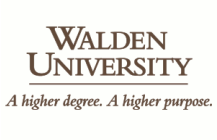

2018

Supply Chain Management Strategies in the Manufacturing Industry

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
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2018

Abstract

Supply Chain Management Strategies in the Manufacturing Industry

by

Marcia S. Falks

MBA, Strayer University, 2008

BBA, Cumberland University, 2004

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Business Administration

Walden University

October 2018

Abstract

Inefficient supply chains result in unsold inventory and unfilled customer orders, posing a significant risk to company profitability and consumer satisfaction. The purpose of this single case study was to explore strategies supply chain managers in the manufacturing industry used to match the level of unsold inventory in the supply chain with customer demand consistently. Porter's value chain provided the conceptual framework for the study. A sample of 5 experienced supply chain managers from a global manufacturing company headquartered in the midwestern United States participated in semistructured interviews. Each participant provided company supply chain documentation for triangulation. Data analysis followed Yin's 5 stages of data analysis and yielded 4 themes: define policies and processes, develop collaborative partnerships, leverage technology, and consider the end-to-end supply chain. The themes are the foundation of successful supply chain management strategies that have improved matching of unsold inventory in the supply chain to customer demand. Study findings benefit both supply chain leaders and consumers by providing the potential to improve consistency in meeting customer demand with less inventory in the supply chain, resulting in customer satisfaction, business growth, and stable employment. The findings may contribute to positive social change by helping supply chain leaders create thriving businesses with satisfied employees and customers who are willing to spend their time and money contributing to community growth, economic stability, and enhanced social conditions.

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Dedication

I dedicate this study to my family and friends for providing support through all of the challenges of this journey. A special thank you to my husband, Dee, for being by my side every step of the way. Your tireless support and endless patience allowed me to focus and achieve this milestone. Thank you!

Acknowledgments

I would like to thank my doctoral committee and the entire Walden University staff for the advice, support, and guidance during my doctoral journey. A special thank you to Dr. Diane Dusick for being an amazing chair. Your dedication and responsiveness made all the difference in my ability to navigate through the process and finish within the planned timeframe.

Table of Contents

List of Tables

List of Figures

Section 1: Foundation of the Study

As the marketplace becomes increasingly fast-paced and global, business leaders must employ innovative strategies to gain and maintain a competitive advantage (Santanu, 2016). Improved technology and increased globalization are spurring rapid changes and new challenges in many industries (Szuster, & Szymczak, 2016). Optimizing supply chains to efficiently deliver goods and services to customers is one of the growing business challenges in the 21st century (Kirovska, Josifovska, & Kiselicki, 2016; Santanu, 2016).

Spurred by the advent of companies like Amazon that can fulfill and deliver online customer orders within hours of order placement, customer expectations for rapid order fulfillment continue to increase (Yao, 2017). The increase in customer expectations highlights the need for leaders in all industries to focus on supply chain management (SCM) to ensure their companies can deliver to customer expectations and manage inventory levels to remain competitive (Datta, 2017). In the literature about SCM in the manufacturing industry from 2014 through 2017, there is a paucity of information about successful strategies to consistently match unsold inventory in the supply chain to customer demand. By exploring successful strategies for matching unsold inventory in the supply chain to customer demand, business and supply chain leaders may solve the challenge of delivering to customer expectations while increasing profitability.

Background of the Problem

Many business leaders rely on SCM strategies to fulfill customer orders and remain competitive (Datta, 2017). SCM is the process of managing the components of

the supply chain to ensure efficient delivery of goods and services to customers (Kirovska et al., 2016). SCM strategies encompass a broad spectrum of topics including (a) customer demand, (b) supplier lead time, and (c) inventory management (Kirovska et al., 2016).

Customer demand and supplier lead time can be difficult to predict, resulting in inventory management challenges (Shen, Deng, Lao, & Wu, 2016). Moreover, excess unsold inventory in the supply chain incurs holding costs and can adversely affect a company's profitability (Plinere & Borisov, 2015). Ideally, supply chains should contain only sufficient inventory to fill customer orders (Plinere & Borisov, 2015). In U.S. manufacturing businesses, total inventory in the supply chain grew steadily during the 7 years between 2010 and 2017 (U.S. Census Bureau News, 2017). Therefore, the opportunity exists for supply chain managers to use SCM strategies to manage inventory levels more effectively. In this study, I explored strategies some supply chain managers use to consistently match unsold inventory in the supply chain to customer demand.

Problem Statement

Inefficient supply chains result in unsold inventory and unfilled customer orders, posing a significant risk to company profitability and competitive advantage (Angeleanu, 2015; Datta, 2017; Kirovska et al., 2016; Liotta, Stecca, & Kaihara, 2015). At the end of 2017, U.S. manufacturers had more than $1.9 trillion of unsold inventory in supply chains (U.S. Census Bureau News, 2017). The general business problem was that unsold inventory in the supply chain adversely affects a company's profitability. The specific business problem was that some supply chain managers in the manufacturing industry

lack strategies to consistently match the level of unsold inventory in the supply chain with customer demand.

Purpose Statement

The purpose of this qualitative single case study was to explore the strategies supply chain managers in the manufacturing industry use to consistently match the level of unsold inventory in the supply chain with customer demand. The targeted population consisted of supply chain managers from a global manufacturing company headquartered in the United States. Specifically, the selected supply chain managers had implemented strategies to match unsold inventory in the company's supply chain with customer demand. The implications for positive social change may include the improved delivery of manufactured goods to meet business and consumer needs. Businesses thrive when their needs for manufactured goods are met, leading to the potential for enhanced employment opportunities for individuals in local communities.

Nature of the Study

I selected a qualitative methodology to explore SCM strategies used in the manufacturing industry. In qualitative analysis, researchers use an inductive approach and open-ended questions to explore and analyze strategies, experiences, and perceptions of the people involved with processes or phenomena (Guercini, 2014; Yilmaz, 2013). By contrast, in quantitative analysis, researchers use a deductive approach, numerical data, and hypotheses to examine relationships and differences among variables (Bhattacherjee, 2012; Yilmaz, 2013). Some researchers combine qualitative and quantitative methods to conduct mixed method studies. In my doctoral study, I sought to explore supply chain

managers' experiences in using SCM strategies to match the level of unsold inventory in the supply chain with customer demand. I did not examine variables' relationships or differences by developing and testing hypotheses. Accordingly, a qualitative methodology was most appropriate for this study.

I considered case study, ethnography, and phenomenology as potential designs for this study. In a case study, the researcher observes a system operating in its usual manner and collects data from the participants (Yin, 2017). In ethnographic research, the researcher explores the behaviors and culture of the study participants (Small, Maher, & Kerr, 2014). In phenomenological research, the researcher observes and derives the meaning of human experience (Manen, Higgins, & Riet, 2016). My study did not involve exploring behaviors or human experiences. Instead, the focus of my research was on exploring SCM strategies that supply chain managers use to match the level of unsold inventory with customer demand in a working supply chain. Hence, a case study design was appropriate to gather information about SCM strategies from the participating supply chain managers.

Research Question

The central research question for this study was as follows: What strategies do supply chain managers in the manufacturing industry use to consistently match the level of unsold inventory in the supply chain with customer demand?

Interview Questions

1. Describe if or when you had too much or too little unsold inventory in the supply chain and how you addressed the problem.

2. What successful strategies are you currently using to match the level of unsold inventory in the supply chain with customer demand?
3. What other strategies have you used to attempt to match the level of unsold inventory in the supply chain with customer demand?
4. Which strategies have been most effective for consistently matching the level of unsold inventory in the supply chain with customer demand?
5. Which strategies were least effective?
6. What were the key barriers to implementing the successful strategies for consistently matching the level of unsold inventory in the supply chain with customer demand?
7. How did your organization reduce the key barriers?
8. What else would you like to add to help supply chain managers consistently match the level of unsold inventory in the supply chain with customer demand?

Conceptual Framework

Porter's (1985) value chain framework was the conceptual framework for this study. Porter introduced the value chain concept in 1985 as a foundation for competitive strategy and asserted that the elements of the value chain were the essential building blocks of competitive advantage. Specifically, the value chain framework includes using value chain mapping to identify each activity in a process as either a primary or secondary function (Koc & Bozdag, 2017; Porter, 1985). Furthermore, managers could use value chain mapping to distinguish the activities that add value from the activities that do not add value (Porter, 1985). Using the value chain map as a guide, leaders can

improve a process by modifying or eliminating activities that do not add value, thereby improving profitability and competitive advantage. Similarly, supply chain managers can use the value chain concept to improve the efficiencies and effectiveness of supply chains. Accordingly, Porter's value chain framework aligned with this study as I explored the strategies supply chain managers in the manufacturing industry use to match unsold inventory levels in the supply chain with customer demand.

Operational Definitions

Big data: Big data refers to large datasets that originate from different sources and must be analyzed in near real time to be of value to business leaders (Tan, Zhan, Ji, Ye, & Chang, 2015; Witkowski, 2017).

Closed-loop supply chain: A supply chain that encompasses all activities from raw material acquisition to product recovery (Govindan, Jha, & Garg, 2016).

Coopetition: Coopetition is the combination of cooperation and competition (Bengtsson & Kock, 2000). Coopetition occurs when competing firms collaborate to achieve better results than they could alone (Bengtsson & Kock, 2000; Cygler & Dębkowska, 2015; Ritala, Golnam, & Wegmann, 2014).

Cross-docking: Cross-docking refers to the warehouse activity of moving incoming freight directly to an outgoing carrier without receiving the product into inventory (Stalk, Evans, & Shulman, 1992; Suh, 2015).

Internet of Things: Internet of Things (IoT) is a system of devices or sensors integrated via the Internet that transfer information such as location or environmental

conditions (Haddud, DeSouza, Khare, & Lee, 2017; Witkowski, 2017; Zhou, Chong, & Ngai, 2015).

Supply logistics integration: Supply logistics integration is the seamless flow of materials and information through the entire supply chain (Prajogo, Oke, & Olhager, 2016; Stock, Greis, & Kasarda, 1998).

Assumptions, Limitations, and Delimitations

Assumptions

Assumptions are facts or situations that people understand or take for granted without supporting evidence (Schoenung & Dikova, 2016). As a researcher conducting a single case study involving interviews, I assumed that the interviewees would allocate sufficient time to participate in the interview process. Further, I assumed that the interviewees provided honest and accurate responses based on their experience and level of knowledge regarding strategies to match unsold inventory to customer demand. I relied on company documentation for triangulation and assumed that study participants would furnish appropriate documentation. Last, I assumed that data collected in a production environment would provide insight into the challenges and benefits of employing strategies to match unsold inventory to customer demand.

Limitations

Limitations are constraints or weaknesses that are beyond the control of the researcher (Yin, 2017). Yin (2017) advised that limitations can affect the transferability of study results. Some potential limitations of this study were related to the participants including their (a) availability for interviews, (b) truthfulness in responses, and (c)

knowledge about the research topic. I relied on documentation for triangulation. Therefore, access to appropriate company documents could have been a limitation. Another limitation was the choice to collect data in the production environment of one company. Gathering data from the production environment of one company provided a snapshot at a single point in time and may have limited transferability of the findings.

Delimitations

Delimitations are characteristics that a researcher controls to limit the scope of the study (Marshall & Rossman, 2016). This case study was delimited to one global manufacturing company. I controlled the scope of my study by interviewing only managers or directors with at least 3 years experience in SCM. Additionally, I interviewed only managers or directors currently working in the supply chain function of the organization.

Significance of the Study

Business leaders face a constant challenge to improve company profits. SCM is one strategy business leaders use to reduce cost and increase efficiency, thereby contributing to profitability (Kirovska et al., 2016; Liotta et al., 2015; Xia, Zu, & Shi, 2015). The findings of this study are significant to business practice because they include innovative SCM strategies to optimize inventory levels in manufacturing supply chains. An innovative SCM strategy could aid manufacturing supply chain leaders in managing unsold inventory levels by improving their organizations' capabilities to match inventory levels to customer demand.

The findings of this study may contribute to positive social change and improved business practice by providing business leaders with tools to ensure supply chain effectiveness and contribute to business success. By consistently delivering products to the market, organizational leaders build a sustainable business where the community can benefit from stable employment opportunities, and consumers can benefit from a reliable supply of products that meet their needs. Furthermore, thriving companies provide local governments with revenues in the form of taxes, which government officials can use to develop programs to enhance social and economic inclusion, thereby improving the social condition for individuals, organizations, and the community.

A Review of the Professional and Academic Literature

Unsold inventory in the supply chain incurs holding costs and adversely affects company profitability (Kirovska et al., 2016; Liotta et al., 2015). Supply chain managers struggle to determine and maintain inventory levels that meet customer demand and minimize cost on a consistent basis (Tarafdar & Qrunfleh, 2017; Yao, 2017). Total inventory in U.S. supply chains continues to increase (U.S. Census Bureau News, 2017). SCM strategies to optimize inventory levels and supply chain performance encompass IT solutions and non-IT solutions (Giri & Sarker, 2017; Musa & Dabo, 2016). In this study, I explored the strategies supply chain managers in the manufacturing industry implement to match unsold inventory with customer demand.

In support of this study, I reviewed a collection of peer-reviewed articles, books, and governmental reports. Of the 98 sources I reviewed, 85 (87%) are peer-reviewed, and 86 (88%) have publication dates between 2014 and 2018. I obtained the peer-

reviewed articles by searching academic databases available through the Walden University library using the following search terms: *Porter's value chain*, *Lorenz chaos theory*, *Simon's levers of control*, *supply chain management*, *manufacturing supply chain, customer demand*, *inventory management*, *big data, bullwhip effect*, *coopetition*, *cross-dock*, *Internet of things*, *multiechelon inventory optimization*, *supply logistics integration*, and *third party logistics*. The databases I used were Academic Search Complete, Business Source Complete, Directory of Open Access Journals, Emerald Insight, Expanded Academic ASAP, ScienceDirect, and Social Sciences Citation Index.

The purpose of my qualitative case study was to explore the strategies supply chain managers in the manufacturing industry use to match unsold inventory with customer demand. Porter's (1985) value chain framework was the conceptual framework for the study. This literature review is an overview of the current research and framework for my study. The review starts with a presentation of supporting and contrasting conceptual frameworks, progresses to a general discussion of SCM strategies, and concludes with an analysis of strategies to manage customer demand and unsold inventory.

Porter's Value Chain Model

Porter (1985) introduced the value chain model as a foundation for competitive strategy and asserted that the elements of the value chain were the essential building blocks of competitive advantage. Two key constructs of Porter's value chain are (a) identifying activities in a process as either primary or secondary, and (b) creating a value chain map to distinguish activities that add value from those that do not add value (Koc &

Bozdag, 2017; Porter, 1985). Porter's value chain model includes five primary activities and four secondary activities to achieve the single outcome of *margin* (see Figure 1).

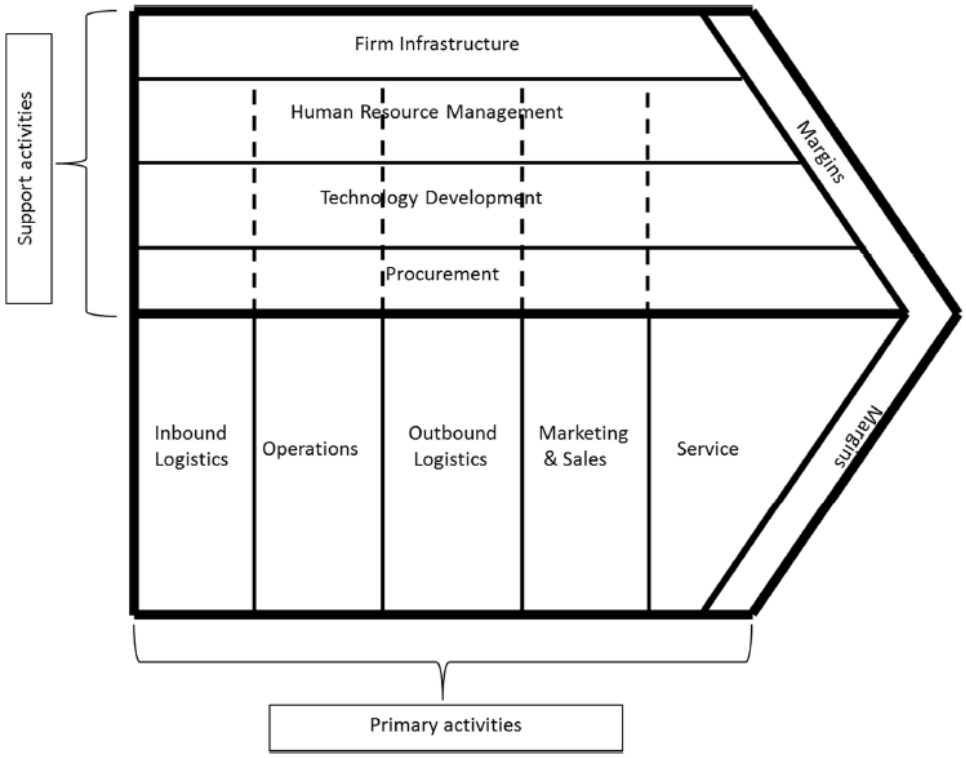

Figure 1. A generic value chain representing one company. From *Competitive Advantage: Creating and Sustaining Superior Performance* (p. 37), by M. Porter, 1985, New York, NY: The Free Press. Reprinted with permission (see Appendix A).

In Porter's (1985) value chain model, the five primary activities encompass product creation, sale of the product, and product support after the sale. Three of the primary activities involved with product creation are (a) inbound logistics, (b) operations, and (c) outbound logistics (Porter, 1985). Inbound and outbound logistics are activities associated with moving materials into the facility and finished products out of the facility, whereas operations includes transforming incoming material into finished goods (Porter,

1985). The other two primary activities in Porter's model are *sales and marketing* and *service.* The sales and marketing activity encompasses communicating with the customer before and during the sale, whereas service involves product support after the sale (Porter, 1985).

The four secondary activities in Porter's (1985) value chain model provide infrastructure and support for the primary activities. Procurement is the function of purchasing all required inputs for the value chain (Porter, 1985). Technology development consists of activities to develop and maintain all technologies used in the organization (Porter, 1985). Human resource management involves ensuring that a well-trained workforce is in place to support firm operations (Porter, 1985). Last, firm infrastructure consists of all the other functions that support the entire organization such as general management, accounting, legal, and quality management (Porter, 1985).

Porter (1985) posited that business leaders could use his generic value chain model to develop strategies to achieve competitive advantage. According to Porter, business leaders could categorize all activities in the organization as one of the nine primary or secondary functions. Next, business leaders could analyze activities within each category to identify whether the activities added value to the process (Porter, 1985). Ultimately, leaders could improve margins and achieve competitive advantage by improving activities that do add value and eliminating activities that do not add value.

Porter's Value Chain in Research

Several researchers (e.g., Cygler & Dębkowska, 2015; Horne, 2014; Koc & Bozdag, 2017; McPhee, 2014; Prajogo et al., 2016) used Porter's (1985) value chain

approach as the foundation for a variety of quantitative and qualitative studies. For instance, McPhee (2014) transformed Porter's value chain model by renaming some elements of the model, but nonetheless provided a framework that closely resembled Porter's model. By contrast, Cygler and Dębkowska (2015) started with Porter's value chain as a foundational concept and concluded the study with findings that were different from Porter's model. Between these two extremes, some researchers (e.g., Horne, 2014; Koc & Bozdag, 2017; Prajogo et al., 2016) used Porter's concept of primary and secondary activities throughout their studies and ended with findings that confirm the veracity of Porter's value chain concept.

McPhee (2014) modified Porter's (1985) value chain model to create a model that business leaders could use to incorporate sustainability activities when developing strategies to achieve competitive advantage. As part of the modification, McPhee renamed the primary activities *product-focused activities* and renamed the secondary activities *sustaining activities.* Furthermore, McPhee added sustainability activities and an additional outcome of *reputation*.

The key sustainability change McPhee (2014) made to the primary or product-focused activities was adding product recovery. By adding product recovery into the model, McPhee ensured his model encompassed the entire lifecycle of a product and included any environmental impact from the life of the product. The key sustainability change McPhee made to the secondary or *sustaining activities* was adding *developing relationships and ideas.* Specifically, McPhee suggested that business leaders need to

cultivate relationships and continuously generate new ideas to meet the combined challenges of achieving sustainability and competitive advantage.

To incorporate sustainability into the outcome, McPhee (2014) added *reputation* to Porter's (1985) original value chain model outcome of *margin*. McPhee suggested that reputation is an important part of a firm's value proposition. Moreover, a firm's sustainability initiatives affect the reputation either positively or negatively (McPhee, 2014). Therefore, in a sustainability model, the appropriate measure of company value is the combination of margin and reputation (McPhee, 2014). In the end, McPhee created an expanded version of Porter's value chain model with five product-focused activities, five sustaining activities, and two measures of value.

By contrast, Cygler and Dębkowska (2015) used Porter's (1985) value chain concept as a foundation for their qualitative study but did not include the components of the value chain model in the findings. The purpose of the study was to identify the attributes business leaders should look for when engaging a partner in coopetition. *Coopetition* occurs when leaders of two organizations combine cooperation and competition to reap mutual gain (Ritala et al., 2014).

Cygler and Dębkowska (2015) identified organizational attributes for the study based on their literature review and used Porter's (1985) value chain concept to define primary and secondary organizational functions where business leaders might benefit from coopetition. Using the defined attributes and functions, Cygler and Debkowska gathered and analyzed survey data from executives of 235 companies and presented their findings. The findings did not reference or resemble Porter's value chain. Rather, Cygler

and Debkowska used the findings to conclude that business leaders selecting coopetitive partners could achieve successful partnerships more efficiently by matching the potential partner's attributes to the area of coopetition.

Other researchers (e.g., Horne, 2014; Koc & Bozdag, 2017; Prajogo et al., 2016) used Porter's (1985) value chain concept throughout their studies and presented findings that aligned with Porter's value chain model. For example, Horne (2014) adapted Porter's value chain and created a framework to prioritize improvement projects based on cost. The framework contained the critical elements of Porter's value chain: primary activities, support activities, and a defined value chain (Horne, 2014). However, Horne added the cost of improvement projects to the model to facilitate project prioritization.

Similarly, Koc and Bozdag (2017) and Prajogo et al. (2016) adapted Porter's (1985) value chain model to address different research topics. Koc and Bozdag conducted a study to measure the impact of innovation on company operations. To aid in the calculation, the researchers added a perceived impact value to Porter's (1985) model (Koc & Bozdag, 2017). The findings from the study included a model that business leaders considering new innovations could use to measure and evaluate the potential impact of the innovations before taking the risk of implementation.

In another example, Prajogo et al. (2016) modified Porter's (1985) value chain model to explore the linkage between supply logistics integration (SLI) and competitive performance. SLI enables the coordination of material flow so producers have the right material at the right time and in the right quantity (Prajogo et al., 2016). The value chain model in the study contained the outcome of *competitive performance* and three primary

activities: (a) SLI, (b) inbound supply performance activities, and (c) lean production processes (Prajogo et al., 2016). After defining the model, Prajogo et al. mapped connections between the activities, defined hypotheses about how the connections could lead to competitive performance, and tested the hypotheses using survey data collected from managers of 232 manufacturing companies (Prajogo et al., 2016).

During the hypothesis testing, Prajogo et al. (2016) found no evidence of a significant direct relationship between SLI and competitive performance. Instead, the researchers found evidence that the other two primary activities in the model fully mediated the relationship between SLI and competitive performance (Prajogo et al., 2016). In sum, Prajogo et al. used Porter's (1985) value chain and quantitative methods to explore the effect of value chain activities on competitive performance.

As the examples show, researchers continue to use Porter's (1985) value chain model as a framework for conducting a variety of studies. Porter's model adds value whether researchers use the model in the original format, modify it to fit their studies, or choose to use the model as a foundation upon which to build. Specifically, Porter's value chain model provides researchers with the structure to examine the relationships between activities in a process. In the final analysis, researchers conducting studies involving business processes should consider using Porter's value chain as a conceptual framework.

Chaos Theory

Halldórsson, Hsuan, and Kotzab (2015) suggested that SCM researchers take an integrative approach and consider multiple theories. Although I selected Porter's value chain as the conceptual framework for this study, I also reviewed other theories such as

Lorenz's chaos theory. Lorenz developed his chaos theory in 1960 while working on the problem of predicting the weather (Krishnamurthy, 2015). One of the premises of chaos theory is that small variations in initial data could cause unpredictability or chaos in a nonlinear network or system (Stapleton, Hanna, & Ross, 2006).

Lorenz's chaos theory is rooted in natural science, but researchers use it as a framework for studies in other disciplines (Adams & Stewart, 2015). Adams and Stewart demonstrated that Lorenz's chaos theory was a useful lens for examining the effect of a natural disaster like Hurricane Katrina on the organizational structure of first responders. Stapleton et al. (2006) found that Lorenz's chaos theory was useful in examining the SCM challenges of demand forecasting and inventory management. Chaos theory applies to these two dissimilar studies because one of the central tenets is that in complex nonlinear systems, changes in incoming data causes unpredictable and chaotic results.

From a practical perspective, chaos theory provides business leaders with a framework to manage uncertainty (Sanial, 2014). Supply chain managers face uncertainty and chaos in areas such as customer demand and supplier production (Göksu, Kocamaz, & Uyaroğlu, 2015). Göksu et al. defined mathematical solutions to stabilize and control chaotic supply chains. Additionally, Kocamaz, Taşkın, Uyaroğlu, and Göksu (2016) presented both mathematical and artificial neural network solutions to control chaotic supply chains. Although I did not select Lorenz's chaos theory as the conceptual framework for my study, it is applicable to SCM research.

Simons's Levers of Control Theory

Simons's levers of control (LOC) theory is a strategic management tool that many researchers use as a conceptual framework (Martyn, Sweeney, & Curtis, 2016). In 1995, Simons presented the LOC theory as a strategy to foster innovation while achieving strategic goals (Kruis, Speklé, & Widener, 2016; Martyn et al., 2016). Simons's theory consists of four LOC with underlying strategic variables: (a) belief systems and core values, (b) boundary systems and risks to avoid, (c) interactive control systems and strategic uncertainty, and (d) diagnostic control systems and critical performance variables (Simons, 1995). Specifically, core values are foundational to belief systems and identifying risks to avoid supports boundary definition for the organization (Simons, 1995). Further, scanning the environment and recognizing strategic threats prompts the creation of interactive control systems; whereas defining and measuring critical performance metrics constitutes an essential part of diagnostic control systems (Simons, 1995).

A fundamental tenant of LOC theory is that leaders can control the strategic variables to balance the four LOC, thereby creating a culture of innovativeness and achievement (Kruis et al., 2016; Simons, 1995). For example, leaders can modify the strategic variables of core values and risk avoidance to influence employee behavior and define boundaries for business operations (Martyn et al., 2016; Simons, 1995). Additionally, leaders can monitor strategic uncertainty or threats to the business and use critical performance indicators to change the speed or direction of growth and track progress toward goals (Kruis et al., 2016; Simons, 1995). Balancing the four LOC is one

way that leaders can manage both innovativeness and business growth (Kruis et al., 2016; Martyn et al., 2016; Simons, 1995).

Several researchers further explored the key tenants and application of LOC theory (e.g., Heinicke, Guenther, & Widener, 2016; Kruis et al., 2016; Speklé, van Elten, & Widener, 2017). Kruis et al. provided some evidence that leaders who balanced all four LOC were more successful at achieving long-term organizational goals than leaders who only focused on some of the LOC. Similarly, Speklé et al. concluded that leaders who balanced all four LOC could create an environment that fostered innovation because employees felt empowered and creative. By contrast, Heinicke et al. found that leaders who created flexible organizational cultures did not balance all four LOC, but focused on one LOC and underlying strategic variable: beliefs systems and core values.

In practice, both researchers and business leaders use Simons's LOC theory in a variety of ways. Martyn et al. reviewed 45 studies from a 25-year period in which researchers and business leaders used Simons's LOC to address a wide range of issues from interactive use of management accounting systems to management of corporate social responsibility activities and performance. Additionally, Rezania, Baker, and Burga (2016) found that the LOC framework was useful in project management. Specifically, the balancing of the four LOC had a positive influence on project performance (Rezania et al., 2016). Although I found evidence of researchers using LOC theory for several types of studies, I did not find evidence of the use of LOC theory in studies about SCM. Hence, I did not select LOC theory as the conceptual framework for my study.

Supply Chain Management Strategies

Business leaders must employ a variety of innovative strategies to achieve competitive advantage and profitability (Koc & Bozdag, 2017; Porter, 1985). SCM is one strategy that business leaders use to reduce cost and increase efficiency, thereby contributing to profitability (Xia et al., 2015). SCM involves the integration of critical processes that transform raw materials into a product or service delivered to the customer (Whitley & Ulmer, 2013). Moreover, SCM includes using innovative ideas to penetrate functional silos and optimize supply chain operations across the organization (Koc & Bozdag, 2017; Whitley & Ulmer, 2013). A critical objective of SCM strategy is developing and maintaining agility in the supply chain to respond to customer demand while minimizing company cost (Tarafdar & Qrunfleh, 2017). SCM strategies are the subject of a variety of studies by researchers exploring existing and innovative approaches to optimize the supply chain and increase profitability.

SCM and corporate responsibility. Several researchers (e.g., Bhinge, Moser, Moser, Lanza, & Dornfeld, 2015; Govindan et al., 2016; Xia et al., 2015) examined SCM strategies through the lens of corporate responsibility. For example, Bhinge et al. (2015) developed a tool for optimizing global supply chains across three pillars of sustainability: economic, social, and environmental. The scope of the study included all supply chain activities from obtaining raw materials to delivering a finished product to the customer (Bhinge et al., 2015). After creating tables to quantify the impact of supply chain activities on sustainability, Bhinge et al. proposed a multiobjective optimization model. The model used mathematical calculations to analyze the quantified sustainability impact

of supply chain activities and determine the optimal supply chain structure (Bhinge et al., 2015). Leaders could use the model created by Bhinge et al. to measure impact and optimize sustainability efforts across the entire supply chain.

Similarly, Govindan et al. (2016) explored improving sustainability in a manufacturing supply chain across the three pillars of economic, social, and environmental sustainability. However, Govindan et al. expanded the scope of the supply chain activities beyond customer delivery to a closed-loop supply chain, which encompasses the entire lifecycle of a product from raw materials to recovery. Including all supply chain activities in the closed-loop supply chain, Govindan et al. used a multiobjective mixed integer model to find optimal settings to achieve the goals of maximizing profit, minimizing environmental impact, and maximizing social benefits. Govindan et al. conducted multiple tests of the methodology and applied the model to an existing company.

Building upon similar research by Bhinge et al. (2015), Govindan et al. (2016) provided some evidence that business leaders could use a multiobjective mixed integer model as a decision-making tool to try to balance the three pillars of sustainability when evaluating activities directed toward achieving sustainability in a closed-loop supply chain. However, unlike Bhinge et al., Govindan et al. concluded that it was not possible to achieve optimal values for all three sustainability objectives at the same time across the entire supply chain. Instead, supply chain managers would need to make decisions about trade-offs among the sustainability pillars (Govindan et al., 2016). Supply chain managers could use the output from the model created by Govindan et al. to support

decisions about implementing or discontinuing activities directed toward achieving sustainability in a closed-loop supply chain.

Taking a narrower approach, Xia et al. (2015) focused on optimizing one pillar of sustainability in manufacturing supply chains: social sustainability. Specifically, Xia et al. theorized that four variables influence the need for manufacturing supply chain leaders to focus on social sustainability efforts: (a) a product's functional value to the consumer, (b) a product's social value to the consumer, (c) the consumer's ethical disposition, and (d) the social environment of the supply chain . By assigning numerical values to identify different levels of the four variables, Xia et al. created a mathematical model that manufacturing supply chain managers could use to determine the optimal level of investment in supply chain social sustainability activities. Although the approach used by Xia et al. has a narrower focus than the approach employed by Bhinge et al. (2015) and Govindan et al. (2016), the researchers still provided supply chain managers with a tool to aid in making decisions about supply chain sustainability efforts.

By looking through a lens of corporate responsibility, supply chain managers can adjust SCM strategies to optimize three pillars of sustainability: economic, social, and environmental. Using the same pillars of sustainability and different approaches, researchers have developed decision-making tools to optimize sustainability. The tools range in scope from balancing strategies across all three pillars of sustainability, making trade-offs among the three pillars, and focusing exclusively on one pillar. With the data obtained from using any of the decision-making tools, supply chain managers could make

data-based decisions about strategies to increase sustainability efforts in the supply chain and contribute to an organization's corporate responsibility efforts.

Innovative SCM strategies. Using a different perspective, several researchers (e.g., Musa & Dabo, 2016; Suh, 2015; Yin, Nishi, & Grossmann, 2015) explored the relationship between innovative SCM strategies and supply chain optimization. Innovative SCM strategies optimize supply chains by improving efficiency and effectiveness (e.g., Angeleanu, 2015; Kirovska et al., 2016; Santanu, 2016). Prompted by rapid technological advancements, multiple supply chain managers focus on information technology (IT) solutions to optimize supply chains through enhanced management of information and knowledge (e.g., Haddud et al., 2017; Szuster, & Szymczak, 2016; Tan et al., 2015). However, the literature (e.g., Suh, 2015; Witkowski, 2017; Yin et al., 2015) revealed that supply chain managers could also use nonIT solutions to innovate and improve supply chain performance.

Focusing on IT solutions, Musa and Dabo (2016) and Basole and Nowak (2016) explored the use of electronic tracking systems in SCM. Musa and Dabo researched the application of radio frequency identification (RFID) technology in SCM by conducting a literature review. RFID technology uses three components to identify and capture data automatically: (a) a transponder or tag (e.g., barcode), (b) a transceiver or reader (e.g., handheld scanning device), and (c) a database to store and process the information (Basole & Nowak, 2016; Musa & Dabo, 2016). The automatic identification, capture, and processing of data result in both real-time and historical information about any tagged item (Basole & Nowak, 2016; Musa & Dabo, 2016).

Musa and Dabo (2016) reviewed 1187 journal articles published from 2000 through 2015 and provided evidence that supply chain managers have leveraged RFID technology to optimize supply chains in a variety of ways. After grouping the articles by the supply chain function impacted by the RFID technology, the researchers provided a summary of the main findings for each group (Musa & Dabo, 2016). For example, the group *warehouse management* contained six articles and the group findings included using RFID technology for two primary purposes: (a) determining optimal storage location and (b) improving the speed and accuracy of inbound and outbound operations (Musa & Dabo, 2016). Supply chain managers could leverage the findings from this study to develop ideas for RFID technology application or build business cases for implementing RFID technology.

Basole and Nowak (2016) also explored the use of tracking technologies such as RFID chips, smart tags, and cellular networks in supply chains. By using tracking technologies, supply chain managers could have real-time supply chain data such as the location of products in the supply chain, inventory quantity, and location of transportation providers (Basole & Nowak, 2016; Musa & Dabo, 2016; Witkowski, 2017). However, Basole and Nowak advised that the implementation of tracking technology alone will not enhance supply chain effectiveness. Managers must be able to easily access, interpret, and leverage the data from tracking technology to realize a benefit (Basole & Nowak, 2016). Further, collaboration among supply chain partners is critical to realizing the full potential of tracking technology (Basole & Nowak, 2016).

Looking at IT-focused SCM strategies from a broader perspective, Haddud et al. (2017) and Zhou et al. (2015) highlighted the benefits and challenges of leveraging the IoT to enhance supply chain performance. The IoT enables the online connection of information sharing devices like RFID scanners and tags, wireless sensors, and mobile applications (Haddud et al., 2017; Zhou et al., 2015). The benefits of incorporating information sharing via the IoT into SCM strategies include (a) improved material tracking and inventory control, (b) enhanced collaboration among supply chain partners, and (c) the potential for improving delivery to the customer (Haddud et al., 2017; Zhou et al., 2015). Challenges associated with adoption of IoT include (a) network security risks, (b) integration of varied technologies, and (c) the generation of big data (Haddud et al., 2017; Zhou et al., 2015). When selecting an IT-focused SCM strategy, leaders should assess organizational capabilities to overcome challenges against potential benefits.

Orenstein, Ladik, and Rainford (2016) and Witkowski (2017) highlighted the influence of *big data* on SCM. Big data refers to the large volumes of data from various sources that are the product of digitization and connected technologies, as well as the technology and analysis methods to transform the data into a valuable information asset (De Mauro, Greco, & Grimaldi, 2016; Witkowski, 2017). The excessive volume and speed of big data production drive the need for innovative analysis tools and techniques (De Mauro et al., 2016; Witkowski, 2017). With appropriate analysis, supply chain managers could use big data to manage risk and increase efficiency in the supply chain (Orenstein et al., 2016; Witkowski, 2017). Examples include using real-time data to optimize transportation routes and providing customers with real-time data about any

disruptions in delivery (Orenstein et al., 2016; Witkowski, 2017). As supply chain managers implement RFID and other data producing technologies, the ability to leverage big data will be a critical success factor in SCM.

Tan et al. (2015) proposed an analytic infrastructure to leverage big data to enhance supply chain performance. The infrastructure is comprised of data mining and preprocessing techniques along with deduction graphing (Tan et al., 2015). Data mining and preprocessing techniques facilitate harvesting useful data and deduction graphing facilitates structuring and linking various streams of big data to create a visual representation of all or a portion of the supply chain (Tan et al., 2015). Through a case study of a manufacturer of eyeglasses, Tan et al. provided some evidence that the analytic infrastructure including data harvesting and deduction graphing facilitates management of big data. Accordingly, supply chain managers could use the infrastructure proposed by Tan et al. to (a) manage big data, (b) model supply chain and product development ideas, and (c) use the results of the analysis to support SCM strategy decisions.

Chae (2015) and Singh, Shukla, & Mishra (2017) explored using social media platforms such as Twitter and big data analytics to enhance SCM. Researchers can gather Twitter data using the Twitter application programming interface (Chae, 2015; Singh et al., 2017). Examining data gathered via Twitter application programming interface using a structured analysis process, Chae found that supply chain professionals use Twitter for several purposes like information sharing, networking, and communicating with customers. Additionally, Chae suggested that supply chain

managers could leverage Twitter for risk management through broadcasting and monitoring supply chain disruption events.

Singh et al. (2017) took a different approach than Chae (2015) and explored using Twitter data to create a more customer-centric supply chain. Singh et al. used Twitter application programming interface to gather customer tweets about the beef supply chain. Through the process of content analysis, Singh et al. identified the top six issues that beef consumers were tweeting about and developed mitigation plans. Given that consumers express their opinions on social media, Singh et al. suggested that business leaders could leverage data from social media to evolve from operations-focused supply chains into customer-centric supply chains.

When implementing IT solutions as part of SCM strategy to create value for customers through improved delivery and reliability, supply chain leaders could also implement nonIT solutions (Basole & Nowak, 2016; Witkowski, 2017). As an example, supply chain leaders who implement RFID technology also continue to focus on nonIT solutions such as (a) continuous process improvement, (b) improving the network structure, and (c) managing risk in the supply chain (Basole & Nowak, 2016; Witkowski, 2017). Examples of nonIT solutions available in the field of SCM include (a) cross-docking, (b) employing discount policies, and (c) outsourcing selected supply chain tasks to third party logistics (3PL) providers.

Suh (2015) investigated using cross-docking strategy to optimize global manufacturing supply chains. Cross-docking involves matching incoming orders to incoming freight and transferring the matched orders from incoming trucks directly onto

outgoing trucks (Serrano, Delorme, & Dolgui, 2017; Suh, 2015). A key benefit of cross-docking is the elimination of the need for interim storage and material handling (Serrano et al., 2017; Suh, 2015). Suh proposed a cross-docking simulation model that used specific inputs that supply chain policymakers could control.

After simulating the cross-docking operation with specified settings on the controllable inputs, the model provided output metrics that supply chain managers could use to measure success (Suh, 2015). Through simulation with 52 weeks of historical data and various settings of the controllable inputs, Suh (2015) provided evidence that using a cross-docking strategy that optimized key controllable inputs could improve supply chain performance in a number of manufacturing companies. Supply chain managers seeking to reduce the need for storage space and reduce material handling could consider cross-docking as a viable option for supply chain optimization.

Implementing discount policies is an example of a nonIT SCM strategy used by supply chain managers (Nie & Du, 2017; Yin et al., 2015). Nie and Du (2017) and Yin et al. (2015) examined the influence of discount policies on suppliers and supply chain performance. Specifically, Nie and Du posited that implementing quantity discount contracts in a retail supply chain could reduce the effect of stochastic demand and contribute to long-term supply chain efficiency. Yin et al. posited that implementing an optimal quantity discount policy in a manufacturing supply chain could induce suppliers to maintain relationships with manufacturers despite demand uncertainty, thus improving long-term supply chain performance.

Nie and Du (2017) and Yin et al. (2015) used the Stackelberg game theory model to test the influence of discount policies on supply chain performance. In the Stackelberg model, leaders and followers compete on quantity (Stackelberg, Hill, Urch, & Bazin, 2011). The goal is to set up and solve the game theory model to achieve equilibrium of profit between the leaders and followers (Stackelberg et al., 2011). Nie and Du designated the supplier as the leader and the retailers as the followers. Yin et al. conducted simulations with the manufacturers as the leaders and the suppliers as the followers.

Nie and Du (2017) and Yin et al. (2015) incorporated quantity discounts into the Stackelberg model and conducted multiple simulations to observe the changes in profit levels and supply chain performance. Nie and Du concluded that implementing quantity discount contracts resulted in higher profits for the supplier, compared to implementing wholesale price contracts. However, implementing quantity discount contracts resulted in lower profits for the retailers when compared to implementing wholesale price contracts (Nie & Du, 2017). To solve the Stackelberg model and create equilibrium, Nie and Du proposed a solution that combined quantity discount contracts and fixed fees.

Yin et al. conducted five tests, altering five parameters to observe the changes in profit levels. The parameters were (a) unit revenue, (b) opportunity loss cost, (c) inventory cost, (d) deviation of random demand, and (e) mean of random demand (Yin et al., 2015). The simulation resulted in two key findings related to profit and demand uncertainty: (a) when the deviation of demand decreases, profit increases and (b) when the mean value of demand decreases, profit does not always decrease (Yin et al., 2015).

Hence, Yin et al. concluded that a single manufacturer with multiple suppliers could use a Stackelberg game theory model to derive an optimal quantity discount policy that maximizes profit for both supplier and manufacturer during times of demand uncertainty. In both studies, the researchers provided some evidence that discount policies could improve supply chain performance in periods of demand uncertainty.

Supply chain managers are increasingly advocating integrating 3PL providers into the supply chain (Denisa, Lucie, Eva, & Leona, 2015; Giri & Sarker, 2017). Companies referred to as 3PLs provide a variety of logistics services such as (a) transportation, (b) packaging, and (c) warehousing (Denisa et al., 2015). Denisa et al. (2015) used qualitative and quantitative methods to explore the use of 3PL services in Czech manufacturing companies. The study findings included evidence that reducing cost and filling gaps in organizational expertise were the two primary reasons that Czech manufacturing companies integrated 3PLs into the supply chain (Denisa et al., 2015). Further, Denisa et al. found that leaders of Czech manufacturing firms used a model that combined in-house and 3PL facilities and services. Like Denisa et al., Giri and Sarker (2017) found that 3PLs provide benefits such as (a) reduced logistics cost, (b) logistics expertise, and (c) improved supply chain performance. Additionally, Giri and Sarker concluded that leveraging 3PLs can enhance customer satisfaction and company profitability.

By contrast, Jiang, Wang, and Liu (2016) asserted that managing the cost of service improvement when using 3PLs could be a key challenge for business leaders. When trying to improve service, 3PL leaders may employ strategies that add costs such

as hiring additional staff or employing new equipment or technology (Jiang et al., 2016). Similarly, Szmelter (2017) conducted a literature review and found evidence that adding 3PLs into the supply chain introduces complexity that could add to SCM challenges. Jiang et al. suggested that supply chain managers could implement cost sharing among the 3PLs and all supply chain members as one way to manage the cost of improved service. To reduce the complexity in a supply chain, Szmelter recommended reducing or limiting the number of outsourced partners.

In summary, supply chain managers must continuously innovate to improve supply chain performance and ensure their companies remain competitive. Many innovative SCM strategies involve IT solutions, but supply chain managers can also leverage a wide range of nonIT solutions. Implementing RFID technology and utilizing social media are examples of IT-focused SCM strategies that leverage the IoT and produce big data. Supply chain managers harvest and analyze big data to monitor and optimize supply chain performance.

By contrast, cross-docking, offering discount policies, and integrating 3PLs into the supply chain are examples of nonIT SCM strategies that address specific SCM challenges. Cross-docking minimizes the need for storage space and material handling in warehouses. Offering discount policies contributes to profitability during times of demand uncertainty. Integrating 3PLs into the supply chain reduces the need for organizational expertise in all supply chain services. However, supply chain managers should be aware that integrating 3PLs into the supply chain can add both complexity and cost if not managed with care. Ultimately, supply chain managers should consider the

benefits and risks before selecting and implementing innovative SCM strategies to enhance supply chain performance.

Customer Demand

Understanding and accurately forecasting customer demand contributes to the optimization of inventory levels in the supply chain but is a continuous challenge for supply chain managers (e.g., Dai, Li, Yan, & Zhou, 2016; Jin, DeHoratius, & Schmidt, 2017; Mackelprang & Malhotra, 2015). Several factors add to the challenge of understanding and forecasting customer demand, such as the *bullwhip effect* (e.g., Dai et al., 2016; Jin et al., 2017; Lee, Padmanabhan, & Whang, 1997). Lee et al. (1997) first used the term bullwhip effect to describe the variation that occurs between orders and customer demand in a supply chain. Specifically, the variation between orders to the suppliers and customer demand amplifies as the information moves up the supply chain from the retailer to the manufacturer and the supplier of raw materials (Lee et al., 1997). The bullwhip effect results in distorted demand information and adds complexity to forecasting demand (e.g., Dai et al., 2016; Jin et al., 2017; Lee et al., 1997).

Several researchers (e.g., Dai et al., 2016; Jin et al., 2017; Ma, Wang, He, Lu, & Liang, 2015; Mackelprang & Malhotra, 2015) have studied the causes and implications of the bullwhip effect in SCM. Using analytical models, Dai et al. (2016) explored how different levels of information quality influence the impact of the bullwhip effect within the supply chain of an industry. One key finding was that sharing real-time information within the supply chain had a positive effect on forecasting accuracy and overall supply

chain costs (Dai et al., 2016). Thus, Dai et al. recommended that manufacturers foster real-time information sharing with retailers to improve demand forecasting accuracy.

Jin et al. (2017) took a different approach than Dai et al. (2016) but provided a similar recommendation to improve demand forecasting accuracy. Using data from census reports and quantitative analysis, Jin et al. examined the magnitude of the intraindustry shipping, manufacturing, and ordering bullwhip effect, as well as the correlation between the bullwhip effects. Jin et al. provided some evidence that the shipping bullwhip effect was negatively correlated with the manufacturing and ordering bullwhip effects. Further, managers in most industries employed smoothing techniques to reduce the shipping, manufacturing, and ordering bullwhip effects (Jin et al., 2017). Based on these results, Jin et al. concluded that supply chain managers who employed smoothing techniques in shipping created bullwhips in manufacturing and ordering. Ultimately, Jin et al. recommended that managers improve communication between the shipping, manufacturing, and ordering functions within the supply chain to reduce the bullwhip effect and increase demand forecasting accuracy.

Supply chain managers could improve forecasting accuracy by understanding and employing strategies that reduce the bullwhip effect in the supply chain (Dai et al., 2016; Jin et al., 2017; Ma et al., 2015). Ma et al. (2015) used an interacting demand model to explore the bullwhip effect in parallel supply chains. Parallel supply chains, particularly a competitor's parallel supply chain, could influence the bullwhip effect and affect demand forecasting accuracy (Ma et al., 2015). A critical finding from this study was the existence of a situation where the interaction between parallel supply chains significantly

reduces the bullwhip effect: when parallel supply chains are from competing organizations and the products are substitutable. Ma et al. recommended that supply chain managers consider the potential influence of parallel supply chains when calculating demand.

Employing technology solutions could enhance information sharing in the supply chain and facilitate demand forecasting (Bruque-Cámara, Moyano-Fuentes, & Maqueira-Marín, 2016; Singh, Mishra, Ali, Shukla, & Shankar, 2015). Bruque-Cámara et al. (2016), Jede and Teuteberg (2016), and Singh et al., (2015) explored the influence of cloud-based technology on information sharing in SCM. Bruque-Cámara et al. used quantitative methods to provide evidence that a positive relationship exists between cloud technology and the integration of physical and information flows in the supply chain. Through a literature review, Jede and Teuteberg identified information sharing as one of the sustainability factors realized when implementing cloud technology for SCM. Approaching cloud computing from a different perspective, Singh et al. created and tested a model of a private cloud network that allowed centralized reporting and information sharing across the supply chain. In sum, cloud computing is a technology solution that business leaders could use to facilitate information sharing across the supply chain and contribute to the capability to forecast customer demand.

Going beyond the recommendations for information sharing, Mackelprang and Malhotra (2015) and Venegas and Ventura (2017) recommended that supply chain members coordinate specific activities. Mackelprang and Malhotra suggested that supply chain members coordinate production. Through quantitative analysis, Mackelprang and

Malhotra provided some evidence that production coordination reduces the impact of the bullwhip effect, resulting in fewer lost sales and reduced cost to suppliers for short-term measures like overtime or emergency shipments. Using a cooperative model, Venegas and Ventura found that supply chain capability to meet customer demand improves when all parties in the supply chain coordinate inventories. Moreover, Venegas and Ventura suggested that coordination of inventories results in increased benefits for both suppliers and buyers. Building upon information sharing, supply chain managers could better meet customer demand by implementing strategies such as coordinating production activities or coordinating inventories across the supply chain.

Accurately forecasting customer demand is a critical factor component of successful SCM strategy. Supply chain managers should implement strategies to counter factors, such as the bullwhip effect, that affect forecasting and meeting customer demand. Employing parallel supply chains and information sharing across the supply chain are two SCM strategies, supply chain managers use to forecast customer demand more accurately. Further, cloud-based technology enhances the efficiency and effectiveness of information sharing. Coordinating production and coordinating inventories are additional strategies that supply chain managers could implement to improve the capability of meeting customer demand. By employing various SCM strategies, supply chain managers could increase the accuracy of customer demand forecasting and strengthen supply chain capability to meet customer demand.

Unsold Inventory in the Supply Chain

Unsold inventory in the supply chain adversely affects company profitability (Datta, 2017). To reduce the adverse effect of unsold inventory, business leaders and supply chain managers employ a variety of inventory management strategies (Datta, 2017). Several researchers (e.g., Datta, 2017; Lee, Park, & Seshadri, 2017; Plinere & Borisov, 2015; Shen et al., 2016) have conducted studies to explore inventory management strategies. The strategies range from improving information sharing and collaborative partnerships to implementing computer-based optimization models.

In separate studies, Shen et al. (2016) and Datta (2017) provided recommendations and support for information sharing and collaboration as inventory management strategies. Shen et al. explored inventory management through a case study of a manufacturing firm in China. The company leaders used rolling horizon flexibility (RHF) supply contracts as the primary inventory management strategy (Shen et al., 2016). In the RHF model, company leaders contracted quantities with suppliers in four periods, with some flexibility to adjust the quantities (Shen et al., 2016).

After gathering and analyzing data, Shen et al. (2016) concluded that the RHF contract could be a useful inventory management tool for normal demand variation but was not adequate for emergency orders or seasonal demand fluctuation. Moreover, RHF required efficient communication between the firm and the supplier (Shen et al., 2016). The recommendations to fill the gaps in the inventory management strategy included (a) enhancing IT infrastructure to improve communication and collaboration with partners, (b) using safety stock to account for the seasonality of demand, and (c) fostering long-

term collaborative partnerships with suppliers and customers (Shen et al., 2016). By aligning different supply chain strategies, business leaders enhance the probability of achieving competitive advantage (Datta, 2017; Shen et al., 2016).

Similar to Shen et al. (2016), Datta (2017) provided evidence from case studies to support using information sharing and collaboration strategies for inventory management. In two separate case studies, the company leaders were responding to a change in the business environment (Datta, 2017). In one case, the leaders of a tobacco company responded to a decline in demand by launching a web-based system to bolster visibility and traceability of all supply chain operations (Datta, 2017). In the other case, leaders of a mosquito coil manufacturing company responded to a decline in demand by connecting suppliers via an IT platform that provided daily production reports and tracked product locations (Datta, 2017). By modifying the strategy to enhance information sharing and collaboration, the leaders could improve supply chain responsiveness and gain more control of inventory costs in a time of demand uncertainty (Datta, 2017; Shen et al., 2016).

Both Shen et al. (2016) and Datta (2017) concluded that supply chain managers could manage inventory effectively and achieve competitive advantage by using strategies that include information sharing and collaboration. However, Datta emphasized that a single inventory management strategy is not appropriate in every situation. Rather, leaders should consider and evaluate multiple factors when selecting inventory management strategies (Datta, 2017). By considering factors such as (a) cost, (b) supplier adaptability to change, and (c) potential interaction between new and existing

strategies, leaders can select strategies that better align with the business environment (Datta, 2017).

Managing inventory in a global company is a growing challenge for supply chain managers (Lee et al., 2017). Supply chain managers must employ strategies to ensure sufficient inventory is available to meet customer demand while avoiding the cost of overstocking or excess inventory (Plinere & Borisov, 2015). Plinere and Borisov proposed a strategy that combined classifying inventory into levels based on percentage of sales and using a computer-based agent for replenishment. By contrast, Lee et al. (2017) proposed a strategy that incorporated transportation costs and exchange rates for moving inventory across country boundaries.

Plinere and Borisov (2015) concluded that supply chain managers could realize improvement in two areas by using the proposed agent system and inventory classification methodology. With the strategy, inventory holding costs would decrease, and the ability to respond to deviations in demand would increase (Plinere & Borisov, 2015). Hence, supply chain managers could avoid overstocks while ensuring that sufficient inventory existed to meet customer demand (Plinere & Borisov, 2015). Although Plinere and Borisov addressed the stated objectives of preventing overstocks and unfulfilled customer orders with their strategy, they did not consider risks encountered with international trade. Lee et al. (2017) filled the gap by including transportation costs and exchange rate risks in their study.

Transportation costs and exchange rate risks are two factors that supply chain managers in global companies should include when managing unsold inventory in the

supply chain (Lee et al., 2017). Taking a different approach than Plinere and Borisov (2015), Lee et al. (2017) employed a triangular model to examine how variations in transportation costs and exchange rates affect inventory shipments and inventory levels in global companies. After analyzing data from a Korean firm, Lee et al. concluded that fluctuations in transportation costs and exchange rates between home and host countries significantly influence inventory levels. Consequently, Lee et al. recommended incorporating both factors into SCM strategies.

Unlike the model proposed by Lee et al. (2017), the model proposed by Torkul, Yılmaz, Selvi, and Cesur (2016) was a real-time inventory model designed to reduce unsold inventory by eliminating safety stock. The model included a calculation of reordering time rather than safety stock to manage variation in customer demand (Torkul et al., 2016). With discrete-event simulation, Torkul et al. provided some evidence that their model reduced inventory and the associated holding costs. However, the simulation contained occurrences of stock-out (i.e., no inventory available to fill orders) which could affect service levels (Torkul et al., 2016). Hence, leaders should test the model using historical company data to understand the frequency and severity of stock-out occurrences.

Modern supply chains are multiechelon systems consisting of several stages related to procurement, manufacturing, distribution, and transportation (Eruguz, Sahin, Jemai, & Dallery, 2016; Fichtinger, Chan, & Yates, 2017). Each stage in a multiechelon supply chain is a potential location for safety stock (Eruguz et al., 2016). Safety stock is one of the levers supply chain managers use to mitigate the risk of stock-out in supply

chains (Shen et al., 2016). Supply chain managers have the option to use multiechelon inventory optimization (MEIO) methods to determine the optimal amounts and locations for safety stock (Eruguz et al., 2016). The objective of MEIO is to allocate inventory across the supply chain in a manner that minimizes cost while meeting customer demand (Eruguz et al., 2016; Fichtinger et al., 2017). Fichtinger et al. (2017) used MEIO to create a network and safety stock optimization model that supply chain managers could use to define the optimal network and inventory solution to minimize cost and meet customer demand.

There are a variety of inventory management strategies to reduce unsold inventory in the supply chain. Researchers have explored strategies as basic as information sharing and as complex as automated inventory management agents. A basic strategy such as improving information sharing and collaboration could be sufficient in certain situations, but other situations require a more complex strategy. Complex strategies include (a) computer-based agents, (b) multiple-factor models, (c) real-time inventory models, and (d) MEIO methods. Supply chain managers should examine both the internal and external business environments before selecting a strategy to reduce unsold inventory in the supply chain.

Transition

In this study, I explored SCM strategies supply chain managers use to match unsold inventory in the supply chain with customer demand. Section 1 contains foundational elements of the study, including the background of the problem, the problem statement, and the purpose statement. A description of the nature of the study,

presentation of the research and interview questions, and discussion of the conceptual framework add to the foundation of the study. Section 1 also contains operational definitions, assumptions, limitations, and delimitations. The section concludes with a discussion of the significance of the study and a comprehensive literature review.

The literature review covered the conceptual framework, general SCM strategies, and SCM strategies focused on forecasting customer demand and managing unsold inventory. Porter's value chain was the conceptual framework for the study because it facilitates analyzing activities in the supply chain to determine whether the activities add value to the process. General SCM strategies encompassed IT solutions and nonIT solutions. IT strategies for SCM leverage RFID technology or the IoT and produce big data that supply chain leaders must extract and analyze. NonIT strategies for SCM address specific challenges. Examples were cross-docking to reduce required storage space and material handling, discount policies to mitigate the effects of demand uncertainty, and 3PLs to reduce the need for organizational expertise in all supply chain services.

Supply chain managers leverage multiple strategies to forecast customer demand more accurately and manage unsold inventory. Strategies to forecast customer demand more accurately countered factors like the bullwhip effect. Examples were leveraging cloud-based technology for information sharing, employing parallel supply chains, and coordinating production and inventories. Strategies to manage unsold inventory ranged from information sharing and collaborative partnerships to implementing computer-based optimization models and MEIO methods.

In Section 2, I discuss details about the research project. Critical elements include the role of the researcher, strategies and criteria for participants, research method and design, and justification for sample size. Section 2 also contains information about data collection, organization, and analysis. The section concludes with a description of methods to ensure dependability, credibility, transferability, and confirmability.

In Section 3, I present the findings and implications of the study. The discussion includes a comparison of the findings to existing literature and application of the findings to current business practice. Section 3 also contains implications for social change and recommendations for action. The section concludes with recommendations for further research and reflections on my experience in completing the study.

Section 2: The Project

Section 2 is a discussion about the design and execution of the research project. Critical elements include discussions of (a) the role of the researcher, (b) recruitment strategies and participant criteria, (c) research method and design, and (d) justification for sample size. Section 2 also contains information about data collection, organization, and analysis. The section concludes with a description of methods used to ensure dependability, credibility, transferability, and confirmability.

Purpose Statement

The purpose of this qualitative single case study was to explore the strategies supply chain managers in the manufacturing industry use to consistently match the level of unsold inventory in the supply chain with customer demand. The targeted population consisted of supply chain managers from a global manufacturing company headquartered in the United States. Specifically, the selected supply chain managers had implemented strategies to match unsold inventory in the company's supply chain with customer demand. The implications for positive social change may include the improved delivery of manufactured goods to meet business and consumer needs. Businesses thrive when their needs for manufactured goods are met, leading to the potential for enhanced employment opportunities for individuals in local communities.

Role of the Researcher

My role as the researcher was to design and execute a case study in an ethical and unbiased manner. In case studies, the researcher assumes the role of primary research instrument and is responsible for ensuring ethical and unbiased data collection, analysis,

and reporting (Baškarada, 2014; Gaikwad, 2017; Yin, 2017). There are a variety of tools and resources available to assist researchers in conducting ethical and unbiased research when engaging human subjects in case studies. The Belmont Report is one of the resources I used for my study.

The Belmont Report addresses the ethical principles of (a) respect for persons, (b) beneficence, and (c) justice in research involving human subjects (Bromley, Mikesell, Jones, & Khodyakov, 2015; U.S. Department of Health and Human Services, 1979). Respect for persons includes ensuring subjects' voluntary participation and the ability to decline participation at any time (Bromley et al., 2015; U.S. Department of Health and Human Services, 1979). Beneficence refers to maximizing benefits and minimizing harm to research subjects (Bromley et al., 2015; U.S. Department of Health and Human Services, 1979). Justice involves the fair distribution of benefits and risks among participants (Bromley et al., 2015; U.S. Department of Health and Human Services, 1979). My role was to ensure I understood and upheld the ethical principles in the Belmont Report. To demonstrate understanding, I completed the National Institutes of Health web-based training course, *Protecting Human Research Participants*, certificate number 2264996. I refrained from conducting research until I received approval of my research proposal from Walden University's Institutional Review Board (IRB).

Qualitative researchers should take steps to mitigate bias and avoid viewing data through a personal lens (Baškarada, 2014; Morse, 2015; Yin, 2017). Researchers can reduce bias in qualitative studies by understanding the sources of bias and using tools such as interview protocols and member checking (Morse, 2015; Rosenthal, 2016). An

interview protocol is a guide for conducting interviews in qualitative research (Baškarada, 2014; Rosenthal, 2016). Interview protocols provide structure, increase efficiency, and reduce bias by providing specific steps for researchers to follow in each interview (Baškarada, 2014; Rosenthal, 2016). Member checking is the process of allowing interviewees to validate the transcribed data and, potentially, the data analysis (Gaikwad, 2017; Rosenthal, 2016). To mitigate bias in my study, I developed and followed an interview protocol (see Appendix B) approved by Walden University's IRB and conducted member checking to validate the transcribed interview data.

As a researcher conducting a study in my professional field, I acknowledged that I had professional relationships and personal views about SCM that could cause bias in my research. My knowledge of the study topic stemmed from working in the supply chain function for 3 years. Although I may have had a general awareness of the study participants through professional conferences or supply chain function meetings, I did not have a direct professional or personal relationship with any of the individuals who participated in the study. To mitigate bias, I followed the interview protocol, remained objective, and refrained from letting my personal opinions and experiences influence my research.

Participants

Selecting appropriate participants is a critical success factor in case study research (Broadhurst, 2015; Rosenthal, 2016; Yin, 2017). Participants should have sufficient knowledge and experience with the subject matter to provide rich and diverse data (Broadhurst, 2015; Rosenthal, 2016; Yin, 2017). Participants should also be willing and

able to share their knowledge and experience (Broadhurst, 2015; Bromley et al., 2015; Yin, 2017). I conducted research among SCM professionals employed by one global manufacturing company headquartered in the United States. To be eligible, potential participants must have had a minimum of 3 years of SCM experience and been working as a manager or director in the supply chain function of the organization.

After I received IRB approval, I contacted an executive leader via email and requested a meeting to present my proposal and request names of potential participants. Qualitative researchers should obtain informed consent from study participants (Gaikwad, 2017; Hiriscau, Stingelin-Giles, Stadler, Schmeck, & Reiter-Theil, 2014; Robinson, 2014). After obtaining permission from the executive leader to gain access to participants, I solicited individual participant interest in the study through email invitation. The email contained an informed consent form with details of the study. The email also contained instructions to respond via email with the words *I consent* to confirm consent to take part in the study.

Creating rapport and establishing a working relationship with participants is a critical success factor in qualitative research (Gaikwad, 2017; Hiriscau et al., 2014; Robinson, 2014). My strategy for creating rapport and establishing a working relationship with participants included (a) obtaining informed consent, (b) employing effective interviewing skills, and (c) maintaining confidentiality. Once I received informed consent, I contacted each participant via email or phone and scheduled the interview at a time that was convenient for the participant. At the beginning of each interview, I reminded the participant that participation was voluntary. I reiterated that the

reports from the study would not include any information that could reveal their identities. Throughout the interview, I remained professional, followed the interview protocol, and employed effective interviewing and listening skills.

Research Method and Design

Researchers should select a research method and design appropriate for the study and should consider the study's goal when making this selection (Baškarada, 2014; Morse, 2015). My goal in this study was to understand strategies that supply chain managers in the manufacturing industry use to match inventory with customer demand on a consistent basis. To accomplish my goal, I selected a qualitative research method and a single case study research design.

Research Method

I selected a qualitative research methodology to explore strategies supply chain managers use to match inventory with customer demand in the manufacturing industry. Qualitative methods enable researchers to explore and analyze experiences and perceptions of people immersed in processes or activities (Hoeber & Shaw, 2017; O'Cathain et al., 2014; Palinkas et al., 2015). Through qualitative methods, researchers gain insight into the reasons that participants make decisions or take certain actions (Rosenthal, 2016). Therefore, qualitative methodology was ideally suited to ascertain how and why supply chain managers successfully use strategies to match inventory to customer demand and reduce unsold inventory in the supply chain.

By contrast, quantitative methods enable researchers to examine and analyze relationships among variables using numerical data and hypotheses (Palinkas et al., 2015;

Walsh, 2015). With quantitative methods, researchers develop hypotheses, gather data, and determine if the data support the hypotheses (Palinkas et al., 2015; Walsh, 2015). Researchers may combine qualitative and quantitative methods to conduct mixed method studies. Mixed methods studies combine the hypothesis-driven rigor of quantitative methodology with the flexibility of qualitative methodology (Adil, Nunes, & Peng, 2014). I did not create hypotheses or use numerical data to achieve my goal of exploring the strategies supply chain managers are currently using to match unsold inventory to customer demand. Therefore, using a quantitative or mixed methods methodology was less appropriate than using a qualitative method for my study.

Research Design

A case study is a standard approach for exploring how and why a process operates in a real-life setting (Gaikwad, 2017; Yin, 2017). In case studies, researchers observe processes and collect data from the participants (Gaikwad, 2017; Yin, 2017). Researchers conduct interviews and review company documentation to gather data in case studies (Morse, 2015; Rosenthal, 2016). Single case studies include data from one case, whereas multiple case studies include data from more than one case (Morse, 2015; Yin, 2017). A single case study design was appropriate for this study because I explored how and why supply chain managers in one manufacturing company select and use strategies to consistently match unsold inventory in the supply chain to customer demand.

Before deciding on a case study design, I considered using ethnography and phenomenology. Using ethnography, researchers study the social interaction and culture of groups of people (Hoeber & Shaw, 2017; Hyett, Kenny, & Dickson-Swift, 2014).

Using phenomenology, researchers study the human experience during a specific phenomenon and derive meaning from the perspective of the individuals in the study (Hyett et al., 2014; Rosenthal, 2016). Because my research did not involve studying the culture of groups of people or studying human experience during a phenomenon, ethnographic and phenomenological research designs were not appropriate.

Data saturation, the point when data collection is no longer adding new information, is an essential consideration in qualitative research (Morse, Lowery, & Steury, 2014; Palinkas et al., 2015). Reaching data saturation ensures the data collection effort is adequate to support the study (Morse et al., 2014; Palinkas et al., 2015). To ensure data saturation in my study, I continued participant interviews and collected relevant documentation until no new themes emerged.

Population and Sampling

The population for this study was supply chain managers and directors employed by a global engine manufacturing company headquartered in the Midwestern United States. Researchers planning qualitative studies should select a provisional sample size that is practical and flexible (Baškarada, 2014; Lewis, 2015). Purposeful sampling is a nonrandom method for ensuring participants have the knowledge and capability to address the research questions (Lewis, 2015; Robinson, 2014). With purposeful sampling, the researcher ensures that certain types of individuals are in the final sample (Robinson, 2014). I used purposeful sampling to ensure that the sample for my study included supply chain managers or directors who had experience employing SCM

strategies to match unsold inventory in the supply chain with customer demand. As a provisional sample size, I identified four to six potential participants for my study.

Although I identified four to six potential participants, the final sample size in my study depended on reaching data saturation. Data triangulation or the use of multiple data sources contributes to data saturation (Baškarada, 2014; Fusch & Ness, 2015). I continued interviewing participants until I was no longer collecting new information that resulted in new themes or new coding. The final sample size was five participants. Additionally, I used company documentation including policies, process documents, and metrics reports to support the collected data and ensure data saturation.

When using purposeful sampling, the researcher should define criteria for potential participants (Robinson, 2014; Rosenthal, 2016). It is vital to select potential interviewees who have sufficient knowledge and experience to answer interview questions and provide rich data (Baškarada, 2014; Robinson, 2014; Rosenthal, 2016). Potential participants in my study were managers or directors who had a minimum of 3 years of SCM experience. The managers or directors were working in the supply chain function of the global engine manufacturing organization at the time of the study and had experience employing SCM strategies to match unsold inventory in the supply chain with customer demand.

Researchers should conduct interviews in a manner that is convenient and comfortable for the interviewee (Baškarada, 2014; Robinson, 2014; Rosenthal, 2016). Researchers can effectively conduct interviews via telephone or video chat applications such as Skype (Rosenthal, 2016). I offered each interviewee the choice of an in-person,

Skype, or telephone interview. All the participants selected Skype interviews. For each Skype interview, I confirmed that the interviewee and I were both in locations that provided privacy and allowed us to speak freely, without interruptions. I scheduled each interview at a time that fit the interviewee's schedule.

Ethical Research

Obtaining informed consent is a fundamental component of ethical research (Gaikwad, 2017; Hiriscau et al., 2014). Researchers should obtain informed consent before conducting interviews or gathering data (Gaikwad, 2017; Hiriscau et al., 2014). I obtained informed consent from all participants via email acknowledgment of the consent form. The consent form contained background and procedural information about the study as well as details about ethical considerations such as the voluntary nature of the study and disclosure about payment for participation. As documented in the consent form, participants could withdraw from the study at any time without penalty. There were no payments, thank you gifts, or reimbursements for participation in the study. Per the interview protocol (see Appendix B), I reviewed the acknowledged consent form at the beginning of each interview, confirming the lack of incentives to participate and the ability of participants to withdraw at any time without penalty.

Adhering to ethical guidelines is essential in qualitative research involving human subjects (Bromley et al., 2015; Robinson, 2014). Conducting research according to recommendations in the Belmont report is the minimum standard (Robinson, 2014; U.S. Department of Health and Human Services, 1979). To assure adequate ethical protection of participants in my study, I followed recommendations contained in the Belmont report,

refrained from conducting research until I received IRB approval, and adhered to the standards documented in the consent form. As evidence of my understanding of the content in the Belmont report, I completed the National Institutes of Health web-based training course, *Protecting Human Research Participants* certificate number 2264996. I received IRB approval number 05-17-18-0662854. As indicated in the consent form, I have not and will not share the identities of participants, nor any details that might identify the participants. To protect the identities of participants, I assigned each participant an alphanumeric code such as P1, P2, through P5. I coded the documents with generic names (e.g., Document 1) that do not include any information that readers could use to identify the organization or any individual within the organization. In the report for the study, I use the alphanumeric code rather than the participant's name and refer to documents with the generic names. I stored the study data on a password protected laptop until the study was complete. Upon completion of the study, I transferred the data to a password protected jump drive, placed the jump drive in a locked safe, and will store the jump drive in the locked safe for 5 years.

Data Collection Instruments

The researcher assumes the role of primary data collection instrument in case studies (Gaikwad, 2017; Yin, 2017). Using semistructured interviews with probes contributes to the validity of qualitative studies (Morse, 2015; Yin, 2017). In my case study, I was the primary data collection instrument, conducting semistructured interviews and reviewing company documentation in accordance with the interview protocol (see Appendix B). In each interview, I followed the steps of the interview protocol in

Appendix B. The interview protocol includes asking the eight open-ended interview questions listed in Section 1, probing for additional information as needed, and reviewing company documentation such as policies, process documents, or metrics reports. The company documents provided support for the information revealed in the interviews.

Tools such as interview protocols and member checking enhance the reliability and validity of the data collection process (Morse, 2015; Rosenthal, 2016). Member checking through transcription review allows interviewees to validate the transcribed data and, potentially, add additional information (Morse, 2015; Rosenthal, 2016). In addition to following the interview protocol consistently, I conducted member checking via transcription review and review of the study results. During the transcription review, interviewees validated the transcribed interview data, clarified some responses, and provided additional information. After completing data analysis, I sent each interviewee a summary of the findings of the study to review and validate my interpretation of the collected data.

Data Collection Technique

I collected data via semistructured interviews and the review of company documents such as policies, process documents, and metrics reports. Data collection did not include a pilot study. In semistructured interviews, researchers use a set of open-ended questions combined with probes to explore responses (Morse, 2015; Rosenthal, 2016). Qualitative researchers should follow an interview protocol to conduct all interviews in a consistent manner and collect data from more than one source to achieve triangulation (Baškarada, 2014; Rosenthal, 2016). For each interview, I followed the

interview protocol in Appendix B, including asking the eight interview questions in Section 1 and reviewing company documents. The interview protocol contains steps for conducting the interview, discussing member checking, and requesting access to company documents. By following the protocol, I ensured I conducted all interviews in a consistent manner and requested company documents for review. The review of company documentation fulfilled the requirement for triangulation.

There are advantages and disadvantages to collecting case study data through semistructured interviews and reviewing company documents. An advantage of using semistructured interviews is that the open-ended questions prompt participants to not only answer the question, but provide opinions and perspectives gained from experience (Baškarada, 2014; Rosenthal, 2016). Additionally, researchers can use probing questions to clarify information or further explore a theme (Gaikwad, 2017; Rosenthal, 2016). Combining interviews with document review is a method of triangulation that contributes to the reliability and validity of the study (Fusch & Ness, 2015). I asked the open-ended questions listed in Section 1 and used probing questions to clarify information or gather additional detail. The information in the company documents supported the data from the interviews.

One disadvantage of collecting data through interviews and reviewing company documents is the amount of time required (Gaikwad, 2017; Rosenthal, 2016). Researchers collecting data via interviews and document review must take time to (a) schedule and conduct multiple interviews, (b) transcribe audio recordings of the interviews, (c) read multiple company documents, and (d) conduct member checking to

confirm the interpretation of the collected data (Rosenthal, 2016). My strategy was to create a detailed plan that included adequate time to complete all the required steps: (a) scheduling and conducting interviews, (b) transcription, (c) document review, and (d) member checking. For member checking, I asked each participant to schedule an hour to review the interview transcript, confirm accuracy, and provide clarification or additional information, as needed. I also asked each participant to allow time to review a summary of the findings after I completed data analysis.

Data Organization Technique

Qualitative researchers can leverage a variety of tools and techniques to organize case study data. While collecting data, the researcher should categorize, label, and store the data for easy retrieval (Baškarada, 2014). Microsoft Excel and Nvivo are standard tools used by qualitative researchers for data organization, analysis, and reporting (Bree & Gallagher, 2016; Robins & Eisen, 2017). During my case study, I referred to each of my participants with an alphanumeric code such as P1 and referred to each document with a generic code such as Document 1. To keep my data organized, I created a folder for each participant labeled with the alphanumeric code and one folder for all the documents. As I collected data such as the consent form, audio recording, or transcription, I labeled each item with the alphanumeric participant code (e.g., P1 Consent Form) and stored it in that participant's folder. The documents folder contained all the documents, each labeled with a generic code such as Document 1. In preparation for data analysis, I copied the transcribed interview data and the data extracted from

company documents into an Excel spreadsheet with headings to identify the data (e.g., participant code, document code, question number, and response).

During the study, I stored electronic study data on a password protected laptop and physical data in a locked safe. After the study was complete, I transferred the electronic data to a password protected jump drive and deleted the data from my laptop. I will store the jump drive and physical data in a locked safe for 5 years. At the end of 5 years, I will delete the electronic data from the jump drive and shred the physical data.

Data Analysis

Defining the process and tools for data analysis is a critical step in planning a case study (Baškarada, 2014; Rosenthal, 2016). Typical data analysis processes for case studies include methodological triangulation, coding, and thematic analysis (Baškarada, 2014; Hoeber & Shaw, 2017). Methodological triangulation requires the use of more than one method to gather data (Fusch & Ness, 2015). I accomplished methodological triangulation by gathering data through conducting semistructured interviews and reviewing company documentation.

Yin (2017) recommended five stages of data analysis: (a) compiling, (b) disassembling, (c) reassembling, (d) interpreting, and (e) drawing conclusions. Compiling refers to collecting and organizing the data (Yin, 2017). Disassembling and reassembling includes separating the data into groups, identifying patterns or themes, and regrouping the data by themes (Yin, 2017). Interpreting involves associating the themes with existing research and the conceptual framework (Yin, 2017). Through interpretation, researchers draw conclusions about the information gathered in the study

(Yin, 2017). In my study, the data came from interviews and company documentation. I used Microsoft Excel as the primary tool during the five stages of data analysis. My literature review was a critical component when I was interpreting the data and drawing conclusions.

Microsoft Excel and Nvivo are common tools for data analysis in case studies (Bree & Gallagher, 2016; Robins & Eisen, 2017). Bree and Gallagher (2016) described a process to color code case study data and identify themes within an Excel workbook. I followed the process described by Bree and Gallagher. First, I copied the raw data from interview transcriptions and document reviews into an Excel workbook, using headings to identify the data (e.g., participant code, question number or document number, and response). After copying the raw data into a second tab of the Excel workbook, I began identifying themes and color coding the responses by theme. Next, I followed an iterative process to eliminate duplicate responses and further develop themes. Bree and Gallagher suggested that creating a new tab in the Excel workbook for each iteration of analysis provides a record of the analysis process and provides the researcher with the flexibility to go back to a previous step. For each iteration of the analysis, I copied the data into a new tab of the Excel workbook to create a record of the analysis process.

Thematic analysis of the data facilitates interpretation of current research in relation to existing research (Bree & Gallagher, 2016; Yin, 2017). When using the five stages of data analysis, researchers should consider the research question and think about how the collected data relates to the information in the literature review (Baškarada, 2014; Yin, 2017). Correlating themes from data analysis to other published studies and

the conceptual framework demonstrates alignment and rigor in qualitative research (Bree & Gallagher, 2016; Yin, 2017). As part of the five-stage data analysis process, I compiled the data from the interviews and company documentation and identified key themes through the iterative process of disassembly and reassembly. As I defined themes, I thought about the meaning of the data and interpreted the themes in relation to the SCM information in the literature review, Porter's value chain concept, and newly published SCM studies. Based on the data interpretation, I drew and reported my conclusions.

Reliability and Validity

Reliability and validity refer to the quality and rigor of the design, execution, and results of a research study (Fusch & Ness, 2015; Gaikwad, 2017). In qualitative research, reliability and validity are analogous with dependability, credibility, transferability, and confirmability (Gaikwad, 2017; Morse, 2015). Techniques qualitative researchers can employ to enhance reliability and validity include conducting member checking and ensuring data saturation (Fusch & Ness, 2015; Gaikwad, 2017). When conducting qualitative studies, researchers should employ techniques that contribute to the reliability and validity of the study.

Reliability

Reliability in qualitative research is equivalent to dependability or repeatability (Gaikwad, 2017; Morse, 2015). Triangulation and member checking are strategies that qualitative researchers use to enhance reliability or dependability (Fusch & Ness, 2015; Morse, 2015). Methodological triangulation involves using more than one method to

collect data (Fusch & Ness, 2015). Member checking involves participant review of transcribed or analyzed data (Gaikwad, 2017; Rosenthal, 2016). To enhance reliability in my study, I employed triangulation and member checking. I accomplished triangulation by gathering data from interviews and company documents such as policies, process documents, and metrics reports. To complete member checking, I had participants review the interview transcripts to confirm accuracy, clarify responses, and provide additional information. I also sent each interviewee a summary of the findings of the study to review and validate my interpretation of the collected data.

Validity

Validity in qualitative research is analogous with credibility, transferability, and confirmability (Morse, 2015; Rosenthal, 2016). Member checking and triangulation are strategies qualitative researchers use to improve both reliability and credibility in case studies (Morse, 2015; Rosenthal, 2016). Gathering rich data through appropriate sample size and providing thick descriptions of the study process contributes to transferability (Gaikwad, 2017; Morse, 2015). Triangulation and auditing to ensure the study findings align with the data analysis are strategies for enhancing confirmability (Morse, 2015; Yilmaz, 2013). I completed member checking by asking study participants to review the interview transcripts and a summary of the findings, thus contributing to the credibility of the study. By conducting interviews and reviewing company documentation, I demonstrated methodological triangulation, which enhances both credibility and confirmability.

To improve validity and transferability, I provided thorough descriptions of the study process and continued gathering data until I reached data saturation. Reaching data saturation affects the validity of the study (Fusch & Ness, 2015; Palinkas et al., 2015). Data saturation is the point when the researcher is collecting repetitive information with no new themes (Fusch & Ness, 2015; Morse et al., 2014). My strategy to achieve data saturation was to continue collecting data through interviews and review of company documentation until the data was repetitive and no new themes emerged. By providing rich and thorough descriptions of the study process, I enhanced the transferability of my research to future research efforts.

Researchers who employ strategies to enhance reliability and validity improve the quality and value of qualitative research. Reliability and validity are measures of quality in research studies. Dependability, credibility, transferability, and confirmability are terms used for reliability and validity in qualitative research. Triangulation, member checking, and data saturation are strategies for enhancing reliability and validity in case studies. The strategy for my study included (a) methodological triangulation using interviews and company document review, (b) member checking through review of the transcript and summary of the findings, and (c) ensuring data saturation by collecting data until the data was repetitive and no new themes emerged.

Transition and Summary

In Section 2, I discussed the design and execution of my research project. I selected a qualitative single case study to explore the strategies supply chain managers in the manufacturing industry use to consistently match the level of unsold inventory in the

supply chain with customer demand. As the primary data collection instrument, I was responsible for conducting ethical research and mitigating bias. I did not begin collecting data until I received IRB approval. After receiving IRB approval, I followed an interview protocol to gather data through interviews and the review of company documents. Microsoft Excel and thematic coding are the tools I used for data organization and analysis. To enhance the reliability and validity of my study, I used methodological triangulation, member checking, and data saturation.

In Section 3, I present the findings from my study, the application to professional practice, and the implications for social change. The findings include a discussion of the themes, analysis, and linkage of the findings to the literature and conceptual framework. Section 3 also contains my recommendations for action and further research. I close the section with reflections about my experience during this study and a concluding statement.

Section 3: Application to Professional Practice and Implications for Change

Introduction

The purpose of this qualitative single case study was to explore strategies supply chain managers in the manufacturing industry use to consistently match the level of unsold inventory in the supply chain with customer demand. Porter's (1985) value chain framework was the conceptual framework for this study. Using purposeful sampling and semistructured interviews, I gathered data from five supply chain managers employed by a global engine manufacturing company headquartered in the Midwestern United States. Each study participant provided answers to eight interview questions along with documentation related to the study topic.

My qualitative analysis of the data from the interviews and documentation resulted in four themes: (a) define policies and processes, (b) develop collaborative partnerships, (c) leverage technology, and (d) consider the end to end supply chain. At least four of the five participants offered responses associated with each theme and provided supporting documentation. The themes and supporting information represent strategies that experienced supply chain managers in the manufacturing industry have used to consistently match the level of unsold inventory in the supply chain with customer demand.

This section is a thematic presentation of the findings from my study, including discussions of its application to professional practice and implications for social change. My report of the findings encompasses a discussion of the themes, analysis, and linkage to both the existing literature and the conceptual framework. In this section, I also offer

my recommendations for action and further research. I then offer reflections about my experience during this study and close with a concluding statement.

Presentation of the Findings

The goal of this qualitative single case study was to answer the central research question: What strategies do supply chain managers in the manufacturing industry use to consistently match the level of unsold inventory in the supply chain with customer demand? Researchers use open-ended questions followed by probing questions in semistructured interviews to prompt participants to provide rich information that includes opinions and perspectives gained from experience (Gaikwad, 2017; Rosenthal, 2016). To achieve the goal of the study, I used semistructured interviews with open-ended questions and followed a defined interview protocol. I conducted interviews and gathered data until no new themes emerged and there was ample data for analysis.

Yin's (2017) five stages of qualitative data analysis were instrumental as I defined themes and drew conclusions from the data. Bree and Gallagher (2016) described a process to color code qualitative data and identify themes in an Excel workbook. Following the process described by Bree and Gallagher, I completed the five stages of data analysis as proscribed by Yin. The data analysis yielded four themes: (a) define policies and processes, (b) develop collaborative partnerships, (c) leverage technology, and (d) consider the end to end supply chain. Table 1 displays the number of participants and documents that support each theme.

Table 1

Count of Participants and Documents Supporting Each Theme

	Participants	Documents	Total
Theme 1	5	5	10
Theme 2	5	5	10
Theme 3	5	5	10
Theme 4	4	4	8

Theme 1: Define Policies and Processes

All five study participants mentioned the importance of defining policies and processes as part of their SCM strategy. Discount policies are one type of policy used in SCM strategy. Employing discount policies could mitigate the effects of demand uncertainty and contribute to long-term supply chain performance (Nie & Du, 2017). Supply chain managers write proactive discounts into contracts with supply chain partners and employ reactive discounts to reduce excess inventory. P4 discussed a volume discount program offered to a major customer and provided an example document. P1 discussed reactive discounts and stated, "We worked with marketing to do a lot of fire sales to give the customers a lot of discounts and burned a lot of excess inventory." P2 and P5 provided similar examples of using reactive discounts to dispose of excess inventory instead of scrapping the inventory. In these examples, proactive and reactive discount policies mitigated the impact of demand uncertainty for the organization and provided a benefit for the customers.

Developing efficient processes and reducing complexity are integral to successful SCM strategy. Supply chain managers leverage process improvement and process reengineering methods to reduce and manage complexity (Szmelter, 2017). P3 provided

an example of creating efficient processes and reducing complexity in a manufacturing plant. Using lean manufacturing and process reengineering methods in conjunction with Porter's value chain concept, the plant team created and implemented a process called engineering material flow (EMF). According to P3 and the information in the EMF value stream map document, EMF is a streamlined process to transport material from the warehouse and deliver it to the manufacturing line at the time and place the material is needed. P3 stated, "EMF makes things simpler and helps to completely match the inventory with what is being built and it makes the material lineside presentable. EMF makes us more efficient in our manufacturing." The EMF process resulted in increased efficiency by reducing material handling and optimizing inventory in a manufacturing warehouse and plant.

As their scope of influence expands from a few elements to many elements of the supply chain, supply chain managers leverage processes such as MEIO to optimize inventory and meet customer demand. One objective of MEIO is to allocate inventory across multiple echelons of the supply chain in a manner that minimizes cost while meeting customer demand (Fichtinger et al., 2017). P1 and P2 discussed using MEIO to ensure the distribution channel contains the right inventory to meet customer demand. P2 emphasized, "One can describe the problem has having too much or too little inventory. I think it is about having the right inventory on the shelf to serve or respond to our customers' demand." P1 elaborated on the idea of using MEIO to ensure the supply chain contains the right amount of inventory, "When you have the right inventory in the distribution channel, you don't have to have a lot of inventory. You still can fill the

customer demand." P4 and P5 asserted that MEIO includes reducing inventory in selected locations and increasing inventory in other locations to achieve optimal inventory levels. P5 discussed continuously adjusting the quantity and location of safety stock in the distribution channel to have the right inventory in the right place to meet customer demand. The participants' comments aligned with a company SCM strategy document in which two of the seven objectives referred to MEIO and inventory placement in the supply chain: "accelerate the implementation of MEIO," and "optimize the network by placing inventory to deliver on time to customers and with minimal handling."

Defining policies and processes is an integral part of creating and implementing SCM strategy and fits within Porter's (1985) value chain concept. One of the secondary functions in Porter's value chain model is *firm infrastructure*. Firm infrastructure includes functions such as general management or leadership that support the entire organization. As a secondary function that supports the organization, leaders define and implement SCM policies and processes to enhance supply chain effectiveness and create value for the organization. Accordingly, the leaders of the company in my study performed a secondary function in Porter's value chain model by defining and implementing proactive and reactive discount policies along with processes such as EMF and MEIO as part of an SCM strategy that supports the organization.

Theme 2: Develop Collaborative Partnerships

Developing collaborative partnerships enhances supply chain effectiveness and enables more consistent matching of inventory with customer demand. Datta (2017)

posited that supply chain managers could manage inventory effectively and achieve competitive advantage by using strategies that include information sharing and collaboration. P1 said, "Communication is the biggest part of strategy." All participants described communication and information sharing as foundational to building collaborative supply chain partnerships. P1 provided examples of the communication and planning processes used by the manufacturer and suppliers to increase forecasting accuracy and better match inventory with demand. One example was a structured monthly review process called sales, inventory, and operations planning (SIOP).

Structured communication and information sharing contribute to developing collaborative supply chain partnerships that facilitate matching inventory with customer demand. P1 described SIOP as a structured information sharing session between the distribution center, marketing, and the manufacturing plant to create a production plan that coordinated plant capacity with customer demand. The SIOP spreadsheet provided by P1 contained a responsibility matrix with specific milestones in the SIOP process and the person or group responsible for each milestone. The SIOP spreadsheet also contained 11 months of production, inventory, and customer order data which supported P1's assertion that the collaborative partnership created through the SIOP process resulted in a significant reduction of inventory and back orders. This collaborative partnership was an effective strategy to match inventory with customer demand.

Communication among supply chain partners contributes to the development of collaborative partnerships and enables supply chain performance that satisfies both customer expectations and business requirements. Supply chain capability to meet

customer demand improves when all parties in the supply chain collaborate (Venegas & Ventura, 2017). P3 stated, "Communication is everything," and emphasized that supply chain partners should communicate proactively using various modes of communication. To illustrate, P3 discussed regularly scheduled conference calls with suppliers to preempt having too much or too little inventory and emailing or calling customers to preempt issues with orders and delivery. All participants emphasized that SCM strategy should include staying connected to both the business and the customers and referred to a company SCM strategy document. In the SCM strategy document, the supply chain leader described "information sharing up and down the supply chain" as part of the future state of the supply chain. Developing collaborative partnerships through proactive communication and information sharing is part of the company strategy to create a customer-oriented supply chain and drive value for the business.

Leaders can use Porter's value chain concept to create value for the business by examining a value chain, determining which activities add value, and optimizing those activities (Koc & Bozdag, 2017). Supply chain leaders in this study determined that developing collaborative relationships added value to supply chain effectiveness and that improving communication and information sharing contributed to the development of collaborative relationships. To optimize communication and information sharing, the supply chain leaders implemented SIOP and added value by creating collaborative partnerships that resulted in reduced inventory and back orders. The SCM strategy document identified information sharing up and down the supply chain as an activity that adds value to supply chain performance. Following the SCM strategy document, supply

chain leaders built collaborative relationships through information sharing across the entire supply chain. These relationships resulted in more consistent matching of inventory to customer demand.

Theme 3: Leverage Technology

Supply chain managers can leverage various types of technology to enhance supply chain performance and improve consistency in matching inventory to customer demand. Implementing IT solutions as part of SCM strategy creates value for customers through improved delivery and reliability (Basole & Nowak, 2016; Witkowski, 2017). Each study participant discussed the importance of leveraging technology in the form of IT solutions as part of SCM strategy. The IT solutions ranged from relatively simple solutions such as RFID technology to more complex solutions such as warehouse management systems (WMS), material requirements planning (MRP) systems, and data analytics.

Tracking technologies like RFID provide supply chain managers with real-time supply chain data such as inventory quantity and location in the supply chain (Basole & Nowak, 2016; Witkowski, 2017). P1 and P4 discussed using RFID technology to track inventory in a warehouse and trigger replenishment in the manufacturing supply chain. P1 noted, "Warehouse workers use RFID scanners to track part numbers, quantity, and location of inventory, improving inventory accuracy." P4 described increasing efficiency in the replenishment cycle of the manufacturing supply chain by using RFID scanners. According to P4, sending electronic replenishment signals is more efficient than using manual replenishment signals such as Kanban totes. According to P1 and P4, work

instructions for material handlers in the warehouse and manufacturing plant include the use of RFID scanners. Metrics reports for four warehouses where material handlers use RFID technology showed inventory accuracy averaging above 99% month over month.

Implementing IT solutions such as WMS and MRP enhances supply chain agility. Successful leaders develop agile supply chains with the capability to respond quickly to changes in customer demand (Tarafdar & Qrunfleh, 2017). P4 described technology as "an enabler to help the business be more efficient and more controlled and capable with our processes." P3 discussed the benefits of using a WMS to track and report on inventory in a warehouse and stated, "The WMS really helps with matching inventory with customer demand." Similarly, P4 emphasized the role of an MRP in matching inventory with customer demand, noting, "The MRP is really doing an equation on supply and demand constantly and sending forecast signals to our suppliers." P2 agreed that IT systems enhanced supply chain agility to meet customer demand but emphasized that the various IT systems in the supply chain should be connected in a way that they could share information. The SCM strategy document includes implementing capable systems that share information up and down the supply chain.

IT solutions create large amounts of data that supply chain managers can leverage to improve supply chain performance. With appropriate analysis, supply chain managers could use big data to manage risk, increase efficiency in the supply chain and evolve from operations-focused supply chains into customer-centric supply chains (Singh et al., 2017; Witkowski, 2017). P4 discussed the importance of using data analytics to solve problems and manage risk: "If you think about potential problems with the product. We

need to spot that before it is a problem to the customer. Analytics is a great enabler in that." P1 provided an example of using supply chain modeling software to increase efficiency. After collecting data from the end customer, P1said, "The model gives us a recommendation to say how many units we needed to stock in each lane of the supply chain," P5 suggested, "If you analyze data to really understand what your customers need, when they are going to buy it, and what satisfies them, then you can set up a supply chain that matches that really well." The technology roadmap includes (a) ensuring every warehouse is equipped with RFID technology and a standard WMS, (b) implementing MRP systems that connect across the global supply chain, and (c) increasing the use of data analytics software to enhance supply chain effectiveness.

The strategy of leveraging technology to enhance supply chain performance aligns with Porter's (1985) value chain model. Technology development is one of the four secondary activities in Porter's value chain model and encompasses activities to develop and maintain all technologies used in the organization. The leaders of the subject organization developed a strategic technology roadmap to enhance supply chain performance. The roadmap includes maintaining and continuously improving some of the existing IT solutions such as RFID technology, WMS in warehouses, and MRP systems in manufacturing plants. The roadmap also includes developing the capability for the various systems to communicate and create a single data source, which will facilitate more robust use of data analytics.

Theme 4: Consider the End to End Supply Chain

As companies expand across the globe, supply chain leaders must eliminate barriers between functions and consider the end to end supply chain to remain competitive. SCM encompasses using innovative ideas to penetrate functional silos and optimize supply chain operations across the organization (Koc & Bozdag, 2017). To illustrate, P1 said, "You have to look at the whole picture for the business when developing supply chain strategy." P2 highlighted that leaders are beginning to understand the impact of considering the end to end supply chain and stated, "All of the functions in the supply chain from the engineers, to quality, to marketing, to the customer, it is all interconnected." According to P5, the company's global supply chain transformation is about bringing all the supply chain functions together and operating as an end to end supply chain instead of operating in silos. The SCM strategy document included a description of the supply chain transformation as "evolving the supply chain from *winning at the handoffs* to *winning together*."

Considering the end to end supply chain includes effectively managing global inventory and creating a customer driven supply chain. Managing inventory in a global company is a growing challenge for supply chain managers (Datta, 2017; Lee et al., 2017). Supply chain managers struggle to determine and maintain inventory levels that meet customer demand and minimize cost on a consistent basis (Tarafdar & Qrunfleh, 2017; Yao, 2017). P1 discussed the challenge of lack of visibility of global inventory due to various IT systems across the globe. P4 asserted that operating in silos caused inventory duplication across the globe. All participants agreed that the new supply chain

strategy addressed their concerns about global inventory management with new processes and technology solutions. P2 said, "When it comes down to the new supply chain strategy, we're starting to look at one company, winning together, and having one global inventory." In a video introducing the new supply chain strategy, the executive supply chain leader discussed the company's supply chain journey. The leader highlighted the successes the company had with the previous strategy of winning at the handoffs, such as building a strong foundation, producing cost savings, and developing functional capabilities. Further, the leader emphasized the importance of building on past success and evolving to an end to end supply chain, which includes integrating new capabilities that increase visibility to inventory around the world and contributes to the growth strategy for the company.

Understanding customer expectations and developing innovative ways to meet those expectations is fundamental to creating a customer driven supply chain. Customer expectations for efficient order fulfillment continue to increase because companies like Amazon can fulfill and deliver online customer orders within hours of order placement (Yao, 2017). To remain competitive in the global marketplace, leaders in all industries should focus SCM strategies on delivering to customer expectations and managing inventory levels (Datta, 2017). P1 and P2 discussed the importance of gathering and analyzing information from customers to understand their requirements. P2 provided an example: "For example, in Europe we have a voice of the customer questionnaire and we are conducting interviews with the customers to understand their needs and expectations working with our company." According to P4 and P5, the key is to know your customer

and stay current on their buying preferences. P5 elaborated, "If you understand the cadence and how they are buying, the speed, the timing, the strength, the lulls, then you can make your supply chain work to meet that. You know what I mean? The customer rules." An internal company web portal contains voice of the customer questionnaire templates along with recommendations for analyzing and periodically refreshing the data. Through the SCM strategy document and the video introducing the new SCM strategy, the executive supply chain director highlighted the vision of the supply chain transformation; "Enabling profitable growth and driving customer value through a seamless, end to end, market driven supply chain."

With Porter's (1985) value chain model, leaders look across the organization and distinguish activities that add value from those that do not add value. Leaders then take action to enhance activities that add value and eliminate activities that do not add value. Following Porter's value chain concept, the supply chain leaders in my study considered the end to end supply chain and identified activities that add value. Two of the activities that added value were managing global inventory and creating a customer driven supply chain. The leaders created a supply chain transformation strategy that contained processes and IT solutions to improve the management of global inventory and ensure leaders developed the supply chain based on customer requirements.

Applications to Professional Practice

The goal of this study was to identify strategies some supply chain managers in the manufacturing industry use to consistently match unsold inventory in the supply chain with customer demand. The results of this study are significant to professional practice

because the findings include SCM strategies used by supply chain leaders in the current business environment to enhance supply chain performance. New supply chain leaders or leaders seeking to improve supply chain performance may be able to use the information presented in this study to develop strategic plans and transform their supply chain, thereby increasing company profitability. Supply chain leaders in the manufacturing industry may not be successful without intentional focus on the four themes identified in this study: (a) define policies and processes, (b) develop collaborative partnerships, (c) leverage technology, and (d) consider the end to end supply chain.

Each theme supports supply chain leaders seeking to improve supply chain performance. Defining policies and processes creates the foundation for building the supply chain strategy. Developing collaborative partnerships engages all stakeholders. Leveraging technology highlights the importance of automation, data analysis, and information sharing in the current business environment. Finally, considering the end to end supply chain encompasses global inventory management and creating a customer driven supply chain.

Current supply chain leaders in the manufacturing industry may find some of these strategies useful for enhancing supply chain performance and company profitability. The four themes provided best practices for improving consistency in matching inventory with customer demand in the current business environment of the manufacturing industry. This information may fill gaps in knowledge about effective supply chain strategies in the manufacturing industry.

Implications for Social Change

Exploring strategies to improve supply chain performance in matching unsold inventory with customer demand has implications for positive social change. The results of this study could help some supply chain leaders in the manufacturing industry improve supply chain performance to meet customer demand better, support business growth, and stimulate job creation, thereby contributing to economic stability and improved social conditions. By consistently delivering products that satisfy market demand, organizational leaders build a sustainable business where individuals and the community can benefit from stable employment opportunities, and consumers can benefit from a reliable supply of products that meet their needs.

Improved delivery of manufactured goods to meet business and consumer needs across the globe may contribute to business success, consumer satisfaction, economic stability, and enhanced social conditions. Successful businesses offer the potential for enhanced employment opportunities for individuals in local communities. Satisfied consumers may remain in communities with stable employment and contribute to community growth and economic stability. Furthermore, thriving businesses and employed community members provide governments with revenues in the form of taxes, which government officials can use to develop programs to enhance social and economic inclusion, thereby improving the social condition for individuals, organizations, and the community.

Recommendations for Action

As a supply chain professional, I see the broad impact a successful global supply chain can have and plan to share my study findings. The results of this study provide supply chain leaders with themes that can be used to create or enhance supply chain strategy and performance. Specifically, leveraging the themes facilitates improved matching of unsold inventory in the supply chain to customer demand. Improving matching of unsold inventory to customer demand may promote business growth, enhance customer satisfaction, and contribute to company profitability.

New supply chain leaders and leaders of companies with underperforming supply chains, especially those leaders who are creating or refreshing supply chain strategies, could benefit from the study findings. The participants in my study created and implemented successful supply chain strategies incorporating four themes: (a) define policies and processes, (b) develop collaborative partnerships, (c) leverage technology, and (d) consider the end to end supply chain. I recommend that supply chain leaders align their strategies with the four identified themes. My goal is to share my findings with supply chain and manufacturing industry professionals when networking and through publication in professional journals such as *Supply Chain Management* or *International Journal of Logistics Management*.

Recommendations for Further Research

The findings from this study include strategies that supply chain managers in the manufacturing industry use to match unsold inventory in the supply chain to customer demand. The data were from supply chain managers in one global manufacturing

company headquartered in the Midwestern United States. I recommend other researchers reproduce this study with a different population. For example, the target population could be from a different geographical region, from multiple companies, or from an industry other than manufacturing. Conducting the study with a different population could provide clarity on the transferability of study results.

Future studies elaborating on one or more of the themes from this study may identify more specific ideas for creating and implementing successful SCM strategies. One recommendation is to explore strategies supply chain managers use to develop collaborative partnerships that improve supply chain performance. Conducting a quantitative study to examine the impact of various technology solutions on supply chain efficiency might yield interesting findings. Additionally, further exploration into the meaning and complexity of considering the end to end supply chain in SCM strategies could generate insights for supply chain leaders who are expanding supply chains across regional and global borders.

Reflections

Completing this doctoral journey has been one of the most significant challenges of my life. I began working on my DBA with limited knowledge of the rigor and discipline required to complete the journey. My goals were to learn more about SCM strategy, hone my researching skills, and finish in a reasonable amount of time. The rigor, discipline, and hours required to complete the journey were significant, but contributed to the sense of accomplishment and amount of prestige associated with the

degree. Moreover, the rigor of the process ensured that I executed the case study in an ethical and unbiased manner.

I am proud to say that I achieved my goals and more. Through the conduct of this study, I expanded my knowledge of SCM strategies and honed my researching skills beyond my expectations. Additionally, I completed my journey in a timeframe that I considered reasonable. One unexpected outcome from my DBA journey was an enhanced appreciation for affecting social change through research and knowledge sharing.

Conclusion

The purpose of this qualitative single case study was to explore strategies supply chain managers in the manufacturing industry use to consistently match the level of unsold inventory in the supply chain with customer demand. I used purposeful sampling to identify potential study participants and gathered data through semistructured interviews with five experienced supply chain managers from one manufacturing company. Each participant provided documentation that I used for triangulation. To further enhance reliability, I employed member checking. Data analysis yielded four themes: (a) define policies and processes, (b) develop collaborative partnerships, (c) leverage technology, and (d) consider the end to end supply chain.

Each theme supports supply chain leaders seeking to create strategies to improve supply chain performance and may contribute to improved business practice and positive social change. Creating and implementing SCM strategies that incorporate the themes could facilitate improved matching of unsold inventory in the supply chain to customer

demand and may contribute to business growth, consumer satisfaction, economic stability, and enhanced social conditions. Growing businesses offer the potential for stable employment and consumer satisfaction in local communities. Successful businesses, individuals with stable employment, and satisfied consumers may remain in communities, spending their time and money to contribute to community growth and economic stability. Furthermore, thriving businesses and employed community members provide governments with revenues in the form of taxes, which government officials can use to develop programs to enhance social and economic inclusion, thereby improving the social condition for individuals, organizations, and the community.

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Appendix A: Permission Email

Permission to use visual representation of Michael Porter's value chain.

From: Nadella, Bhanuteja <bnadella@hbs.edu>
Sent: Thursday, July 27, 2017 9:29:26 AM
To: Marcia S. Falks
Cc: Hogue, Jill
Subject: RE: Permission to use value chain model in doctoral study

Hi Marcia,

Thanks for the information and citation. Please proceed to use the visual representation along with the citation as mentioned below.

Thanks,

Bhanu

From: Marcia S. Falks [mailto:marcia.falks@waldenu.edu]
Sent: Wednesday, July 26, 2017 7:54 PM
To: Nadella, Bhanuteja <bnadella@hbs.edu>
Subject: Re: Permission to use value chain model in doctoral study

Hi Bhanu,

Thank you for your response.

This is the visual representation I would like to use.

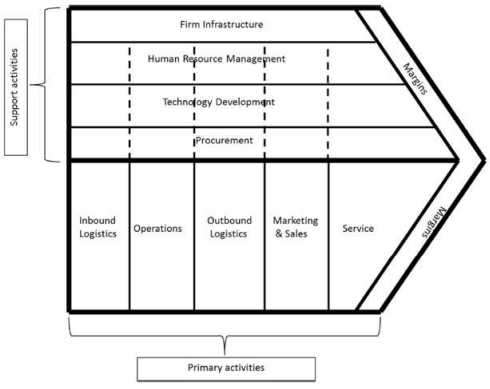

Figure 1. A generic value chain representing one company. From *Competitive Advantage: Creating and Sustaining Superior Performance* (p. 37), by M. Porter, 1985, New York, NY: The Free Press. Reprinted with permission.

From: Nadella, Bhanuteja <bnadella@hbs.edu>
Sent: Wednesday, July 26, 2017 4:55 PM
To: Marcia S. Falks
Subject: RE: Permission to use value chain model in doctoral study

Hi Marcia,

Thanks for your email. I am Bhanu, and I work for Prof. Porter. Can you please send me a copy of the visual representation and citation that you are using?

Regards,
Bhanu.

-----Original Message-----
From: marcia.falks@waldenu.edu [mailto:marcia.falks@waldenu.edu]
Sent: Tuesday, July 25, 2017 3:48 PM
To: Institute of Competitive Strategy <isc@hbs.edu>
Subject: Permission to use value chain model in doctoral study

Professor Porter,
My name is Marcia Falks. I am a doctoral candidate enrolled at Walden University. In my doctoral study, I am exploring strategies supply chain managers use to match the level of unsold inventory in the supply chain to customer demand.

I selected your value chain framework as the conceptual framework for my study. To support my choice, I would like to include a visual representation of the value chain model in my study. Specifically, I would like to use a copy of the generic value chain on page 37 of your book titled Competitive Advantage: Creating and Sustaining Superior Performance.

Since there is a copyright on the book, I am seeking your permission to include the image in my study.

Thank you for your consideration.

Marcia Falks

Appendix B: Interview Protocol

1. Send each participant a calendar invitation for the agreed date and time. Include location, Skype link, or telephone number in the invitation.
2. Send a reminder to each participant the day before the interview.
3. Begin with an introduction and greeting to establish rapport, restate the purpose of the research, and review consent form that participant confirmed via email.
4. Request permission to record the interview.
5. Start the audio recording device.
6. State the overarching research question.
7. Using a semistructured interview format, ask the eight interview questions. Include interview probes, as needed.
8. Request access to documents such as policies, process documents, or metrics reports.
9. At the end of the interview, stop the audio recording device.
10. Discuss member checking with participant.
11. Thank the participant and reiterate contact details for follow up questions or concerns.