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Supply Chain Opportunities and Challenges with the Application of Technology and Innovation for Sustainability in the Era of Globalization

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A B S T R A C T

This research aims to find out the opportunities and challenges of supply in the future, identify strategies and best practices in managing complex and dynamic supply chains, develop models and frameworks that can be used by companies to increase efficiency, reduce costs and improve product quality, analyze the application of new technology, regulations and changes in demand on supply chain performance, implement technology and innovation for supply chain sustainability in an increasingly competitive era of globalization. The research method used was a qualitative research approach and analyzed descriptively based on the results of relevant references. The results of this research show that there are significant supply chain opportunities, there has been the application of technology in supply chain activities, innovation for supply chain sustainability in the era of globalization. The results of this research can be concluded as follows, namely: the supply chain business is still promising in this era of globalization with the increasingly massive application of digital technology, the company's supply chain still has several weaknesses, such as low efficiency, significant bottlenecks, and unsatisfactory product quality. who have implemented technology to help companies improve performance, customer satisfaction and sustainability within the company.

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INTRODUCTION

In today's era of globalization and intense economic competition, a deep and applicable understanding of supply chain management is not only a necessity but also the main key in achieving organizational success. Rapid global economic development has increased the complexity of supply chains. Companies must face challenges such as increasing efficiency, reducing costs, and improving product quality. Apart from that, companies also have to face risks such as changes in demand, supply disruptions and changes in regulations (Sodhi & Tang, 2021) .

In recent years, supply chains have become increasingly complex and dynamic. Companies must face challenges, namely: (1). increase efficiency and reduce costs; (2). improving product quality and meeting customer needs; (3). dealing with risks such as changes in demand, supply disruptions and regulatory changes; (4). integrating technology and information systems to improve efficiency and performance (Sallam et al., 2023).

Therefore, this research aims to identify strategies and best practices in managing complex and dynamic supply chains. This research also aims to develop models and frameworks that can be used by companies to increase efficiency, reduce costs and improve product quality. Then the aim of this research is to; (1). knowing supply opportunities and challenges in the future, (2). identify strategies and best practices in managing complex and dynamic supply chains; (3). develop models and frameworks that can be used by companies to increase efficiency, reduce costs, and improve product quality; (4). analyze the influence of factors such as new technology, regulations, and changes in demand on supply chain performance; (5) technology and innovation for the sustainability of a supply chain play an important role in business sustainability in an increasingly competitive era of globalization (Ergun et al., 2023).

This research will focus on supply chains in the manufacturing and logistics industry. This research will use qualitative and quantitative research method approaches to collect information and analyze data.

LITERATURE REVIEW

Supply Chain Management

Management as a process of using organizational resources to achieve organizational goals through planning and decision making, organizing, leading and controlling functions (Sivula et al., 2021). Management is the process of planning, organizing, leading, and supervising the work of organizational members and using all available organizational resources to achieve clearly stated organizational goals (Chang et al., 2020).

(Dutta et al., 2020) provide a definition of management as a process for getting activities completed efficiently and effectively through other people. Efficient shows the relationship between input and output by seeking minimum resource costs, while effective shows the meaning of achieving predetermined goals. An organization is formed to achieve common goals and to achieve goals effectively and efficiently, good and correct management is needed. (Parola et al., 2021) said that the definition of management basically has more or less the same meaning.

Supply Chain Management describes the coordination of the entire supply chain activities, starting with raw materials and ending with satisfied customers. The supply chain includes suppliers; manufacturing companies and/or service providers, and distributor, wholesaler and/or retailer companies that deliver products and/or services to final consumers. The importance of increasing effectiveness and efficiency can also provide opportunities for continuous improvement in the overall supply chain structure (Garcia & You, 2015).

Explains that supply chain operations management is closely related to the management of existing processes in the production and distribution of goods or services, while (Gupta & Palsule-Desai, 2011) define supply chain management as managing the flow of goods, data and finances in a production process from start to finish. Operations management includes planning, production, quality control, process management, and stock management while according to (Remko, 2020) supply chain management is the key to creating efficiency across all company operations. That operations management and supply chain management play an important role in increasing operational efficiency and company productivity.

Currently the supply chain management (MSC) that is generally used is supply chain management/(SCM) which functions to integrate supply chain processes, corporate resource planning systems (ERP) and inventory management systems/(IMS) to manage inventory, transportation management system/(TMS) to manage transportation, warehouse management system (WMS) to manage warehouses.

Supply Chain Opportunities and Challenges

Business in the future will be influenced by changes in the globalization environment, technological advances, economic growth and the workforce. Globalization has created new markets, new products, new thoughts or ideas, new competencies and new lines of thinking regarding various businesses.

Economic globalization is a systematic process of economic activity and world trade, where the territorial boundaries of countries become blurred because the country's economy is integrated with the world economy, but in reality there are many opportunities and challenges that companies must face (Bischoff & Seuring, 2021).

(Sodhi et al., 2023) explains that future challenges in supply chain management and operations cover various aspects, from technology to sustainability. Some of the main challenges include the adoption of new technologies such as the Internet of Things (IoT) and artificial intelligence (IA), risk management, global market instability, and demands for sustainability and social responsibility. Apart from that, changes in consumer behavior and demands for faster delivery of goods are also part of this challenge. Supply chain and operations managers need to prepare themselves to face change with continuous innovation and adaptation.

Opportunities and challenges for Indonesia's supply chain in the global era, namely the opportunity to increase exports of its products to global markets, especially to ASEAN and Asia-Pacific countries, increase investment: Indonesia

can attract foreign investment to build a more modern and efficient supply chain infrastructure, can improve its logistics capabilities to increase efficiency and speed of delivery of goods, and can increase cooperation with other countries to improve its supply chain capabilities. Then, according to (Friedman & Ormiston, 2022) global economic demands force companies and the entire supply chain to adopt a more flexible and responsive way of operating.

Meanwhile, the future challenges of the Indonesian supply chain business are that it still has inadequate infrastructure, such as roads, ports and airports, which can hamper supply chain efficiency, complex and convoluted bureaucracy that can hamper the process of delivering goods, has high dependence on imports, which can hamper supply chain capabilities, is vulnerable to weather changes and natural disasters which can hamper supply chains and skills and still has inadequate human resource skills and capabilities, which can hamper supply chain capabilities.

Application of Technology

Technological advances in supply chains have been stated by (Kache & Seuring, 2017) that supply chain management has ushered in a new era with the application of solutions such as the internet of thought (IoT), artificial intelligence (IA) and blockchain not only becoming possible but also very profitable. On the other hand, there are risks that continue to increase in global business demanding effective and efficient risk management strategies as emphasized.

The application of supply chain management (MSC) technology that is generally used is the supply chain management (SCM) system to integrate supply chain processes, the enterprise resource planning (ERP) planning system to manage company resources, the inventory management system (IMS) to manage inventory, the transportation management system (TMS) to manage transportation, and the warehouse management system (WMS) to manage warehouses.

Digital technology that is generally used in today's era of globalization, namely the internet of things (IoT) is for connecting devices for collecting data and information, artificial intelligence (AI) is for analyzing data and predicting needs, blockchain is for increasing security and transparency, cloud computing is for accessing data online, and big data analytics is for analyzing big data for decision making.

Supply chain technology that is generally used in today's era of globalization, namely tracking system technology is for tracking shipments, the customs clearance system is for managing customs clearance processes, the quality management system is for managing product quality, the risk management system is for identifying and managing risks, the security management system is for managing security.

Then other supply chain technologies used in the era of globalization, namely radio frequency identification (RFID) is for identifying products or goods and services, global positioning system (GPS) is for tracking location, electronic data interchange (EDI) is for sending data electronically, mobile application is for accessing information mobilely, and robotic process automation (RPA) is for automating the production process of goods or services.

Innovation for Supply Chain Sustainability in the Era of Globalization

The use of technology in the supply chain is to increase efficiency, reduce costs, improve quality, increase customer satisfaction, as well as reduce risk. Therefore, it is necessary to have several effective and efficient supply chain management strategies, including the main strategy, namely integrating various stages of the supply chain, such as production, storage and delivery, to increase efficiency and reduce costs, effective inventory management to avoid stock shortages or excesses, efficient transportation management to reduce delivery time and costs, product quality management to ensure that the products produced meet established standards, and risk management related to the supply chain, such as changes in demand, transportation disruptions and weather changes.

(Kumar & Agrawal, 2023) said the supply chain management (SCM) strategy is a holistic approach to managing the flow of goods and services which includes all processes from procurement of raw materials to delivery of products to final consumers. Here are several strategies in supply chain management, namely:

Operational strategy using a just-in-time (JIT) strategy to reduce production time and costs by producing products only when needed, using a vendor-managed inventory (VMI) strategy to manage inventory with vendors, so that vendors are responsible for inventory management, using a drop shipping strategy to send products directly from vendors to customers, thereby reducing storage and shipping costs, using a cross-docking strategy to reduce shipping time and costs by sending products directly from the warehouse to customers, using technology such as supply chain management systems (SCM), enterprise resource planning systems (ERP), and the internet of things (IoT) to increase efficiency and reduce costs (Marhawati et al., 2023).

Collaboration strategy by collaborating with vendors to develop close relationships with vendors to improve quality and reduce costs, collaborating with customers to develop close relationships with customers to understand their needs and improving product quality, collaborating with partners to develop close relationships with other partners, such as logistics companies and technology companies, to increase efficiency and reduce costs, developing networks with other companies to increase capabilities and reduce costs, and using platforms such as supply chain collaboration platforms to increase efficiency and reduce costs.

Other strategies in supply chain activities, namely using data analysis to understand demand patterns, identify areas of improvement and increase efficiency, developing team capabilities and competencies to increase efficiency and reduce costs, using sustainable resources to reduce environmental impact and increase efficiency, developing plans to deal with unexpected risks and disruptions, using environmentally friendly technology to reduce environmental impact and increase efficiency

Product innovation strategy to increase business competitiveness, namely through new product development by making unique products that meet consumer needs, product improvements by increasing product quality and

features, product diversification by adding product variants to expand the market, and technological innovation: applying the latest technology to increase efficiency.

Supply chain process innovation strategies can include automation to save time and costs, Lean Manufacturing to reduce waste and increase efficiency, Kaizen to implement continuous improvement, and the use of analytical data to analyze data to improve decisions.

Marketing Innovation Strategy through digital marketing by utilizing social media and online advertising, content marketing to create interesting and relevant content, customer experience to focus more on customer satisfaction, and collaboration to collaborate with other companies.

Organizational innovation strategy with an innovation culture: build an environment that supports innovation, team development, use of technology by applying technology to increase efficiency, risk management by identifying and managing risks. The technology-based innovation strategy for supply chains is to apply artificial intelligence (AI) for automation, Internet of Things (IoT) to connect devices to increase efficiency, blockchain technology is used for security, and cloud computing is used for flexibility. Meanwhile, the stages of implementing innovation are through identifying needs and opportunities, determining innovation strategies, allocating resources, and implementing strategies, as well as evaluating and improving. The benefits of technological innovation in the supply chain are that it can increase competitiveness, increase income, increase customer satisfaction, reduce costs, and increase the ability to compete in the era of globalization

METHODOLOGY

The method used in this research will focus on supply chains in the manufacturing and logistics industry. This research will use an approach with qualitative research methods to collect data and information from literature reviews and then analyze the data sources. Next, the researcher identifies the research problem, formulates objectives, and develops a theoretical basis that will serve as a guide.

The population in this study consisted of 20 supply chain companies and. according to (Hendro & Bowo Pranogyo, 2023) that the sample is a portion of the population selected to represent the entire group. Purposive sampling as explained by Sugiyono (2017) is the technique used in this research, where the sample is selected based on certain criteria that are relevant to the research objectives.

RESEARCH RESULTS

The results of the research data examined include supply chain companies operating in Indonesia and Internationally as samples as in the list below.

Table 1. Description Company of Research

No	Supply Chain Company in Indonesia	No	International Supply Chain Company
1	PT. Pos Indonesia	11	DHL
2	PT. Tiki	12	FedEx
3	PT. JNE	13	UPS
4	PT. Mitra Solusi Transportasi	14	Prologis
5	PT. Wahana Dharma Logistics	15	Amazon
6	PT. Sumber Mitra Jaya	16	Alibaba
7	PT. Schneider Electric Indonesia	17	CEVA Logistics
8	PT. DB Schenker Indonesia	18	DB Schenker
9	PT. CEVA Logistics Indonesia	19	Maersk
10	PT. Kuehne + Nagel Indonesia	20	Kuehne + Nagel

Source: Data Processed in 2025.

The research results show several challenges in Indonesia's future supply chain in the global era, namely the need to develop a culture of innovation in an organization or business can be a challenge, managing limited resources can be a challenge in increasing productivity and sustainability, and facing rapid and unexpected changes can be a challenge in increasing sustainability.

Indonesia's supply chain in the global era has several opportunities, namely: it has a big opportunity to increase its product exports to the global market, especially to ASEAN and Asia-Pacific countries, increasing Indonesian investment can attract foreign investment to build a more modern and efficient supply chain infrastructure, Indonesia can improve its logistics capabilities to increase efficiency and speed of delivery of goods, increase cooperation with other countries where Indonesia can increase cooperation with other countries to increase its supply chain capabilities.

Meanwhile, the challenges of the supply chain business are inadequate infrastructure: Indonesia still has inadequate infrastructure, such as roads, ports and airports, which can hinder supply chain efficiency, complex bureaucracy: Indonesia has a complex and convoluted bureaucracy, which can hinder the process of sending goods, dependence on imports: Indonesia still has high dependence on imports, which can hinder the ability of its supply chain, as well as changes in weather and natural disasters because Indonesia is vulnerable to changes in weather and natural disasters which can hinder the supply chain, the skills and abilities of human resources in Indonesia are still lacking. and inadequate capabilities, which can hamper supply chain capabilities.

DISCUSSION

Currently, the supply chain technology generally used is supply chain management (SCM) which functions to integrate supply chain processes, enterprise resource planning (ERP) to manage company resources, and inventory management system (IMS) to manage inventory, Transportation Management System (TMS) to manage logistics transportation, and warehouse management system (WMS) used to manage warehouses.

Then the digital technology that is generally used in today's era of globalization, namely the Internet of Things (IoT) is to connect devices for data and information collection, Artificial Intelligence (AI) is to analyze data and predict needs, Blockchain is to increase security and transparency, Cloud Computing is to access data online, and Big Data Analytics is to analyze big data for decision making.

Logistics technology that is generally used in today's era of globalization, namely: a tracking system is for tracking shipments, a customs clearance system is for managing the customs clearance process, a quality management system is for managing product quality, a risk management system is for identifying and managing risks, a security management system is for managing security.

Then other supply chain technologies used in the era of globalization, namely Radio Frequency Identification (RFID) is for identifying products or goods and services, Global Positioning System (GPS) is for tracking location, Electronic Data Interchange (EDI) is for sending data electronically, Mobile Application is for accessing information mobile, Robotic Process Automation (RPA) is for automating the goods production process.

By utilizing technology in the supply chain, it is possible to increase efficiency, reduce costs, improve quality, increase customer satisfaction and reduce risk. Then the product innovation strategy, which includes developing new products to create unique products and meet consumer needs, product improvements to improve product quality and features, product diversification to expand markets, technological innovation by applying the latest technology to increase efficiency.

To improve the supply chain, companies need a strategy towards the era of globalization, namely: (1) Process innovation strategy, namely by automating technology to save time and costs, lean manufacturing to reduce waste and increase efficiency, applying Kaizen for continuous improvement, and using analytical data to improve decisions, (2) Marketing innovation strategy using digital marketing by utilizing social media and online advertising, interesting and relevant marketing content, customer experience with a focus on customer satisfaction, and network collaboration to collaborate with other companies, (3) Organizational innovation strategy by implementing an innovation culture to building an environment that supports innovation, developing team motivation, using technology with the aim of increasing efficiency, and risk management by identifying and managing risks comprehensively, (4) Technology-based innovation strategies by applying artificial intelligence (AI) by applying AI for automation, internet of things (IoT) to connect devices to increase efficiency, and Blockchain technology for security, and cloud computing by utilizing cloud

computing for flexibility, (5) to increase competitiveness, increase revenue, increase customer satisfaction, reduce costs, and increase global competitive capabilities.

Future supply chain developments will include several trends and technologies that enable better efficiency and effectiveness, namely: digitalization with the implementation of digital technology to increase efficiency and effectiveness in logistics processes, such as the use of warehouse management systems (WMS), transportation management software (TMS), and cloud-based tracking platforms, artificial intelligence (AI) with the application of AI in data analysis and demand forecasting to help companies anticipate customer needs and respond to market demand more quickly, sustainable logistics with a focus on environmentally friendly logistics practices, such as the use of environmentally friendly materials and reducing carbon footprints, supercomputers with computing capabilities faster and more accurate to support more precise decision making, smart robots in automating logistics processes to increase efficiency and reduce human error and neurotechnology with the development of technology that can assist in making more precise, effective and efficient decisions (Ramon-Rodriguez et al., 2021).

Impact on Industry with the application of technology and continuous innovation in the supply chain business can increase efficiency with the use of digital technology and AI can help companies reduce operational costs and increase efficiency, improving quality with the implementation of more sophisticated technology can help companies improve the quality of products and services, change in comfort zones: companies must be ready to adapt to rapid technological changes and leave their comfort zones (De Felice & Petrillo, 2021).

Prediction of the future sustainability of supply chain companies related to technology, innovation and collaboration in the era of globalization with the use of digital technology, companies will increasingly use digital technology such as artificial intelligence (AI), internet of things (IoT), and blockchain to increase efficiency and productivity, companies will increasingly use data analysis to make more precise decisions and improve performance, companies will increasingly pay attention to cyber security to protect data and systems from cyber security threats, product and service innovation: Companies will increasingly innovate in developing better and more environmentally friendly products and services, companies will increasingly develop business models new, more sustainable and more focused on customer needs, companies will increasingly collaborate with startups to develop innovation and new technology, companies will increasingly collaborate with other companies around the world to develop business and increase sustainability, companies will increasingly develop global markets to increase sales and increase sustainability, and companies will increasingly develop human resources to increase capabilities and increase sustainability (Prasanna et al., 2019).

The future of supply chain company sustainability will be closely linked to technology, innovation and global collaboration. Companies must be ready to adapt to rapid change and improve sustainability to achieve long-term success. Innovation, productivity and sustainability are three very important concepts in

improving the performance and success of an organization or business. For supply chain sustainability in the era of globalization, companies must pay attention to the following things, namely: companies will increasingly focus on reducing carbon emissions and increasing environmental sustainability, companies will increasingly use renewable energy such as solar energy and wind energy to increase sustainability, and companies will increasingly develop environmentally friendly products to increase sustainability (Baghdadi, 2019).

The relationship between innovation, productivity and sustainability, namely innovation can increase productivity by developing more efficient processes and technology, productivity and sustainability with high productivity can help an organization or business to survive and develop in the long term, innovation and sustainability with innovation can help an organization or business to develop products and services that are more environmentally friendly and sustainable.

Meanwhile, the benefits of implementing technological innovation are that it can improve the performance, productivity and sustainability of an organization or business and success, innovation can help an organization or business to develop better and more environmentally friendly products and services, increase trust and productivity and can help an organization or business to increase trust and reputation in the eyes of customers and society.

Strategies for facing supply chain challenges in the era of globalization, namely for companies to increase investment in infrastructure, then the government and private sector need to increase investment in infrastructure to increase supply chain efficiency, the government and private sector need to increase human resource capabilities to increase supply chain capabilities, the government and private sector need to increase cooperation with other countries to increase supply chain capabilities and the government and private sector need to increase the use of technology to increase supply chain efficiency.

CONCLUSION

Based on the results of the research and discussion, it can be concluded that the findings are as follows:

1. The supply chain business is still promising in this era of globalization with the increasingly massive application of digital technology, the company's supply chain still has several weaknesses, such as low efficiency, significant bottlenecks, and unsatisfactory product quality, the use of technology and data analytics can help improve supply chain efficiency and performance, increasing human resource capabilities and collaboration with suppliers can also help improve performance and customer satisfaction, companies need to increase investment in technology, human resources, and cooperation with suppliers to improve performance. and supply chain sustainability, supply chains that have implemented technology help companies to improve performance, customer satisfaction and sustainability within the company.
2. The implications of the results of this research are that it can help companies improve performance and customer satisfaction, this research can help companies improve supply chain sustainability, this research can help

companies improve their ability to compete in the global market, this research can help companies increase customer trust and improve the company's reputation.

RECOMMENDATION

Recommendations from the results of this research are that companies need to develop a more effective and efficient supply chain strategy, companies need to increase the use of technology and data analytics to improve performance and customer satisfaction, companies need to improve human resource capabilities and cooperation with suppliers to improve performance and customer satisfaction, companies need to increase investment in technology, human resources, and cooperation with suppliers to improve supply chain performance and sustainability.

FURTHER STUDY

Then, for further research, research needs to be carried out on the influence of innovation, technology and sustainability on supply chain businesses in the era of globalization.

REFERENCES

Baghdadi, I. (2019). Innovation Networks: A Tool for Food-Culture Preservation and Sustainability in the Era of Globalization. *Journal of Sustainable Development*, *12*(1). https://doi.org/10.5539/jsd.v12n1p10

Bischoff, O., & Seuring, S. (2021). Opportunities and limitations of public blockchain-based supply chain traceability. *Modern Supply Chain Research and Applications*, *3*(3). https://doi.org/10.1108/mscra-07-2021-0014

Chang, Y., Iakovou, E., & Shi, W. (2020). Blockchain in global supply chains and cross border trade: a critical synthesis of the state-of-the-art, challenges and opportunities. *International Journal of Production Research*, *58*(7). https://doi.org/10.1080/00207543.2019.1651946

De Felice, F., & Petrillo, A. (2021). An interdisciplinary framework to define strategies for digitalization and sustainability: Proposal of a 'digicircular' model. *IET Collaborative Intelligent Manufacturing*, *3*(1). https://doi.org/10.1049/cim2.12013

Dutta, P., Choi, T. M., Somani, S., & Butala, R. (2020). Blockchain technology in supply chain operations: Applications, challenges and research opportunities. *Transportation Research Part E: Logistics and Transportation*

Review, *142*. https://doi.org/10.1016/j.tre.2020.102067

Ergun, O., Hopp, W. J., & Keskinocak, P. (2023). A structured overview of insights and opportunities for enhancing supply chain resilience. *IISE Transactions*, *55*(1). https://doi.org/10.1080/24725854.2022.2080892

Friedman, N., & Ormiston, J. (2022). Blockchain as a sustainability-oriented innovation?: Opportunities for and resistance to Blockchain technology as a driver of sustainability in global food supply chains. *Technological Forecasting and Social Change*, *175*. https://doi.org/10.1016/j.techfore.2021.121403

Garcia, D. J., & You, F. (2015). Supply chain design and optimization: Challenges and opportunities. *Computers and Chemical Engineering*, *81*. https://doi.org/10.1016/j.compchemeng.2015.03.015

Gupta, S., & Palsule-Desai, O. D. (2011). Sustainable supply chain management: Review and research opportunities. *IIMB Management Review*, *23*(4). https://doi.org/10.1016/j.iimb.2011.09.002

Hendro, J., & Bowo Pranogyo, A. (2023). Inovasi Berkelanjutan: ESG Initiatives Untuk Masa Depan Yang Bertanggung Jawab. *Jurnal Ilmu Sosial, Manajemen, Akuntansi Dan Bisnis*, *4*(4). https://doi.org/10.47747/jismab.v4i4.1445

Kache, F., & Seuring, S. (2017). Challenges and opportunities of digital information at the intersection of Big Data Analytics and supply chain management. *International Journal of Operations and Production Management*, *37*(1). https://doi.org/10.1108/IJOPM-02-2015-0078

Kumar, A., & Agrawal, S. (2023). Challenges and opportunities for agri-fresh food supply chain management in India. In *Computers and Electronics in Agriculture* (Vol. 212). https://doi.org/10.1016/j.compag.2023.108161

Marhawati, A. Azizah, Erwina, & Raflianto. (2023). E-commerce dan Startup: Wujud Inovasi Keberlanjutan Bisnis Di Era Industri 4.0. *Journal of Economics, Entrepreneurship, Management Business and Accounting*, *1*(1). https://doi.org/10.61255/jeemba.v1i1.16

Parola, F., Satta, G., Buratti, N., & Vitellaro, F. (2021). Digital technologies and

business opportunities for logistics centres in maritime supply chains. *Maritime Policy and Management*, *48*(4). https://doi.org/10.1080/03088839.2020.1802784

Prasanna, R. P. I. R., Jayasundara, J. M. S. B., Gamage, S. K. N., Ekanayake, E. M. S., Rajapakshe, P. S. K., & Abeyrathne, G. A. K. N. J. (2019). Sustainability of SMEs in the competition: A systemic review on technological challenges and SME performance. In *Journal of Open Innovation: Technology, Market, and Complexity* (Vol. 5, Issue 4). https://doi.org/10.3390/joitmc5040100

Ramon-Rodriguez, A. B., Such-Devesa, M. J., Perles-Ribes, J. F., & Moreno-Izquierdo, L. (2021). Competitiveness, intelligence and sustainability in consolidated destinations: What we know and pending research challenges. In *Tourism* (Vol. 69, Issue 2). https://doi.org/10.37741/T.69.2.8

Remko, van H. (2020). Research opportunities for a more resilient post-COVID-19 supply chain – closing the gap between research findings and industry practice. *International Journal of Operations and Production Management*, *40*(4). https://doi.org/10.1108/IJOPM-03-2020-0165

Sallam, K., Mohamed, M., & Wagdy Mohamed, A. (2023). Internet of Things (IoT) in Supply Chain Management: Challenges, Opportunities, and Best Practices. *Sustainable Machine Intelligence Journal*, *2*. https://doi.org/10.61185/smij.2023.22103

Sivula, A., Shamsuzzoha, A., & Helo, P. (2021). Requirements for blockchain technology in supply chain management: An exploratory case study. *Operations and Supply Chain Management*, *14*(1). https://doi.org/10.31387/oscm0440284

Sodhi, M. M. S., & Tang, C. S. (2021). Supply Chain Management for Extreme Conditions: Research Opportunities. In *Journal of Supply Chain Management* (Vol. 57, Issue 1). https://doi.org/10.1111/jscm.12255

Sodhi, M. M. S., Tang, C. S., & Willenson, E. T. (2023). Research opportunities in preparing supply chains of essential goods for future pandemics. *International Journal of Production Research*, *61*(8).

https://doi.org/10.1080/00207543.2021.1884310