INTERNATIONAL JOURNAL OF FINANCIAL ECONOMICS (IJEFE) e-ISSN: 3063-3648
Vol. 2 No. 1 July 2025, page 114-125

OPTIMISATION OF MATERIAL, INFORMATION AND MONEY FLOW IN SUPPLY CHAIN MANAGEMENT

Hery Purnomo
Prodi Manajemen, Fakultas Ekonomi Dan Bisnis, Universitas Nusantara PGRI Kediri
Corespounding Author: herypurnomo@unpkediri.ac.id

Subagyo
Magister Pendidikan Ekonomi, Fakultas Ekonomi Dan Bisnis, Universitas Nusantara PGRI Kediri
subagyo@unpkediri.ac.id

Faisol
Prodi Akuntansi, Fakultas Ekonomi Dan Bisnis, Universitas Nusantara PGRI Kediri
faisol@unpkediri.ac.id

Dodi Kusuma Hadi Soejoko
Prodi Manajemen, Fakultas Ekonomi Dan Bisnis, Universitas Nusantara PGRI Kediri
dodikusuma@webmail.unpkediri.ac.id

Poniran Yudho Leksono
Prodi Manajemen, Fakultas Ekonomi Dan Bisnis, Universitas Nusantara PGRI Kediri
poniranyudho@unpkediri.ac.id

Abstract

This study aims to examine strategies for optimising the flow of materials, information and money in supply chain management (SCM) through the literature review method. Effectively integrated SCM can improve operational efficiency, accelerate response to market demand, and strengthen the company's competitiveness. Material flow optimisation is achieved through accurate demand planning, efficient inventory management, and strategic partnerships with suppliers. Meanwhile, optimised information flow is achieved by the application of digital technology, integration of information systems, and data transparency between supply chain actors. Efficient money flow management involves financial system integration, receivables and payables management, and the utilisation of supply chain finance. The study results show that the synergy of the three flows, supported by technology and collaboration, is essential to create an adaptive, responsive, and sustainable supply chain. This research is expected to be a reference for practitioners and academics in developing more effective supply chain management strategies in the era of global competition.

Keywords: supply chain management, material flow, information flow, money flow, optimisation, integration, efficiency.

Introduction

Supply Chain Management (SCM) is one of the important approaches in the modern business world that aims to integrate all activities ranging from raw material procurement, production processes, to the distribution of final products to consumers. SCM does not only involve individual companies, but also the entire network consisting of suppliers, manufacturers, distributors, and retailers, thus creating a coordinated and integrated system (Singh & Modgil, 2020) .

Along with increasing global competition, companies are required to be able to manage supply chains efficiently and effectively. This efficiency is not only related to cost, but also speed and accuracy in meeting consumer needs. In this context, optimising the flow of materials, information and money is the key to achieving this goal. Material flow in the supply chain covers the entire process of moving goods from suppliers to manufacturers, then to distributors, and finally to consumers. Good material flow management will ensure the availability of products in the market with the amount, time, and quality that matches consumer demand (Lohakare et al., 2025) .

Besides material flow, information flow also plays an important role in SCM. Accurate and real-time information allows each party in the supply chain to make the right decisions, from production planning, inventory management, to distribution of goods. Delays or inaccuracies in information can lead to stock build-ups or shortages of goods in the market (Kumar & Mangla, 2020) . The flow of money in the supply chain includes all financial transactions that occur between the parties involved, from payments to suppliers to receiving payments from end consumers. Efficient money flow management will help companies maintain liquidity and reduce financial risks that may arise in the business process (Yu & Xu, 2020) .

Digital transformation and advances in information technology have brought significant changes in supply chain management. The application of technologies such as cloud computing, Internet of Things (IoT), and integrated information systems allows companies to monitor and control the flow of materials, information, and money more effectively and efficiently (Chopra & Meindl, 2007) .

In Indonesia, the role of supply chain management is increasingly vital as industry and trade grow rapidly. However, challenges in supply chain management are still considerable, especially related to logistics infrastructure, technological limitations, and lack of understanding of good SCM principles. Supply chain performance in Indonesia is still relatively low when compared to other countries in Southeast Asia (Alkahtani, 2022) . This is reflected in the high logistics costs and Indonesia's low ranking in the world Logistics Performance Index (LPI). Therefore, efforts to optimise the flow of materials, information and money are very important to improve the competitiveness of the national industry.

Supply chain optimisation not only impacts a company's operational efficiency, but also contributes to overall economic growth. With an integrated and efficient supply

chain, companies can reduce production and distribution costs, increase customer satisfaction, and strengthen their position in the global market (X. Li & Li, 2020) .

Previous studies have shown that the integration of the three main flows in the supply chain, namely material, information, and money, can significantly improve company performance. However, many companies still face obstacles in implementing such integration optimally, both due to internal and external factors (Alam & Tui, 2022).

Thus, this research aims to identify concepts, strategies, and challenges in optimising the flow of materials, information, and money in supply chain management. By understanding various theories and best practices that have been applied in various industries, it is hoped that this research can contribute to the development of supply chains in Indonesia.

Research Methods

This research uses the literature review method, namely by collecting, examining, and analysing various relevant literature sources such as books, scientific journals, articles, and research reports related to optimising the flow of materials, information, and money in supply chain management (Eliyah & Aslan, 2025) . The data obtained from the literature was then analysed descriptively and comparatively to identify concepts, strategies, and challenges faced in supply chain management. This approach allows researchers to formulate strategic recommendations based on theoretical findings and best practices that have been implemented in various industries (Bolderston, 2008) .

Results and Discussion

Material Flow Optimisation Strategy

Material flow optimisation in supply chain management starts with aligning the supply chain strategy to the company's business objectives. All processes, from raw material procurement to final product distribution, must be integrated and support the achievement of company targets efficiently. This integration requires close collaboration between departments such as production, marketing, and logistics so that there are no obstacles in the movement of materials (Aulia et al., 2020) .

Accurate demand planning is a key foundation in managing material flow. By utilising historical data and analysing market trends, companies can estimate material requirements precisely so as to avoid excess or shortage of stock (X. Li & Li, 2020) . Good planning also helps to match production capacity with actual demand in the market. Efficient inventory management is essential to minimise storage costs and reduce the risk of goods obsolescence. The application of methods such as Just-In-Time (JIT) and Vendor Managed Inventory (VMI) allows companies to maintain stock at optimal levels, so that materials are always available when needed without causing waste (Alam & Tui, 2022) .

Strategic partnerships with suppliers are key in ensuring a smooth supply of materials. Long-term relationships based on trust and open communication allow companies and suppliers to share information, plan for mutual needs, and innovate in the procurement process. This collaboration can also improve material quality and on-time delivery (Retnowo & Waluyo, 2022) .

The application of lean supply chain principles aims to eliminate all forms of waste in the material flow process. Any non-value-added activities, such as waiting time, inefficient transport, or repetitive processes, should be identified and eliminated. Thus, supply chain efficiency and productivity can be significantly improved (Y. Zhang & Qian, 2021) .

Technology and automation play an important role in material flow optimisation. The use of warehouse management systems (WMS), transport management systems (TMS), as well as tracking technologies such as RFID and barcodes, improve the visibility, accuracy, and speed of material movement. Automation also speeds up the process of shipping and stock management, thereby reducing the potential for human error (H. Zhang & Wang, 2021) .

Optimisation of the distribution network is done by designing efficient delivery routes and selecting strategic distribution centre locations. Logistics data analysis helps determine the fastest and most cost-effective path, so that products can reach customers with minimal time and cost. A good distribution network also increases customer satisfaction through timely delivery (X. Li & Li, 2020) .

Supply chain risk management is essential to maintain the smooth flow of materials. Companies must be able to identify potential disruptions such as supply delays, price fluctuations, or natural disasters, and prepare contingency plans. Diversifying suppliers and adding buffer stock can be a solution to reduce the impact of these risks (S. Li & Li, 2021) .

Segmenting materials and products based on market characteristics and needs helps companies prioritise procurement and distribution. Products with high demand or long lead times can be prioritised in material flow management, so that the availability of goods in the market is maintained. Measurement and evaluation of material flow performance is conducted periodically using indicators such as inventory replenishment rate, delivery cycle time, and delivery accuracy rate. This evaluation is important to identify areas that need improvement and ensure the process runs according to the expected efficiency target (J. Li & Wang, 2021) .

Human resource development is a key enabler in material flow optimisation. Employees trained in the use of technology and data-driven decision-making are able to proactively identify problems and make continuous process improvements. A focus on sustainability in material flow is increasingly important in the modern era. Companies are encouraged to choose environmentally-friendly suppliers, manage waste responsibly, and reduce the carbon footprint in the distribution process. These practices

not only improve the company's image, but also support long-term efficiency (Kumar & Mangla, 2020) .

Case studies from global companies such as Walmart, Toyota, and Unilever show that material flow optimisation can be achieved through technology integration, collaboration with suppliers, and careful inventory management. Their success serves as a reference for other companies in designing optimisation strategies that suit their individual needs (Chen & Zhang, 2020) .

Material flow optimisation is a dynamic process that requires continuous evaluation and improvement. Companies must be open to innovation, receptive to feedback from customers and suppliers, and adaptive to market and technological changes in order for the supply chain to remain competitive and responsive to today's business challenges (Yan, 2022) .

Thus, the material flow optimisation strategy in supply chain management shows that good integration and coordination between all elements of the supply chain is essential to achieve operational efficiency and effectiveness. Alignment of supply chain strategy with business objectives, accurate demand planning, efficient inventory management, and strategic partnerships with suppliers are the main foundations in ensuring smooth material flow. The application of lean principles, the utilisation of technology and automation, and the optimisation of distribution networks have proven to improve the speed, accuracy and visibility of material movements.

In addition, proactive risk management, product segmentation, regular performance measurement, and the development of competent human resources are also factors supporting the success of material flow optimisation. A focus on sustainability and adaptation to best practices from global companies provide added value in building a resilient and competitive supply chain. Thus, material flow optimisation not only impacts cost efficiency and increased customer satisfaction, but also strengthens the company's position in facing market dynamics and future business challenges.

Information Flow Optimisation Strategy

Optimising the flow of information in supply chain management is one of the main keys to improving efficiency, responsiveness, and competitiveness. This process starts with building an integrated information system throughout the supply chain, so that each party can access relevant data in real-time. This system integration enables the exchange of fast and accurate information between suppliers, manufacturers, distributors, and end customers, so that decision-making can be made in a timely and data-driven manner. (Dong, 2022) .

The application of digital technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), and cloud computing is helpful in accelerating and expanding the reach of information flows. IoT enables real-time monitoring of goods through

sensors and connected devices, while AI can analyse big data to predict demand and identify potential disruptions in the supply chain. Cloud computing facilitates centralised data storage and access, so that all supply chain partners can collaborate without geographical barriers (Setyorini & Purwanti ., 2025)

Information transparency is an important factor in building trust between supply chain actors. With RFID-based tracking systems, GPS, and digital dashboards, companies can accurately monitor shipment status, item condition, and inventory position. This transparency not only improves delivery reliability, but also facilitates the identification and proactive handling of problems before they impact customers (Saghafian & Van Oyen, 2021) .

Effective collaboration and communication between supply chain partners is necessary to optimise information flow. Open exchange of demand data, production plans, and delivery schedules helps all parties adjust capacity and resources according to market needs (Octaviany & Gunawan, 2023) . This collaboration also encourages joint innovation in the development of new products and services. Standardising data formats and communication protocols is a strategic step to avoid miscommunication and duplication of information. By using international standards such as Electronic Data Interchange (EDI) or Application Programming Interface (API), companies can ensure that data sent and received between systems is always consistent, valid, and can be processed automatically (Christopher, 2016) .

Data security is a major concern in optimising information flow. The implementation of blockchain technology can increase the security and transparency of transactions, as any changes to data are permanently recorded and cannot be changed without the consent of all parties involved. This is very important to prevent fraud, data manipulation, and privacy violations in the supply chain (Judijanto et al., 2024) .

The use of data analytics and business intelligence helps companies identify patterns, trends and anomalies in the flow of information. With predictive analysis, companies can forecast market demand, optimise inventory and respond to changes faster. Business intelligence also supports supply chain performance evaluation through measurable and relevant Key Performance Indicators (KPIs). Increased supply chain visibility through interactive dashboards and real-time monitoring systems allows management to monitor the entire process from upstream to downstream. This visibility accelerates the detection of problems such as delivery delays, stock shortages, or changes in demand, so that corrective actions can be taken immediately to minimise negative impacts (Choi, 2021) .

Training and development of human resources in the use of information technology is essential so that the entire supply chain team is able to utilise the system optimally. Employees who are skilled in operating SCM software, analysing data and communicating digitally will increase the effectiveness of information flow and speed up the decision-making process (Dalal, 2024) .

Change management is needed to ensure the adoption of new technologies and processes goes smoothly. Companies must involve all stakeholders in the digital transformation process, provide training, and build a work culture that is adaptive to technological innovation and change. Periodic evaluations and audits of supply chain information systems need to be carried out to ensure the reliability, security and relevance of the data used (Anisa et al., 2025) . These audits also help identify gaps or weaknesses in the system, so that improvements can be made on an ongoing basis to maintain the company's competitive advantage.

Information risk management is an integral part of an optimisation strategy. Companies should identify potential risks such as data leakage, cyberattacks, or system failures, and prepare contingency plans to minimise the impact if such risks occur. Diversification of data sources and system backups are also important to maintain operational continuity (Yu & Xu, 2020) .

Case studies from global companies such as Walmart and Indomaret show that supply chain digitalisation and information system integration can improve efficiency, reduce logistics costs, and accelerate response to changes in market demand. Their success has inspired other companies to adopt similar strategies to optimise information flow (Xu et al., 2024) .

Information flow optimisation in supply chain management is a dynamic process that requires continuous evaluation and innovation. Companies must continuously monitor technological developments, adapt strategies to market needs, and build a supply chain ecosystem that is collaborative, transparent, and adaptive to changes in the modern business environment.

Money Flow Optimisation Strategy

Optimising the flow of money in supply chain management is a crucial aspect that determines the smooth operation and competitiveness of the company. This process starts with building an integrated financial system across the supply chain, so that each party can monitor cash flow, payments, and receipts in real-time. This financial system integration enables faster and more accurate decision-making in managing the Company's liquidity (Ivanov, 2021) .

One of the key strategies is to accelerate the cash conversion cycle (CCC). Companies need to minimise the time it takes to convert investments in inventory and receivables into cash. This can be achieved by speeding up billing to customers, slowing down payments to suppliers without disrupting business relationships, and optimising inventory management so that there are not too many funds held back (Chen & Zhang, 2020) .

Negotiating more favourable payment terms with suppliers and customers is the next important step. By extending payment terms to suppliers and shortening the time to receive payments from customers, companies can keep cash flow positive. This

strategy can also be supported by incentivising discounts for early payment or implementing electronic payment systems that speed up the transaction process (Wang & Li, 2022) .

The application of supply chain finance (SCF) is an innovative solution in optimising the flow of money. Through SCF, companies can utilise third-party financing facilities to pay suppliers early, while the company continues to pay on schedule. This scheme provides benefits for both parties: suppliers receive faster payments, while companies can maintain liquidity without disrupting business relationships (Kumar & Mangla, 2020) .

Active management of receivables and payables is essential to avoid bad debts and late payments. Companies need to conduct credit analyses of customers, monitor payment due dates, and implement automated reminder systems to collect receivables. On the other hand, good debt management ensures that the company does not incur late fees and maintains its reputation with suppliers (Handfield et al., 2020) .

The use of digital technology such as enterprise resource planning (ERP) and financial management system (FMS) is very helpful in monitoring and controlling the flow of money. These systems allow the integration of financial data from various departments, so that management can conduct a thorough cash flow analysis and make strategic decisions based on actual data (Anggraini et al., 2025) .

Optimising inventory management also has a direct impact on cash flow. By implementing just-in-time (JIT) or vendor managed inventory (VMI) methods, companies can reduce funds held in stock, making more cash available for other needs. Efficient inventory management also reduces the risk of obsolescence and financial losses due to unsold goods (Putra Permana ., 2023)

Dynamic discounting strategies can be applied to encourage early payment from customers. By offering discounts to customers who pay before the due date, companies can accelerate cash turnover and reduce the risk of bad debts. Conversely, companies can also take advantage of discounts from suppliers by paying early if cash conditions allow (Singh & Modgil, 2020) .

Diversification of funding sources is an important step to maintain cash flow stability. Besides relying on internal cash, companies can utilise bank credit facilities, invoice financing, or supply chain finance programmes to meet working capital needs without disrupting operations.

Strict control of operating costs also contributes to the optimisation of cash flow. Companies should regularly evaluate all expense items, identify areas of savings, and eliminate costs that do not add value. Cost efficiency will increase profit margins and strengthen the company's cash position (Lohakare et al., 2025) .

Close collaboration with supply chain partners is necessary to create a healthy financial ecosystem. Transparent exchange of information related to payment schedules, invoice status, and financial conditions helps all parties better manage cash

flow and reduce potential conflicts due to late payments. Financial risk management is an integral part of the cash flow optimisation strategy. Companies should identify potential risks such as exchange rate fluctuations, interest rate changes, or economic uncertainty, and prepare contingency plans to maintain financial stability. Credit insurance and hedging can be used to minimise the impact of such risks (Kumar & Mangla, 2020) .

Regular financial evaluations and audits are necessary to ensure the effectiveness of the strategies implemented. Internal and external audits help identify weaknesses in the financial management system, so that improvements can be made on an ongoing basis to maintain the reliability of money flow (Yu & Xu, 2020) .

Case studies from global companies show that optimising cash flow through digitalisation, supply chain finance, and collaboration with business partners can improve efficiency, accelerate growth, and strengthen competitiveness in the global market. Their success inspires other companies to adopt similar strategies according to their individual business needs and characteristics (Chopra & Meindl, 2007) .

Optimising the flow of money in supply chain management is a dynamic process that requires continuous innovation, evaluation and adaptation. Companies must continuously monitor technological developments, market trends, and financial regulations to ensure that the strategies implemented remain relevant and effective in facing modern business challenges.

Conclusion

Optimising the flow of materials, information and money in supply chain management is a key foundation for creating an efficient, responsive and competitive supply chain. The integration of these three flows allows companies to manage procurement, production, distribution, and financial transactions in a coordinated and transparent manner. Thus, companies can reduce operational costs, accelerate response time to market demand, and increase customer satisfaction through timely and quality product availability.

The implementation of integrated information technology and management systems is instrumental in facilitating the flow of information and money throughout the supply chain network. Accurate and real-time information supports better decision-making, while efficient cash flow management maintains a company's liquidity and financial stability. Close collaboration between supply chain actors, supported by data transparency and effective communication, is key to addressing risks, optimising inventory, and strengthening long-term business relationships.

Overall, optimising the flow of materials, information and money not only results in cost efficiency and increased profitability, but also strengthens a company's competitiveness in a dynamic global market. Companies that are able to manage these

three flows synergistically will be more adaptive to market changes, better able to fulfil consumer needs, and build a sustainable business foundation for the future.

References

Alam, N., & Tui, S. (2022). Pengaruh Supply Chain Management Terhadap Keunggulan Kompetitif dan Kinerja pada Perusahaan Manufaktur. *YUME: Journal of Management*, *5*(3), 367–382.

Alkahtani, M. (2022). Supply Chain Management Optimization and Prediction Model Based on Projected Stochastic Gradient. *Sustainability*, *14*(6), 3486. https://doi.org/10.3390/su14063486

Anggraini, F., Putri, A. I., Agustin, A., Neriana, & Sari, R. (2025). Analisis Tren Penerapan Supply Chain di Berbagai Sektor: Tinjauan Literatur Sistematis. *Integrative Perspectives of Social and Science Journal (IPSSJ)*, *2*(2), 2138–2149.

Anisa, L. N., Andawiah, S., Utama, D. P., & Afan, I. (2025). Implementasi Supply Chain Management untuk Meningkatkan Kinerja Logistik Perusahaan. *Jurnal Masharif Al-Syariah: Jurnal Ekonomi Dan Perbankan Syariah*, *10*(1), 460–471.

Aulia, D., Supaya, S., & Nurkhayati, I. (2020). Pengaruh Implementasi Internal Supply Chain Management Terhadap Kinerja Operasional Perusahaan (Studi Kasus pada PT. Pan Brothers Tbk, Boyolali). *Business Accounting Review*, *1*(2), 183–192.

Bolderston, A. (2008). Writing an Effective Literature Review. *Journal of Medical Imaging and Radiation Sciences*, 71–76.

Chen, L., & Zhang, Y. (2020). Data-driven supply chain optimization: A review. *Computers & Industrial Engineering*, *149*, 106821. https://doi.org/10.1016/j.cie.2020.106821

Choi, T. M. (2021). Innovative supply chain optimization with artificial intelligence. *Transportation Research Part E: Logistics and Transportation Review*, *145*, 102174. https://doi.org/10.1016/j.tre.2020.102174

Chopra, S., & Meindl, P. (2007). *Supply Chain Management: Strategy, Planning & Operation*. Springer.

Christopher, M. (2016). *Logistics & Supply Chain Management*. Pearson UK.

Dalal, S. (2024). Improving efficiency and sustainability via supply chain optimization. *Technological Forecasting and Social Change*, *205*, 122345. https://doi.org/10.1016/j.techfore.2024.122345

Dong, Y. (2022). Optimization and Analysis of Raw Material Supply Chain Based on Computational Intelligence. *Journal of Computer Networks and Communications*. https://doi.org/10.1155/2022/8683598

Eliyah, E., & Aslan, A. (2025). STAKE'S EVALUATION MODEL: METODE PENELITIAN. *Prosiding Seminar Nasional Indonesia*, *3*(2), Article 2.

Handfield, R., Sun, H., & Rothenberg, L. (2020). Assessing Supply Chain Risk for Apparel Production in Low Cost Countries using Newsfeed Analysis. *Supply Chain Management: An International Journal*, *25*(6), 803–821.

Ivanov, D. (2021). Digital supply chain management and technology to enhance resilience and optimization. *International Journal of Production Research*, *59*(16), 4862–4880. https://doi.org/10.1080/00207543.2021.1956677

Judijanto, L., Riandari, F., & Marsoit, P. T. (2024). Leveraging AI for optimization in supply chain decision support: Enhancing predictive accuracy. *Jurnal Teknik*

Informatika C.I.T Medicom, *16*(3), 171–184. https://doi.org/10.35335/cit.Vol16.2024.858.pp171-184

Kumar, A., & Mangla, S. K. (2020). Supply chain optimization for circular economy: A review. *Journal of Cleaner Production*, *276*, 123225. https://doi.org/10.1016/j.jclepro.2020.123225

Li, J., & Wang, S. (2021). Supply chain finance and optimization: A systematic review. *Omega*, *102*, 102312. https://doi.org/10.1016/j.omega.2020.102312

Li, S., & Li, J. (2021). Optimization of supply chain finance with digital technologies. *Omega*, *102*, 102312. https://doi.org/10.1016/j.omega.2020.102312

Li, X., & Li, Y. (2020). Multi-objective optimization for supply chain network design. *Expert Systems with Applications*, *159*, 113594. https://doi.org/10.1016/j.eswa.2020.113594

Lohakare, S., Chavhan, K., Lohi, R., Nagrikar, R., & Ganorkar, S. S. (2025). Supply Chain Optimization in Manufacturing. *International Journal for Research in Applied Science and Engineering Technology*, *13*(5), 70686. https://doi.org/10.22214/ijraset.2025.70686

Octaviany, T., & Gunawan, A. (2023). Mengoptimalkan Manajemen Persediaan Melalui Teknologi Rantai Pasokan. *Journal of Informatics and Business*, *1*(3), 150–155.

Putra Permana, K. B. (2023). Analisis Peran Supply Chain Management (SCM) dalam Meningkatkan Kinerja Perusahaan. *COMSERVA: Jurnal Penelitian Dan Pengabdian Masyarakat*, *3*(06), 2275–2287.

Retnowo, M., & Waluyo, A. F. (2022). Penerapan Supply Chain Management untuk Mengoptimalkan Produksi Berdasarkan Persediaan Barang. *Jurnal Information System & Artificial Intelligence*, *2*(2), 157–164.

Saghafian, S., & Van Oyen, M. P. (2021). Operations research and supply chain optimization in healthcare. *Operations Research for Health Care*, *28*, 100288. https://doi.org/10.1016/j.orhc.2020.100288

Setyorini, R., & Purwanti, P. (2025). Optimalisasi Manajemen Persediaan: Strategi Meningkatkan Efisiensi dan Mengurangi Biaya dalam Operasi Rantai Pasokan. *Jurnal Akuntansi Keuangan Dan Perpajakan*, *1*(3), 210–215.

Singh, S., & Modgil, S. (2020). Supply chain optimization using IoT and big data analytics. *Computers & Industrial Engineering*, *149*, 106895. https://doi.org/10.1016/j.cie.2020.106895

Wang, Y., & Li, X. (2022). Blockchain-based supply chain optimization: A review and future directions. *Computers & Industrial Engineering*, *162*, 107746. https://doi.org/10.1016/j.cie.2021.107746

Xu, Z., Elomri, A., Baldacci, R., Kerbache, L., & Wu, Z. (2024). Frontiers and trends of supply chain optimization in the age of industry 4.0: An operations research perspective. *Annals of Operations Research*. https://doi.org/10.1007/s10479-024-05879-9

Yan, D. (2022). Optimization and Analysis of Raw Material Supply Chain Based on Computational Intelligence. *Journal of Computer Networks and Communications*. https://doi.org/10.1155/2022/8683598

Yu, M., & Xu, X. (2020). Supply chain network optimization with sustainability considerations. *Computers & Operations Research*, *123*, 105047. https://doi.org/10.1016/j.cor.2020.105047

Zhang, H., & Wang, Y. (2021). Optimization of supply chain with blockchain technology. *Computers & Industrial Engineering*, *151*, 106948. https://doi.org/10.1016/j.cie.2020.106948

Zhang, Y., & Qian, C. (2021). Green supply chain optimization under carbon emission regulations. *Journal of Cleaner Production*, *278*, 123956. https://doi.org/10.1016/j.jclepro.2020.123956