

# Enhancing E-Business Efficiency with Effective Supply Chain Management

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**Abstract** - By the end of this decade, the global e-business industry is expected to be worth trillions of dollars. This highlights the importance of e-business as a key component of the modern digital economy. For the success of e-businesses, supply chain management (SCM) is critical for various reasons, such as ensuring the efficient flow of goods, information, and services. Therefore, understanding the role of SCM in e-business is essential for improvement. The aim of this review article is to examine the functions of SCM in e-business, including adaptability, efficiency, inventory management, cost reduction, customer satisfaction, technology integration, sustainability, collaborating partners, competitive advantage, and risk minimization. To achieve the objectives of this study, several Scopus-indexed articles were reviewed, particularly recent studies focusing on the various roles of SCM in e-businesses. These numerous roles of SCM address different challenges in e-business, such as sudden market changes, supplier disruptions, traceability issues, delivery processes, acquiring new customers, rising competition, inventory optimization, and technological advancements. By implementing certain strategies, these challenges can be mitigated to improve the success of e-businesses. These strategies include flexible sourcing, automation, maintaining adequate stock levels, market trend analysis, proactive responses, insurance, and technological adaptation. This paper explores several functions that can enhance SCM practices in e-businesses by addressing key challenges and achieving positive outcomes for e-businesses.

**Keywords:** E-Business, Supply Chain Management (SCM), Adaptability, Inventory Management, Competitive Advantage

## I. INTRODUCTION

Do you know that the market value of e-business is likely to reach around \$7.9 trillion by 2030 (E-Commerce Evolution in Asia and the Pacific, 2023)? This indicates that e-business is an essential component of the evolving digital economy in the contemporary era (Ma, 2024). The term “e-business,” also known as online-based business or e-commerce, refers to the exchange of goods and services via networked computers and mobile devices. It means that conventional enterprises engage in electronic commerce while developing new business strategies in digital spaces (Yaşlıoğlu, 2020). Traditional businesses can create significant value through e-business integration, which improves supply chain visibility, synchronized planning, integrated workflows, and innovative business models (Lee & Whang, 2004). In e-business, supply chain management (SCM) is crucial for producing competitive advantages and enhancing the overall performance of enterprises and business partners

internationally (Liu, 2007). E-business is transforming companies by boosting output, connecting with external clients, and requiring adaptable, secure IT infrastructure (Tracy, 2000). Consequently, the importance of supply chain issues - such as visibility, distribution, pricing, customization, and relationships with suppliers - has grown dramatically with the rise of e-business (Swaminathan & Tayur, 2003). Therefore, the roles of SCM in e-business need to be re-examined.

SCM involves a wide range of activities in any business, including e-business. These activities include procurement, production, logistics, and sales (Nakano, 2020). In other words, SCM manages various tasks, from raw materials to the final consumer (Venkataraman & Pinto, 2023). It is important to clarify that the supply chain, properly speaking, is a network of businesses and partnerships rather than a series of one-on-one business-to-business interactions (Lambert & Cooper, 2000): dealers, manufacturers, suppliers, and retailers (Kumar & Schmitz, 2011; Ajayi & Laseinde, 2023). The nature of these relationships has been continuously evolving due to technological innovations. With the increasing adoption of cutting-edge technologies, supply chain operations can be improved (Grigoryan, 2023). These technologies are not only transforming conventional businesses into e-businesses but also enhancing supply chain operations. As a result, the functions of SCM have been reshaping and expanding in e-business. Therefore, understanding the various functions of SCM in e-business is essential. The objective of this article is to review scholarly works related to e-business in order to uncover the functions of SCM in e-business.

## II. SUPPLY CHAIN MANAGEMENT’S ROLE IN E-BUSINESS

Supply chain management (SCM) plays several roles in e-business, including enhancing adaptability, improving efficiency, optimizing inventory management, reducing costs, increasing customer satisfaction, integrating technology with e-business, ensuring sustainability, collaborating with partners, gaining a competitive advantage, and minimizing risk. Figure 1 provides a visual representation of these roles. Each of these roles will be described in the following subsections. After reviewing relevant literature for each section, a table will be provided to present the insights.

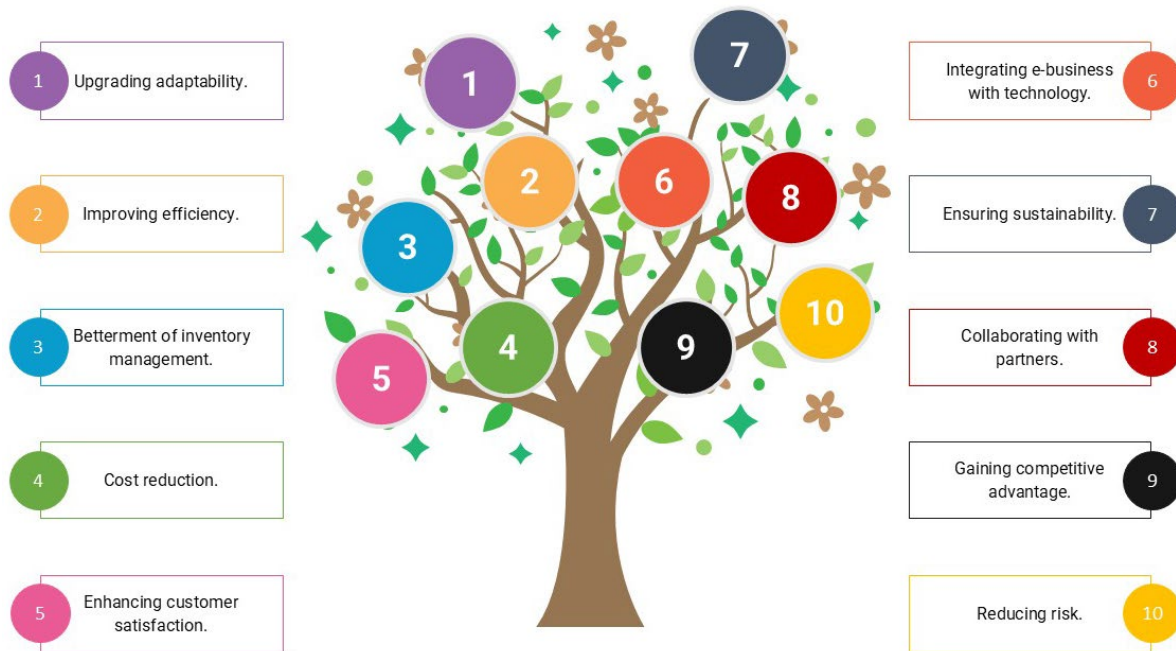


Fig. 1 A visual representation of different functions of Supply Chain Management in e-business

*A. Adaptability*

Supply chain adaptability in e-business refers to the capacity to adjust activities in response to barriers or opportunities (Pettit *et al.*, 2013). In other words, it denotes a supply chain’s ability to navigate transitions and recover effectively from disruptions (Nabil *et al.*, 2024). Supply chain adaptability includes several subcategories, such as flexibility, redundancy, and adaptive management (Nabil *et al.*, 2024; Pettit *et al.*, 2013).

To begin with the literature on adaptability, Pettit *et al.*, (2013) presented a paper on supply chain flexibility in e-business contexts. According to the study, organizations need flexibility to quickly adjust to market changes, supplier disruptions, and demand fluctuations. E-business operations that must adapt to sudden shifts in customer preferences require flexibility when sourcing supplies and completing orders. This versatility allows e-businesses to respond rapidly to disruptions and maintain a steady supply of goods, which is essential for staying competitive and meeting customer expectations (Pettit *et al.*, 2013).

Furthermore, Eckstein *et al.*, (2015) argued that both cost performance and operational performance are highly impacted by supply chain agility and flexibility. Their research provided evidence of an indirect relationship between supply chain agility, cost, and operational performance. Additionally, Dharmayanti *et al.*, (2023) suggested that digital adaptability helps businesses identify and seize new opportunities, reach a wider audience, and enhance customer experiences. As a result, customer satisfaction, loyalty, and higher sales are generated. Businesses that incorporate digital adaptability into their operations can achieve long-term financial success by continuously adjusting to evolving customer expectations,

market demands, and technological advancements (Dharmayanti *et al.*, 2023).

Moreover, Henrike Heunis *et al.*, (2024) argued that applying integrative and distributive negotiation strategies is indicative of strategic adaptability. The integrative strategy, a collaborative win-win approach, emphasizes value creation, while the distributive strategy, a competitive win-lose approach, focuses on value claiming. Strategic flexibility in negotiations involves using a variety of distributive and integrative tactics and alternating between them as needed (Heunis *et al.*, 2024).

Therefore, supply chain adaptability in e-business is related to quick demand adaptation, operational flexibility, sourcing flexibility, cost adjustments, and changes in inventory according to the situation.

*B. Efficiency*

Supply chain efficiency in e-business is defined as the ability to generate outcomes with minimal resource requirements (Pettit *et al.*, 2013). In other words, supply chain efficiency emphasizes how swiftly the supply chain responds (Nabil *et al.*, 2024; Ponomarov & Holcomb, 2009). It also includes several subcategories, such as supply chain agility, crisis strategy, capacity for supply and demand, and business improvement strategy (Nabil *et al.*, 2024; Pettit *et al.*, 2013).

To begin with the scholarly works on supply chain efficiency in e-business, Hofmann and Rüsç (2017) demonstrated that logistics management was essential for verifying the effectiveness of the e-business delivery process, from the time the order was received until the product was delivered. Additionally, Moons *et al.*, (2019) suggested that the delivery process could be made more efficient by utilizing automation

and technology. In order to improve the delivery process, Silva *et al.*, (2022) and Yu *et al.*, (2016) highlighted that a substantial number of products must be kept in stock to meet demand. For distributing stock to meet demand, Custodio and Machado (2020) proposed that automation technologies, such as picking systems and automated vehicles, could be employed. Furthermore, Staudt *et al.*, (2015) reinforced these findings, noting that storage capacity, shipping efficiency, and delivery processes are interconnected.

Therefore, supply chain efficiency in e-business involves improving delivery process verification, utilizing automation in the delivery process, holding sufficient stock to meet demand, and distributing stock through advanced technologies.

### C. Inventory Management

Inventory management is crucial for e-business to ensure a smooth flow of goods. Supply chain management (SCM) plays an impactful role in e-business by optimizing the inventory of those goods.

To begin with, Guo *et al.*, (2024) wrote that efficient inventory management at various supply chain levels is a key tactic for increasing supply chain resilience. Since the primary goal of inventory management is to balance costs and service levels, a thorough understanding of both supply-side and demand-side data is required. In the event of supply chain disruptions, inventory reserves are essential for meeting consumer demand, which helps reduce the mismatch between supply and demand. In other words, inventory control ensures that goods continuously flow from suppliers to consumers.

According to Ali *et al.*, (2024), inventory management prioritizes achieving the company's financial and operational objectives. Thus, inventory management necessitates preventing stockouts and overstocking by maintaining an ideal balance between supply and demand. Put differently, this balance enables companies to better utilize their resources and save expenses associated with storing unnecessary items.

Moreover, Prabha *et al.*, (2024) found that the relationship between the raw material turnover ratio and inventory holding duration demonstrated a company's ability to optimize inventories, lowering costs and minimizing the risk of obsolescence. They also noted that the continuous reduction in the inventory conversion period indicated the company's increased capacity to convert inventory into sales, thereby improving cash flow and operational efficiency.

Furthermore, Kalinov *et al.*, (2020) suggested that, in the modern era, inventory management can be automatically controlled due to advancements in computer vision and artificial intelligence (AI) technology. In support of this, Villegas-Ch *et al.*, (2024) found that the performance of inventory management systems was greatly enhanced by

combining computer vision and machine learning technology, as machine learning allows for more accurate demand forecasting. Therefore, inventory management in e-business is crucial for increasing supply chain resilience, reducing the mismatch between supply and demand, optimizing resource use, and saving costs.

### D. Cost Reduction

Cost is a factor that must be minimized for the success of any business, and e-business is no exception. The supply chain plays a significant role in reducing costs in e-business.

To begin with, the literature on cost reduction, Shaikh (2024) argued that a digital supply chain enhances cost reduction in e-business by enabling proactive responses to transportation and manufacturing risks, optimizing resource allocation, and improving efficiencies. Additionally, Chen and Kumari (2024) noted that by leveraging data, e-commerce businesses can optimize logistics strategies, leading to reduced operational costs and improved profitability. To increase profits and reduce costs, Barrad and Valverde (2020) suggested that internal communications, procurement effectiveness, and streamlined operations must be improved.

### E. Customer Satisfaction and Retention

Customer satisfaction is another important metric for e-business. Without satisfying customers, retaining them is impossible. It is commonly acknowledged that without customers, no firm can survive or stay competitive (Zhang & Zhang, 2024).

To begin with the scholarly works, Zhang and Zhang (2024) highlighted that firms can gain a competitive edge and expand their operations through improved customer satisfaction and loyalty. To achieve this, a better understanding of client demands and behaviors is essential for any firm. Therefore, market trend analysis should be emphasized. In addition to satisfying customers, Murali *et al.*, (2016) focused on customer retention. This has become a significant issue for businesses, as it has been shown that retaining customers is more profitable than spending large amounts of money to acquire new ones. In other words, companies find that acquiring new customers is costly and challenging because it requires significant time, money, and effort (Murali *et al.*, 2016). Moreover, after analyzing customer behavior through a survey, Samad *et al.*, (2023) found that product quality was one of the most impactful factors.

### F. Integration with Technology

Technology integration is essential to the supply chain because it facilitates easy access to real-time data, proactively boosts task productivity, enhances communication, and fosters global teamwork (Odimarha *et al.*, 2024; Baki & Andaloussi, 2024; Bhavaani *et al.*, 2024).

To begin with, Yu *et al.*, (2021) showed that the adoption and spread of IoT technology significantly minimized supply chain market risk and contributed to more efficient economic development by strengthening the interconnectedness of supply chain information in e-business sectors. Thus, it was essential to consistently enhance the use of IoT technology in the supply chain for e-business. Another study by Dharmayanti *et al.*, (2023) explored how integrating technologies significantly affects an organization's long-term financial performance. Additionally, Kuandee *et al.*, (2019) demonstrated that real-time information on a range of supply chain operations, including inventory levels, equipment performance, temperature, and energy use, is available to enterprises due to IoT technologies. Businesses can now easily trace shipments, which aids in prompt order fulfillment. This proposition was also supported by Qiu *et al.*, (2015), who found that IoT provided warehouse and industrial enterprises with real-time visibility, insights, and information sharing. Therefore, by adopting digital technology and adjusting to the digital age, businesses can enhance their economic performance (Dharmayanti *et al.*, 2023).

One such technology is blockchain. Blockchain refers to a distributed database system that uses a consensus process to record transaction-related data. Yasanur *et al.*, (2022) highlighted that blockchain could be used to access data. According to Payandeh *et al.*, (2024), the goal of blockchain technology is to address several widespread supply chain traceability issues, including guaranteeing product legitimacy, eliminating opacity in international supply chains, and enabling prompt responses to recalls and quality control concerns. Additionally, Yontar (2023) stated that the benefits of blockchain technology in the supply chain include providing customers with accurate and unchangeable information about products, reducing inter-process fraud, enabling payments, ensuring transparency among all parties involved, and achieving high efficiency at a lower cost with fewer mistakes. Furthermore, Shinde *et al.*, (2021) demonstrated that blockchain technology is not limited to cryptocurrency or financial transactions; rather, blockchain is viewed as a new technology for protecting important process applications.

### G. Sustainability

In addition to increasing business profitability, supply chain management helps the environment and society. The sustainability of supply chain management focuses on how businesses operate from an economic, social, and environmental perspective. In other words, sustainability in the supply chain refers to the careful monitoring of sourcing, production, distribution, and disposal procedures to minimize adverse environmental impacts, uphold social norms, and promote economic expansion (Ferrari *et al.*, 2023).

To begin with, sustainable supply chain management entails evaluating the full product lifecycle and implementing strategies to protect the environment, guarantee ethical labor

practices, and promote community well-being, according to Aravindaraj and Chinna (2022). Singh (2024) showed that the significance of sustainable supply chain management has grown dramatically in recent years due to a confluence of technological, socioeconomic, and environmental factors. This was also illustrated in Vidal *et al.*'s study (2024). Zimon *et al.*, (2020) noted that sustainable supply chain management is an essential tactic for companies to ensure ethical behavior, especially in sectors with major social and environmental impacts. By addressing critical sustainability issues and promoting long-term viability, sustainable supply chain management enables businesses to create sophisticated and effective supply chain strategies. Additionally, Govindan *et al.*, (2013) wrote that the implementation of sustainable supply chain activities could be crucial in attaining the "triple bottom line" - the concept of environmental, social, and economic standards for evaluating suppliers. Hence, sustainability can be seen as a differentiator in the commercial world. As a result, sustainable companies have the capacity to stand out in the marketplace (Geyi *et al.*, 2020). Another study by Amindoust *et al.*, (2012) emphasized the importance of selecting sustainable suppliers through competitive bidding processes, as it influences an organization's overall sustainability performance.

### H. Collaboration with Suppliers and Partners

Collaboration with suppliers and partners is essential because business is multi-faceted, and business thrives on communication. Suppliers and partners can improve business opportunities and manage their production and service operations more effectively by working together.

To begin with, Amindoust *et al.*, (2012) stated that partnering with a supplier who shares the same aspirations is worthwhile. Additionally, Lv and Qi (2019) noted that partner selection is the process of choosing the best candidate from a group of potential partners based on predetermined standards, values, and goals. This process is essential for the development of supply chain cooperation. Furthermore, Amiri and Farvaresh (2023) emphasized that value generation is highly dependent on the presence of partners.

### I. Competitive Advantage

Competitive advantage is the degree to which a company can establish a position that it can defend against rivals (McGinnis & Vallopra, 1999). Generally, the characteristics of competitive advantage enable a business to set itself apart from its rivals (Tracey *et al.*, 1999).

To begin with, competitive advantage results from important management choices - such as price/cost, quality, delivery, and flexibility - according to Tracey *et al.*, (1999). Anjum (2019) demonstrated that, among the factors affecting the success of e-commerce businesses in the Asian region, competitive advantage was one of the most influential factors for successful e-business. Additionally, Tao and Jiang (2014) identified that the next source of competitive advantage is

time. Furthermore, Vickery *et al.*, (1999) specified some characteristics of value-to-customer: quality, competitive price, reliable delivery, and manufacturing innovation. Another study by Li *et al.*, (2006) focused on time to market, product innovation, quality, delivery reliability, and cost as key sources of competitive advantage. With the help of these parameters, businesses can bolster their long-term competitive advantage (Nyaga *et al.*, 2010).

*J. Risk Reductions*

Another focus of the supply chain in e-business is risk mitigation. Like other businesses, e-businesses face various risks that need to be minimized.

To begin with, Dutta *et al.*, (2019) noted that local or global disturbances, such as fires, floods, cyclones, or economic crises, can halt the flow of goods. Another risk identified was the planning and integration of supply and demand. For instance, if demand spiked unexpectedly, there was a risk that supply might not be able to meet the demand, which could lead to a decline in customer satisfaction and sales. One additional notable risk was information privacy and security. E-businesses possess critical client information, such as shipping addresses and contact details, so it is essential to protect this data from unauthorized access and misuse. Moreover, risks related to third-party fraud data are associated with suppliers, sellers, or third-party logistics providers who violate the terms of their contracts or engage in actions that could damage a company’s reputation and reduce sales (Dutta *et al.*, 2019). In support of this, Dass

(2019) mentioned that commercial risks arise when either the purchaser or supplier defaults and fails to fulfill its commitments. The study also highlighted transportation risks, which involve the possibility that goods may be destroyed, pilfered, lost, or stolen in transit, or that the journey may be redirected to another location. Insurance coverage can generally help limit these risks. Furthermore, Dutta *et al.*, (2019) identified several other risks associated with the e-business supply chain, including inventory obsolescence, theft, damage in warehouses and distribution centers, network disruptions, data center disruptions, natural disasters, accidents, and logistics disruptions. The study recommended that organizations take steps such as using technology, prepositioning emergency inventories, establishing flexible supplier/seller bases, and planning alternative routes or transportation methods to mitigate these risks.

In addition to the aforementioned risks, Singh *et al.*, (2023) identified three significant barriers within the e-business system: contractual risk, scalability concerns, and lack of employee training. These factors were found to affect the entire system due to their regular interaction with other issues. Additionally, Trkman and McCormack (2009) noted that currency fluctuations, capacity limitations, technological incompatibilities, and natural disasters were also considered risks in e-businesses. Properly addressing these risks is essential in e-business to avoid financial losses. For example, although technological advancements offer many benefits, cybersecurity concerns can lead to significant financial losses (Villegas-Ch *et al.*, 2024).

TABLE I CAUSES, FACTORS, AND EFFECTS OF DIFFERENT SUPPLY CHAIN ROLES IN E-BUSINESS.

Roles of Supply Chain Management in E-Business	Causes	Influential Factors	Corresponding Positive Effect in E-Business if the Factors are Met	Sources
Adaptability	Changes in sudden customer preferences; supplier disruptions; and demand changes	Flexible sourcing supplies	A steady supply of goods; staying competitive and satisfying customers.	(Pettit <i>et al.</i> , 2013)
	New business opportunities and technological improvements.	Digital adaptability	Reach a wider audience, improve customer experiences, and achieve long-term financial success.	(Dharmayanti <i>et al.</i> , 2023)
	The availability of different negotiation methods	Strategic adaptability	Early choices required both win-win and win-lose approaches	(Heunis <i>et al.</i> , 2024)
Efficiency	Requires verification of the delivery process	Logistics management	Real-time monitoring	(Hofmann & Rüsche, 2017)
	Requires improvement in the delivery process	Utilizing automation and technology	More efficient delivery process	(Moons <i>et al.</i> , 2019)
	To meet demand	Holding considerable stocks	More efficient delivery process	(Silva <i>et al.</i> , 2022) (Yu <i>et al.</i> , 2016)
Inventory Management	Supply chain interruptions	Inventory reserves, computer vision, artificial intelligence, and machine learning technology	Reduce the mismatch between supply and demand, prevent stockouts and overstocking, make better use of resources, save expenses, improve cash flow, and enhance operational efficiency	(Guo <i>et al.</i> , 2024) (Ali <i>et al.</i> , 2024) (Prabha <i>et al.</i> , 2024) (Kalinov <i>et al.</i> , 2020) (Villegas-Ch <i>et al.</i> , 2024)

Cost Reduction	Resources, internal communications, procurement effectiveness, and streamlining operations	Proactive responses; big data technology	Optimizing resource allocation, optimizing logistics, higher profit margins, and cost minimization	(Shaikh, 2024) (Chen & Kumari, 2024) (Barrad & Valverde, 2020)
Customer Satisfaction	Client demands and habits	Market trend analysis	Improved customer satisfaction and loyalty	(Zhang & Zhang, 2024)
	Acquiring new customers is more costly and challenging than retaining existing customers.	Customer retention; improving product quality	Keeping consumers is more profitable	(Murali <i>et al.</i> , 2016) (Samad <i>et al.</i> , 2023)
Integration With Technology	Market risk, connectedness with the market, and product identification	Adoption and spread of IoT technology	Minimized market uncertainty, boosted communication, and increased economic performance	(H. Yu <i>et al.</i> , 2021) (Dharmayanti <i>et al.</i> , 2023) (Qiu <i>et al.</i> , 2015)
	Traceability issues, product legitimacy, opacity in international supply chains, quality control concerns, inter-process fraud, and the need for real-time information	Blockchain	Access to data, increased performance, providing customers with accurate information, guaranteeing transparency, protecting important process applications, and ensuring prompt order fulfillment	(Kayikci <i>et al.</i> , 2022) (Payandeh <i>et al.</i> , 2024) (Yontar, 2023) (Shinde <i>et al.</i> , 2021) (Kuandee <i>et al.</i> , 2019)
Sustainability	Arising from the concept of environmental, social, and economic standards for evaluating suppliers; guaranteeing ethical behavior	Socio-economy and environment;	Have the capacity to stand out in the marketplace, develop long-term supply chain plans, and protect the environment	(Singh, 2024) (Vidal <i>et al.</i> , 2024) (Zimon <i>et al.</i> , 2020) (Govindan <i>et al.</i> , 2013) (Geyi <i>et al.</i> , 2020) (Amindoust <i>et al.</i> , 2012)
Collaboration With Suppliers and Partners	Partner selection options and the presence of partners	Goals	Best supply chain cooperation	(Amindoust <i>et al.</i> , 2012) (Lv & Qi, 2019) (Amiri & Farvaresh, 2023)
Competitive Advantage	Rising competitors	Competitive time to market, product innovation, quality, delivery reliability, and cost	Long-term competitive advantage	(Tracey <i>et al.</i> , 1999) (Anjum, 2019) (Tao & Jiang, 2014) (Vickery <i>et al.</i> , 1999) (Li <i>et al.</i> , 2006) (Nyaga <i>et al.</i> , 2010)
Risk Reductions	Inventory obsolescence, theft, damage in warehouses, distribution centers, network disruption, data center disruption, natural disasters, accidents, logistics disruption, employee training, operational risk, currency fluctuations, capacity limitations, technological incompatibilities, commercial risks, and transportation risks	Prepositioning emergency inventories, flexible suppliers, alternative means of transportation, and insurance	Avoid financial losses	(Dutta <i>et al.</i> , 2019) (Dass, 2019) (Singh <i>et al.</i> , 2023) (Trkman & McCormack, 2009) (Villegas-Ch <i>et al.</i> , 2024)

Table I presents a summary of the roles of Supply Chain Management in e-business, highlighting causes, key supply chain factors, and anticipated positive effects. If e-businesses focus on these influential factors, they can achieve positive

outcomes for their operations. Ultimately, e-businesses are expected to gain a larger market share by implementing these factors.

### III. CONCLUSION

In this era, e-business is crucial for the economy of any country. Therefore, identifying the limiting factors affecting e-businesses is essential. Subsequently, key factors should be analyzed to mitigate these challenges and achieve beneficial outcomes for e-businesses. This study discusses various roles of Supply Chain Management in e-business to identify the barriers hindering e-business success. These roles are categorized in Table I to highlight the relevant factors that can alleviate these limitations. Finally, the study outlines the potential positive effects e-businesses can expect from implementing these influential factors.

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