order to maintain participant confidentiality, I undertook several measures. After completing the transcript review, I transferred voice recordings from the folder on my computer to a flash drive, deleted the folder containing the recordings, and deleted the folder from the trash. I have stored all data in a fireproof safe requiring a combination only accessible to me. The data includes the transferred voice recordings to the flash drive and all paper documents, including transcripts, notes, and documents signed by participants.

Jeanes (2017) recommended storing collected data in a secure location and destroying data after the project is completed. Penn (2016) secured recorded data in a fireproof safe and deleted all electronic materials five years after completing the study. Five years after the completion of my study, I will destroy all paper documents via

shredder and will destroy the data saved to a flash drive via Killdisk destruction software. I obtained Institutional Review Board (IRB) approval and requested permission to interview participants before collecting data. The IRB approval number for this study is 04-08-019-0660949.

## Data Collection Instruments

Researchers are the primary data collection instrument in qualitative research (Clark & Veale, 2018). Houghton, Murphy, Shaw, and Casey (2015) and Yin (2018) noted case study evidence comes from sources such as (a) documentation, (b) archival records, (c) interviews, (d) direct observations and interaction with selected participants, and (d) physical artifacts. The data collection instrument is an active participant in the interviewing process and influences the conversational context that can be used to contribute to the clarification of participant responses and can determine the type of information gathered for the study (Clark & Veale, 2018; Yates & Leggett, 2016). Serving as the data collection instrument, researchers collect information using structured, unstructured or semistructured interviews to obtain data related to the participants' real-life experiences with the phenomenon under investigation (Saunders & Townsend, 2016).

Rule and John (2015) found the type of interview likely to generate data that will answer the research question will depend upon the research design. As the data collection instrument, I conducted semistructured interviews to facilitate extensive data collection, asking participants open-ended questions related to strategies to mitigate supply chain disruptions. I also gathered company documents such as operational procedures, company reports, risk management plans, meeting minutes and procurement policies.

Yazan (2015) and Yin (2018) asserted company records, reports, and artifacts provide contextual and facilitative evidence that can link data to the study.

Macdonald and Corsi (2013) used semistructured interviews to determine the internal and external factors that influence the overall disruption of management process in supply chains. Yin (2018) noted that semistructured interviews are valid data collection methods and are useful in gaining insights on the research topic. Researchers use open-ended questions to obtain detailed descriptions of the phenomenon to answer the research question (Dikko, 2016).

Semistructured interviews are part of an interview protocol where respondents answer preset questions associated with the research problem (Castillo-Montoya, 2016; Yin, 2018). Qualitative researchers use an interview protocol to (a) ensure reliable and valid data, (b) mitigate bias, (c) ensure transferability, and (d) maintain the focus of the inquiry (Marshall & Rossman, 2016). Elswick, Casey, Zanskas, Black, and Schnell (2016) and Yin (2018) noted that an interview protocol for a qualitative research case study comprises (a) an overview of the research study, (b) procedures for data collection, (c) interview questions, and (d) reconfirm consent to participate. Interview protocol for this study is in Appendix A and interview questions in Appendix B.

As the data collection instrument, I conducted semistructured interviews via Skype voice. The use of Skype and telephonic platforms is cost-effective, saves time for the researcher and participants, captures data with greater accuracy, and enables the researcher to review recordings as needed (Shawver et al., 2016). To ensure the accuracy of the interviews, I audio recorded the interviews using MP3 Skype recorder.

Before starting the interview, I verbally notified the participants that the interview would be recorded, explained why I was recording, and confirmed their consent to be recorded. Post-interview protocols include writing contextual notes, clarifying responses, editing the transcripts, and entering the information in a general purpose software tool (LaPelle, 2004). Researchers use general purpose software tools such as Microsoft (MS) word and Excel to aid in the coding of the collected data. These protocols are essential to standardize data collection and ensure effective interview and data analysis processes (Elswick et al., 2016).

I used transcript review to enhance the reliability and validity of the data collection process. Jordan (2018) posited validity and reliability are the central tenets of quality research. Krotov (2016) described *reliability* as a measurement tool in data collection to mitigate errors that lead to consistent results. Noble and Smith (2015) referred to *validity* as study findings accurately representing the data collected pertaining to the phenomenon. Morse (2015) described *transcript review* as a process whereby the researcher provides the participants with a copy of the interview transcript to verify accuracy, correct errors, or inaccuracies in the transcript, and clarify participant responses. Transcript review allows respondents to ascertain the researcher has developed an accurate report of the narratives and ensures the credibility and consistency of the researcher's interpretation (Yin, 2018).

After transcribing and analyzing the recorded interviews, I provided each participant with a copy of their transcripts via email and asked them to review the transcripts to verify correctness, validate responses, and provide clarification of the

collected data. Participants made changes and corrections as appropriate to accurately represent their views and responses. After receiving the corrected transcripts, I re-analyzed the interview transcripts, company documents, and peer-reviewed literature to ensure data analysis supported research reliability, validity and credibility. Morse (2015) postulated that transcript review improves rigor in qualitative research and researches can enhance research data integrity by applying a structured instrumentation process to collect and analyze data. Morse (2015) and Noble and Smith (2015) suggested researchers invite respondents to comment on and validate transcripts to ensure final themes and concepts accurately reflect participant responses to interview questions pertaining to the phenomena being studied. Researchers verify interview information with respondents to enhance the quality and credibility of data as well as establish construct validity (Moon, 2015; Yin, 2018).

## Data Collection Technique

Dikko (2016) explained the interview technique allows the researcher to use open-ended questions to obtain data rich descriptions about the phenomenon. AlKhateeb (2018) indicated that interviews might contribute to effective data collection by allowing the researcher to engage respondents via face-to-face or telephone. One of the data collection techniques I used to address my research topic was semistructured interviews.

Dikko (2016) and Brooks and Normore (2015) noted that semistructured interviews are a favorable data collection technique and are used to capture and gain an understanding of participant experiences, opinions, and attitudes about the phenomenon being studied. Semistructured interviews are a prevalent data collection instrument used

in different studies to acquire rich, experiential narratives of the participants' experiences and perspectives, enabling the researcher to give direction and structure to the dialogue while allowing a free and open discussion to develop (Yin, 2018). Although face-to-face interviews are the most common data collection tools, I conducted semistructured interviews via Skype voice. AlKhateeb (2018) and Kasprzak (2015) noted that Skype is a cost-effective means of contacting participants outside the researcher's geographical location. The use of Skype voice was cost-effective and enabled me to contact participants outside of my geographical location. Skype voice versus Skype video was used to protect the participants' privacy and confidentiality.

Upon receiving IRB approval, I contacted prospective participants via LinkedIn messaging or email addresses and requested their participation. I explained to each participant the goal and intended use of the project; reiterated their right to privacy, confidentiality, and withdrawal; provided a copy of the consent form; and explained how the study might benefit their firm. I told each participant that because of our different geographic locations, the interviews would be conducted via Skype voice and would be audio recorded using MP3 Skype recorder. Lord, Bolton, Fleming, and Anderson (2016) and Shawver et al. (2016) indicated telephonic, or Skype platforms are cost-effective, and qualitative researchers collect data via telephonic or Skype interviews to obtain data from participants in distant geographical areas.

After receiving the signed informed consent forms from each participant, I contacted selected participants via email to schedule the interviews. To mitigate intruding upon participants, work, and personal time, I was flexible in scheduling and rescheduling

interviews. Arsel (2017) recommended taking time between interviews to enter data collected from participants, journal preliminary findings, and journal self-reflecting thoughts such as biases that could affect study findings. I allowed myself 45 minutes between interviews, which provided me enough time to interpret and enter information such as voice intonations and hesitations in my journal. Based on the need to obtain rich data through extensive participant involvement and consultations, the semistructured interview was used for my study. Interview protocol is in Appendix A.

Another data collection technique I used was reviewing company meeting minutes and policy manuals provided by participants as well as publicly available company documents. Dasgupta (2015), Yazan (2015), and Yin (2018) recommended researchers conduct case studies using (a) organization's strategic documents, (b) administrative documents, (c) archived organizational reports, and (d) company policies as forms of the study documentation. Ridder (2017) and Yazan (2015) gathered internal communications and data from audits to understand the process of implementing new best practice guidelines. I gathered publicly available information and documents about strategies to mitigate supply chain disruptions by searching the company website. Company websites contain business history, press releases, company policies and procedures, and contact information. I also searched newspaper articles and industry magazines such as *The Manufacturer and Industry Supply* and reviewed documents provided by participants. Company records and artifacts provide additional evidence that can link data to the study (Yazan, 2015; Yin, 2018).

According to Cridland, Jones, Caputi, and Magee (2015) and Yin (2018), advantages of open-ended semistructured interviews include providing insight about human affairs and allows the focus to remain on the case study topic. Semistructured interviews enable the researcher to develop rapport, listen carefully, address complex questions; and promote the further clarification of the participants' responses (Wolgemuth et al., 2015). The third advantage of semistructured interviews are the direct, insightful, and highly efficient means by which researchers collect rich, empirical data when the phenomenon of interest has no single set of outcomes (Dikko, 2016). The advantage of conducting interviews via telephone or Skype is the researcher has wide geographical access to participants (AlKhateeb, 2018; Kasprzak, 2015; Lord et al., 2016). Yazan (2015) and Yin (2018) described the advantages of document and artifact review as follows: (a) inexpensive, (b) a source of background information that covers a long span of time and events, (c) provides the researcher with information that may not be directly observable, (d) may reveal issues not noted via interviews, and (e) can be unobtrusive and non-reactive because, unlike human participants, documents do not become upset or have other obligations.

The interview process has five disadvantages. First, as a result of extensive arrangements in planning and scheduling interviews, developing questions, and executing transcription and analysis, interviews can be time-consuming (Brooks & Normore, 2015). Interviews can be time-consuming because of scheduling and rescheduling, setting up the site and placing calls, and having abrupt interruptions. Second, interviews can be

intrusive to participants because of their personal or work time (Brooks & Normore, 2015).

Third, Yin (2018) postulated that the disadvantages of semistructured interviews include bias due to poorly articulated questions, researcher interpretation bias, and interviewees may have difficulty recalling the phenomenon. For instance, the researcher may intentionally or unintentionally bias the study by asking leading interview questions or using interviewees' responses to confirm researchers' beliefs. Depending on the amount of time that has passed between the interview and the phenomenon being studied, respondents may have difficulty recalling the event.

Fourth, AlKhateeb (2018) noted in conducting telephonic interviews researcher miss social cues such as eye contact and body language of the interviewee. However, researchers can use participant voice and intonation social cues, such as pauses and rise and fall in pitch (AlKhateeb, 2018). For example, the rise in a participant's pitch may be an indicator of stress or being upset, or a pause could mean the participant is thinking. Using telephonic or Skype interviews means the participant may be visible to other employees and managers of the organization or family members, which means the interview can be abruptly interrupted (AlKhateeb, 2018). AlKhateeb warned the use of Skype video can be a breach of privacy and confidentiality. I utilized Skype voice versus Skype video to protect the participants' privacy and confidentiality.

The disadvantages to document and artifact review include (a) incomplete, inaccurate or insufficient details, (b) unavailable, missing or outdated, (c) review process can be time-consuming, and (d) difficult to retrieve (Yazan, 2015). Transcript review

enables participants to verify the correctness of the transcribed data (Leung, 2015). Transcript review during data interpretation is an integral component of effective data analysis. Yin (2018) noted that transcript review enables research participants to determine whether the researcher prepared an accurate report of the narratives and ensures the credibility and consistency of the researcher's interpretation.

Researchers use transcript reviews to examine the rigor of the responses obtained during the interviews (Moon, 2015). I provided each participant with a copy of their transcript and asked for clarification of their responses, to verify the transcript for accuracy, and to correct errors. By examining the transcripts, participants provide clarification of their responses and verify the transcript for correctness and accuracy, which is necessary for valid and reliable conclusions (Moon, 2015; Morse, 2015). Upon receipt, I reviewed the returned transcripts. Participants made corrections and changes regarding spelling, missing words, and explanation of technical language. The corrections and changes did not change the results of the data analysis. Transcript review is an effective approach to determining the credibility, validity, and reliability of research findings (Jordan, 2018; Noble & Smith, 2015).

## Data Organization Technique

Woods, Macklin, and Lewis (2016) suggested developing a data tracking system is an important approach in qualitative data organization. Al-Rawahi and Al-Balushi (2015) and Morse (2015) indicated an appropriate data organization system such as logs or journals could be used to track research activities, promote reflective thinking on the research process, and manage key information supporting data retrieval and analysis to

enhance credibility. I tracked research data including interviews, company documents, audio recordings, and journals. I maintained a handwritten journal using a standard journaling notebook to capture vital information collected during recording semistructured interviews, and the review of company records.

Woods et al. (2016) maintained data tracking should include relevant contexts, and sources and should continue through data compilation and analysis. Tracking techniques are necessary to ensure consistency and coordination in data flow, which leads to minimal complications in compilation, storage, and reporting (Woods et al., 2016). I kept a reflective journal to track my learning process and any biases I had about the research and data collected. Al-Rawahi and Al-Balushi (2015) posited that a reflective journal allows the researcher to observe their learning processes and goals, leading to a better understanding of themselves and their biases. Chamberlain (2016) and Raza (2016) noted that a reflective journal should address (a) reflections on the situation to develop information linked to the actual research experience, (b) learning skills to improve the knowledge of the emotions and feelings developed in the study, and (c) event interpretation to indicate the specific knowledge and insights acquired in the study.

Soares, Bastos, Rodrigues, Pereira, and Baptista (2015) described *data organization* as classifying and assigning file names for stored research data with identifiable content related references. The first step in data organization is selecting and establishing a system for naming files (Woods et al., 2016). Andreica (2016) indicated that a file-naming system might contain the data collection method and the collector's initials. I used a file-naming system entitled SSI-VB (Semistructured Interview-Vanessa

Benton) as the standard approach for identifying the entire qualitative data files. I also used an alphanumeric labeling system (e.g., P1_092518_1700 -participant-1; interview date; interview time) to protect participant identity. The use of special characters removes any information that may serve as direct or indirect identifiers of respondents and their place of employment (Kirilova & Karcher, 2017; Ross et al., 2018).

I am storing all collected data for 5 years in a fireproof safe with a combination lock accessible only to me. Jeanes (2017) suggested storing collected data in a secure location and destroying data after the project is completed. At the end of 5 years, I will shred all paper documents and destroy data saved to a flash drive using Killdisk destruction software.

## Data Analysis

To gain a broader understanding of the research topic, I used methodological triangulation for the study. Mayer (2015) found methodological triangulation is the most commonly used form of triangulation in case studies. Fusch and Ness (2015) and Joslin and Muller (2016) described *methodological triangulation* as using more than one source (e.g., interviews, observations, questionnaires, and documents) to collect data to obtain multiple perspectives of the phenomenon and validation of data. Yin (2018) recommended collecting data from multiple sources to ensure the reliability and validity of data. I reviewed company records, meeting minutes, policy manuals, procurement policies, and analyzed data collected from semistructured interview transcripts to corroborate findings and ensure validity and reliability. Methodological triangulation might enable researchers to (a) obtain more insight into the research problem, (b)

minimize inadequacies and inconsistencies, (c) determine the validity and credibility of the study by using multiple sources, and (d) analyze the data and draw more accurate conclusions and outcomes of the research findings (Fusch & Ness, 2015; Mayer, 2015).

Sousa and Figueiredo (2014) discussed five steps to data analysis (a) cleaning and organizing, (b) coding, (c) identifying emerging patterns and themes, (d) interpreting, and (e) evaluating results and developing conclusions. Soares et al. (2015) indicated data organization requires data cleansing or data scrubbing. After completing the data collection process, I transcribed the data collected from audio recorded semistructured interviews and data collected from company documents using MS word. LaPelle (2004) used MS word to analyze informant interviews, case studies, focus groups, and open-ended survey questions. MS word contains built-in functions that do not require programming skills and has served ideally for qualitative research projects (LaPelle, 2004).

Once I completed the data transcription, I organized and cleaned the interview data by grouping the responses to each question by grouping responses together with question one, then grouping responses together with question two, and so on. Grouping data having the same characteristics as other data can facilitate identifying emerging themes and patterns (Awangga, Pane, Tunnisa, & Suwardi, 2018). I cleaned and manually inspected the data to identify (a) inaccuracies, (b) administrative errors, (c) data entry or coding mistakes, and (d) ensure responses to questions made sense. Azeroual, Saake, and Schallehn (2018) posited that organizing and cleaning data would ensure the researcher identifies and corrects errors.

Researchers should generate specific coding rules, including the use of thematic approaches, to facilitate data categorization and analysis (Saldana, 2016; Soares et al., 2015). By using coding rules, researchers can organize data into categories to identify emerging themes, trends, and patterns from interviews (Saldana, 2016; Soares et al., 2015). I used MS Excel to store, code, organize, analyze data, and identify emerging themes. Ose (2016) suggested that researchers use MS Word and Excel spreadsheets to record, organize, track codes, and identify themes. Although no standard structures for data coding have been established, the researcher can adopt a coding system that will generate relevant data based on the research and interview questions (Saldana, 2016).

Marshall and Rossman (2016) postulated qualitative researchers use coding to facilitate identification of core concepts or themes prominent to the collected data. Saldana (2016) and Zamawe (2015) suggested qualitative researchers design a descriptive construct or code to translate data that attribute meaning to each datum when categorizing and identifying patterns and themes. Saldana (2016) described *coding* as a process whereby the researcher establishes the meaning of the collected data. Chen, Drouhard, Kocielnik, Suh, and Aragon (2018) and Saldana (2016) stated that labeling, coding, and organizing data are necessary and essential parts of qualitative research. Researchers should label data according to the identified themes, using keywords and color coding (Saldana, 2016; Zhang & Atallah, 2017). In my study, I focused on the strategies used to mitigate supply chain disruptions and remain profitable, and the coding system I used contained keywords such as supply chain management strategies, supply chain disruptions, and profitability.

Saldana (2016) suggested researchers begin the coding process using a combination of (a) attribute coding, which is used as a management technique; (b) structural or holistic coding, an overview of all data; (c) descriptive coding, a detailed content inventory of notes, document and artifacts; and (d) general-purpose software program such as MS Word used for interview transcripts to familiarize researcher with participants' perspective. The coding process is described as the first cycle coding method (Saldana, 2016). Low, Tong, and Low (2016) indicated that researchers use manual coding procedures as a process to identify themes. For researchers unfamiliar with computer-assisted qualitative data analysis software (CAQDAS), Saldana (2016) recommended researchers perform manual coding and qualitative data analysis using pencil and paper on hard copy data that had been transcribed, entered, and formatted using a basic word-processing software.

After organizing and cleaning the data, I implemented coding and data analysis using pencil and paper and identified emerging patterns and key themes and drew meaning from data collected for the study. Ose and Saldana postulated that CAQDAS does not actually code data. The responsibility of coding is with the researcher (Ose, 2016; Saldana, 2016). I used a combination of first cycle coding methods of attributes and descriptive coding to identify patterns and themes. After transcribing, organizing and cleaning the data, I began the coding process by reading and reflecting on the data transcripts. I highlighted and color-coded relevant phrases and keywords that supported answering the research question. Data coding in qualitative studies is the basis for developing and synthesizing data to identify and categorize themes and patterns (Fusch &

Ness, 2015). Attributes coding might enable researchers to provide participant information for future reference and context for analysis and interpretation, whereas descriptive coding may allow for the assigning of labels and provide an inventory of topics for indexing and categorizing (Saldana, 2016). Saldana noted researchers should remain open to change in case selected methods do not generate applicable data.

Saldana (2016) and LaPelle (2004) suggested researchers might use basic word-processing software such as MS Word and Excel for data organization and qualitative data analysis (QDA). Saldana indicated that the use of a basic word-processing software is suitable for small-scale data collection. Ose also claimed that MS Word and Excel is efficient when coding and analyzing four or more interviews. Using MS word and Excel to organize and analyze the research data, I inserted text boxes and typed codes to summarize the highlighted text to describe the data. Percy, Kostere, and Kostere (2015) proposed reading and inserting codes in the margins or inside transcript documents might stimulate the researcher's understanding and highlight relevant facts from the evidence supporting the research question. I conducted a second and third iteration of the coding process to detect additional codes to further synthesize the data. I focused on related themes and patterns of information collected from participant interviews and publicly available company records and documents.

After completing the coding iterations, I created a word table to collate, organize, and summarize the main concepts to connect common themes based on participants responses to the interview questions and input the results into an MS Excel spreadsheet to continue my analysis. Percy et al. (2015) recommended connecting key themes and

patterns based on commonalities of participant experiences to the phenomenon. I grouped the common themes and created a master list that supported the research question using the trinity strategy. Clark and Veale (2018) defined *trinity strategy* as the discussion of the three main patterns or themes that stand out from the data. To ensure alignment, I reviewed and compared the data to information derived from the literature review and conceptual framework for the study. Qualitative researchers map the relationship between evidence and conceptual framework tenets to bridge the knowledge gap between theory and practice (Vaughn & Turner, 2016).

## Reliability and Validity

### Reliability

Yin (2018) indicated the convergence of multiple sources of information such as (a) interviews, (b) artifacts and documents, (c) questionnaires, and (d) review of the literature enhances the reliability and validity of a study. To ensure reliability, I used data collected from semistructured interviews, the literature review, and company documents as sources of evidence for the study. Qualitative researchers can ensure the reliability and trustworthiness of their study by triangulating different data sources (Fusch & Ness, 2015). I used methodological triangulation, which is described as the use of multiple data sources such as interviews, observations, archives, and questionnaires (Joslin & Muller, 2016) to obtain multiple perspectives of the phenomenon, corroborate findings, and ensure reliability.

Lincoln and Guba (1985) noted qualitative researchers validate rigor and trustworthiness of the study findings using the four criteria strategy of (a) credibility, (b)

transferability, (c) dependability, and (d) confirmability. Henry (2015) postulated dependability is a technique to establish rigor and trustworthiness in qualitative research. Marshall and Rossman (2016) recommended transcript review, member checking, and documentation of the research procedure to ensure research credibility and trustworthiness.

*Transcript review* is described as verifying and confirming data accuracy with participants to ensure credible and reliable account of the research findings (Morse, 2015). Moon (2015) postulated the use of transcript review to address the validity and reliability in qualitative research encompasses (a) correction of errors and or omissions, (b) add details participant could not recall during the interview, (c) change or rephrase a statement, and (d) removal of statements. I had participants review their transcripts to check for errors, verify accuracy, and clarify participants' responses.

**Validity**

Kihn and Ihantola (2015), Leung (2015), and Noble and Smith (2015) referred to *validity* as the rigor in which data is accurately reflected in the research process, tools used, and findings of the research study. In qualitative research, validity involves the researcher legitimizing and confirming data accuracy (Morse, 2015). Transcript review and verifying data collected from multiple sources are validation strategies used by qualitative researchers (Fusch & Ness, 2015). Validity in qualitative research ensures that the collected data is plausible, credible, trustworthy, and defensible (Roulston & Shelton, 2015).

**Credibility.** Hussein (2015) and Stewart, Gapp, and Harwood (2017) referred to *credibility* as the researcher establishing quality, credible, and accurate data interpretation of research findings. Researchers use various strategies such as transcript review, triangulation, and maintaining field notes to ensure credibility (Henry, 2015; Stewart et al., 2017). I conducted a transcript review with each research participant to clarify and verify the accuracy of their responses and my interpretation of the interview data. Transcript review allows the researcher to address the issue of research validity by inviting interviewees to examine transcripts with the objective of correcting identified inaccuracies and errors. I confirmed data collected from semistructured interviews and company documents with the research findings to establish credibility.

Researchers use interviews, observations, and archival information in a methodological triangulation to attain research credibility (Henry, 2015; Stewart et al., 2017). I established credibility by employing the methodological triangulation technique of various data instruments, e.g., semistructured interviews, and document analysis. Fusch and Ness (2015) described *triangulation* as the use of multiple data sources and methods to support research credibility. Researchers use triangulation strategy to enhance diverse perspectives and sources of evidence to support quality research and enhance understanding (Fusch & Ness, 2015).

**Transferability.** Noble and Smith (2015) and Sund (2015) referred to *transferability* as the applicability of the research findings to transfer or generalize to other contexts and studies. To ensure transferability of the study, I provided a thorough description of the research process, study contexts such as data collection, sampling, and

analysis techniques, and covered relevant data in the study to ensure a better understanding of the research phenomenon. Morse (2015) and Soares et al., (2015), recommended researchers provide rich explanations of all the research procedures, the context of the study, and finalization of the report to ensure data is transferrable. Cope (2014) indicated that transferability is essential if the study results are to have meaning for individuals and readers not participating in the study. The transferability of the findings and results of the study might apply to other studies pertaining to strategies manufacturing firms use to mitigate supply chain disruption to remain profitable.

**Confirmability.** Alonso-Diaz and Yuste-Tosine (2015) and Rapport, Clement, Doel, and Hutchings (2015) described *confirmability* as the researcher confirming with other researchers that the interpretation of the data collected supports the research findings and not personal biases. Rapport et al. (2015) posited that maintaining accurate records, and interpretation of data are ways to limit data bias and improve research data confirmability. Achieving confirmability of the study includes using validation procedures, transcript review, and triangulation methods (Moon, 2015). Wamba, Akter, Edwards, Chopin, and Gnanzou (2015) postulated maintaining an audit trail of the data collection and analysis process demonstrates accurate confirmability and comprehensive records of the research.

I ensured confirmability of the study by maintaining accurate records (e.g., handwritten notes, journals and audio recorded interviews) and careful interpretation of the data to support the research themes. Maintaining an accurate account of audio recorded interviews, handwritten notes, and journals can help in facilitating an objective

account of the participants' views. Morse (2015) noted that objectivity in data interpretation is the preferred criteria for assessing data confirmability.

**Data Saturation.** Data saturation is an essential component of rigor as it ensures rich data to address the research question (Fusch & Ness, 2015; Morse, 2015; Saunders et al., 2018). Data saturation occurs when data collected from multiple sources (e.g., interviews, archival review, multiple cases, archives, and observations) result in the gathering of repeated information and additional coding is no longer feasible (Dasgupta, 2015; Fusch & Ness, 2015; Morse, 2015). Marshall and Rossman (2016) maintained that using multiple interviews assists researchers in achieving data saturation.

Boddy (2016) indicated that depending upon the nature of the study, a sample size of four participants might be sufficient in sampling a population having the same type of employment. I interviewed four supply chain managers from two manufacturing firms to obtain extensive information necessary for data saturation, enhance replicability, and arrive at confirmable conclusions and recommendations linked to supply chain disruptions in the manufacturing sector. Marshall and Rossman (2016) noted using multiple interviews help researchers achieve data saturation. Researchers may ask participants follow-up questions, which could yield additional information to accurately understand the phenomenon (O'Connor, 2015). To ensure data saturation and support research credibility and dependability for this study, I asked participants follow-up questions to obtain any new perspectives or supplementary information to fully understand the research topic. Addressing the concepts of reliability, validity,

transferability, confirmability, and data saturation in qualitative research is critical to obtaining credible, dependable, and trustworthy study findings.

## Transition and Summary

In Section 2 of the study, I discussed the purpose of the study and detailed information on (a) my role as the researcher, (b) participants, (c) research methodology and design, (d) population and sampling, and (e) ethical research. I discussed the data collection process and data analysis techniques. The section contains in-depth discussions and justifications that support decisions to ensure validity and reliability of the findings. Section 3 contains the findings and results, applicability of the study, discussion on the implications for social change, recommendations for future research, reflections, and the conclusion.

Section 3: Application to Professional Practice and Implications for Change

## Introduction

My purpose in this qualitative exploratory multiple case study was to explore strategies that manufacturing firm managers use to mitigate supply chain disruptions to remain profitable. My research findings indicated that participants had developed strategies to mitigate supply chain disruptions and build a more resilient and profitable firm through (a) collaboration and information sharing, (b) use of multiple supplies, and (c) improving the firm's IT infrastructure and trust. My findings also confirmed that supply chain managers used a variety of mitigation strategies to achieve fit and reduce the risk of supply chain disruptions. Data analysis, themes, and supporting documentation provided by the participants confirmed and linked peer reviewed studies to the conceptual framework. Macdonald and Corsi (2013) and Polonsky et al. (2016) postulated business leaders can raise the standard of living and improve the social well-being of local residents by catalyzing economic growth, creating jobs, and investing in the community. The participants' shared experiences could inform other supply chain managers of possible strategies to lessen the effects of or prevent supply chain disruptions and maintain company profits.

## Presentation of the Findings

The overarching research question for this study was: What strategies do manufacturing firm managers use to mitigate supply chain disruptions to remain profitable? From the overarching question, I presented seven predetermined open-ended interview questions (see Appendix B) to participants in reference to supply chain

disruptions involving (a) strategies used, (b) barriers and challenges, (c) resources used, (d) implementation, and (e) effectiveness. Participants consisted of four middle-to-senior level supply chain managers from two manufacturing firms who have experience in developing and implementing strategies to mitigate supply chain disruptions. Participants were identified with a code, such as P1, P2, etc. to protect participant and firm identities. The identification code allowed me to present evident from participant responses while protecting their identity. From the data collection and analysis, four themes emerged:

- Collaboration and information sharing.
- Multiple suppliers.
- Information Technology and supply chain risk.
- IT collaboration and trust.

**Theme 1: Collaboration and Information Sharing**

Collaboration and information sharing with supply chain partners to mitigate disruptions in the supply chain was a reoccurring theme among the participants. Supply chain collaboration is two or more partners in the supply chain working together to align supply chain operations, share information, and build value-add processes and sustainability (Chen et al., 2017). Odongo et al. (2016) and Zhu et al. (2016) posited that information sharing and collaboration is an effective strategy that business leaders use to mitigate the effect of disruptions in the supply chain. Researchers used CTF to build a collaborative communications network to effectively manage and mitigate the negative effect of a disruption on business performance (Sheffi, 2015). Evidence presented from the collected data indicated that collaboration and information sharing is supported by the

literature review and CTF in answering the overarching research question. However, in researching the literature, I did not find articles that addressed the alignment of collaboration and information sharing using CTF. In reviewing, coding, and analyzing the collected data, I concluded that all four participants indicated that collaboration, information sharing along with trust is an important strategy to mitigate the effect of disruptions in the supply chain.

P3 stated, "We received an unexpectedly large order from one of our customers, but our main supplier was a small business and did not have enough of the part on hand to fill the order." Ho et al. (2015) maintained the success of strategies used to increase or maintain profits may be compromised due to a disruption in the supply chain. P3 added, "Failure to fill the order would cost the firm a huge loss in revenue." P2 indicated that they had ordered equipment from a supplier located overseas. P2 stated:

> Although the equipment had arrived in the United States, due to the government shutdown, the equipment sat at the port because there were no customs agents available to clear the delivery, and we were not sure how long the shipment would sit at the port. We resolved the issue by contacting our partners and explaining the situation. Due to having a trusting working relationship and being in constant communication with our supply chain partners, we were able to fill the demand. Immediate dissemination of information enabled us to respond and resolve the disruption quickly and prevented the firm from losing millions of dollars in profits.

Grotsch et al. (2013) posited that supply chain disruptions are minimal when a firm can organize quick efficient responses. Zhu et al. (2016) suggested the more collaborative relationships managers develop with suppliers, distributors, and customers the better they can manage and minimize the effects of a disruption in the supply chain. Odongo et al. (2016) posited that a firm can build a well-integrated supply chain through information sharing and having a strong and trusting mutual relationship with their partners.

P3 said, "Having to purchase the part from their partners as well as pay for the original order had a slight effect on profits; however, had the order not been filled, we could have lost more than a few thousand dollars in profits." P3 also stated, "The disruption could have cost the firm millions, possibly billions of dollars in profits and loss of its customer base." P2 stated, "Failure in filling the demands was not an option as doing so would have had a negative impact on the firm's profits." Aggarwal and Srivastava, (2016) posited that supply chain collaboration could reduce uncertainty leading to superior business performance due to capitalizing on resources, capabilities, and process of supply chain partners.

In a follow-up question, each participant was asked what type of information was shared between the firm and their partners. Per the responses, each shared some of the same type of information, e.g., long- and short-term forecasting, demands, delivery schedules, and historical data. P1 stated, "Sharing this type of information enables the firm to maintain what is needed to meet customer demands yet avoid excess inventory." P2 said, "Production schedules, order status, reorder points, and any delays in shipments are shared internally and externally". P3 stated, "Information sharing enables us to be

proactive versus reactive to changing demands, and internal sharing allows us to manage the risk collectively versus separately, which allows us to maintain our profits." P2 also remarked that, "Information pertaining to order status and delays in shipment are shared with our customers." A review of the planning meeting minutes confirmed the responses of P2 and P3. P1 stated, "Sharing information internally and externally allows everyone to monitor the movement of the product, fill demands quickly, collectively resolve problems, and implement best practices to mitigate supply chain risks, saves cost, and maintain profits." Participants indicated that integrating all aspects of the supply chain helps to build stronger relationships. They also shared that collaborative efforts among all supply chain partners can reduce the effects of a supply chain disruption. Through information sharing, managers can maintain a tighter vertical integration of the supply chain and minimize the effect of disruptions (Teller et al., 2016).

When asked about the barriers and strategies used to address the barriers, each participant indicated that having a trusting collaborative relationship and culture with their partners, suppliers, distributors, and customers is crucial. P3 stated, "Collaborating with and having mutual trust in our partners and suppliers enables us to fill orders in a timely manner and everyone benefits when a collaborative culture exists." Each participant indicated that it was important to have trust and maintain an active line of communication with their supply chain partners and also important to have that same relationship with their customers. P2 stated, "We contacted our customers via email to notify them of the possible delay in delivery due to the government shutdown." P2 continued, "We wanted to let our customers know that we were working with our supply

chain partners to ensure they [customers] received their deliveries on time." P2 said, "It is company policy to maintain an open line of communication with their customers and supply chain partners." A review of the policies and procedures documents supports P2's statement. P2 said, "Communicating with our customers lets them know we care, and it builds a trusting relationship, which enables us to maintain and build our customer base." P1 articulated, "Sharing information with our customers helps us to improve the quality of customer service, reduce payment cycles and maintain customer trust." Mutual trust, effective communication, the existence of personal bonds, shared rewards and risks that result in greater profitability and better business performance is the basis of collaboration (Durach et al., 2015; Soosay & Hyland, 2015).

Fawcett et al. (2015) indicated that conflicts between cross-functional partners, strategic misalignment, information hoarding, and distrust could lead to a lack of collaboration among supply chain partners. Soosay and Hyland (2015) postulated that the high cost of sharing information, low level of trust among supply chain partners, a disparity in technological capability among supply chain partners, and a lack of top management support could be major obstacles to effective supply chain collaboration. Therefore, managers should foster inter-organizational relationships and manage conflicting interests for effective collaboration. Teller et al. (2016) found that firms having a collaborative relationship with supply chain partners have access to essential resources and critical information that can minimize supply chain disruptions, which can improve responsiveness to disruptions in the supply chain.

Riley et al. (2016) found that managing information can bolster a firm's risk management capabilities. Having an interrelationship enables supply chain managers and partners to share information and collaborate to mitigate supply chain risks and provide quality customer service. Talluri et al. (2013) posited that to efficiently manage disruptions in the supply, managers should design response efforts that focuses on managing the flow of information (Talluri et al., 2013).

Manufacturing firm managers can achieve fit in internal and external environments by using a variety of approaches with the focus on the effectiveness of fit (Jiang et al., 2018). As confirmed by the findings, CTF served as the basis for firm and supply chain partners to share information, build a mutually trusting relationship, and have an effective collaborative communication network to mitigate disruptions in the supply chain (Talluri et al., (2013). Talluri et al. (2013) explained that the implementation of CTF could increase business performance and reduce the risk of disruptions in the supply chain.

**Theme 2: Multiple Suppliers**

The second theme that emerged from the analyzed data was the use of multiple suppliers. Each participant noted that having a multiple supplier base is an important strategy they used to minimize the effects of supply-side disruptions. P2 noted that they source from different suppliers to protect the company against supply failure by some of their vendors. P2 stated, “Using multiple suppliers mean that we have a more agile, lean, and flexible supply chain as well as vendors compete for our business.” P3 mentioned that sourcing from different suppliers made the firm more agile and flexible to respond to

unexpected supply chain disruptions and enabled the firm to switch from the primary supplier to other vendors who already supply the company.

P3 added, "Sourcing from multiple suppliers gives the firm a variety of options as well as helps maintain a level of competition among suppliers, maintain profits, and improves the firms' supply chain performance." An agile and flexible supply chain reduces the chances of a disruption and enables the firm to gain exceptional firm performance (Eltawy & Gallear, 2017; Hallavo, 2015). Managers can use lean practices to leverage agility to mitigate disruptions in the supply chain (Birkie, 2016). P3 explained, "The need to have multiple suppliers was a lesson learned when our sole source vendor was unable to provide the part we needed." Sawik (2016) posited that managers should develop supply chain risk management strategies that focuses on the optimal selection of primary and recovery suppliers combined with decisions made before, during and after the disruption.

P1 and P4s responses resonated the views of P2 and P3. P4 remarked that:

> Using multiple sources enabled the company to better manage demand fluctuations, made the company more agile and flexible, lessens the risk of being exposed to a disruption in the supply chain, prevents the company from having to rely on one source, improves firm performance and profits, and promotes competition among the suppliers.

CTF is considered favorable for a firm's overall performance and growth (Walker, 2015). P2, P3 and P4 indicated that having multiple suppliers meant timely deliveries and receiving quality products and services at competitive prices. P1 stated,

"Whenever possible, we purchase from a diverse group of suppliers, such as women-owned, minority-owned, veteran-owned, disabled-owned, small business vendors etc." Having diverse suppliers not only promotes competition, but also benefits the community by creating jobs, and increases salaries and spending. The participants were asked whether they experienced barriers with having multiple suppliers. P1 stated, "Managing multiple suppliers can be very complex, and there can be issues with selecting suppliers, negotiating and managing contracts, and quality control issues." To avoid disruptions in the supply chain, managers should identify potential supplier risks (Cagnin et al., 2016).

Each participant confirmed that they had established a selection criterion. P1, P2, and P3 indicated their selection criteria were based on the reputation and performance of the supplier, pricing, quality of the product, and lead times. Excerpt of the procurement policy provided by P2, indicated that:

> Selection of a supplier will be coordinated by members of the Tender Committee. Selection criteria shall address cost, quality assurance, reputation, supplier performance, customer service, lead and delivery times, financial stability, and past performance. The committee will score proposals using a separate scorecard for each bid submitted. The committee chairman shall identify qualifying suppliers based on the overall score received. A final selection will be made after the committee has conducted a site visit and assessed the business operations of each selectee.

Each participant indicated that the Tender Committee holds a face-to-face meeting with the supplier(s) during contract negotiations. P2 and P3 agreed that they discuss topics

such as how the firm and vendor can benefit, timely deliveries, quality control issues, shared risk, and information sharing. P1 indicated that the company also conducts monthly meetings to discuss issues and areas where firm and supplier can improve. P1 stated, "Conducting monthly meetings helps to avert any potential problems, builds a trusting relationship, and helps to improve the bottom line for the company and the supplier." Each participant indicated that mutual trust, collaboration and information sharing is critical when developing a buyer-supplier relationship. Durach et al. (2015) noted that trust and information sharing is essential to have a good buyer-supplier working relationship. Revilla and Knoppen (2015) indicated that effective communication, trust and information sharing can result in a more transparent buyer-supplier relationship.

The reviewed literature and conceptual framework supports the study results that implementing a multiple supplier base strategy not only minimizes the effect of supply chain disruptions, but also creates a more agile, flexible, lean and profitable supply chain. Agility, flexibility and leanness are three of the five tenets of CTF (Hallavo, 2015). An agile and flexible supply chain can help a firm reduce the likelihood of disruptions, quickly respond to fluctuations in customer demands, and achieve fit in an uncertain environment (Walker, 2015). Agility in the supply chain also enables a firm to be more competitive, which increases financial performance (Walker, 2015). A lean supply chain is a holistic way of doing business that (a) reduces waste, (b) minimizes lead times, (c) reduces cost, (d) enhances information sharing, and (e) improves supply chain performance (Eltawy & Gallear, 2017; Lotfi & Saghiri, 2018). Behzad et al. (2017)

suggested that implementing CTF tenets of agility and flexibility aids a firm in adapting to and quickly recover from supply chain disruptions.

Jensen (2017) and Tsai (2016) found that using multiple suppliers ensures timely product delivery and functions as a barrier against disruptions in the supply chain. Rajesh, Ravi, and Rao (2015) noted managers use multiple suppliers to guard against the possible failure of a single source supplier. Improper management of a single supplier or lack of financial support can harm an organization's performance (Dellana & West, 2016). The use of multiple supply sources can mitigate disruptions in the supply chain, improve firm performance and maintain profitability. van de Ven and Drazin (1985) speculated that optimal incorporation of strategies is dependent on how well the firm aligns resources with the internal and external environments. Cagnin et al. (2016) suggested that because of an increase in demands, competition and risks in the environment, business leaders should focus more on supplier selection and sustaining their supply chain. Manufacturing managers should ensure their supply chain is aligned and integrated with other business units and suppliers (Behzad et al., 2017). Proper alignment and integration of suppliers enables a firm to respond quickly to changes in the operating environment, recover from disruptions in the supply chain, and maintain profits (Behzad et al., 2017). Jiang et al. (2018) argued for using a variety of approaches that focus on the effectiveness of fit and the adaptation processes by which manufacturing firm managers can achieve fit in their environments. Regarding CTF, managers can mitigate the effect of disruptions in the supply chain by adjusting order allocations between their suppliers (Zahran et al., 2017). Managers can also maximize the firm's

business performance by selecting suppliers who can perform within the firm's internal and external environments.

**Theme 3: Information Technology and Supply Chain Risk**

The third theme that emerged from the data was information technology (IT) and supply chain risk. In conducting the interviews, all participants noted that the use of innovative IT not only reduces disruptions in the supply chain but improves their firm's business performance. P3 stated, "IT enabled us to operate more efficiently, gave the company a competitive advantage, maximized business performance, reduced supply chain disruptions, and increased our profits." Drnevich and Croson (2013) posited that IT is an essential supply chain management tool as IT is effective in improving organizational performance and increases profits. Leveraging innovative technology in the supply chain can strengthen the supply chain against disruptions (Huang, Wu, Lu, & Lin, 2016). P2 remarked, "IT improved our internal and external communications as well as lowered our labor and production costs." Using CTF, Khazanch (2005) discovered that implementing new and innovative IT would result in positive business performance if IT appropriateness factors matched the business and technology contexts and the internal business environment.

P3 mentioned, "We utilize an ordering system that is compatible to our suppliers, which reduces the risk of a disruption in their supply operations." Sook-Ling et al. (2015) argued that a competitive advantage, improvement in customer service and a reduction in inventory cost can be achieved by utilizing IT applications. Tripathy et al. (2016) recommended that as part of the firm's IT strategy, managers should maintain an up-to-

date technology infrastructure and have an IT-based ordering system that is compatible to the suppliers' systems.

When asked about a supply chain disruption caused by an IT failure, P1 stated, "Our material requirements planning (MRP) and demand planning was affected by software issues between our customized System Analysis Program (SAP) and official SAP version updates. P1 continued, "Glitches in the customized SAP software caused orders to disappear and had to be reordered, which created a sales backlog". P1 added that, "The IT department made customized SAP updates to the system before the official SAP version was upgraded". P1 said, "We use three supply management systems and each time one system undergoes a change, the other systems are affected, which causes part of our supply chain operations to fail." P1 explained, "This happens because everything from supply, finance, maintenance, etc. is intertwined within the Enterprise Resource Planning System (ERP), plus the systems are not coordinated."

I asked P1 two follow up questions: (1) "Would it not make sense to wait until the official SAP software has been updated before running the customized version?", and (2) "Do IT or the other department managers not work together to let everyone know when there's going to be an update so everyone can monitor their individual systems?" P1 responded that, "We do not control when the official SAP software is updated, as the vendor releases those updates, nor can we avoid applying the official updates." As for advanced notification or working together, P1 indicated that sometimes they (department managers) are notified of the updates. P1 said, "It makes sense for everyone to work

together and some of us do; however, some managers seem only to be concerned about what happens in their individual department."

When asked what strategies can be implemented to minimize this type of disruption, P1 suggested, "The three systems should be treated as one and when a change or upgrade to the customized SAP is performed, conduct a regression test to ensure that no supply chain function has been affected." P1 explained, "The barrier to implementing the strategy is that SAP is an expensive product and leadership would have to approve the resources needed such as money, and additional people to make the required changes." Manufacturing managers should conduct a strategic review to assess whether their vendors have the right people, processes, and technology to support the firm's business functions (Tse et al., 2016). P1 stated, "The firm employs IT personnel that are versed in customizing SAP; however, due to proprietary issues it is policy that the firm have SAP experts come in to fix system failures caused by software updates." Based on the extremely high salary cost, the firm does not employ SAP experts on a full-time basis. P1 indicated that the initial cost of making the needed changes would have a short-term negative impact on profits. P1 admitted not making the changes could negatively affect earnings in the long run as failures would cause delays in production and delivery.

P1 stated, "Senior management must change the silo culture and compel system administrators to work together to solve the problems." P1 continued, "The problems of software updates and the silo mentality would eventually be addressed once the integration of systems is achieved; however, this would take much effort in terms of changing people and software. Doing so would lead to a more effective and efficient

supply operating system with fewer disruptions." Having a collaborative computer-based information system is critical because business managers strive to reduce uncertainty, increase business performance, and achieve a competitive advantage (Aggarwal & Srivastava, 2016).

P4 described a similar disruption that occurred due to software failure; however, the disruption was due to a defect that was introduced by the software vendor (SW vendor). P4 stated, "Basically, we submitted orders and assumed everything was fine because we didn't receive an error message; however, we did not receive confirmation that the requests were received by the supplier. Suppliers were contacted, and we were told they (supplier) had not received any orders." P4 continued, "We, as well as the supplier, doubled checked all order submissions to ensure the issue was not due to human error. Per company policy, the IT department checked the system and discovered the problem was a failure with the software."

P4 stated, "The SW vendor was contacted, and we were told the SW vendor is aware there was a problem with the updated software; however, the vendor failed to notify us about the issue, which was a shortcoming on the part of the SW vendor." P4 remarked, "We had two options (strategies) to resolve the issue: (1) reload the previous version of the software to remove the newer version's defect and resubmit the orders, or (2) revert to using manual procedures, e.g., call suppliers and place orders until the issue was resolved." P4 stated, "The decision was to combine the strategies." The firm reverted to manual procedures while the previous version of the software was being reloaded and tested to ensure it would work. P4 explained that, "In the event the reload did not work,

manual procedures would enable us to fill customer demands while waiting for the SW vendor to resolve the issue." I asked P4 how often a system back-up was conducted? P4 replied, "System back-ups were conducted monthly; however, after the disruptive event, the firm increased the frequency of system back-ups to bi-weekly in the event recovery was needed." An extract from the company policy and procedures manual provided by P4 confirmed that the IT department would perform a system back-up on a bi-weekly basis. Implementing a system back-up strategy makes system recovery easier, lessens downtime, and gives the firm a competitive advantage (Akhtar, Buchholtz, Ryan, & Setty, 2012).

**Theme 4: IT Collaboration and Trust**

Collaboration is an important strategy that business leaders use to recover from disruptions in the supply chain (Zhu et al., 2016). Arora et al. (2016) posited that supply chain transformation occurs when firms are integrated and collaborative. P1 and P4 mentioned the issue of collaboration and trust. P1 indicated not only should the firm's three systems be coordinated and treated as one, but organizational behavior should change. P1 stated, "Having independent systems has become virtual silos and project managers and administrators' personalities do not lend to collaborative efforts." P1 remarked that, "Not sharing when one of the systems is being updated appears as if some managers don't care if or how the other departments are affected, which causes trust issues within the organization." P4 said, "Glitches in software happens; however, the behavior of the vendor who should have been concerned with the integrity of its product, and maintaining a trusting relationship was unacceptable." P4 continued, "As soon as the

SW vendor realized there was an issue, vendor management should have ensured that everyone using that version of the software was contacted and provided a copy of the previous version so operations could continue with minimal to no disruptions." Information hoarding and distrust can be a barrier to an efficient supply chain (Fawcett et al., 2015). P1 stated, "Not only should there be internal collaboration of the updates, but there should also be a level of trust between managers and administrators." P1 indicated the need for collaboration is highlighted because expertise had become localized for each system. P1 said, "Specific fixes in the system can only be done by the individual departments' experts while other repairs are outsourced to the SAP vendor." P1 continued, "All systems experts should be notified when customized changes are taking place so we can monitor our systems and be prepared for possible disruptions." P4 noted that software vendors should be mindful that knowingly providing customers with software containing virus' or faults is unethical and can cause harm to the firms' IT infrastructure and business.

Supply chain disruptions can be a result of changes in government regulatory guidance, labor strikes, poor communications among suppliers and manufacturers, IT issues, and operational problems (Macdonald & Corsi, 2013). Supply chains are not static and vary in size, shape, and configuration due to technology changes, emergence of new products and market niches (MacCarthy et al., 2016). Supply chain managers can recognize how technology and market changes affect the firm's organizational and supply chain performance.

Tripathy et al. (2016) studied the structural relationship between IT, logistic effectiveness, operational efficiency, customer relations, supplier relations and competitive advantage. Tripathy et al. (2016) found IT is critical in achieving a competitive advantage. For example, if a terrorist attack or hurricane caused a disruption in several manufacturing firms IT infrastructure, the first company that comes back online and resumes operations would have the competitive advantage. Failure in a firm's IT infrastructure, the cost of innovative technology, and compatibility of IT solutions to partners can affect a firm's performance and profitability. Operational efficiency, which is the fourth tenet of CTF can be obtained by using the latest technology to streamline communications with suppliers and customers, simplify supply chain processes, lower costs, and increase growth and profitability (Walker, 2015).

## Applications to Professional Practice

I conducted a qualitative exploratory multiple case study to explore strategies manufacturing firm managers used to mitigate supply chain disruptions and remain profitable. Based on the data collected, four themes emerged from the data analysis. My study findings might aid manufacturing firm managers in the improvement of business practices using CTF, and providing the required information needed to mitigate the effects of disruptions in the supply chain. The use of CTF has been referred to as being suitable and beneficial for the overall performance and growth of the firm (Walker, 2015). Talluri et al. (2013) indicated mitigating supply chain disruptions is a crucial element in a supply chain manager’s risk management strategy. Ambulkar et al. (2015) posited that manufacturing firm managers could make their firm more resilient and

competitive by managing disruption risks. Disruptions in the supply chain can cause a loss in sales and a loss of the firm's customer base, which can negatively affect the firm's profits; therefore, it is crucial that the firm have various mitigation strategies to reduce the effect of supply chain disruptions (Sawik, 2019).

Based on participant responses to semistructured interview questions, and review of company policies and procedure documents, my findings indicated that having a strong collaborative relationship and information sharing policy between the firm, suppliers, and supply chain partners is a crucial business practice and strategy used to mitigate disruptions in the supply chain. Supply chain managers can foster collaborative relationships to prevent and mitigate the negative affect of disruptions in the supply chain. For example, if a warehouse fire or flood delays a shipment from the primary supplier, the information can be shared among supply chain managers, partners and other suppliers to locate the needed product to fill customer demands in a timely manner. Swanson, Jin, Fawcett, and Fawcett (2017) argued that managers seek integrative and collaborative efforts to cope with uncertainties, share costs, and minimize risks. Huang et al. (2015) and Riley et al. (2016) found that supply chain managers who control information flow and engage in collaborative activities can (a) save on costs, (b) spread risk between the firm and supply chain partners, (c) allow more flexibility to market changes, and (d) reduce the effect of disruptions on business performance. From this study, managers might learn the use of best practices to find and implement a better way to communicate and collaborate with suppliers and supply chain partners to effectively reduce disruptions.

Managers who have a multiple supplier-base strategy and implement innovative IT compatible with suppliers, can mitigate supply-side disruptions. Based on my findings, purchasing from one supplier is not always a wise decision as the supplier might be unable to fulfill the order or go out of business. Having a multiple and diverse supplier base ensures lower production cost, quality products at affordable prices, and a stable source of supply. The use of multiple suppliers protects against the possible failure of a single supplier and ensures timely delivery of products (Jensen, 2017; Rajesh et al., 2015; Tsai, 2016). I found the selection of a supplier should be based on more factors than price. Other considerations for supplier selection are (a) reliability, (b) financial stability, (c) past performance reviews, and (d) lead and delivery times. Using the aforementioned selection criteria enables the firm to identify potential supplier risks and mitigate disruptions.

Implementing a multiple supplier base makes a firm more agile and flexible, and reduces the possibility of a disruption; thereby improving the firm's business performance (Eltawy & Gallear, 2017; Hallavo, 2015). I ascertained that having a good multiple supplier base, and up-to-date IT that is compatible with the supplier improves performance, enhances growth and profitabily, and promotes competition among suppliers by providing the firm with a variety of options. Huang et al. (2016) suggested that capitalizing on innovative IT strengthens the supply chain against disruptions. Magutua et al., (2015) postulated that innotative IT improves a firm's performance by 88%. Implementing strategies to mitigate supply chain disruptions can aid companies in lowering production costs, providing quality products and services, and maintaining

profits (Chakravarty, 2013). A reduction in production costs and risks translates to firms being more competitive and profitable, with the ability to offer quality goods and services to consumers at affordable prices. Profitable firms can empower consumers buying power by producing affordable products, which leads to an increase in spending in the local community. The more empowered society becomes, the higher the return on investment (ROI) is for the firm. The ROI for the firm can lead to increased profits that attract investment capital for business expansion.

The information provided in the findings of this study may contribute to the improvement of a manufacturing firm's business practices and can increase supply chain managers' knowledge and awareness of strategies to reduce the effect of supply chain disruptions. The findings and recommendations of my study might contribute to existing and future research and fill the knowledge gap in employing collaborative processes for minimizing the effect of disruptions in the supply chain. Furthermore, my study might be used to explore the causes of and precursors to disruptions in the supply chain and develop standards for maintaining a sustainable supply chain.

## Implications for Social Change

Successful business leaders can contribute to the improvement of social conditions and human life by creating more jobs, improving economic growth, and sustaining the environment (Polonsky et al., 2016). Disruptions in a manufacturing firm's supply chain might result in product recalls, which can have a negative effect on business performance (Chaudhuri, Mohanty, & Singh, 2013). Supply chain managers can improve SCRM by implementing mitigation strategies that can lead to (a) an efficient supply

chain, (b) production of quality goods, (b) reduction in recalls, (c) increased revenues, and (d) investing in the local community. By utilizing innovative mitigation strategies, information technology, and proper execution of cost associated with risk, manufacturing firms can have a more efficient and effective supply chain.

This study might contribute to positive social change by providing managers knowledge of tactics to help reduce production costs, mitigate risk in the supply chain, and investment in the community. A reduction in production cost might lead to offering quality goods and services to consumers at affordable prices. Business leaders could use surplus profits from the sale of goods and services for business expansion. Business expansion could lead to employment opportunities, investments in social service projects such as job training, and nutrition and housing programs for low-income families. An increase in employment and salaries could lead to increased consumer spending. Job training and nutrition and housing programs could lead to the employment of unskilled workers, the feeding and housing of the homeless and low-income families; thereby raising the standard of living and social well-being of local community residents.

## Recommendations for Action

van de Ven and Drazin, (1985) found a disruption in the supply chain indicates a lack of fit between the internal and external operating environment. Disruptions in a manufacturing firm's supply chain can be costly; therefore, management needs to evaluate risks in the supply chain and develop efficient mitigation strategies (Chaudhuri et al., 2013). Jiang et al. (2018) recommended using a variety of approaches that focus on the effectiveness of fit and the adaptation processes by which manufacturing firm

managers can achieve fit in their environments. The business problem addressed in this study was that some manufacturing firm managers lack strategies to mitigate supply chain disruptions to remain profitable. In this study, I found participants used a variety of strategies to mitigate disruptions in the supply chain. Based on the findings of this study, I propose the following strategies manufacturing firm and supply chain managers could implement to mitigate disruptions, maintain profits, and improve business performance:

- Adopt a systematic strategic approach to mitigating supply chain disruptions by identifying risks and causes of the risks, the impact, and drivers. Track risk drivers and select the best strategy to reduce the disruption risk as per the level of risk and uncertainty.
- Establish a trusting, collaborative information sharing and communications relationship internally and externally through quarterly meetings and conference calls. Discussions should include ways to improve the buyer-supplier relationship, performance and risk-sharing.
- Use e-collaborative tools such as web-based conferencing or chat tools to improve communication and information sharing within the supply chain.
- Integrate and treat separate supply chain systems as one structure to prevent failures when software updates occur.
- Change organizational behavior and the silo culture to ensure project managers and administrators work together to solve system errors.
- Initiate and invest in supplier development and reward programs to improve buyer-supplier relationships that aid in motivating the supplier to

improve performance in terms of pricing, product quality, delivery commitments, and loyalty.

This study could be useful to manufacturing industry leaders and managers in developing and managing SCRM strategies that can lessen the effect of supply chain disruptions. The scholarly community and supply chain managers could also use the findings in this study toward research and the advancement of knowledge in supply chain risk management. After publication, a summary of the research results will be shared with participants. I will also disseminate research results at professional development workshops and logistics conferences. I will make this study available to other scholars, practitioners, and researchers via publication through ProQuest and supply chain management journals.

## Recommendations for Further Research

Tse et al. (2016) defined *supply chain disruption* as an unintended, unexpected event that occurs within the internal or external supply chain interrupting the flow of goods and services, which threaten normal supply chain operations. Managing disruption risk has become a vital part of SCRM strategy. The low-probability and high-impact flow disruptions as well as possible loss in revenue threatens the financial state of firms (Zhu et al., 2016). For example, the disruptive events of 2011 in the automotive and electronics supply chains resulted in profit losses for major automakers and electronics manufacturers (Haraguchi & Lall, 2015).

Mitigating risk in the supply chain is a critical component of a firm's overall risk management strategy and performance. Using CTF, Talluri et al. (2013) posited that

appropriateness and effectiveness of risk mitigation strategies are contingent on the internal and external environments and no one strategy works for every supply chain. The literature on risk management proposed a variety of strategies and techniques for effectively evaluating, managing, and mitigating supply chain risks. However, in conducting the study, I discovered risk mitigation strategies that had not been addressed or sufficiently addressed. I recommend further research on strategies manufacturing firm managers can use to mitigate supply chain disruptions and remain profitable by:

- Assessing the efficiencies of alternative risk management strategies. Such assessments could help in the selection of the appropriate mitigation strategy in an operating environment.
- Investigating how supply chain disruptions affects a firm's profitability as this topic is not adequately covered in the literature.
- Researching how CTF aligns with collaboration and information sharing and how CTF improves a firm's business performance and profitability.
- Exploring the reciprocity and collective outcomes of collaboration between the manufacturing firm, suppliers, and supply chain partners.
- Querying managers as to what mitigation strategies did or did not work in the past and why. By doing so, researchers could discover ways to improve upon current strategies.
- Examining the implementation and adoption of technology versus the use of technology to mitigate supply chain disruptions.

One limitation for my study was that the supply chain managers were located in the southern region of eastern Virginia. Other researchers could widen the research scope to other geographical areas. A second limitation was the sample size. Depending on the study a sample size of four to 10 participants of a homogenous population might be sufficient to obtain data saturation (Boddy, 2016). Increasing the participant sample size could help with in-depth explorations regarding useful and practical risk management strategies across the manufacturing industry. A larger sample can be used by other researchers in determining whether the results are similar. However, in qualitative research, no set rules exist for determining sample size as the size will depend on what the researcher wants to know, the credibility of the participants and collected data, and whether the information collected is useful in answering the research question (Blaikie, 2018; Roy et al., 2015). Other researchers may consider using mixed methods or the quantitative method. The quantitative method could be used to examine the rate of performance for each strategy in minimizing and preventing the effect of disruptions in the supply chain.

## Reflections

In pursuit of my doctoral degree, I not only acquired skills on an academic level, but learned and reaffirmed several things about myself. During this pursuit, I knew time management was the key to completing this journey. I had to prioritize and balance multiple responsibilities such as school, work, personal organizational activities, friends, and personal time.

Going through the DBA process improved my critical thinking skills. I learned how to write in a scholarly manner, how to synthesize, and to be more observant of what I read. This journey gave me a new perspective on how to be patient and never give up on my goals. The continued pursuit of one's goals is not only the key to achieving academic success but is also the key to achieving overall success in life. I currently work in the logistical field for the U.S. military and worked as a logistician while serving in the military. I had preconceived ideas or biases about supply chain disruptions and strategies to mitigate risk in the supply chain. My preconceived ideas were about forecasting, information sharing, and purchasing equipment. For example, item managers forecast demands 12 to 24 months out, and set a reorder point to ensure shelves are well stocked. This avoids having long customer wait times. Items managers are also notified at least 36 months in advance when a part or piece of equipment will be upgraded or replaced. This information enables the item manager to work with research and development to forecast stock levels and set reorder points. However, while conducting my research I realized that I was looking at this from the military side versus the manufacturers' side as most manufacturing companies do not have customers the size of or have equipment similar to the military. This epiphany reaffirmed that I am able to place objectivity over my personal bias and that my outcomes must be based on facts and evidence versus my own ideas, beliefs, and opinions. This discovery is not only true for academic research but also accurate for life and the judgment of individuals. I enjoy conducting research and was fascinated by the literature review, data collection process, and my discoveries on supply chain disruptions. The literature and data I collected provided me with a better

understanding of why an organization should have more than one source of suppliers, and the importance of ensuring the organization has strategies in place to mitigate supply chain disruptions. Interviewing participants also provided me with a better understanding of what supply chain managers face as it pertains to organizational decisions that affect the implementation and execution of supply chain risk management strategies.

Finally, the doctoral journey was not an easy road to travel; if it were, everyone would take the journey. However, without my chair's excellent feedback, encouragement, and long talks as well as support from family, friends, and classmates, I would have given up a long time ago. Thanks again for all the support. I expect the findings of this study may contribute to an increased understanding of supply chain risk management and mitigating supply chain disruptions. My experiences during the process were frightening, enlightening, exciting, and thought-provoking and I am happy I chose to take the journey.

## Conclusion

Wieland, Handfield, and Durach (2016) posited that effective SCRM strategies have become one of the most crucial topics in supply chain research. The emergence of complex supply networks in conjunction with a turbulent business environment has significantly increased the vulnerability of supply chains (Durach et. al., 2017). Changes in an uncertain business environment contribute to destabilize supply chains (Tiwari, Tiwari, & Samuel, 2015). Supply chain disruptions are not entirely preventable. However, supply chain managers can take measures to ensure products continually move through the supply chain to fill customer demands.

My research for this study led to an extensive investigation of supply chain disruptions that affect business performance and improve profits. I focused on examining the underlying factors of supply chain disruptions in the manufacturing sector and developing and implementing strategies necessary to mitigate the disruptions. Based on findings in the study, disruptions in the supply chain could have significant detrimental effects such as loss of products, services, profits and consumers, and increased production costs. Supply chain disruptions could increase business costs and negatively affect a firm's profitability (Tang, Yang, Cao, & Lai, 2018).

The findings also indicated that to manage supply chain risks supply chain and manufacturing managers need to have a better understanding of (a) their internal and external operating environments, (b) finance, (c) personnel, and (d) supply chain partners to implement and execute risk management strategies. Using CTF as the conceptual framework, I explored strategies supply chain managers could use to achieve the desired level of fit within the supply chain. Analyzing data from semistructured interviews and reviewing company documents led to four themes as collaboration and information sharing, multiple suppliers, IT and supply chain risks, and collaboration and trust as crucial elements used in mitigating supply chain disruptions.

Based on the findings, supply chain managers need to understand the sources of disruption risk, assess the effect of the risk, and select an appropriate strategy based on the level of uncertainty and risk. Supply chain managers could reduce and mitigate the effects of disruptions in the supply chain by collaborating and sharing information with partners and suppliers, using a multiple supplier base, and using up-to-date IT. Each of

the aforementioned can aid the firm in improving (a) growth, (b) performance and profits, (c) agility, (d) flexibility, (e) responsiveness, and (f) competitiveness. Finally, the research findings have the potential for economic and social change as manufacturing firm leaders can use surplus profits for business expansion. Business expansion can lead to job creation for the local community, increased salaries for community residents, investing in community development such as nutrition and housing programs, and economic growth.

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# Appendix A: Interview Protocol

The aim of this interview is to answer the research question on strategies manufacturing firms use to mitigate supply chain disruptions and remain profitable. I will complete the following steps during each interview.

1. The interview will begin with a brief introduction, overview of the research, the purpose, and the time required for the interview.
2. I will thank each participant taking the time to participate in the interview and will ask 2-3 insequential questions to make the interviewee feel at ease.
3. As a consequence of the different locations, consent forms will be sent and collected via email; however, I will explain and review the following with the participants, (a) participation is voluntary, (b) there is no monetary compensation, (c) participant can withdraw at any time, (d) ask if he/she understands the contents, and (e) if he/she has any questions or concerns.
4. I will remind participants that the interview will be audio recorded and notes will be taken to ensure data accuracy.
5. I will remind and assure participants that their identity, the identity of the firm they work for, and information shared and discussed are protected under confidentiality and will be used solely research purposes.
6. I will begin each interview by introducing each participant using a code e.g., P1, P2, P3…., date, time, and location. Each interview should take approximately 40-60 minutes.
7. I will ask each participant seven pre-defined open-ended interview questions

and any follow-up questions when necessary (see Appendix B for interview questions).

8. At the end of each interview I will thank each participant for their time and participation and explain the next step which is transcript review.

9. I will explain to participants that the notes and audio recordings will be transcribed verbatim. Each participant will receive a copy of their individual interview transcript to review for accuracy and make corrections.

10. I will schedule a follow-up interview to discuss the transcript review and receive and provide clarification and receive feedback from each participant. If follow-up interview is not feasible, corrections/feedback/discussion will take place via email.

11. I will end the interview and again will thank the participant for taking the time to participate.

# Appendix B: Interview Questions

1. What strategies do you use to mitigate supply chain disruptions to remain profitable?
2. What key barriers have you overcome in the development of strategies to mitigate supply chain disruptions to remain profitable?
3. What type of resources, if any was used to implement strategies to mitigate supply chain disruptions?
4. What challenges have you overcome to implement strategies to mitigate supply chain disruptions to remain profitable?
5. How did implementing the strategies help to mitigate the supply disruptions to remain profitable?
6. How do you measure the effectiveness of selected strategies to mitigate supply disruptions to remain profitable?
7. Do you have any additional information that you would like to add about strategies you use to mitigate supply disruptions to remain profitable?