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MASTER OF SCIENCE IN INTEGRATED SUPPLY CHAIN MANAGEMENT

By

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Abstract

The overall supply chain management field including the purchasing profession has been evolving over the past century. Many aspects have influenced and shaped the supply management landscape such as technology, social, geopolitical, manufacturing, and environmental changes. This paper will discuss the evolution of the supply chain management field in the United States of America as understanding the past may help predict the future of the supply chain management discipline. The practitioners in the field have morphed from a clerical role decades ago to a strategic functional group with dynamic capabilities that are critical to modern-day business practices and recognized by senior management as a key contributor to the success of an organization.
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Introduction

From a hypothetical perspective, where do you envision a hungry office worker would go to find a free donut, a slice of pizza, or other tasty morsels on any given day at businesses across the country? A likely answer is the purchasing, procurement, materials management, or other comparable supply chain management organization within a business. When I started my career as a buyer for a laboratory equipment manufacturer in 1995 that was the situation. For some, this reputation along with other historical business practice variables has fueled a negative image of the supply chain management field.

Unfortunately, on several occasions in the past, I have witnessed cross-functional representatives within an organization expressing their opinion about the ‘purchasing department’ and describing the function as a tactical team made up of workers that lacked formal education, had basic skills and abilities, and could easily be influenced/manipulated by savvy suppliers. This is one example of a supply chain management discipline that has evolved and is now often viewed as a critical and strategic function within a business.

Dating back to the turn of the 20th century, purchasing practices along with most of the supply chain management (SCM) field was primarily viewed as a necessity but noncritical function within a business. Many senior managers did not recognize the significance and potential of the SCM organization’s ability to provide the business with a competitive advantage in the marketplace. SCM roots started as a manual and labor-intensive process, however, today SCM is a highly developed discipline that involves extraordinarily complex global networks that include elements such as integrated purchasing strategy, supplier relationship management, logistics synchronization, value chain management, and many other critical roles/contributions within a business (Wisner & Tan, 2000).
Purpose of the Study

This research paper will identify and discuss factors that helped influence and shape the SCM field and primarily will focus on purchasing management and related subjects. The evolution of technologies, manufacturing practices, geopolitical dynamics, business practice transformations, logistics, social influence, and environmental initiatives are the key areas that will be examined.

In modern times, “purchasing being considered highly strategic is more linked to the possibility to ensure the security of supply and to the value creation and the constitution of a sustainable competitive advantage” (Poissonnier, 2017). In addition, enhanced SCM practices allow for greater flexibility in Lean manufacturing systems that facilitate a high degree of customization and quick response time based on consumer preferences (Carter & Narasimhan, 1996). These examples of SCM evolution along with many others will offer the reader more insight into the history and evolution of the SCM profession and may help predict future SCM transformation as the speed and frequency of change within the industry is currently unprecedented.

Literature Review

The Technology Revolution

Leading up to the 1960’s the majority of all SCM transactions, documentation, and information exchanges were done manually via written or verbal communication. By the mid-1960’s, the computer technology revolution emerged and opened the door to a tremendous opportunity for innovations in SCM and was a paradigm shift within the profession. A notable milestone in 1967 was IBM’s release of the first computerized inventory management and forecasting system (“The history and evolution,” n.d.). During the spawn of the computer age, information sharing, and strategic supply relationships were not considered as companies viewed the technology advancements as a competitive advantage in the marketplace and did not want to
take the risk (Tan, 2002). Data generated by computerization led to many innovations in areas such as warehousing and distribution, manufacturing, transportation, inventory optimization, and sourcing (“The history of Supply,” 2018).

In the 1970s, Material Requirements Planning (MRP) software was developed (Tan, 2002). The utilization of MRP introduced new materials management, sourcing, and manufacturing concepts that introduced vast improvements in planning, manufacturing cycle times, inventory management, product quality, new product development, and on-time customer deliveries (Tan, 2002). MRP’s core foundation also fueled the development and expansion of fundamental manufacturing processes and roles such as the master production scheduling, planning, bill of material management, and inventory database utilization (Krajewski, Malhotra, & Ritzman, 2016).

“In the 1960’s, computers were large and immobile, and in order to make use of information stored in any one computer, one had to either travel to the site of the computer or have magnetic computer tapes sent through the conventional postal system” (“A brief history of the internet,” n.d.). According to Van Weele & Van Raaij (2014), the introduction of IBM’s Personal Computer (PC) in 1982 spawned the emergence, innovation, and widespread use of personal computer technology that revolutionized SCM. PCs allowed SCM to use new software technologies that enabled unprecedented strides within the trade and since the 1980s, computer technology has advanced at a phenomenal rate (“The evolution and history,” 2015).

The introduction of the Internet revolutionized the SCM industry and introduced unprecedented capabilities. The initial development of the Internet foundation traces to cold war military experiments dating back to the early 1960’s. As Internet technology evolved,
various computer networks across the globe did not have a standard way to communicate with each other’s networks. The birthday of the Internet is recognized on January 1, 1983, this is when a universal computer language became available and facilitated worldwide connections ("A brief history of the internet," n.d.). Johnson (2020) highlighted several notable SCM Internet-based advancements that have significantly influenced the SCM field. These SCM tools include cloud computing, electronic procurement systems, electronic data interchange, Internet-based online auctions, Internet-based catalogs, Internet web browsers, search engines, and electronic commerce.

The introduction of the internet has yielded a platform to support many aspects of SCM. The speed of communication capabilities has fundamentally changed the way we think about information sharing ("The evolution and history," 2015). In addition, the evolution and proliferation of mobile devices such as smartphones provide SCM practitioners with real-time access to information and data on a 24/7 basis. These mobile tools offer flexible solutions and remote work opportunities that support work-life balance (Johnson, 2020).

In the 1990s, Enterprise Resource Planning (ERP) systems surfaced and by the year 2000, nearly all major corporations and companies utilized ERP systems ("The history of Supply," 2018). ERP software centralizes and automates business functions and enables businesses to use the software to manage many SCM processes (Krajewski, Malhotra, & Ritzman, 2016). An example of an ERP function is to establish plans and define due dates for components and purchased materials over a range of time. ERP is designed to manage dependent demand inventory and schedule replenishment orders (Krajewski, Malhotra, & Ritzman, 2016).
Other technology advancements such as barcoding, radio frequency identification (RFID), and countless software programs presented the SCM field technology advancements that offered tremendous value and with the ever-changing technological advancements, it will be difficult to predict what the future will look like (Johnson, 2020).

**Organization Recognition**

In the late 1920s, the introduction of assembly lines and mass production established the foundation for SCM practices (“A short history of supply,” 2019). For many years, SCM was considered a subdiscipline of manufacturing and operations management (Van Weele & Van Raaij, 2014). For decades, SCM’s traditional role was primarily focused on material acquisition and cost reduction initiatives, via negotiation and pursuit of competitive sourcing (Van Weele & Van Raaij, 2014). The concept of SCM began to emerge as manufacturers experimented with strategic partnerships (Tan, 2001).

Herberling (1993) suggested SCM is more important when management views its role in terms other than simply obtaining materials at low prices. Business leaders began to take note that external supplier relationships can be leveraged as a competitive advantage in the marketplace (Van Weele & Van Raaij, 2014). Furthermore, senior management started to recognize and acknowledge SCM as a strategic role with equality when compared to other cross-functional teams (Brandon-Jones, & Knoppen, 2018). As the evolution continued, increased outsourcing of business activities triggered firms to start to become aware that the SCM function should have a significant role in corporate strategic planning (Herberling, 1993). By the 1990’s, organizations further expanded SCM best practices by allowing the function to mobilize and manage supplier capabilities via strategic supply chain relationships (Tan, 2002).
The recognition of the significance and importance of the SCM function has introduced more SCM involvement in areas such as long-range strategic planning, new product development, and business process enhancement (Brandon-Jones, & Knoppen, 2018). The modern-day SCM profession has developed into a functional domain of strategic relevance (Van Weele & Van Raaij, 2014).

**Manufacturing Influence**

Over time manufacturing process changes have helped shape the SCM function. The following is an example of the adoption of Just-In-Time (JIT) manufacturing in response to intense global competition that triggered world-class organizations to manufacture low-cost, high-quality products with greater design flexibility (Tan, 2001). The JIT manufacturing approach involves a fast-paced manufacturing environment with little inventory buffer and required SCM to develop a supply base that could support the new production process. JIT manufacturing organizations quickly began to realize the potential benefit and importance of strategic and cooperative buyer-supplier relationships (Tan, 2001).

Another manufacturing strategy led companies to identify and improve upon their manufacturing core competencies while outsourcing their non-core competencies to suppliers (Van Weele & Van Raaij, 2014). The outsourcing initiatives had a major influence on SCM strategies, and processes and introduced many new sourcing variables including offshoring. McLymont, (2004) suggested, “offshoring helps companies remain competitive in the global marketplace, holds down consumer prices, and ultimately preserves American jobs by keeping companies afloat” (p.3). The following process summary is an example of SCM methodology that was developed and utilized for the identification of services that should be reviewed for offshoring consideration…. *analysis, sourcing, negotiation and contracting, implementation, measurement, and management* (Tate & Ellram, 2009). An
SCM response to offshoring was nearshoring when possible. Nearshoring advantages include the potential for shorter lead times, similar time zones, limited language barriers, and cultural differences allowing for less complex and more efficient sourcing relationships (Page, Deme, & Nodoushani, 2010).

**Globalization**

Globalization and economic openness have contributed to a significant need to increase international sourcing in the 21st century (Tu & Chih, 2011). Businesses in the U.S. and other regions across the world started to understand that was a distinct competitive advantage by collaborating with overseas suppliers that have higher capabilities and lower cost structures (Kotabe, Murray, & Mol, 2008). McLymont (2004) stated, “There is no U.S. corporation that would not prefer to keep things closer to home, but [globalization] is a new reality. It makes no sense economically or logistically to source any other way but internationally” (p.4). Many firms adopted this sourcing disposition in response to globalization, which in turn, accelerated the need for the SCM field to quickly expand their knowledge and processes in areas such as logistics, inventory management, and foreign business practices (Kotabe, Murray, & Mol, 2008).

In mid-1980, the first wave of globalization that affected the SCM process was in the manufacturing sector (Kotabe et al., 2008). Large manufacturing began to use suppliers from many countries across the globe and by doing so, introduced more sourcing complexity. Low-cost regions such as China presented more competition in the market but also presented more vulnerable supply chains when compared to domestic sourcing approaches (Kotabe et al., 2008).
Kurniawan & Zailani (2010) summarized several elements of globalization and suggested that globalization creates unforeseen demand and far-reaching supply chain sourcing opportunities; however, the international context has added the complexity of this network to make it more vulnerable to disruptions. Business environments have become so dynamic as well as supply chain development into more efficient structures tends to exacerbate the impact of supply chain risks. The development and the subsequent implementation of global supply sources may provide improved product quality and greater product flexibility. The effectiveness of a supply chain mitigation strategy that provides a greater ability to respond to volatile circumstances is utmost of importance (p. 4).

**Geopolitical Dynamics**

Military conflicts and economic recessions, dating to 1832 had an influence and helped develop and evolve SCM practices over time (Van Weele & Van Raaij, 2014). In 1915, World War I had a major economic impact on the U.S. economy as demand for materials increased and the costs of war surged. SCM’s response to the wartime supply chain disruptions that included a reduction of the Europe supply base and material price inflation elevated the SCM’s contributions to a mainstream audience within the public and private sectors of the United States (Leenders & Fearron, 2008).

In the 1930-40’s, the Great Depression introduced SCM advancements in “governmental purchasing, performance measurement, purchasing education, legislation and the scope of supply functions” (Leenders, & Fearron, 2008, P.20) The postwar World War II era and the beginning of the Cold War was characterized by strong technology
development and increased demand for consumer products that further expanded and developed the SCM profession (Van Weele & Van Raaij, 2014).

Events such as the global financial crisis and subsequent economic recession that started in mid-2007 introduced different SCM risks, exposed supply chain vulnerabilities, and prompted the creation of new SCM strategies such as increased awareness of monitoring the financial condition of the suppliers (Kurniawan & Zailani 2010). More recent examples such as USA–China trade war and related import tariffs and the global pandemic have drastically impacted long-standing SCM processes and strategies. These events yielded widespread and unplanned supply and demand factors and rapid price inflation. Economies across the globe sporadically shut down for weeks and quickly introduced unprecedented supply chain disruptions and the impacts on the SCM profession have yet to be fully understood (Handfield, Graham, & Burns, 2020).

**Logistics**

Logistics manages and implements the material flow process as a complete system with SCM. Activities include the movement of inbound, outbound, internal, and external shipments along with the storage of goods, and services between the origin and destination point (Johnson, 2020). A notable logistic milestone that introduced many new opportunities and processes to SCM was the introduction of pallets in 1925. Shipments now could be consolidated on a pallet and much more efficiently, handled, shipped, and stored in warehousing (“The history and evolution,” n.d.).

During the 1950’s and 1960’s, the development and proliferation of the intermodal shipping container helped revolutionize the SCM industry. The containers increased the movement and efficiency of shipments via multiple modes of transportation including ships, trains, and trucks. In addition, containerization optimized shipping space, reduced dunnage,
improved company profit margins, and perhaps most notably, helped enable global sourcing ("The history and evolution," n.d.).

**Social and Cultural**

Over the past several decades, consumers and businesses have become more aware and involved with ethical sourcing practices and related social responsibilities such as diversity (minority and small business) and human rights (Carter & Ellram, 2003). Purchasing and Corporate Social Responsibility have influenced the SCM practices, policies, and initiatives surrounding a variety of social responsibilities such as gender and racial workplace diversity, business effects on the natural environment, philanthropy, human rights, community, and safety in the workplace. SCM must contend with and address a perception from some firms that socially responsible programs can lead to increased costs and reduced profitability (Carter, 2004). Handfield, Graham, & Burns (2020) described the following observation concerning the relationship between low cost, offshore sourcing, and potential related social responsibility violations

Intelligent executives realize there is a reason why the price or cost is so low in a country, and this is ultimately reflected in the equation of total cost, which includes the cost of poor quality, late delivery, impact to the brand, supply chain disruptions and other impacts such as the cost of unsafe and inhumane working conditions, which is being regulated by national governments (P.8)

From a cultural perspective, SCM has had to take into consideration and adapt to diverse cultures across the globe from a supplier selection perspective. SCM’s understanding of different ethnic and cultural aspects will help SCM adjust strategies when conducting business in these different regions of the world. Examples of some cultural
attributes of interest to SCM include religion, gender, language, class, ethnicity, knowledge, beliefs, art, laws, morals, and customs (Tu & Chih, 2011). Not surprisingly, cultural attributes tend to be the greatest obstacle to productive cross-border or region collaboration and need to be well understood before entering a new business relationship (Guiso et al., 2006). Furthermore, as increased globalization unfolds, SCM organizations have realized a lack of understanding of the cultural differences can significantly impact SCM’s ability to conduct business with cultures across the globe (Tu & Chih, 2011).

**Environmental**

SCM vulnerability due to severe weather such as earthquakes/tsunamis, hurricanes/typhoons, drought, and floods have become more and more common in today's highly integrated supply chains and has introduced SCM variables that warrant new strategies, contingency plans, supply chain designs, and a heightened awareness of climate change effects. A relatively recent example of a natural disaster that disrupted global supply chains was the Great Tohoku Earthquake and Tsunami that devastated the northeast coast of Japan (Canis, 2011). This event opened the eyes of companies across the globe and highlighted the importance of SCM mitigation strategies to address future comparable environmental-related disasters (Kurniawan & Zailani, 2010).

Climate change may become one of the most significant and impactful SCM evolutionary events over the entire SCM history. Decarbonizing the supply chain as a climate change mitigation effort is becoming a priority for businesses across the globe (Dasaklis & Pappis, 2013). Examples of SCM strategies in response to climate change include requiring new and existing suppliers to have carbon management and Green House Gas (GHG) emission reduction management plans (Dasaklis & Pappis, 2013). Handfield,
Graham, & Burns (2020) indicated “supply chain designs are evolving, focusing less exclusively on profit and low landed cost and more on other metrics such as sustainability, lower working capital, lean production, resiliency, low emissions, and better risk-recovery strategies” (p.7).

In the face of changing environmental conditions, rapid SCM adaptation, actions, accumulation of new skills, capabilities, and strategies toward the threats and opportunities associated with climate change should provide a universally positive perspective about the overall SCM profession for many years into the future (Brandon-Jones, & Knoppen, 2018).

**Methodology**

The primary research approach and organization involved qualitative methods that allowed me to explore, analyze, interpret, observe, and extract secondary information and data from reliable and scholarly sources. Qualitative research techniques utilized include Thematic, Narrative, and Content Analysis. Examples of applied reference material include case studies, international and domestic journals, academic textbooks, scholarly publications, and business articles retrieved from the Internet. No data collection, experiments, interviews, or surveys were conducted for this seminar paper, however, some of the secondary research/reference material did include this research methodology (including quantitative analysis) in their original work.

The research material evaluated, includes SCM evolutionary elements dating back from the late 1800’s to the present time. In addition, the research material encompassed a diverse range of SCM subject matter that had a direct influence on SCM practices and helped shape the modern SCM discipline. The principal research objective was to identify, analyze, validate, and consolidate key SCM evolutionary events. In turn, thematically related content was organized
into eight subheadings in the literature review. Important historical SCM evolutionary milestones within the subheading categories were documented in chronological order.

Additional seminar paper content was derived from my past learning/prior knowledge gained from other Integrated Supply Chain Management course content and professional training from organizations such as Institute for Supply Management, Association for Supply Chain Management (previously known as APICS), and the American Society for Quality. Furthermore, I also reflected on my twenty-five-plus years of SCM work-related experience that involved a first-hand account of several SCM evolutionary events addressed in the literature review.

Conclusion

The primary intent of this seminar paper was to capture significant historical SCM evolutionary events that directly influenced and transformed the SCM profession. There have been enormous changes that have affected how we source, manufacture, and transport goods. This history brings us to the present, and continued transformation of the SCM field ("The evolution and history," 2015).

Significant SCM transformations have been attributed to periods of intense business, political, cultural, and environmental upheaval such as military conflicts, raw material supply shortages, inflation, intense competition, natural disasters, and climate change (Herberling, 1993). In addition, the movement toward globalization along with rapid and vast technological advances has shifted the SCM field from clerical duties to a key strategic function within organizations. Evidence of this strategic role can be seen in the increasing value placed on SCM by senior management and recognition of SCM equality compared to other organizational functions (Brandon-Jones, & Knoppen, 2018). SCM is now viewed as a mainstream value-adding process that is “strategic” to an organization’s success (Cousins, Lawson, & Squire,
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2006). SCM has evolved and grown in strategic posture and this evolution requires the SCM function to develop new skills and quickly adapt to the ever-changing global supply chains (Ellram, & Carr, 1994).

SCM practices have reacted to emerging patterns in how material moves through the supply chains (Handfield, Graham, & Burns, 2020) and SCM learned to identify, embrace, and optimize important variables such as value versus price, the total cost of ownership, supplier relations, talent management, supply risks, corporate social and environmental responsibility, ethics, and standardization (Leenders & Fearon, 2008). Additionally, SCM has migrated to a more data-driven, network-driven, and collaborative supply chain ecosystem that presents real value and development within the discipline (“The evolution and history,” 2015).

Over the past 20-plus years, globalization has dominated SCM practices fueled by the relentless pursuit of the “lowest landed cost” goods and services. The pandemic and other geopolitical events have revealed a myriad of strained, extended, or broken supply chains on a global scale and launched the SCM profession into daily mainstream media. These unprecedented and ongoing supply chain disruptions have opened the eyes of many world leaders and business executives across the globe to the hard realization of being overly dependent on extended global supply networks.

Examples of recent global events that have dramatically affected SCM practices include the ongoing pandemic, Russia’s invasion of Ukraine, raw material supply, manufacturing capacity and workforce constraints, China’s global economic superpower status, increased logistics complexity, climate change/environmental events, global inflation, and the resurgence of political trade tariffs have upended the global supply chain. In response, many businesses have accelerated the phenomenon of “reshoring” also known
as “onshoring” which is the practice of reversing “offshored” business operations or sourcing and returning to the company's original country or region of the world. All these variables have introduced instability and volatility to global supply chains and may yield new and chaotic “de-globalization” of the global economy (Handfield, Graham, & Burns, 2020).

A few notable observations and learnings I have gained from this seminar paper include the understanding that SCM evolution will likely continue at an accelerated pace. Also, during unstable geopolitical times, SCM practices and strategies may be far more unpredictable and lastly, history indicates past major world events have significantly contributed to SCM evolutionary advancements. Recognizing and understanding key historic SCM evolutionary aspects will not only assist today's supply management professionals and academics in current practices and theories in context but also aid in predicting the future of SCM (Leenders & Fearron, 2008).
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