EXAMINING CHINA’S SMALL AND MEDIUM-SIZED ENTERPRISES IN SUPPLY CHAIN MANAGEMENT

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This study examined supply chain management (SCM) for small and medium-sized enterprises (SMEs) in China. It first described the characteristics of the supply chain and its changes, challenges, and competition in both domestic and global markets for China’s SMEs. The study used the qualitative survey research method to interview twenty individuals working in China’s SMEs among diverse industries. The results indicated that (a) China’s SMEs had struggled with the cost and suitability when using information systems in supply chain management, (b) China’s SMEs had not found an effective measure to avoid or reduce supply chain risks, and (c) China’s SMEs cautiously welcomed globalization but also pointed out globalization brought uncertainty and challenges.

Keywords: supply chain management (SCM), small to medium-sized enterprises (SMEs), information system, supply chain risks, technology innovation, Industry 4.0, globalization.

INTRODUCTION

The 2020 United Nations Trade and Development Report (2021) shows that China’s exports of goods in 2019 increased by about 4%. The report predicted that the global economy would grow by 4.7% in 2021, of which the Chinese economy would grow by 8.1% (United Nations Conference on Trade and Development, 2021). According to the 2021 China Business Climate Survey Report, from January to February 2021, China’s total import and export value of goods traded was 5.44 trillion yuan, an increase of 32.2% over the same period in 2020 (AmCham China, 2021). China has become the largest trading partner of more than 120 countries and regions, including the United States, the European Union, Japan, and India (AmCham China, 2021). Small and medium-sized enterprises (SMEs) contributed 46.6% to the total value of China’s foreign trade in 2020, which increased by 3.9% from 2019 (China General Administration of Customs, 2021) and accounted for 99.8% of total registered businesses (National Bureau of Statistics of China, 2019). Thus, SMEs are increasingly important in China’s economy (Liu, 2008).

From a global perspective, SMEs comprised 90% of businesses and 50% of employment in 2020 (World Bank, 2021). According to the World Bank, 600 million new jobs will be created by
2030 to absorb the growing global workforce, making the development of SMEs a high priority for many governments worldwide. SMEs are the backbone of an economy, whether the economy is that of a random state or global (Robu, 2013). However, when comparing them to large firms, it is more difficult for SMEs to survive and develop because SMEs may not compete directly against large firms due to their limited resources (Cooper et al., 1986). Further, large firms can control small suppliers (Hong & Jeong, 2006) through large orders or equity investing. The average survival rate of SMEs in China is 2.9 years (Fang, 2016). In the U.S., about one-third of SMEs cannot survive longer than two years, and about half cannot survive more than five years (Small Business Administration, 2012). China’s SMEs can improve their survival rate by studying their supply chain, exploring strategies to compete with large firms, and inspiring strategic supply chain management thinking, leading to practical application for SMEs. This study examines the current status of supply chain management (SCM) from the perspective of 15 executives in SMEs across eight industries and five provinces in China. The report argues for future reforms and development in China’s supply chain management SMEs.

Businesses are facing new challenges in SCM today. For instance, the COVID-19 pandemic challenges conventional wisdom related to the resiliency and agility of the supply chains in healthcare and many other industries (Francis et al., 2021). The shortage of medical masks and other daily necessities in 2020 has been etched in people's memories worldwide and has further underlined the importance of SCM. SCM is a set of approaches utilized to effectively integrate suppliers, manufacturers, logistics, and customers to improve individual companies' long-term performance and the supply chain as a whole (Chopra & Meindl, 2001). A supply chain generally has three characteristics: (a) a network structure, (b) it is mainly consumer-driven, and (c) it is a value-added chain of activities (Huang, 2020). SMEs play vital roles in SCM as they produce value-creating activities (Hong & Jeong, 2006). However, many SCM studies only focus on large firms, while small firms are not treated (Chopra & Meindl, 2001). Therefore, more research is needed to study SCM in the context of SMEs (Hong & Jeong, 2006).

According to the Organization of Economic Cooperation and Development (2005), small and medium-sized enterprises (SMEs) are non-subsidiary and independent firms. The import and export trade in China belongs to the wholesale and retail industry (Standardization Administration of China, 2017). Based on China’s SME Classification Standards (Chinese Ministry of Industry and Information Technology, 2011), firms with fewer than 200 employees in the wholesale industry and 300 employees in the retail industry are SMEs. In this study, SMEs are those with less than 300 employees.

The supply chain network is composed of nodes. The traditional supply chain nodes include suppliers, manufacturers, and retailers (Huang, 2020). A broad definition of supply chain nodes contains all elements within the network, such as the raw material producers, processors, packagers, distributors, retailers, transporters, and so on. The various nodes within the supply chain are increasingly incorporating data systems to an unprecedented degree (Maras, 2016).

Compared to large enterprises, SMEs lack sufficient operational capabilities. Due to scale and resource limitations, it is difficult for SMEs to address internal and external changes. Therefore,
SMEs must optimize their SCM processes to achieve competitiveness. This study examined the SCM challenges to small and medium-sized Chinese businesses in terms of strategies to compete with larger enterprises.

The central question concerns Chinese SMEs' challenges and opportunities in supply chain development, accompanied by three subsidiary questions: (a) Will SCM technological innovation change the operational mode of China's SMEs?, (b) How can China's SMEs best deal with supply chain risks?, and (c) How does globalization impact SCM in China's SMEs?

**LITERATURE REVIEW**

Industry innovation and technological change impact the supply chain. History indicates we have entered our fourth industrial revolution, labeled Industry 4.0 (Szozda, 2017; See Figure 1), highlighting technology's influence on economic activities. The creation of new information and communication technologies indicates a circular economy, where resources are recycled to achieve maximum value (Cwiklicki & Wojnarowaska, 2020).

![Figure 1. Industrial Revolutions – Historical Overview](image)


Industry 4.0 was introduced in Germany in 2011, with more than 60 related technologies (Pfohl et al., 2015), triggering a manufacturing revolution including production, transportation, and inventory control (Simanavičienė & Besagirskaitė, 2019). Internet of Things (IoT) technology in SCM increases the performance and relationships between all supply chain participants while facilitating data capture, transmission, and analysis (Georgescu & Ibanescu, 2020). Szozda (2017) concluded that Industry 4.0 is familiar to contemporary companies and impacts the organization of physical and information flows in various parts of the supply chain, such as manufacturing, distribution, and procurement.

Simanavičienė and Besagirskaitė (2019) present the structure of current production systems and the fundamental concepts of Industry 4.0, including modular and efficient production systems. The vision is to realize the same economic benefits for individual production in small series as mass manufacturing. Factory 4.0, also named the Smart Factory, is the production module under the concept of Industry 4.0 which covers three possible archetypes: a) fully automated, b) mass personalization, and c) e–factories that focus both on individualization and remote operations (Szozda, 2017). Industry 4.0 Smart Factories are collaborative cyber-physical systems
representing the future form of industrial networks (Ivanov et al., 2019). Smart Logistics and Smart Factory will significantly impact the supply chain structure as all activities become digitalized (Pfohl et al., 2015).

The Prospects of Industry 4.0

Industry 4.0 will replace the entire manufacturing system, from organizational structures to products, services, and business models. Digitalization's continual application and development will keep growing and extend to every aspect of the industry (Simanavičienė & Besagirskaitė, 2019). Georgescu and Ibanescu (2020) concluded (a) a positive relationship between the size of the firm and the adoption of IoT technology in supply chain management, (b) a positive relationship between the financial resources of the company and the adoption of IoT technology in supply chain management, (c) a positive relationship between new product advantage and the adoption of IoT technology in supply chain management, and (d) a positive relationship between the return on investment rate targeted by the firm and the adoption of IoT technology in supply chain management.

To gain the potential benefits of Industry 4.0, managers must consider digitalization an opportunity to transform their business models due to societal expectations, requiring production plants to adopt a circular economy model (Cwiklicki & Wojnarowaska, 2020). The circular economy is renewable and closed. It comprises closed supply chains that maximize value during the whole product life circle (Hetman et al., 2019).

Technological improvements causing disruptive innovations are changing the pattern of many industries and their business models. The most significant impact of Industry 4.0 innovations are procurement, production, and distribution innovations in the supply chain. Structural and organizational changes are expected mainly in manufacturing processes (Pfohl et al., 2015). Further, in this context, the business model focuses on the entire ecosystem, including supply chains, rather than on a single company. In turn, all participants improve their processes to maximize benefits for the final consumer (Szozda, 2017).

Industry 4.0 Changes Consumer Behavior

The application of Industry 4.0 to SCM includes distribution channel development. The omnichannel is where managers assess the vertical and horizontal distribution channel intersections between producers and consumers (Cummins et al., 2016). The customer determines when and how they want a product delivered. It is essential to meet their needs and provide a uniform experience during the purchase, return, or complaint related to the product (Szozda, 2017). Acquiring true customer loyalty is much more complicated than giving them instant satisfaction. Customer service is another critical component of the existence of a manufacturing company (Simanavičienė & Besagirskaitė, 2019). The supply chain must accommodate change because it one of the most important tools to service customers.

Technology evolution changes consumer behaviors and expectations, which requires firms to adjust their service concept. Oláh et al. (2018) indicate that “servitization” is an instrument of
differentiation that creates new opportunities in growing markets. Servitization is the transition process to continuously innovate services and add value to core products. It also builds barriers to competition because it requires a comprehensive understanding of the differentiated demand customers bring to the service providers. The rapid changes in service experience accompanying Industry 4.0 are wide-ranging to meet customer demands.

The purchasing habits of the contemporary consumer differ significantly from those previously experienced. With the proliferation of the Internet and changing consumer behavior, expectations for timely response and product delivery are magnified. The “timely effective” requires faster global supply chain solutions and promotes the need for highly developed supply and distribution logistics (Oláh et al., 2018).

**Technological Innovation Causes Market Re-allocation**

New technology will change the role of the enterprise in global value chains (GVCs) (Siddivò, 2017). Upgrading technology, knowledge, and skills equates to economic upgrading and motivates firms to change their business model and management style to benefit. For example, firms can significantly reconstruct GVCs by enhancing regional supply chains and retail networks (Gereffi & Lee, 2016).

Technological innovation provides alternative markets where rising firms compete with global firms on better terms, either with more local knowledge or models uniquely suited to developing country markets (Lee & Gereffi, 2015). However, these competitions requiring technology and sustainability investments can increase the burden on SMEs. For example, the Chinese government’s industrial plans aim to upgrade national industry at or beyond the “advanced level” of developed countries. This approach risks marginalizing domestic firms, especially SMEs in the market and within GVCs, and could polarize firms in manufacturing industries (Siddivò, 2017).

**The Unknowns and Limitations of Industry 4.0**

Business models and related supply chain functions are not fully developed during start-up. More research is needed to show how SMEs can adopt Industry 4.0 technologies and identify the most relevant and profitable digitalization technologies (Simanavičienė & Besagirskaitė, 2019). Organizations must discover the relevant links between circular economies and Industry 4.0 (Cwiklicki & Wojnarowska, 2020).

Industry 4.0 is developing in manifold ways and unexplored markets (Szozda, 2017). While inquiry to date is preliminary, a primary forecast shows changing supply chains and increasingly individualized products to meet the purchaser's tastes (Szozda, 2017). New elements, concepts, and problems will continuously appear and affect the trend of future supply chain ecology and behaviors of enterprises. By putting industrial development into a globalized economic environment, the changes brought by Industry 4.0 will be opportunities or threats depending on the firm’s response. As innovative technologies impact an industry’s value chain, managers must employ the essential digitization, networking, automation, mechanization, and miniaturization methods (Simanavičienė & Besagirskaitė, 2019).
SMEs’ Challenges and Risks

Technological development brings opportunities, challenges, and changes to the supply chain (Georgescu & Ibanescu, 2020). Simanavičienė and Besagirskaitė (2019) suggest that firms unable to acquire knowledge and catch up to the technologies, nor invest themselves in those projects, will likely lose the competitive advantage and transformation opportunities, thus yielding adverse outcomes. The risk of many firms being marginalized in the market or within GVCs is of greater importance since leading firms will benefit from new technologies (Siddivò, 2017).

Financial risks. Supply chain finance becomes one of the primary ways for SMEs to obtain loans with looser constraints, for core enterprises to improve cash flow, and for financial institutions to reduce possible risks. The prediction models of SMEs' credit risk in supply chain finance are essential for financial institutions to improve supply chain cash flow, reduce possible overall supply chain risks, and make correct credit loan decisions (Zhu et al., 2017).

A financial crisis is one of the primary reasons that firms lose control of their capital, contributing to the breakdown of supply chains (Li, 2020). The smaller the firm, the fewer resources it typically controls, making it more vulnerable to internal and external events, such as critical employee staffing, declining financing options, or reducing demand due to competition (Eggers, 2020). SMEs wanting to control financial risks must establish a comprehensive financial risk management system and constantly improve their strength and risk-response ability. The sustainable development of small-medium enterprises is inseparable from effective risk response strategies, especially effective control of financial risks (Li, 2020).

Social crises. Many pandemic-induced realities make supply chain planning challenging (Oleksy, 2020). Compared with large enterprises, SMEs have disadvantages in dealing with social crisis risks (Eggers, 2020). For example, business was seriously affected after the World Health Organization (WHO) issued stringent advice to international travelers in 2003 and 2013 due to the outbreaks of SARS and H7N9 in China (Qiu et al., 2018). Crises and disasters can create undue resource availability and liquidity problems for SMEs as consumers reduce spending and financiers guard their investment activity (Egger, 2020).

A small change in retail demand can unduly impact the supply chain. For example, the 2020 COVID-19 state of emergency in the United States yielded dramatic national shortages of daily necessities such as toilet paper. Anxious buyers who stockpiled supplies created product shortages (Boone & Ganeshan, 2021). Products with uncertain demand require additional inventories, spare capacity, and suppliers built for speed, all of which are expensive to execute (Fischer, 1997). According to a survey of more than 5,800 SMEs (Bartik et al., 2020), about 41.3% of small businesses reported being temporarily closed because of COVID-19, with 1.8% permanently closed.

The risk of nodes failure. In the generation and development of the supply chain network, nodes and links failure will cause changes in the supply chain structure and reduce the efficiency
of the supply chain. New nodes, such as distributors and transfer stations, frequently join the network while some old nodes exit. Risks originate at one supply chain node and create a "ripple effect," amplifying impacts across the network (Ojha et al., 2018). SMEs lack the advantages of larger enterprises that can establish multiple node risk prevention networks like backup supplier lists. Therefore, the risk of node failure more fundamentally impacts SMEs and their supply chains.

The direction of global goods flows, and the growth of nodes in trading networks significantly impact the development of logistics hubs. For example, due to the effects of globalization and localization, where a product or service is global while also serving local markets, consumer behavior changes and expectations significantly influence new technology solutions (Oláh et al., 2018). SMEs can manage supply chain disruption risk by protecting and splitting key nodes. To find the critical nodes in a supply chain network, SMEs must measure their importance and the strength of their interconnections (Ma et al., 2014).

### Competition and Cooperation in Global Market

**Forming alliances.** Firms in different markets and countries have different perceptions. For example, Slovak SMEs are more aware of the Industry 4.0 implementation than Polish SMEs (Snieška et al., 2020). Globalization has created opportunities for smaller companies to form alliances with other small companies, allowing them to gain access to skills from different countries and develop synergies to achieve competitive benefits.

SMEs do not have the global market and resource advantages of large companies. Research (Giovannetti et al., 2015) indicates that small firms outside of a supply chain are less likely to export than SMEs participating in a supply chain. Although globalization has disadvantages for SMEs, it has created opportunities for smaller companies to form alliances, allowing them to gain access to skills from other countries and develop synergies for competitive benefits (Popescu, 2019). Ilan et al. (2019) provided a marketing integration solution for SMEs by studying the New Silk Road between China and Europe. The New Silk Road initiative encompasses various topics, including policy, infrastructure and facilities, trade, finance and investment, research and development, and cultural communication. Ilan et al. (2019) argue that European SMEs and Chinese importers should create closer collaboration, expand their relationship beyond SCM, and integrate their marketing efforts for mutual benefit. Chinese importers should expand their role from a traditional supply chain partner to an essential marketing partner through closer integration with European manufacturing SMEs.

**Market differences.** Globalization and increased regional economic integration have intensified competition in both domestic and international markets and triggered new models of global business (Asian Development Bank Institute, 2016). Fujita and Thisse (2006) indicate that globalization goes hand-in-hand with lower costs in trade between countries and communication between headquarters and plants. Although the integration process might first lead to the agglomeration of more plants in the core, it eventually triggers the relocation of plants into the periphery because once trade and communication costs have decreased sufficiently, the wage differential effect becomes predominant. Survey results indicated that many SMEs first set up
companies or factories in coastal cities because of the convenient transportation. However, due to the difference in human resource costs in cities and towns, they have gradually relocated labor-intensive factories to third- and fourth-tier cities. Milovanović et al. (2017) also suggested that globalization is an opportunity to reduce costs in the supply chain as it encourages competition between suppliers that can offer the best materials at advantageous prices. Researchers also believe that globalization significantly reduces transport costs by designing products that allow fuller capacity utilization of transport equipment.

**Globalization Triggers Industrial Development.** Ongoing globalization is causing substantial changes in today’s global economic situation and forcing manufacturing companies to develop and change (Simanavičienė & Besagirskaitė, 2019). On the one hand, globalization should provide a nearly endless choice to individuals, which would lead to economic homogenization. The modern accelerator of the globalization of financial processes is the social environment of innovation accompanied by incentives for self-development, reproduction, generation of innovative ideas, and production of new technologies, goods, and services (Hetman et al., 2019). On the other hand, it should provide globally oriented companies with a chance to increase economies of scale (Milovanović et al., 2017). One primary example is the case of “Made in China 2025.” Once new technologies have spread in Chinese economic, institutional, and social life, they will significantly influence the restructuring of the manufacturing industry, changing China’s current position as “the world factory” (Siddivò, 2017). Smaller firms have also benefited greatly from the technology generated by the globalization of market segments (Popescu, 2019). In a rapidly changing international context, new opportunities emerge for small firms specializing in the supply chains' different phases (Giovannetti et al., 2015). For example, research concludes that firms can profit more by using the supply chain cooperative strategy (Chen & Su, 2021). The cooperative strategy is the supply chain strategy, where complementary products are sold through all channels.

**Globalization brings changes to SMEs.** Globalization also provides new technological innovation solutions for SMEs. For example, it is possible to realize profit performance improvement of the two parties in a “hybrid-channel” supply chain and the whole system by optimizing decision-making parameters (Zhu et al., 2017). Globalization also brings changes to SMEs' production models. Globalization of market economic system, trade globalization, and globalization of production and enterprises pose competition in time and efficiency challenges while yielding opportunities for contemporary enterprise development. SMEs can achieve chained alliance cooperation through “horizontal integration” to realize the goal of effective integration of internal and external enterprise resources (Zhu et al., 2017). For companies to compete, their supply chain must be cost-efficient, responsive, flexible, and agile while enabling customers to get the right products in quantity at the right time and place. Companies must become part of global supply chains to operate in the modern environment successfully. Control of global supply chains rests on the constant commitment of managers to optimize their activities and processes (Milovanović et al., 2017).
METHODOLOGY

This study uses qualitative survey data from supply chain managers in a sample of China SMEs. The respondents included 15 managers with specialist-level supply chain experience who were pre-screened for their qualifications and willingness to participate. Among those, five had more than ten years of related experience, and nine had five or more years of experience. The position titles included CEO, COO, VP, general manager, procurement director, production manager, sales manager, foreign trade agent, account manager, assistant manager, customs broker, and quality control specialist. The sample represents eight different industries: (a) clothing, (b) footwear, (c) sporting goods, (d) kitchenware, (e) furniture, (f) electronics, (g) toys, and (h) party supplies. To ensure broad representation, no more than 30% of the participants came from the same industry. Finally, each participant’s company had no more than 200 employees to ensure a SME classification.

A 30-question survey collected demographic questions and short answers to open-ended questions. The questions focused on (a) the organization’s characteristics, (b) supply chain operation expectations, (c) market status, and (d) supply chain challenges, including technology, production, and finance. Additional questions solicited opinions on supply chain future trends.

Analysis and Findings

Max Qualitative Data Analysis (MAXQDA) was employed to form codes and categories for analysis. The analysis yielded three themes: (a) operational tools, (b) solving problems, and (c) international markets, while some general findings suggest the following:

1. Cost is one of the major concerns when SMEs select ERP systems for managing the supply chain.
2. Chinese SMEs were still highly dependent on manually monitoring the operation and production processes.
3. Although extending business into foreign markets was not new to SMEs, globalization still has barriers and threats.

Theme one: Operational tools. The results indicated that most SMEs wish to obtain a cost-effective ERP system for supply chain management. Within the SMEs, meetings were the primary way for the teams to ensure accurate information communication. The results also detected that the SMEs could barely collect and analyze data from operation and production.

Under the first theme, the questions were designed to study China’s SMEs’ equipment, system, or business operations methods, including communication, production, and logistics. For example, one question asked the participants what equipment or system their company currently uses to support supply chain operations. Ten responded that they use professional supply chain software or other specific systems designed by their IT department. The last five participants said they use other essential software such as Microsoft Office or WPS Office free version. Among all those who use professional supply chain software, only one participant’s company used Chinese-
designed supply chain software, meaning all other companies used foreign software to operate their supply chain. The questionnaire also asked what features the participants wanted the software to have. The result focused on the ability to share data within the organization (ERP) and the cost of the system (Table 1).

**TABLE 1**
The Ideal features of the Supply Chain System

<table>
<thead>
<tr>
<th>Ideal Features</th>
<th>Frequency Mentioned</th>
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<tbody>
<tr>
<td>A better ERP System</td>
<td>6</td>
</tr>
<tr>
<td>Lower Cost</td>
<td>6</td>
</tr>
<tr>
<td>No Idea / Good with the Current Software</td>
<td>3</td>
</tr>
</tbody>
</table>

The questionnaire asked the SME participants to estimate their annual budget for using and maintaining the supply chain system software. Ten participants provided numbers (including two who reported zero), and the other five did not know the information (see Figure 2). The average annual spending was 72,500 Chinese Yuan, about $11,260, based on the exchange rate in September 2021.

![Figure 2. Average Annual Cost of Using and Maintaining the System](image)

In addition to the system operations, the study also investigated the different aspects the SMEs needed to ensure all information was received and processed accurately and on time. The most frequent answers were teamwork, accountability, and communication. For example, one of the participant's (P) responses was: "I think the information sender and receiver need to communicate effectively to ensure the detail of the information is sufficient (P1, 2021)."
Operational meetings such as cross-department meetings, weekly meetings, and team meetings were used in sharing and processing information internally within the companies. "We have a production meeting every morning to make sure we have all the accurate information about the production of the day," a participant who was the production manager of a sports shoe company responded (P2, 2021). The designated person-responsible method is a system widely used by SMEs to ensure the accuracy of information. Seven of the participants mentioned that they had employees such as account managers, customer service agents, and department managers in charge of the accuracy and effectiveness of communication. The research also assessed how SMEs collect and analyze data from operations and production. However, none of the participants provided useful answers. Eleven replied that their company did not collect data from the process, and the other four did not know what information was collected.

**Theme two: solving problems.** The results suggested that the supply chain in many Chinese SMEs relies heavily on manual management, which made the availability of professional personnel critical to the business's success. In China, SMEs focused on whether the candidate has the relevant working experience, academic qualifications, and English communication skills when recruiting supply chain management personnel. When a problem occurred in the supply chain, most companies had mature countermeasures so customers could get usable products as soon as possible. However, these measures could not fundamentally solve the supply chain problems to prevent these problems from recurring.

The second section of the research questionnaire examines the challenges and risks that China's SMEs face and how those were resolved. The survey first asked about the steps involved in the entire supply chain operation and how those steps were monitored and managed. According to the information received, a conventional supply chain process consists of nine steps: sales, accounting, confirmation, raw material, production, inspection, warehousing, transportation, and completion (Figure 4). Based on the product's features and the sales agreement, some orders may require more or fewer steps. For example, one of the participants mentioned tooling in the response. Thus, the typical process might not suit all businesses and products.

Among all responses, 13 indicated that specified employees or operational teams managed the supply chain steps manually. Two replies showed that the actions were monitored automatically by the system. The questionnaire also collected information about the supply chain team (SCT) and the company's recruitment requirements. Twelve participants provided the total number of employees in their SCT. The average size of SCT was 35 people (Figure 5). Since the average size of the sample companies was 93 people, the SCT accounts for 37.6% of the company's total headcount.
Figure 4. The General Supply Chain Process

Figure 5. Number of Employees in the SCT
Work experience, academic qualifications, and language skills were the most critical requirements of employers. Four SME firms required at least an associate’s degree, and five wanted employees with a bachelor’s. Although only two participants mentioned the requirement of English skills in business communication, a person who earned a college degree in China usually has a certain level of English skills since passing the English level test is one of the necessary conditions for obtaining a college degree. Therefore, most recruiters sought candidates with basic English knowledge, while some wanted advanced English skills. Eight firms required work experience.

The next category considered the procedures used to solve problems in order processing. The questionnaire first inquired about the firms’ solutions when their suppliers cannot fulfill the products on time. The most frequent answer (nine responses) was looking for substitute suppliers. For example, one reply mentioned, "We will have to find substitutes from other suppliers, sometimes at a higher cost, to keep the promise to our customers (P3, 2021)." Other solutions included (a) searching for existing inventory (four responses), (b) following the contract (four responses), and (c) working with the vendor (three responses).

When a company failed to deliver products on time, communicating with the customer (seven cases), offering discounts or substitute products (seven cases), and rushing production (three cases) were the common reactions to resolve the problem. Most of the replies mentioned talking to the customer, letting the customer know the situation, and asking if the customer has a plan B, or working out a solution to overcome the difficulty together.

The research also examined the average lead time for regular and rush orders. The results show the average lead time for regular orders is seven weeks. The data indicates products in different industries have significant differences in production cycles. Other factors such as transportation methods, season, payment terms, and inspection standards would also affect the lead time (see Figure 6).

![Figure 6. Regular Production Cycle Lead Times by Company](image-url)
Ten of the participants’ companies had procedures to deal with a rush order, and five of them did not accept rush orders. When a company received a rush order, it assigned responsibility to a production manager. The primary differences between a regular order and a rush order are in Table 2.

**TABLE 2**

<table>
<thead>
<tr>
<th>Regular Order</th>
<th>Rush Order</th>
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<tbody>
<tr>
<td>Production based on the regular schedule</td>
<td>Schedule changes to accommodate production</td>
</tr>
<tr>
<td>Regular working hours and production speed</td>
<td>Overtime work or increased production speed</td>
</tr>
<tr>
<td>No extra cost</td>
<td>Extra cost</td>
</tr>
</tbody>
</table>

The companies that did not accept rush orders provided other solutions. For example, one of the solutions was to ship a partial order so the customer could have a portion of the product earlier. Some also mentioned searching for existing inventory or similar products for rush needs. The last category of this theme was to determine the popularity of supply chain finance products among SMEs. Only one participant replied that their company had experience in supply chain finance, which indicated the concept is not yet popular among SMEs in China.

**Theme three: International markets.** The results show that most of the SMEs had experience in foreign markets. Globalization brought opportunities such as reduced costs and more partners to Chinese SMEs. It also brought potential risks and threats, including solid competition, strange environments, and decreased revenue, among other issues. Four companies had one to five years of partnership experience with overseas firms, five with five to ten years of experience, and three with more than ten years of experience. Only three companies had no business partners overseas (see Figure 7).

![Figure 7. Companies Years of Experience with Overseas Partners](image-url)
Although eight surveyed SMEs focused primarily on the domestic market, five were in foreign markets. Data showed that China's SMEs' major foreign markets were Southeast Asia, South and North America, Europe, and Africa (see Figure 8).

![Figure 8. SMES in Major Overseas Markets by Region](image)

The results indicate that SMEs have competitors in foreign markets. Compared with the competitors, China's SMEs claimed advantages in supreme quality, customer service, competitive price, complete product series, and lead time flexibility. For example, one of the respondents stated their biggest advantage is lead time flexibility and customer service, accompanied by product quality driven by the highest standard in the industry (P4, 2021). The questionnaire also determined the participants' opinions on globalization. Table 3 summarizes their comments about globalization.

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower cost</td>
<td>Decreased revenue</td>
</tr>
<tr>
<td>More partners</td>
<td>Strong competition</td>
</tr>
<tr>
<td>More choices and a larger market</td>
<td>Unstable environment</td>
</tr>
<tr>
<td>Improves the logistics process</td>
<td>Increased risk</td>
</tr>
</tbody>
</table>

Some participants claimed that globalization would create a bigger market, allowing the company to find more business partners and opportunities. For example, one participant wrote, "With economic integration and globalization, competition between industries increases. Supply chain integration is an inevitable product of competition. As a result, the overall supply chain cost is expected to be reduced (P5, 2021)." However, some participants raised opposite opinions. For example, one participant wrote, "globalization means more choice and bigger market. But at the
same time, we will have more competitors and risk (P6, 2021).” They expressed concerned that globalization would force the companies to reduce the price of their product to attract customers, as the customers would have more choices.

For the next decade, nine participant companies planned to extend the business into a new market, while the other six planned to remain in their current markets. When asked what other markets they might consider, five companies indicated China and another five North America for their expansion options. The remaining firms considered Europe, the Middle East, or were undecided.

Globalization encourages businesses to discover and enter foreign markets. However, SMEs had real concerns about doing business in new countries or developing partnerships with foreign companies. According to the responses, the top three concerns were culture shock, language barriers, and reliability. Firms across different countries had to cooperate closely in many aspects of the supply chain to generate a new and smooth supply chain network. For example, one of the participants mentioned that sometimes customers reported issues without sufficient explanations.

**General improvements.** Lastly, the participants indicated what aspects of their company’s supply chain operation they wanted to improve. The most frequent replies were to improve the system and process (5 SMEs), human capital (5 SMEs), and lead time (4 SMEs). Three firms suggested costs and two communication as improvement targets. The system and process refer to the tools and operational methods used in supply chain management. Human capital reflects the degree of supply chain specialization experience. These results suggest that China’s SMEs should increase their systems, processes, and personnel investments.

**Respondent demographics.** A total of 15 respondents from eight different industries participated in this study and supplied demographic information. The participants included four males and 11 females. Respondents ages ranged from 25 to 56 years. Six were younger than 30, four were in their 30s, and another four were in their 40s. Among all participants, 40% (6 managers) had less than five years of experience in supply chain management, 80% (12 managers) had less than 15 years of experience, and 20% (three managers) had more than 15 years of experience. Six participants held associate degrees, another six had bachelor's degrees, and the last three had master's degrees.

Figure 9 shows four companies had fewer than 50 full-time employees, seven companies had more than 50 but less than 100 full-time employees, and three companies had more than 100 but fewer than 200 full-time employees. One company had more than 200 full-time employees. Most companies had fewer than 100 full-time employees, and the average number was 93. All companies were located on the southeast coast of China in the following five provinces: Shandong, Jiangsu, Zhejiang, Fujian, and Guangdong.
Utilizing Information Technology in SCM

Information technology plays a vital role in supply chain management. Szozda (2017) states it influences the organization of physical and information flows in each section of supply chains. The results confirm Georgescu and Ibanescu's (2020) point that technology increases overall SCM performance. However, China's SMEs face difficulties choosing and utilizing technology in the supply chain operation. As the participants revealed, high cost is one of the critical issues hindering the adoption of supply chain software such as an ERP system. According to the participants' experience, adapting a supply chain system requires long-term continuous investment, including annual consulting, training, and maintenance fees. Each additional system function will also pressure the company financially as many are priced separately.

A reliable supply chain system impacts all supply chain nodes. The operation of enterprises requires synergy among accounting, procurement, demand planning, and warehouse management systems. An effective system must integrate all modules to communicate and share data. In addition, an ideal supply chain system exchanges data with external units, such as suppliers, distributors, sales platforms, logistics, and third-party warehouses. A smooth information flow will reduce supply chain costs and improve enterprise operating efficiency. However, the participants in this study indicate that few systems can "talk" with other systems. They also reveal that China's SMEs do not have many localized choices, especially when they want to connect with overseas business partners, because most supply chain systems are designed for large, multinational, or Western companies. While globalization provides new technological innovation solutions for SMEs (Zhu et al., 2017), it also reveals deficiencies in Chinese SMEs’ supply chain technology. These issues are worth attention because China's SMEs comprise a significant market with excellent potential and opportunities. According to Statista (Slotta, 2021), the market size of the systems in the manufacturing industry in China will increase from $1,200 billion to $2,250 billion.
from 2018 to 2023. Designing supply chain systems to accommodate SMEs ensures software producers can expand their market in China to achieve a win-win situation.

**Team Cooperation in SME Supply Chains**

The participants frequently mentioned cross-team cooperation when discussing their organizations' business management. In a traditional operating model, cross-team collaboration is confined within the firm. For example, finance and human resources departments must determine employees' working performance to calculate their salaries and bonuses. Sales and marketing departments must create strategies to achieve sales goals and growth targets. The operation and purchasing teams must work together to forecast inventory levels and budgets. Effective supply chain management requires extending organization unit cross-team collaboration to relationships between supply chain nodes. Industry 4.0 involves collaboration to comprehensively analyze data and information using new technologies such as IoT, big data, cyber-physical systems, and additive manufacturing to achieve the goals of smooth operation, high efficiency, and reduced costs (Cwiklicki & Wojnarowaska, 2020). For example, factories can use big data and market sales trend analysis to predict the purchase plan of raw materials. Suppliers use market trends and production rhythms to help customers manage inventory and logistics, strengthening the concept of "servitization" (Oláh et al., 2018). When SMEs cannot take advantage of economies of scale to compete with large enterprises in terms of quantity and market share, they can use "servitization" and the advantages of flexibility in the supply chain to provide customers with more personalized services.

**Opportunities and Threats of Globalization in Supply Chain Management**

Most participants in this study agree with Popescu’s (2019) position that globalization has created opportunities for SMEs to compete with supply chains and create synergies for competitive benefits. The development of modern supply chains provides enormous benefits and opportunities for SMEs. Due to improved transportation tools, logistics equipment, and supply chain services, SMEs are closer to realizing globalization. Chinese SMEs can rely on the trend of international trading to extend their supply chains to major markets worldwide and connect with the supply chains of overseas partners. For example, Amazon is one of the world's major e-commerce platforms. According to Marketplace Pulse (Kaziukenas, 2021), China-based sellers represented 75% of new sellers on Amazon in January 2021, a significant increase from 47% in the previous year. China's SMEs have matured their experience using e-commerce platforms to conduct business in foreign markets at a relatively low cost. New technology, such as the IoT in Industry 4.0, will allow SMEs to carry out online and offline integrated business strategies under the existing e-commerce model and use the increasingly common 3PL network to target customer groups accurately.

Globalization and technology innovation will also offer the advantage of economies of scale in the supply chain for SMEs to significantly reduce the cost of goods, information, and capital flow. On the other hand, international risk management is now an indispensable part of supply
chain management. Since SMEs cannot fully control all supply chain modules, preparing for emergencies or unexpected situations can help SMEs respond to and prevent crises. For example, many of China's SMEs cannot fully understand contract terms when signing a procurement contract with the supplier and use the agreement to defend themselves due to the lack of necessary legal awareness. They may also not be sensitive to differences in the business laws of different countries. For example, many countries have different rules for pay rates for overtime work, the safety standard for warehousing, requirements for tax filing, maximum duty hours for truck drivers, and so on. Furthermore, China's SMEs need to cultivate the awareness of paying for knowledge. When traditional China's SMEs enter overseas markets, they are not familiar with overseas market rules or cannot effectively identify overseas partners, resulting in excessively high costs and risks on the overseas market side of the supply chain. Therefore, before entering a new market, companies must thoroughly evaluate the market and the supply chain environment, including the distribution channels, logistics networks, and third-party warehouses. If a small business cannot evaluate the market, it is necessary to entrust a professional institution to complete the relevant evaluation.

LIMITATIONS

The data collected in this research project has some limitations. First, all participants come from five coastal provinces. Coastal areas have prominent logistics cost advantages in international trade compared to inland areas. Therefore, enterprises in coastal areas are more aware of the opportunities and requirements for opening up overseas markets. Thus, the results of this investigation do not represent all of China’s SME supply chain activities. SMEs in China's inland areas better reflect the domestic supply chain management. Analyzing and comparing the business environment between inland and coastal areas can provide strategically valuable information such as factory and warehouse dynamics in SME supply chain management.

Second, only 15 individuals from eight different industries participated in this study. The small sample size prevents adequate quantitative analyses and generalization to the larger population. The limited sample also precluded considering the impact of respondent demographics. Gender, age, industry experience, and education might impact participant perceptions and responses.

Further, the companies classified as SMEs vary in business and industry types, limiting the precision of any overall supply chain characterization. Therefore, generalizing China’s SME supply chain practices is constrained. Finally, other sources of variation could be the use of online questionnaires, inaccurate translation of answers given in Chinese, and the extent to which the COVID-19 pandemic impacted supply chain operations temporarily or permanently.

RECOMMENDATIONS

The Exploration of Supply Chain Finance
This study did not examine supply chain finance in adequate depth. Supply chain finance has been an emerging financial service in recent decades. Significantly, the supply chain's capital support will fundamentally change SMEs' operating model. The impact of supply chain finance on Chinese SMEs must be one of the critical directions of China's supply chain research in the future. Supply chain financial services will be another valuable tool for SMEs to optimize their supply chain operation. China's SMEs have not fully employed supply chain finance in their business practice because firms do not understand the advantages of supply chain finance compared to traditional commercial loans. Therefore, the financial services industry should increase the promotion and popularization of supply chain finance and make it convenient for SMEs to apply for and use it. In China, the popularization of supply chain finance cannot succeed without government support. On September 18, 2020, eight Chinese government departments, including the People's Bank of China, the Ministry of Industry and Information Technology, the Ministry of Justice, and the Ministry of Commerce, issued Opinions on Regulating the Development of Supply Chain Finance, Supporting the Stable Cycle and Optimization as well as Upgrade of the Supply and Industry Chain (The State Council Information Office, 2020). The Chinese government will regulate supply chain finance and improve SMEs' accounts receivable financing. It will (a) support the opening and repair of global industrial chains, (b) regulate the development of supply chain inventory, warehouse receipts, and order financing, and (c) strengthen the risk protection support for supply chain finance.

The development of supply chain finance in China is not entirely determined. One complication is that supply chain finance still lacks specific legal protection and international standards compared to traditional finance. For example, multinational businesses need to determine how to use overseas accounts receivable as a condition to get loans approved in China. To apply for overseas financial factoring, SMEs must rely on cooperative relationships with domestic suppliers. Supply chain finance should be a new means and direction for the SMEs development. Supply chain finance research should focus specifically on the needs of SMEs in the context of China's business regulatory environment and integrating China's SMEs into the global supply chain financial system.

Supply Chain Competition in Different Markets

Another research direction is to compare supply chain competition in different markets. Due to rising international shipping costs, increasing tariffs, and trade barriers, many Chinese SMEs seek to move their factories overseas. New research efforts should focus on the manufacturing, transportation, and third-party logistics industries in Southeast Asia, South America, and other areas. The results can help Chinese SMEs establish transnational factories and re-export trade. Studying the supply chain's upstream and downstream cross-border companies can also expand the business market for China's SMEs and help them deepen the process of globalization. International competition and cooperation in the supply chain can reduce the risk of instability, production capacity, and financial barriers caused by a single market.
The Effect of Social Crises on SCM

The social crisis is a new challenge for supply chain management. For example, the COVID-19 pandemic created several global supply chain crises. It caused shortages of goods due to production interruptions, increased costs and international transportation times, and irrational consumer behaviors caused by panic and worries about the future. Although each social crisis is a special unpredictable event, the supply chain impacts are significant and long-term. For SMEs, these supply chain disruptions can cause shutdowns and bankruptcies. Impacts on one supply chain node can cause malfunctions in the entire system. Therefore, establishing social crisis early warning measures is a topic for SMEs to consider seriously. In addition, the Chinese government must explore supply chain assistance programs to assist SMEs in responding to social crises. For example, the government can provide subsidies according to policy during a crisis. It can also explore social and human resources assistance for the post-disaster reconstruction of SMEs.

CONCLUSION

Supply chain innovations are influencing China's SMEs, and they are gradually realizing the importance and necessity of using advanced information technology to manage supply chains. However, Chinese SMEs are still in the initial stage of applying supply chain innovations, such as employing experienced supply chain managers and using new systems to integrate supply chain operations. The high cost, complicated operating systems, and the need to integrate external systems are obstacles to implementing better supply chain systems for China's SMEs. Next, due to scale limitations, SMEs appear more vulnerable to supply chain node disruptions and are unprepared for system variability. The research results indicate that compared to large enterprises, SMEs have less influence on external supply chain nodes and are more sensitive to supply chain risks.

Furthermore, rapid changes in the international environment, including political relations between countries, economic ties, and various natural disasters and emergencies, have intensified global competition and supply chain cooperation. As a result, China's SMEs have taken a conservative approach toward pursuing globalization. Expanding the domestic market has become the primary option for many Chinese SMEs. In addition, Chinese SMEs lack sufficient human resource talent, especially regarding globalization. This condition creates double jeopardy for SMEs because China's total number of supply chain professionals does not meet the market's demand for talent, leaving SMEs to compete with large, multinational, and state-owned enterprises to attract outstanding talent. Thus, innovative technology investment becomes even more important, accompanied by understanding and adopting supply chain finance to attain investment capital appropriately.

REFERENCES


Jiawei He, DBA, is a Chinese scholar who went to the United States for education in 2007. He earned master's degrees in economics and in business administration before obtaining his DBA. Currently, Dr. He is the director of the supply chain department for Himiway Bikes, a company that sells electric bikes and scooters worldwide through e-commerce. Dr. He optimized Himiway's global supply system and formulated the company's supply chain strategy. In November 2022, on behalf of Himiway, Dr. He established the first overseas subsidiary in Los Angeles, USA, and became the CEO of the subsidiary. The establishment of overseas subsidiaries and overseas self-built warehouses is an important part of the core strategy of Himiway's supply chain. It will not only bring a better service experience to overseas users but also greatly improve the company's operational efficiency and reduce logistics costs. In future work, Dr. He will continue to summarize and optimize the supply chain solutions of multinational companies through practice and create more space for the development of supply chains of small and medium-sized enterprises.

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