

DIGITALIZATION OF SUPPLY CHAIN - STS TRADING COMPANY – A QUALITATIVE CASE STUDY

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ABSTRACT

While supply chain digitalization connects all parties to develop an efficient process, it is a complex task, especially in an underdeveloped country. This qualitative single holistic (single unit of analysis) case study revolves around exploring the obstacles that STS trading company has faced with regard to the digitalization of its supply chains and the mechanisms through which the case firm can improve its supply chain digitalization process. Using purposive sampling, ten semi-structured interviews were taken. The findings of this study have revealed that technology adoption, resistance to change, cost and investment issues, lack of skills and training, and supplier/partner collaboration restrict the ability of the case firm to digitalize its supply chains. Assessment and strategy development, collaboration, training and development, outsourcing, and use of consultants can assist the case firm in this regard. The outcomes of this study have implications for both academia and industry. This study bridges the gap between theoretical concepts and real-world implications, providing actionable insights for supply chain optimization.

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INTRODUCTION

STS Trading Company came into existence in 2016 and the company is owned by Dewan Plastics Pvt. Ltd. It is located in Sukkur, Sindh, Pakistan. As a subsidiary of Dewan Plastics Pvt. Ltd., a renowned name in the industry, it takes pride in providing top-quality sanitary products to its valued customers. It is leading with an extensive distribution network spanning across Sindh and Punjab, they strive to offer a comprehensive range of sanitary products as per the requirement of their customers. STS Trading Company, understand the importance of quality and reliability when it comes to sanitary products, and its commitment to excellence is reflected in the diverse range of products they are offering, ensuring that consumers have access to the best options available in the market whether they are looking for bathroom fixtures, faucets, showers, or any other sanitary essentials. As a leading player in the industry, their vast experience and expertise enable them to source products from reputable manufacturers and suppliers. This allows them to maintain consistent quality standards and ensure customer satisfaction with every purchase. They believe in forging long-term relationships with customers by providing them with reliable products and services. What sets us apart is a robust distribution channel, which allows us to reach customers in both Sindh and Punjab efficiently. Their widespread network ensures products are readily available, whether you're a homeowner, contractor, or part of a commercial project. They are dedicated to delivering products on time and in their original condition, guaranteeing a seamless buying experience. At STS Trading Company, we prioritize customer satisfaction above all else. Our knowledgeable and friendly team is always ready to assist you in finding the perfect sanitary products that meet customers' specific needs. They are trying to be your trusted partner, providing not only superior products but also valuable guidance and support throughout your journey. They invite you to explore their extensive range of sanitary products and experience the excellence that STS Trading Company has to offer. They emphasize to their customers to discover why we are the preferred choice for customers seeking quality, reliability, and unmatched service.

In the past decade, businesses were not much focusing about the digitization of their supply chains, and they were wasting their capital resources by investing in the excess Inventory their supply chain was not digitalized as per industry demands therefore, they were not progressing as per competition. Businesses were very much conscious that digitalization will be costly and it won't bring

reasonable results and it won't save extra costs but slowly and gradually after the Industrial Revolution and Internet era companies researched the upcoming transitions in supply chain management then they started updating their supply chains and nowadays, AI, big data analytics, the cloud, and block chain technology are just some of the digital technologies that firms are utilizing to revamp how they manage their supply chains.

Due to corruption and inefficiencies in disaster relief operations (DROs), there is a demand for openness and visibility in the chain of supply and logistics for humanitarian assistance. Due to the fact that humanitarian logistics and supply chain visibility for DROs in Pakistan would be greatly improved by digitization in the future. It has been shown that (Iqbal, & Ahmad, 2022). Due to changes in modern times supply chains traditional supply chains need digitalization's support to improve performance. (Ahmed et al, 2021).

Our aim was to explore the emerging hybrid practices in customer service and logistics that businesses need to adopt in the current landscape, it incorporates both virtual and physical components. Successful companies, according to our findings, are those that regularly come up with novel commercial, scientific, and technological concepts. When it comes to developing and releasing innovative goods, services, and technology, they also excel at pooling their resources. We have also used analytical methods to identify the elements that cause shifts in distributive logistics management in the context of the digital economy. According to our research (Parfenov et al., 2021), this shift has far-reaching effects on channel management. Countries' fiscal and environmental sustainability have been significantly impacted by the introduction of Industry 4.0. This is true even for developing nations like Pakistan. In particular, GSCM, or green supply chain management, methods have been shown to benefit from the implementation of Industry 4.0. As reported by (Umar et al., 2022).

Crisis simulation, locating and safeguarding logistics, and digitizing the cold supply chain are only some of the measures that may be taken to increase the supply chain's resilience in the face of threats like the Covid-19 pandemic. To wit: (Khan et al., 2023). Businesses must ensure that their supply chain can be successful in crises because to compete and survive in the industry they must deploy modern technology and transform and be ready for upcoming crises. The performance of businesses is not much impacted directly by the digital revolution. As a result, smart technologies are crucial for creating the connection between digital transformation and firm success. (AlMulhim, A.F. 2021). This study examines the impact and approaches of incorporating digital business intelligence to integrate different administrative and engineering processes within small and medium enterprises (SMEs) in the context of digital transformation. As a result, the performance of SMEs in terms of product delivery has notably improved, enabling them to achieve an engineer-to-order (ETO) lead time similar to that of companies specializing in manufacture-to-order (Bejlegaard, M., et al 2021).

Advancements in technology present fresh prospects for supply chain management, putting out a counterargument to the commonplace belief that complexity reduction programs are the only way to deal with the complexities inherent in the supply chain pipeline. As a consequence, firms in high-cost countries have access to novel competitive prospects, demonstrating the way in which conventional methods of the coordination of supply chains are being put to the test by the adoption of cutting-edge technical solutions for comprehensive digital integration. (Bejlegaard, M., et al 2021).

The findings of the research indicate that companies are increasingly driven to embrace digitalization. The study highlights the transformative shifts occurring within supply chains and their operational functions, conforming to the standards of the Fourth Industrial Revolution (Baber, 2022). In the digital upstream supply chain, the statement highlights the need of data analytics skills for improving supply chain performance. Additionally, it highlights the significance of data analytics skills in propelling the development and success of the supply chain of the internet. (Hallikas, J., et al, 2021).

In the current business landscape, competition has shifted from being solely between organizations to encompassing entire supply chains. This shift underscores the potential benefits of effective supply chain management (SCM) as a strategic approach to gain a competitive edge and improve overall organizational performance. Both edge over others and organizational performance are examined in relation to supply chain oversight (SCM) strategies. The findings imply that SCM practices at higher levels can boost competitive advantage and enhance organizational performance. Additionally, competitive advantage may directly enhance organizational performance. Additionally, this study

supports the idea that competitive advantage mediates the link between SCM procedures and organizational success. (Cahyono, Y.,2023).

Predictions indicate that unmanned aerial vehicles, big data analytics, and the rise of the Internet of Things (IoT) will have the most future influence on Vietnamese supply chains among industry 4.0 digital technologies. Although widespread use of these innovations is only getting started. it holds greater potential for influencing future sustainability outcomes compared to attempting to retrofit or disrupt existing networks and infrastructure. (Akbari, M.,2022). Therefore, Companies are adopting digitalization in their supply chains to progress in the future Digitalization will be the future of companies and those companies or businesses that ignore digitalization or technological transformation will have vanished soon.

This study has provided new insights that how implementation of digital supply chain management can be implemented in STS trading company, as well as how the digitalization of supply chains can effectively enhance their profitability. Digitalization has automated the operations by using technology and it removed waste and sped up the processes and operations at the firm. As before this study firm was following traditional practices and they are spending huge amounts on running their operations, whereas after the digitalization of the supply chain the profitability of the firm increased. This study can be helpful for Industry and other trading companies can also replicate digitalization practices at their companies and increases the efficiency and profitability because this study can be implemented in the industry to get a competitive advantage in the industry. After all, the future of business is digitalization, and every company will integrate technology into their business operations. Modern technological transformation pushed companies completely to digitalize their operations worldwide and they are researching new and best technologies and getting benefited by implementing them. In addition, this study will help the trading companies to implement digitalization in their whole supply chain and help their business by focusing on modern technologies adoption, and future organizations to digitalize the supply chain landscape of their organization. This study will add knowledge in existing literature and add value in Academia as well, Teachers can also refer this case for their supply chain classroom discussions and emphasize students to study how digitalization can benefit organizations by cutting extra cost and increasing their profitability and helping them to lead the market by adopting modern technology and transform their supply chains as per the modern industry dynamics. It also helps teachers to explain how digitalization can be implemented in a firm and how it will boost the profitability of firm, Students will understand the real case study and they will be updated about digitalization practices in Industry, it will add value in their knowledge and understanding. Therefore, digitalization can play a significant role in the firm, overall Industry, and Academia as well.

METHOD

This study is based on an inductive reasoning method. Inductive research approach (this research is known as subjective because from data the new theory will be developed, and that researched theory will be used in the future. The inductive approach focuses on the understanding of phenomena through the collection and analysis of qualitative data. Inductive reasoning uses primarily qualitative information. Qualitative data include written material and verbal responses like Interviews. This data is examined by utilizing a hermeneutics technique (The process of analyzing and interpreting written text and imagery involves examining the content and visuals to comprehend the message being conveyed and to uncover the author's underlying intentions. This process requires a careful examination of the language, tone, symbolism, and other literary devices used in the text or image to gain a deeper understanding of its meaning. Through this analysis, the reader can identify themes, motifs, and other elements that contribute to the overall message and purpose of the work), in which the information is logically explained by the creation of a new theory. Therefore, an Inductive approach will be used for this study.

Given what is explained in the literature and the way the authors relate the supply chain to achieving digitalization. STS trading company, they are using traditional practices in its supply chain but after this research study one can easily transform it into a digitalized supply chain. Though, the study is focused on a qualitative approach, and it helps in understanding a social phenomenon (Renz et al., 2018). There are several ways to approach qualitative research method, a study examined 89 sources by

trying to define the term "qualitative." (Aspers & Corte, 2019). The author believes that qualitative research is an ongoing approach by which the research community gains a better comprehension by finding new significant distinctions as they get nearer to the phenomenon being investigated. The evaluation of complex multi-treatments, focusing on the improvement of interventions, and examining the reasons why specific events are noticed (or otherwise) are all especially appropriate for qualitative research (Busetto et al., 2020). For the purpose of analyzing digitalization practices in the supply chain, a single case study approach has been adopted in this study. Case study research is a valuable method for investigating specific cases in depth, allowing for a comprehensive analysis of the subject matter. Furthermore, it primarily concentrates on the approaches that could be used for this research. Therefore, a single qualitative case study is used for this study.

There are various methods of data collection, including primary and secondary data. In this particular study, the focus was on gathering primary data, which is first-hand information collected directly from the source. Primary data is the first-hand data collected by the researcher himself (Saunders, 2011). The Primary Method is used to collect data for this study, the most suitable method for gathering data was determined to be a semi-structured interview method. Face-to-face, as well as Zoom interviews, will be carried out with the participants of the research, among them employees of a company, suppliers, customers, digitalization experts in the supply chain, supply chain experts, and Industry consultants. The semi-structured (open-ended questions) is used to find a better solution to the research questions. In-depth knowledge about people's lives is obtained through open-ended interview questions (Jayachandran et al., 2023). Considering data for a record some Zoom interviews, however during the interview notes will be taken which will help conclude. Hence, semi-structured interviews are taken for conducting this study.

As per the design of this case study research, I have used non-probability sampling technique which will be further followed by purposive sampling. The term "non-probability sampling methods" refers to techniques that do not give every possible item in the universe a known probability of being selected for the sampling. The purposive sampling technique enables academics to obtain a diverse range of knowledge from the data they collect. As a result, academics can discuss the significant implications of their findings for a wider audience. Although there are advantages and disadvantages to using purposive sampling there is nothing wrong with purposeful sampling and it is acceptable as far as readers are informed of the (sub) population to which the results apply (Andrade, 2020). I have used purposive sampling. Most often, 4-12 interviews are recommended which are useful to saturate (Eisenhardt, 1989). Hence, I have used 10 interviews for accurate data collection.

Participants of the study will include

1. Employees of the firm
2. Suppliers of the firm
3. Customers of the firm
4. Supply Chain Digitalization experts
5. Supply Chain Experts
6. Industry Experts

In this study, I have used thematic analysis as a qualitative research technique to explain the importance of specific words and data received during interviews hence, thematic analysis helps in discovering meaning in data. Which offers a methodical way to find meaning in textual data (Kleinheksel et al., 2019). It helps the researchers to comprehend the relevance, interpretations, analysis, quantification, and relationships of such particular or particular words, ideas, or topics using thematic analysis. Interview transcripts are collected. All the interview protocols have been followed throughout the interviews, followed by coding, sorting, and sifting. Along with that Thematic analysis is a widely used method for analyzing qualitative data in social sciences and other fields. It involves identifying, analyzing, and reporting patterns or themes within the data.

The case study has followed all the ethical standards, and it has adhered to all ethical policies of the firm, Ethical considerations are the principles and guidelines which guide this study which includes voluntary participation, informed consent, confidentiality, awareness of potential harms, and communication of final results. Business Ethics is important while conducting this research because participants' responses must be utilized ethically there, confidently and privacy is important, maintaining

a suitable environment has made participants feel comfortable to participate while conducting interviews. While conducting research all the Interview protocols were followed, and the participants' confidentiality was maintained and guaranteed participants won't be pressurized to contribute but their participation was on a purely voluntary basis to avoid biases. Participants' prior consent is obtained. If the interviewees don't feel comfortable, they can leave the interview room. The information gathered for this study is solely utilized' for this study. Therefore, it is highlighted that there is not any compromise on ethical standards and business ethics to get genuine outcomes of this study.

RESULT AND DISCUSSION

This information was gathered through interviews with industry representatives who were brought to the Company for interviews and are available to conduct those interviews. References and expert opinions are always based on the recommendations of experts in the logistics sector. This was true whether they were consulted or not. In addition to professionals in logistics, the list also featured employees, suppliers, customers, supply chain experts, Industry expert, and digitalization expert.

This study is based on the data taken from the interviews by distinctive people including the employees of the case firm, suppliers of the firm, and digitalization supply chain experts, SCM experts, and 10 interviews was conducted, and from the data it is decided that digitalization of supply chains is challenging for the industry. The discussion section of this qualitative case study presents a comprehensive analysis of the findings. Digitalization will transform traditional supply chains. As of today, it is said that without technology integration, it is difficult to compete in the modern global world, where everyone prefers a green supply chain, and sustainable operations technology has changed businesses. The goal was to identify the obstacles that STS trading company has faced to digitalize its supply chains. An empirical study was carried out at STS trading company which helped to achieve this goal. The study revealed that STS Trading Company encountered several challenges during the digitalization process. These challenges include awareness, technology constraints, resistance to change among employees, need for substantial investments, data integration and security, lack of skills and training, old traditional management mindset, inefficient communication, supplier and partner collaboration and there is not any academia and industry linkage. To overcome these hurdles, the company devised strategies like providing thorough training, involving employees in the decision-making process, and phased implementation. These findings correspond with the existing literature that highlights the importance of change management and employee engagement in successful digital transformation.

The case study found that the successful digitalization of the supply chain at STS Trading Company relied on the integration of various digital technologies such as IoT devices, data analytics, and cloud-based platforms. The company leveraged these technologies to enhance inventory management, optimize logistics, and improve demand forecasting. These findings align with previous research indicating that the effective integration of digital technologies is essential for achieving supply chain efficiency and visibility. The study revealed that digitalization led to improved supply chain resilience and flexibility. Real-time data availability enabled the company to identify disruptions promptly and implement agile responses. The ability to quickly adapt to changing market conditions was highlighted as a key advantage. This outcome is consistent with literature emphasizing the role of digitalization in enhancing supply chain agility and resilience. The case study found a positive correlation between the digitalization of the supply chain and overall business performance and profitability. STS Trading Company experienced improved operational efficiency, reduced lead times, and enhanced customer satisfaction. The digitalization efforts translated into better decision-making due to data-driven insights. These findings align with existing research that emphasizes the potential of digital supply chains to enhance operational performance. The study highlighted that digitalization facilitated stronger collaboration with suppliers and partners. Real-time data sharing improved communication and coordination across the supply network. The findings support the literature's assertion that digitalization fosters better collaboration, leading to optimized supply chain processes. The case study noted that digitalization positively impacted the company's environmental sustainability efforts. Optimized logistics and inventory management reduced resource wastage and carbon emissions. These findings are in line with the growing emphasis on how digital supply chains can contribute to

sustainability objectives. Based on the findings, the case study offers valuable insights for other companies aiming to digitalize their supply chains. Lessons include the need for a holistic approach, strong leadership support, effective change management, and continuous monitoring of digitalization initiatives. In conclusion, the qualitative case study of the digitalization of the supply chain at STS Trading Company underscores the transformative potential of digitalization. The findings emphasize how strategic implementation of digital technologies can lead to enhanced supply chain performance, profitability, resilience, and collaboration. The study contributes to the existing body of literature by providing empirical evidence of the benefits and challenges associated with digital supply chain transformation. This study will add knowledge in existing literature and add value in Academia as well, Teachers can also refer this case for their supply chain classroom discussions and emphasize students to study how digitalization can benefit organizations by cutting extra cost and increasing their profitability. It also helps teachers to explain how digitalization can be implemented in a firm and how it will boost the profitability of firm, Students will understand the real case study and they will be updated about digitalization practices in Industry. Therefore, digitalization can play a significant role in the firm, overall Industry, and Academia as well.

Table 1. List of interviews taken

Interviewees	Relevant experience
Employee #1	4 years
Employee #2	6 years
Industry Expert #1	8 years
Supplier #1.	8 years
Supplier #2.	5 years
Customer #1.	4 years
Customer #2.	8 years
Supply Chain Expert # 1	6 years
Supply Chain Expert # 2	7 years
Digitalization Expert # 1	9 years

CONCLUSION

The goal of this research study was to highlight the challenges faced by STS Trading Company in implementing digitalization procedures. This qualitative case study investigating the digitalization of the supply chains at STS Trading Company offers significant insights into the transformative impact of digital technologies on supply chain operations. The study highlights that successful digitalization is a multifaceted process that requires strategic planning, integration of technologies, change management, and collaboration. The findings underscore the positive outcomes of digitalization, including enhanced supply chain resilience, operational efficiency, and collaboration with suppliers and partners. Real-time data availability facilitates agile decision-making, leading to improved responsiveness to market dynamics. Moreover, the study sheds light on the positive influence of digitalization on environmental sustainability efforts, contributing to the growing discourse on the synergy between digital supply chains and sustainability goals. As organizations increasingly turn to digital solutions to drive competitiveness and efficiency, the case of STS Trading Company serves as a valuable guide. The insights derived from this study can inform the strategies of companies seeking to embark on similar digital transformation journeys in their supply chains. It is evident that embracing digitalization is not merely an operational shift but a strategic imperative that requires holistic consideration and continuous evaluation to adapt to evolving market dynamics. This case study contributes to the broader understanding of how digitalization reshapes supply chain dynamics and reinforces the idea that a well-executed digital strategy can yield substantial benefits, positioning companies for enhanced performance, resilience, and sustainable growth in an increasingly digitized business landscape and it will improve the profitability of company in long run.

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REFERENCES

- Akbari, M., Hopkins, J.L. Digital technologies as enablers of supply chain sustainability in an emerging economy. *Oper Manag Res* **15**, 689–710 (2022). <https://doi.org/10.1007/s12063-021-00226-8>
- AlMulhim, A.F. (2021), "Smart supply chain and firm performance: the role of digital technologies", *Business Process Management Journal*, Vol. 27 No. 5, pp. 1353-1372. <https://doi.org/10.1108/BPMJ-12-2020-0573>
- Attaran. M (2020). Digital technology enablers and their implications for supply chain management, *Supply Chain Forum: An International Journal*.
- Bejlegaard, M., Sarivan, I.-M. and Waehrens, B.V. (2021), "The influence of digital technologies on supply chain coordination strategies", *Journal of Global Operations and Strategic Sourcing*, Vol. 14 No. 4, pp. 636-658. <https://doi.org/10.1108/JGOSS-11-2019-0063>
- Blandine. A, Omar. B, & Angappa. G (2020). Digital supply chain: challenges and future directions, *Supply Chain Forum: An International Journal*, **21**:3, 133-138,
- Cahyono, Y., Purwoko, D., Koho, I., Setiani, A., Supendi, S., Setyoko, P., Sosiady, M & Wijoyo, H. (2023). The role of supply chain management practices on competitive advantage and performance of halal agroindustry SMEs. *Uncertain Supply Chain Management*, 11(1), 153-160.
- Cao.Y & Jiang.H. (2020). Study on Jingdong Company's Emergency Supply chain in the Context of Unconventional Emergency of Novel Coronavirus Pneumonia. *E3S Web of Conferences* 235, 03026 (2021)
- Chauhan. S, Singh. R, Gehlot. A., Akram. SV, Twala. B & Priyadarshi. N (2020) Digitalization of Supply Chain Management with Industry 4.0 Enabling Technologies, A Sustainable Perspective. *Processes* **2023**, **11**: 9 <https://doi.org/10.3390/pr11010096>
- Hallikas, J., Immonen, M. and Brax, S. (2021), "Digitalizing procurement: the impact of data analytics on supply chain performance", *Supply Chain Management*, Vol. 26 No. 5, pp. 629-646. <https://doi.org/10.1108/SCM-05-2020-0201>
- Harju, A., Hallikas, J., Immonen, M. and Lintukangas, K. (2023), "The impact of procurement digitalization on supply chain resilience: empirical evidence from Finland", *Supply Chain Management*, Vol. 28 No. 7, pp. 62-76. <https://doi.org/10.1108/SCM-08-2022-0312>
- Hautala-Kankaanpää. T (2022). The impact of digitalization on firm performance: examining the role of digital culture and the effect of supply chain capability. *Emerald Publishing Limited*. **28**: 8, 2022pp. 90-109 <https://www.emerald.com/insight/1463-7154.htm>
<https://doi.org/10.1080/16258312.2020.1751568>
<https://doi.org/10.1080/16258312.2020.1816361>
- Iqbal, T., & Ahmad, S. (2022). Transparency in humanitarian logistics and supply chain: The moderating role of digitalization. *Journal of Humanitarian Logistics and Supply Chain Management*.
- Ivanov, D "Digital Supply Chain Management and Technology to Enhance Resilience by Building and Using End-to-End Visibility During the COVID-19 Pandemic," in *IEEE Transactions on Engineering Management*, doi: 10.1109/TEM.2021.3095193.

- Khaddam, A, Irtaimah, H & Bader, B. (2020). The effect of supply chain management on competitive advantage: The mediating role of information technology. *Uncertain Supply Chain Management*, 8(3), 547-562.
- Khan, A. U., & Ali, Y. (2023). Enhancement of resilience and quality of cold supply chain under the disruptions caused by COVID-19: A case of a developing country. *Australian Journal of Management*, 48(2), 341–365. <https://doi.org/10.1177/03128962221095596>
- Kim, H.K & Lee C.W(2021). Relationships among healthcare digitalization, social capital, and supply chain performance in the healthcare manufacturing industry. *International Journal of Environmental Research and Public Health*,18:4
- Kittipanya-ngam, P & Hua, TK (2021). A Framework for Food Supply Chain Digitalisation: Lessons from Thailand,
- Lee.S.Y.(2021). Sustainable Supply Chain Management, Digital-Based Supply Chain Integration, and Firm Performance: A Cross-Country Empirical Comparison between South Korea and Vietnam.*Sustainability*,13:13 <https://doi.org/10.3390/su13137315>
- Li, D, Li, D, Liu, Y& Shou, Y. (2022). Digitalization for supply chain resilience and robustness: The roles of collaboration and formal contracts. *springer.com and journal.hep.com*. 10(1): 5–19.
- Li, Y, Li, D, Liu, Y& Shou, Y (2023) Digitalization for supply chain resilience and robustness: The roles of collaboration and formal contracts, *Frontiers of Engineering Management*, 10(1): 5–19 <https://doi.org/10.1007/s42524-022-0229-x>
- Liu, K.P, & Chiu.W (2021). Supply Chain 4.0: the impact of supply chain digitalization and integration on firm performance, *Asian Journal of Business Ethics*,10:2, 371-389<https://doi.org/10.1007/s13520-021-00137-8>
- Nasiri, M, Ukko, J, Saunila, M & Rantala, T. (2020). Managing the digital supply chain: The role of smart technologies, *Technovation*, 96-97<https://doi.org/10.1016/j.technovation.2020.102121>
- Parfenov A, Shamina L, Niu J, Yadykin V. Transformation of Distribution Logistics Management in the Digitalization of the Economy. *Journal of Open Innovation: Technology, Market, and Complexity*. 2021; 7(1):58. <https://doi.org/10.3390/joitmc7010058>.
- S. Ahmed Khan, S. Kusi-Sarpong, H. Gupta, F. Kow Arhin, J. Nguseer Lawal and S. Mehmood Hassan, "Critical Factors of Digital Supply Chains for Organizational Performance Improvement," in *IEEE Transactions on Engineering Management*, doi 10.1109/TEM.2021.3052239.
- Sarkis, J., Kouhizadeh, M. & Zhu, Q.S. (2020). Digitalization and the greening of supply chains, *Industrial Management & Data Systems*, 121:1, 65-85. <https://doi.org/10.1108/IMDS-08-2020-0450>
- Syed Baber Ali. (2022). Industrial Revolution 4.0 and Supply Chain Digitization: Future of Supply Chain Management. *South Asian Journal of Social Review (ISSN: 2958-2490)*, 1(1), 21–41. <https://doi.org/10.57044/SAJSR.2022.1.1.220>
- Tashtoush, L. (2022). The Impact of COVID-19 Pandemic on the Relationship between Supply Chain Strategy and Organizational Performance. *Asian Journal of Economics, Finance and Management*, 4(1), 190–206.
- Umar, M., Khan, S.A.R., Yusoff Yusliza, M., Ali, S. and Yu, Z. (2022), "Industry 4.0 and green supply chain practices: an empirical study", *International Journal of Productivity and Performance Management*, Vol. 71 No. 3, pp. 814-832. <https://doi.org/10.1108/IJPPM-12-2020-0633>
- Yang, M, Fu, M, Zhang, Z. (2021). Technological Forecasting and Social Change<http://hdl.handle.net/10871/125543>
- Zhao, N, Hong, J, & Lau, K.W. (2023). Impact of supply chain digitalization on supply chain resilience and performance: A multi-mediation model, *International Journal of Production Economics*, 259