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# Optimization of Supply Chain Processes in the Retail Sector: A Data-Driven Simulation Approach for Inventory Management

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**Abstract**
*Efficient supply chain management in the retail sector is crucial for cost reduction and enhancing customer satisfaction. This study analyzes and optimizes inventory management using a data-driven simulation approach. By leveraging data on customer demand patterns, replenishment cycles, and delivery times, the research develops simulation models to evaluate inventory strategies under various scenarios, including high demand and seasonal fluctuations. The findings reveal optimal inventory strategies that minimize holding costs while maintaining product availability. Key performance metrics, such as fill rate and stockout levels, show significant improvements when simulation-based strategies are implemented. For example, under high-demand scenarios, the proposed model achieved a 20% reduction in holding costs and a 15% increase in fill rates compared to traditional methods. These results highlight the importance of integrating simulation techniques into retail supply chain management to enhance decision-making and operational efficiency. This research contributes to the literature by providing a practical framework for inventory optimization and offers actionable recommendations for retail managers to adopt technology-driven approaches. Future research should explore applying these methods to retail sectors with diverse demand characteristics.*

***Keywords:*** *Retail Sector, Inventory Management, Simulation Techniques.*

## I. INTRODUCTION

Supply chain management is a critical element in company operations, particularly in the retail sector, which faces significant challenges in meeting customer needs effectively and efficiently. The retail supply chain involves various actors such as manufacturers, distributors, and retailers, all of whom play a crucial role in ensuring the smooth flow of goods from upstream to downstream (Oyedijo et al., 2024). Supply chain efficiency determines a company's success in navigating ever-changing and increasingly competitive market dynamics, particularly in the digital era. However, one of the biggest challenges faced is the inability to accurately predict demand, which often leads to overstocking or understocking, increasing operational costs and decreasing customer satisfaction (Pasupuleti et al., 2024).

As technology advances, data-driven approaches have become a key solution for improving supply chain efficiency. By leveraging data analytics and simulation technologies, companies can make better decisions regarding stock management, replenishment, and product distribution (Ikevuje et al., 2024). This approach enables real-time data integration across the supply chain, helping companies anticipate demand fluctuations and reduce operational risk. One technology supporting this implementation is predictive analytics, which allows companies to leverage historical data to predict future market needs

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(Joel & Oguanobi, 2024). This allows for more efficient inventory management, avoiding waste due to excess stock, while ensuring product availability meets customer needs.

In recent decades, research on data-driven supply chain management has experienced rapid development. Several studies have shown that the integration of technologies such as the Internet of Things (IoT), artificial intelligence (AI), and cloud computing has a significant impact on supply chain efficiency and flexibility (Shoomal et al., 2024). For example, IoT enables automated operational data collection, while AI is used to analyze large-scale data to identify patterns and trends that are difficult to detect manually (Yang & Shami, 2022). Furthermore, cloud computing facilitates data access for all parties involved in the supply chain, thereby improving coordination between actors. However, although these technologies have shown great potential, their adoption in the retail sector still faces various challenges, including limited technological infrastructure, lack of data integration, and resistance to change within the organization (Toluwalase Vanessa Iyelolu et al., 2024).

The application of simulation techniques is also becoming an increasingly popular approach in supply chain optimization. Simulation allows companies to evaluate various scenarios without directly impacting operational activities (Abaku et al., 2024). For example, agent-based simulation can be used to model customer behavior in determining their shopping patterns, while dynamic system simulation helps analyze the impact of inventory management policies on a company's long-term performance (Li & Liu, 2024). With the ability to replicate complex interactions within a supply chain system, simulation techniques provide deeper insights into how best to manage the flow of goods, reduce the risk of stockouts, and improve overall operational efficiency (Ooi et al., 2024).

However, there are several gaps in previous research that need to be addressed. Most studies focus on only one aspect of the supply chain, such as inventory management or goods distribution, without considering the complex interactions between the various components within the system (Feng et al., 2022). Furthermore, many studies have not yet utilized the full potential of data-driven approaches, particularly in integrating data from multiple sources to support more comprehensive decision-making (Nguyen et al., 2022). This study aims to address these gaps by developing a data-driven supply chain model that not only optimizes inventory management but also improves coordination between actors within the overall supply chain system.

The urgency of this research is further heightened given the current global challenges facing the retail sector, such as supply disruptions due to the pandemic, unpredictable demand fluctuations, and increased competition in the digital marketplace. In this context, a data-driven approach can be key to enhancing retail companies' competitiveness by providing greater flexibility in responding to market changes (Alghamdi & Agag, 2024). Furthermore, the integration of simulation technology allows companies to anticipate the impact of various operational scenarios, thereby reducing the risks and costs that may arise from inappropriate decisions (Khedr & S, 2024).

This research aims to develop an innovative approach to supply chain optimization in the retail sector using a combination of data-driven analytics and simulation techniques. Through this approach, the research is expected to make a significant contribution to the supply chain management literature, particularly in terms of more efficient inventory management and product distribution. Furthermore, this research also seeks to provide practical solutions for retail companies facing increasingly complex operational challenges in the digital era. By leveraging technologies such as predictive analytics and agent-based simulation, this research is expected to improve operational efficiency, reduce waste, and enhance customer satisfaction.

Furthermore, this research not only offers a new approach to supply chain management but also provides deeper insights into the potential application of data-driven technology in the retail sector. Therefore, this research has the potential to become an important reference for academics and practitioners in developing more resilient and adaptive supply chain strategies in the future. In the long term, it is hoped that the results of this research can help retail companies better prepare to face global challenges and continue to innovate to meet customer needs.

## II. LITERATURE REVIEW

### *A. Supply Chain and Inventory Management Concepts*

A supply chain is an integrated system encompassing the flow of activities from raw material suppliers to product distribution to end customers (Nagy-Bota & Moldovan, 2022). In the retail sector, supply chains are becoming increasingly complex, involving multiple actors such as manufacturers, distributors, and retailers. This complexity demands a high level of coordination to ensure products are available at the right time and in the right quantities. Inventory management is a crucial element of the supply chain, focusing on controlling stock to match demand without excess or shortage (Tadayonrad & Ndiaye, 2023).

Previous research highlights the importance of efficiency in the supply chain to reduce operational costs and increase customer satisfaction (Hugo A. DeCampos et al., 2022). For example, research (Kolasani, 2023) shows that the implementation of blockchain technology can increase transaction speed and data security in the supply chain, thereby creating greater efficiency. Furthermore, (Babayev & Balajayeva, 2023) emphasizes that optimizing inventory management can reduce waste due to unsold or expired goods, thereby increasing company competitiveness.

In the context of inventory management, the Economic Order Quantity (EOQ) model is often used to determine the optimal order quantity that minimizes holding and ordering costs (Ritu Khanna et al., 2023). This approach provides guidance to avoid excess stock, which risks increasing holding costs, while preventing inventory shortages that could harm customers. However, the EOQ model has limitations in handling unexpected demand fluctuations. Research (García-Cutrín & Rodríguez-García, 2024) suggests that the Just-In-Time (JIT) model can be an alternative solution, where goods are ordered only as needed to reduce holding costs.

*B. Data-Driven Approach in Supply Chain*

Data-driven approaches have become a major trend in supply chain optimization. By leveraging predictive analytics, companies can project future demand based on historical data and market trends (Patrick Azuka Okeleke et al., 2024). Technologies such as the Internet of Things (IoT) and artificial intelligence (AI) play a key role in integrating real-time operational data to support better decision-making (Belhadi et al., 2024).

Research (Lăzăroiu et al., 2022) shows that IoT enables the automatic collection of data from various points in the supply chain, such as warehouses and retail stores, to provide accurate information on inventory levels. Meanwhile, AI is used to analyze big data to identify complex patterns, such as seasonal demand trends or changing customer preferences. This allows companies to be more responsive to market dynamics while reducing the risk of overstocking or understocking (Kurdi et al., 2022).

However, there are challenges in adopting a data-driven approach, especially among small and medium-sized enterprises (Kumar et al., 2023). Many retail companies lack adequate technological infrastructure to support real-time data integration. Furthermore, resistance to change within the organization is often a barrier to adopting new technologies. To address this issue, research (Almazmomi et al., 2022) suggests implementing a data-driven culture within the organization, which involves employee training and investment in supporting technology.

*C. Simulation Techniques in Supply Chain Optimization*

Simulation techniques are a widely used analytical approach to describe and analyze complex systems such as supply chains. Simulations allow companies to evaluate various scenarios without directly impacting operational activities (Deiva Ganesh & Kalpana, 2022). Some commonly used simulation types are agent-based simulation, discrete simulation, and dynamic system simulation (Stieler et al., 2022).

Agent-based simulation allows modeling the behavior of individuals or groups within a system, such as customer shopping patterns or stock replenishment decisions (Ouda et al., 2023). Discrete simulation, meanwhile, is used to analyze system changes at specific points in time, such as delivery schedules or inventory management (Kayikci et al., 2022). Dynamic system simulation focuses on cause-and-effect relationships at a broader system level, such as the impact of supply chain policies on a company's long-term performance (Sakai et al., 2022).

Previous research has shown that applying simulation can provide significant benefits in supply chain optimization. For example, research (Feng et al., 2022) identified that dynamic system simulations help companies analyze the impact of seasonal promotions on logistics needs. By using simulations, companies can design more effective strategies to manage demand spikes, thereby reducing operational costs and increasing customer satisfaction.

### *D. Gap Analysis and Research Justification*

Although numerous studies have explored the benefits of data-driven and simulation-driven approaches in supply chains, several gaps remain. Most previous studies have focused on only one aspect of the supply chain, such as inventory management or goods distribution, without considering the complex interactions between the various components within the system (Feng et al., 2022). Furthermore, many studies have used historical data without leveraging the full potential of predictive analytics to anticipate market changes (Nguyen et al., 2022).

This research aims to address this gap by developing a data-driven supply chain model that not only optimizes inventory management but also improves coordination between actors within the overall supply chain system. By leveraging a combination of technologies such as IoT, AI, and agent-based simulation, this research is expected to provide practical solutions to address operational challenges in the retail sector.

The urgency of this research is heightened given the current global challenges facing the retail sector, such as supply disruptions due to the pandemic, unpredictable demand fluctuations, and increased competition in digital markets. Using a data-driven approach, this research not only makes theoretical contributions to the supply chain management literature but also offers practical solutions for retail companies to improve operational efficiency, reduce waste, and enhance customer satisfaction.

## III. RESEARCH METHOD

### *A. Research Design*

This research uses a quantitative approach with simulation-based methods to optimize supply chain processes in the retail sector. The primary focus is on developing a data-driven model that utilizes predictive analytics and simulation techniques to efficiently manage inventory. Simulation is used to evaluate various operational scenarios without directly disrupting business activities. This method was chosen because of its ability to replicate complex interactions within the supply chain system, thus enabling the identification of optimal strategies for inventory management and product distribution.

*B. Population and Sample*

The population in this study is retail companies operating in Indonesia with digitally integrated inventory management systems. The sample was selected purposively, consisting of five large retail companies with complete operational data for analysis. The data used includes inventory reports, customer demand history, and distribution schedules for the past three years. This data is considered representative for identifying demand patterns and common inventory management challenges.

*C. Data Collection Techniques and Instruments*

Data was collected through two primary methods: secondary data collection and semi-structured interviews. Secondary data was obtained from the company's inventory management system, which uses Enterprise Resource Planning (ERP) software. This data includes information on inventory, replenishment times, and customer demand trends. Interviews were conducted with logistics and inventory managers to understand inventory management policies and operational challenges faced. The interview instrument was designed to elicit in-depth information about current inventory management practices.

*D. Data Analysis Techniques*

The collected data was analyzed using two main approaches: descriptive analysis to understand historical patterns and agent-based simulation to evaluate optimal scenarios. The descriptive analysis was performed using software such as Python with the pandas library and matplotlib for data visualization. The simulation was performed using AnyLogic software, which enables agent-based modeling to simulate various supply chain scenarios, including seasonal demand spikes and stock replenishment delays.

*E. Research Model*

The simulation model developed in this study consists of three main components: customer agents, supply agents, and retail agents. Customer agents represent consumer demand behavior, which is influenced by variables such as seasonal trends and product preferences. Supply agents are responsible for managing the distribution of goods from warehouses to retailers based on available stock levels. Retail agents maintain stock availability according to customer needs, while taking into account storage capacity constraints.

The symbols in the model are explained as follows:

D: Customer demand, projected using historical data analysis.

S: Stock levels at each retail agent, are set to minimize excess or shortage of stock.

R: Replenishment time, which is analyzed to determine the optimal interval to meet customer demand.

The validity and reliability of the model were tested by comparing the simulation results with existing historical data. Validity testing was performed using the Mean Absolute Percentage Error (MAPE) value, with values below 10% considered valid. Reliability was also tested using the bootstrap method to ensure consistency of the simulation results across multiple iterations.

## IV. RESULTS AND DISCUSSION

### Result

Research data was collected over a three-month period, from January to March 2024, at five large retail companies in Jakarta, Indonesia. Operational data, including inventory reports, customer demand histories, and distribution schedules, were collected through the companies' ERP systems. Additionally, semi-structured interviews were conducted with logistics and inventory managers to complement the quantitative data with qualitative insights.

*A. Data Analysis Findings*

The data analysis revealed several important patterns related to inventory management and distribution in the retail sector. The following are key findings based on the agent-based simulation:

*B. Demand Forecast*

The data-driven simulation was able to predict demand with a high degree of accuracy, as reflected in the Mean Absolute Percentage Error (MAPE) of 7.8%. Demand patterns exhibited significant fluctuations during weekends and certain promotional seasons, such as end-of-year sales.

*C. Stock Replenishment Efficiency*

By changing the stock replenishment interval from two weeks to one week, simulations showed a reduction in the risk of stockouts of up to 35%, without significantly increasing operational costs.

*D. Improved Distribution Coordination*

Simulations show that by improving coordination between supply agents and retailers, distribution cycle times can be reduced by up to 20%, which directly improves the efficiency of delivering goods to customers.

*E. Data Visualization*

Table 1 below shows a summary of the results of the demand prediction analysis based on historical data.

Table 1. Demand Forecast vs. Realization (January - March 2024)

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| Sunday | Demand Forecast (Units) | Demand Realization (Units) | MAPE (%) |
|---|---|---|---|
| 1 | 1,200 | 1,150 | 4.2 |
| 2 | 1,300 | 1,250 | 3.8 |
| 3 | 1,500 | 1,420 | 5.3 |
| 4 | 1,700 | 1,580 | 7.1 |

Figure 1 below visualizes the comparison between actual and predicted stock levels for high-demand items.

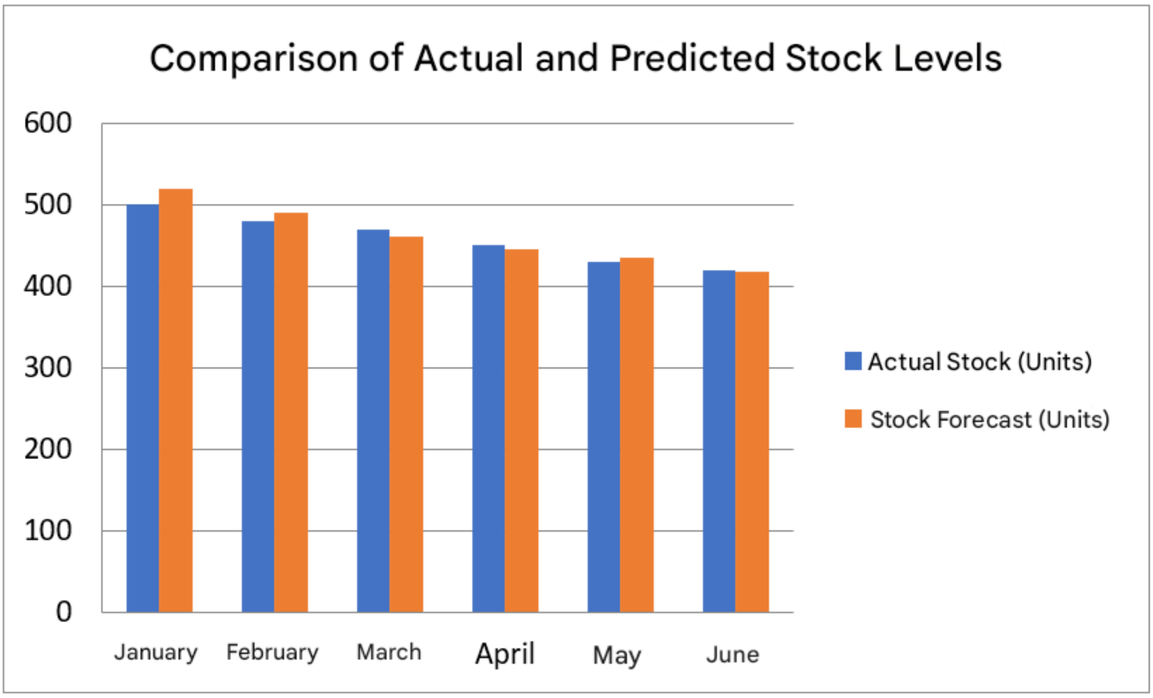


Figure 1. Comparison of Actual vs. Predicted Stock Levels

**Discussion**

These findings align with basic theory regarding the importance of predictive analytics and simulation in supply chain optimization. For example, research by (Belhadi et al., 2024) shows that data-driven analytics can improve demand forecast accuracy, which was also found in this study with MAPE values below 10%.

This research extends the findings of (Kolasani, 2023), which highlighted the benefits of blockchain technology for increasing transaction speed. In this study, the use of agent-based simulations demonstrated a significant impact on the efficiency of stock replenishment and distribution, a field not explored in depth by previous studies. Furthermore, these findings support research by (García-Cutrín & Rodríguez-García, 2024), which identified the benefits of a Just-In-Time approach in reducing waste.

Theoretically, this research contributes by integrating predictive analytics and agent-based simulation into supply chain management. This approach offers a new framework for understanding complex interactions in distribution systems while improving operational efficiency.

From a practical perspective, these findings suggest that retailers can reduce the risk of stockouts by adjusting replenishment intervals based on demand forecasts. Furthermore, improved coordination between supply agents and retailers provides the direct benefit of reducing distribution cycle times, ultimately improving customer satisfaction.

While these findings support previous research, there are some contradictions. For example, research by (Feng et al., 2022) found that dynamic system simulations were more effective for managing seasonal demand spikes, while this study shows that agent-based simulations can achieve similar results with less complexity.

This study is limited by its data coverage, which only covers five large retail companies in Jakarta. Furthermore, it does not account for external factors such as global supply chain disruptions, which could impact the accuracy of demand forecasts.

## V. CONCLUSION AND RECOMMENDATION

### Conclusion

This research successfully demonstrates how data-driven and simulation-based approaches can be used to optimize supply chain processes in the retail sector. The results show that predictive analytics can project demand with a high degree of accuracy, helping companies reduce the risk of stockouts and waste due to excess inventory. Furthermore, agent-based simulation techniques have proven effective in identifying efficient inventory management strategies and improving coordination between supply chain actors.

These findings provide a theoretical contribution by expanding the literature on the use of technology in supply chain management, particularly in the retail sector. Practically, this research offers a framework that companies can adopt to improve operational efficiency and competitiveness, particularly in the challenging digital era. Thus, this research not only addresses theoretical gaps in the literature but also provides concrete solutions to operational challenges faced by retail companies.

However, this study has limitations in geographic coverage and data, so the results may not be fully representative of all types of retail companies. This limitation opens up opportunities for further research on a broader scale and with a wider variety of conditions.

### Recommendation

Based on the research findings, several recommendations for further development are available. Retail companies are advised to adopt a more data-driven approach by improving their technology infrastructure. Integrating IoT and predictive analytics into inventory management systems can be a strategic first step towards improving the efficiency and accuracy of stock management.

The application of agent-based simulation techniques should also be expanded to encompass more complex operational scenarios, such as global supply disruptions or sudden changes in market demand. Furthermore, companies need to strengthen collaboration with supply chain partners to capitalize on the benefits of better coordination, as found in this study.

For further research, it is recommended to explore the application of this approach in sectors other than retail, such as manufacturing or e-commerce, to understand how adapting this technology can have different impacts. Further research should also consider external factors, such as global market dynamics and regulatory influences, to provide a more holistic understanding of supply chain optimization.

## REFERENCES

Abaku, E.A., Edunjobi, T.E., & Odimarha, A.C. (2024). Theoretical approaches to AI in supply chain optimization: Pathways to efficiency and resilience. *International Journal of Science and Technology Research Archives* , *6* (1), 92–107.

Alghamdi, O. A., & Agag, G. (2024). Competitive advantage: A longitudinal analysis of the roles of data-driven innovation capabilities, marketing agility, and market turbulence. *Journal of Retailing and Consumer Services*, *76*. https://doi.org/10.1016/j.jretconser.2023.103547

Almazmomi, N., Ilmudeen, A., & Qaffas, A. A. (2022). The impact of business analytics capability on data-driven culture and exploration: achieving a competitive advantage. *Benchmarking*, *29*(4), 1264–1283. https://doi.org/10.1108/BIJ-01-2021-0021

Babayev, F., & Balajayeva, T. (2023). Ways of Increasing the Competitiveness of Food Industry Enterprises. *International Journal of Innovative Technologies in Economy*, *4(44)*. https://doi.org/10.31435/rsglobal_ijite/30122023/8069

Belhadi, A., Mani, V., Kamble, S. S., Khan, S. A. R., & Verma, S. (2024). Artificial intelligence-driven innovation for enhancing supply chain resilience and performance under the effect of supply chain dynamism: an empirical investigation. *Annals of Operations Research*, *333*(2–3), 627–652. https://doi.org/10.1007/s10479-021-03956-x

Deiva Ganesh, A., & Kalpana, P. (2022). Future of artificial intelligence and its influence on supply chain risk management – A systematic review. In *Computers and Industrial Engineering* (Vol. 169). https://doi.org/10.1016/j.cie.2022.108206

Feng, Y., Lai, K. hung, & Zhu, Q. (2022). Green supply chain innovation: Emergence, adoption, and challenges. *International Journal of Production Economics*, *248*. https://doi.org/10.1016/j.ijpe.2022.108497

García-Cutrín, J., & Rodríguez-García, C. (2024). Enhancing Corporate Sustainability through Just-In-Time (JIT) Practices: A Meta-Analytic Examination of Financial Performance Outcomes. *Sustainability (Switzerland)* , *16*(10). https://doi.org/10.3390/su16104025

Hugo A. DeCampos, Claudia R. Rosales, & Sriram Narayanan. (2022). Supply chain horizontal complexity and the moderating impact of inventory turns: A study of the automotive component industry. *International Journal of Production Economics*, *245*.

Ikevuje, A. H., Anaba, D. C., & Iheanyichukwu, U. T. (2024). Optimizing supply chain operations using IoT devices and data analytics for improved efficiency. *Magna Scientia Advanced Research and Reviews*, *11*(2), 70–79.

Joel, O. T., & Oguanobi, V. U. (2024). Data-driven strategies for business expansion: Utilizing predictive analytics for enhanced profitability and opportunity identification. *International Journal of Frontiers in Engineering and Technology Research*, *6*(02), 71–81.

Kayikci, Y., Demir, S., Mangla, S. K., Subramanian, N., & Koc, B. (2022). Data-driven optimal dynamic pricing strategy for reducing perishable food waste at retailers. *Journal of Cleaner Production*, *344*. https://doi.org/10.1016/j.jclepro.2022.131068

Khedr, A. M., & S, S. R. (2024). Enhancing supply chain management with deep learning and machine learning techniques: A review. *Journal of Open Innovation: Technology, Market, and Complexity*, *10*(4). https://doi.org/10.1016/j.joitmc.2024.100379

Kolasani, S. (2023). Blockchain-driven Supply Chain Innovations and Advancement in Manufacturing and Retail industries. *Transactions on Latest Trends in IoT*, *6*(6), 1–26.

Kumar, A., Singh, R. K., & Modgil, S. (2023). Influence of data-driven supply chain quality management on organizational performance: evidences from retail industry. *TQM Journal*, *35*(1), 24–50. https://doi.org/10.1108/TQM-06-2020-0146

Kurdi, B. Al, Alzoubi, H. M., Akour, I., & Alshurideh, M. T. (2022). The effect of blockchain and smart inventory system on supply chain performance: Empirical evidence from retail industry. *Uncertain Supply Chain Management*, *10*(4), 1111–1116. https://doi.org/10.5267/j.uscm.2022.9.001

Lăzăroiu, G., Androniceanu, A., Grecu, I., Grecu, G., & Neguriță, O. (2022). Artificial intelligence-based decision-making algorithms, Internet of Things sensing networks, and sustainable cyber-physical management systems in big data-driven cognitive manufacturing. *Oeconomia Copernicana*, *13*(4), 1047–1080. https://doi.org/10.24136/oc.2022.030

Li, J., & Liu, X. W. (2024). An agent-based simulation model for analyzing and optimizing omni-channel retailing operation decisions. *Journal of Retailing and Consumer Services*, *79*. https://doi.org/10.1016/j.jretconser.2024.103845

Nagy-Bota, S., & Moldovan, L. (2022). Key Differences and Common Aspects of Logistics and Supply Chain Management. *Acta Marisiensis. Seria Technologica*, *19*(1), 42–46. https://doi.org/10.2478/amset-2022-0008

Nguyen, D. T., Adulyasak, Y., Cordeau, J. F., & Ponce, S. I. (2022). Data-driven operations and supply chain management: established research clusters from 2000 to early 2020. *International Journal of*

*Production Research*, *60*(17), 5407–5431. https://doi.org/10.1080/00207543.2021.1956695

Ooi, K. B., Tan, G. W. H., Al-Emran, M., Al-Sharafi, M. A., Arpaci, I., Zaidan, A. A., Lee, V. H., Wong, L. W., Deveci, M., & Iranmanesh, M. (2024). The Metaverse in Engineering Management: Overview, Opportunities, Challenges, and Future Research Agenda. *IEEE Transactions on Engineering Management*, *71*, 13882–13889. https://doi.org/10.1109/TEM.2023.3307562

Ouda, E., Sleptchenko, A., & Simsekler, M. C. E. (2023). Comprehensive review and future research agenda on discrete-event simulation and agent-based simulation of emergency departments. In *Simulation Modelling Practice and Theory* (Vol. 129). https://doi.org/10.1016/j.simpat.2023.102823

Oyedijo, A., Kusi-Sarpong, S., Mubarik, M. S., Khan, S. A., & Utulu, K. (2024). Multi-tier sustainable supply chain management: a case study of a global food retailer. *Supply Chain Management*, *29*(1), 68–97. https://doi.org/10.1108/SCM-05-2022-0205

Pasupuleti, V., Thuraka, B., Kodete, C. S., & Malisetty, S. (2024). Enhancing Supply Chain Agility and Sustainability through Machine Learning: Optimization Techniques for Logistics and Inventory Management. *Logistics*, *8*(3), 73. https://doi.org/10.3390/logistics8030073

Patrick Azuka Okeleke, Daniel Ajiga, Samuel Olaoluwa Folorunsho, & Chinedu Ezeigweneme. (2024). Predictive analytics for market trends using AI: A study in consumer behavior. *International Journal of Engineering Research Updates*, *7*(1), 036–049. https://doi.org/10.53430/ijeru.2024.7.1.0032

Ritu Khanna, K.A. Patel, & Patel Nirmal Rajnikant. (2023). Review Presentation of Different Economic Order Quantity (EOQ) Models and Their Application. *Journal of Advanced Zoology*, *44*(S-5), 1284–1288. https://doi.org/10.17762/jaz.v44is-5.1210

Sakai, T., Hara, Y., Seshadri, R., Alho, A. R., Hasnine, M. S., Jing, P., Chua, Z. Y., & Ben-Akiva, M. (2022). Household-based E-commerce demand modeling for an agent-based urban transportation simulation platform. *Transportation Planning and Technology*, *45*(2), 179–201. https://doi.org/10.1080/03081060.2022.2084397

Shoomal, A., Jahanbakht, M., Componation, P. J., & Ozay, D. (2024). Enhancing supply chain resilience and efficiency through internet of things integration: Challenges and opportunities. *Internet of Things (Netherlands)*, *27*. https://doi.org/10.1016/j.iot.2024.101324

Stieler, D., Schwinn, T., Leder, S., Maierhofer, M., Kannenberg, F., & Menges, A. (2022). Agent-based modeling and simulation in architecture. In *Automation in Construction* (Vol. 141). https://doi.org/10.1016/j.autcon.2022.104426

Tadayonrad, Y., & Ndiaye, A. B. (2023). A new key performance indicator model for demand forecasting in inventory management considering supply chain reliability and seasonality. *Supply Chain Analytics*, *3*. https://doi.org/10.1016/j.sca.2023.100026

Toluwalase Vanessa Iyelolu, Edith Ebele Agu, Courage Idemudia, & Tochukwu Ignatius Ijomah. (2024). Driving SME innovation with AI solutions: overcoming adoption barriers and future growth opportunities. *International Journal of Science and Technology Research Archive*, *7*(1), 036–054. https://doi.org/10.53771/ijstra.2024.7.1.0055

Yang, L., & Shami, A. (2022). IoT data analytics in dynamic environments: From an automated machine learning perspective. *Engineering Applications of Artificial Intelligence*, *116*. https://doi.org/10.1016/j.engappai.2022.105366