MEGATRENDS IN LOGISTICS AND SUPPLY CHAINS: APPROACHES OF RESEARCH LABORATORIES AT THE FACULTY OF LOGISTICS, UNIVERSITY OF MARIBOR

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Abstract
Megatrends are long-term, global forces that shape the economy, society, technology, and culture, posing new challenges for logistics. The aim of this paper is to examine the impact of key megatrends on logistics processes and supply chains, and to demonstrate how the research laboratories of the Faculty of Logistics at the University of Maribor (FLUM) adapt to these megatrends in developing innovative, flexible, and sustainable solutions. The megatrends considered include demographic changes, technological development, collaboration and integration, globalisation, and environmental factors and sustainability. The following section presents how FLUM research laboratories contribute to adapting to key megatrends. The Laboratory for Cognitive Systems in Logistics addresses technological megatrends by developing artificial intelligence algorithms for decision optimisation and process automation. The Laboratory for Quantitative Modeling in Logistics supports technological development and the complexity of global supply chains through mathematical modeling and big data analytics to enhance efficiency and resilience. The Laboratory for Sustainable Mobility and Transport focuses on environmental megatrends by researching sustainable transport solutions, vehicle electrification, and urban logistics. The Laboratory for Logistics and Supply Chain Management addresses megatrends in globalisation, collaboration, and integration by developing strategies for flexible and effective supply chain management. This paper provides insight into how megatrends are shaping the future of logistics and how FLUM laboratories contribute to the development of adaptable, efficient, and sustainable solutions.
Keywords*: megatrends, logistics, supply chains, research laboratories*
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INTRODUCTION

In the contemporary global environment, logistics and supply chains are facing increasing complexity, uncertainty, and dynamic change. Their functioning is no longer influenced solely by operational and cost-related aspects, but increasingly by broader structural shifts arising from long-term societal, economic, and technological developments. These processes, defined as megatrends, significantly reshape the organization, management, and optimisation of logistics systems, requiring adaptation at both strategic and operational levels. Among the key megatrends affecting logistics are demographic changes, accelerated technological development, the transformation of globalisation, the growing importance of collaboration and integration, and increasingly prominent environmental and sustainability considerations. Their impact is reflected in the transformation of supply chains toward greater digitalization, flexibility, resilience, and sustainability. Understanding these trends is becoming essential for the development of effective logistics solutions and for ensuring the long-term competitiveness of organizations. In this context, research institutions also play an important role, contributing to the development of new knowledge, methods, and technologies for addressing contemporary logistics challenges. The laboratories of the Faculty of Logistics at the University of Maribor represent a significant research environment where theoretical insights are integrated with applied solutions in the field of logistics and supply chains. The purpose of this paper is to analyze key megatrends and examine their impact on logistics and supply chains, with a particular focus on the research orientations of the laboratories of the Faculty of Logistics. The paper thus connects theoretical concepts of megatrends with specific research activities and demonstrates their influence on logistics and supply chains.

1. TRENDS AND MEGATRENDS

A trend is a statistical concept that indicates the direction of global changes in the future. It represents a development trajectory that guides activities toward the balanced growth of individual economic sectors (Galińska, 2018). Across different fields, it appears as a process of change that can be examined from economic, psychological, or sociological perspectives, and may manifest as a short-, medium-, or long-term phenomenon at either a regional or global scale (Vejlgaard, 2008, p. 9). Trends can differ in terms of their scope and duration. They may be classified as regional, national, or global. In addition, trends can be divided into the following categories (Wicker, 2010, p. 7):

- short-term trends (fashion trends);
- medium-term trends (consumer trends);
- medium- to long-term trends (social and cultural trends);
- long-term trends (so-called megatrends).

Figure 1 below illustrates the relationships among selected trends.

Figure 1: Specification of trends (Source: Wicker, 2010, p. 7)

Among the longest-lasting and most influential forms of trends are megatrends, which transcend the temporal and spatial boundaries of conventional trends and significantly shape the development of modern economic systems. Their impact is also highly pronounced in the field of logistics, which represents one of the fastest-growing economic sectors. An analysis of key changes in this sector indicates that the logistics industry is strongly shaped by megatrends (Kersten, Blecker, & Ringle, 2014, p. 15).

The term "megatrend" was first introduced in 1982 by John Naisbitt to describe "large-scale social, economic, political, and technological changes that influence us over an extended period of time" (Naisbitt, 1982). Megatrends can be defined as global trends, phenomena, or processes that stem from the long-term civilizational development of humanity. They permeate all areas of human activity, including economic, social, political, and cultural systems, and also influence human consciousness (Muszyński, 2001). They represent global, long-term, and macroeconomic forces of development that shape business, the economy, society, and individual lives, while also influencing the future development of society (Kumar & Sharma, 2021).

Megatrends differ from trends primarily in their duration and scope of impact, as the latter are typically shorter-term and limited to narrower geographical or thematic contexts (Rohner, 2018). In contrast, megatrends represent long-term and global processes that affect most regions of the world (Kalaitzi et al., 2021). Their key characteristics are defined by three dimensions (Kartnig, Grösel & Zrnic, 2012):

- time horizon: they can be observed over several decades, with their effects already partially visible today, allowing for reliable projections into the future;
- scope: they are global in nature and affect most regions of the world, while also generating complex interactions between political, social, and economic systems;
- impact strength: they significantly influence the functioning of states, organizations, and individuals, shaping long-term development trajectories.

2. MEGATRENDS AND THEIR IMPACT ON LOGISTICS AND SUPPLY CHAINS

Megatrends identified in the literature differ in their scope and nature. Some of them directly affect logistics and its key domains, particularly supply chains. Among the most significant are (Seppälä, 2016): (1) demographic changes, urbanization, and shifting demand, (2) technological development, (3) collaboration and integration, (4) globalisation, reshoring, and changing global competition, and (5) environmental factors and sustainability. These megatrends do not operate in isolation but rather as interconnected forces that collectively shape the structure, efficiency, and resilience of modern logistics systems. Their combined impact is reflected in increasing demands for flexibility, digitalization, and sustainable operation of supply chains.

2.1. DEMOGRAPHIC CHANGES

Christopher (2011, p. 258) states that among the most important emerging factors shaping the future of supply chains are demographic changes and shifts in global consumption patterns.

Demographic changes and urbanization influence the structure of demand for goods and services. Stevens and Johnson (2016, p. 38) note that in the future, customers will demand greater differentiation and a higher level of customization of products and services, which will be enabled by the development of mass customization and new distribution models.

At the same time, the ageing of the population in developed countries and the growth of the global population are changing consumption patterns (Liimatainen et al., 2015, p. 280).

The increased need for pharmaceutical products associated with ageing leads to growing demand for specialized transport requiring controlled conditions, such as temperature and cleanliness (Gernandt, 2012). Consequently, specialized and more regulated supply chains are being developed, focusing on high reliability and traceability.

At the same time, due to changing customer expectations, the logistics sector is facing increasing pressure for faster delivery. Demands for next-day, same-day, or even very short delivery time windows (Gue et al., 2014, pp. 23–25) are driving the expansion of small-parcel distribution directly to end users (Liimatainen et al., 2015, p. 280).

This implies a shift in the organization of logistics systems, where proximity to the customer and the ability to respond quickly are becoming crucial. Antai and Ohlson (2013, p. 512) therefore emphasize that increasing demands for customized services and shorter delivery times are strengthening the role of urban logistics centers and last-mile optimisation.

2.2. TECHNOLOGICAL DEVELOPMENT

Technological megatrends have varying levels of impact and adoption dynamics across different industries. While they are already widely used in the financial sector, other industries such as logistics, healthcare, and education are adopting them more gradually. In logistics, key technological megatrends include artificial intelligence, big data, and blockchain technology (Kumar & Sharma, 2021).

Artificial intelligence is based on the concept that human intelligence can be modelled in a way that enables systems to imitate and perform tasks of varying complexity (The Investopedia Team, 2025). Its implementation in logistics represents an important transition towards greater efficiency and innovation, while simultaneously requiring appropriate management due to the potential for process disruptions (Zhu, Liu, & Shi, 2022). In practice, AI is applied across numerous areas, including process automation, warehouse optimisation, safety enhancement, advanced analytics, and improved customer communication. It is utilised throughout the entire logistics chain, from warehousing and distribution to transport operations, ports, and airports (Takyar, 2024). The primary objective is the automation of repetitive tasks, which increases productivity and reduces operational costs (Savič, 2021). This development signifies a shift in logistics from a predominantly operations-oriented system towards a data-driven and automated environment, where decision-making and process management are becoming increasingly proactive.

Big data also plays an important role, as the logistics sector generates vast amounts of data due to extensive flows of goods and information. Logistics providers monitor millions of shipments on a daily basis, recording data on origin, destination, weight, content, and location (Lekić et al., 2021). However, it remains an open question to what extent this data is actually being utilized. Greater integration and linking of data flows among different actors in supply chains could reduce market fragmentation and enable new forms of collaboration and process optimisation (Anshari et al., 2018). Big data therefore does not represent only a technological tool, but also a foundation for the transition toward more integrated, transparent, and data-driven logistics systems, where the quality of analytics is becoming a key determinant of competitiveness.

Blockchain technology is also becoming increasingly important, as it enables greater transparency and trust among stakeholders in supply chains. Its applications include information sharing, goods tracking, and the execution of financial and payment processes (Harish et al., 2025). Due to this technology, the logistics sector is increasingly evolving toward decentralised and digitalised systems, where process efficiency and transparency are improved (Wang et al., 2021). Blockchain reduces the need for intermediaries and enhances traceability, which significantly contributes to more reliable supply chain operations. In this way, it supports the development of collaborative and secure logistics networks in which trust between actors is increasingly enabled by technology rather than solely by institutional mechanisms (Harish et al., 2025).

2.3. COLLABORATION AND INTEGRATION

Collaboration in supply chains is divided into vertical and horizontal collaboration, where the former involves coordination between different functions within a company as well as cooperation with customers and suppliers, while the latter refers to collaboration among competitors or other organizations (Barratt, 2004, p. 32). The role of collaboration in logistics has increased in recent years, as it represents one of the key factors for ensuring efficient and sustainable operation of logistics systems. Gue et al. (2014, pp. 41–44) emphasize that the development of collaboration is essential to support the needs of the economy and society, while simultaneously achieving low costs and reducing negative environmental impacts.

In practice, the potential of collaboration is mainly reflected in better resource utilization and the optimisation of logistics processes. Sharing transport capacities, such as trailers, enables the reduction of empty runs, which contributes to lower fuel consumption, reduced labour and capital costs, and decreased strain on transport infrastructure (Seppälä, 2016). Despite these advantages, significant limitations remain, particularly related to data sharing, security issues, and the high level of competition among companies (Gue et al., 2014, p. 5).

The development of collaboration and integration therefore leads to the transformation of logistics systems into more connected and coordinated structures, where efficiency increasingly depends on the aligned performance of all stakeholders in the supply chain. This implies that the competitiveness of companies is no longer determined solely by the optimisation of their own processes, but by their ability to integrate into broader logistics networks.

2.4. GLOBALISATION

Globalisation represents one of the key economic phenomena of recent decades, which has significantly reshaped the organization of production and distribution. Through globalisation, industrially developed countries have mainly benefited from lower production costs, as manufacturing has been relocated to regions with more favourable conditions, such as the Far East and Central Europe. At the same time, developing countries have gained new jobs and greater access to economic development, which has contributed to a broader availability of goods and an increase in living standards (Gernandt, 2012).

The connection between globalisation and the development of increasingly long and complex supply chains is direct. The growth of globalisation, free trade agreements, and outsourcing increases the importance of logistics and supply chain management (Ballou, 2007, p. 341). At the same time, companies are increasingly faced with the challenge of optimising global flows of goods, while awareness of risks such as supply disruptions, geopolitical changes, and market instability is gradually increasing. Consequently, companies are more frequently reassessing their strategies for managing global supply chains (Stank et al., 2015, p. 24).

Globalisation has also contributed to the increasing importance of logistics within companies' overall cost structures, as greater transport distances and the need for inventory coordination have led to higher logistics costs (Ballou, 2004, p. 16). This creates a need for more efficient management of complex logistics networks, where flexibility, resilience, and strategic supply chain planning are becoming key factors.

2.5. ENVIRONMENTAL FACTORS AND SUSTAINABILITY

Growing awareness of the limited availability of natural resources, global warming, greenhouse gas emissions, and associated health risks is encouraging companies to increasingly integrate sustainable practices into their business strategies.

In addition to regulatory pressures, companies also recognize reputational risks and potential damage to brand value that can result from unsustainable practices within supply chains (Dey et al., 2011, p. 1238).

Sustainability in logistics is implemented through both primary and support activities within the supply chain. Key activities include warehousing, materials handling, procurement, packaging design, and information management, all of which also represent a significant share of logistics costs (Dey et al., 2011, pp. 1244–1245). Integrating sustainability principles into these processes enables the reduction of negative environmental impacts while simultaneously improving operational efficiency.

Companies that integrate sustainability at an advanced level not only contribute to reducing environmental and social impacts but also improve their competitive position while maintaining economic viability (Stank et al., 2015, pp. 26–27). At the same time, the increasing focus on energy and environmental issues opens up new business opportunities and contributes to broader economic development (Liimatainen et al., 2015, pp. 280–281). In this context, sustainability is becoming an integral part of modern logistics systems, where economic objectives are increasingly intertwined with environmental and social dimensions of development.

3. LABORATORIES OF THE FACULTY OF LOGISTICS AND MEGATRENDS

The megatrends presented in the previous chapter have a significant impact on the development of logistics and supply chains and are also reflected in the research directions of the laboratories at the Faculty of Logistics, University of Maribor (FLUM). Individual laboratories address different aspects of these megatrends, with their research areas complementing one another.

3.1. COGNITIVE SYSTEMS LABORATORY IN LOGISTICS

The research work of the Cognitive Systems Laboratory in Logistics is focused on the development, modelling, and optimisation of mechatronic (robotic) systems and intralogistics processes, with an emphasis on transport and warehousing systems, packaging, and reverse logistics. Fundamental research includes the development of advanced analytical and numerical models for system optimisation, while applied research covers the development of prototypes of transport and warehousing equipment, material flow analysis in intralogistics, packaging development, the use of 3D printing, and the identification and tracking of logistics processes using GS1 solutions (Faculty of Logistics, University of Maribor, n.d.).

Such a research orientation of the laboratory is directly linked to technological megatrends, particularly the automation, digitalisation, and robotisation of logistics processes arising from changes in modern supply chains. The development and optimisation of mechatronic systems and intralogistics processes reflect the need for greater efficiency, flexibility, and precision in managing material flows. The use of analytical and numerical models, as well as tracking technologies, supports the transition toward data-driven and automated logistics systems and reflects the impact of megatrends on the digitalisation of logistics. In this way, the laboratory contributes to the development of more automated, data-supported, and efficient logistics systems.

3.2. QUANTITATIVE MODELLING LABORATORY IN LOGISTICS

The Quantitative Modelling Chair focuses on mathematical modelling and the optimisation of material flow in logistics networks, with quantitative modelling of logistics processes representing its central research orientation. In addressing complex optimisation problems, methods from graph theory, combinatorial optimisation, and geographic information systems (GIS) are used (Faculty of Logistics, University of Maribor, n.d.).

Research areas include route optimisation and fleet management, optimisation of internal transport routes in production systems, and optimisation of internal logistics in manufacturing, service, and healthcare organisations. In addition, research focuses on the simulation of logistics processes, spatial data analysis using GIS, and the optimisation and recording of working time in service activities (Faculty of Logistics, University of Maribor, n.d.).
The research orientation of this laboratory is linked to the impacts of technological and organisational megatrends on modern logistics systems, as well as to the increasing complexity of supply chains, digitalisation, and the need for more efficient decision-making. By using methods from graph theory, combinatorial optimisation, and geographic information systems, it enables the analysis of spatially distributed logistics problems arising from globalisation, urbanisation, and changes in demand. In this way, the laboratory contributes to the optimisation of transport routes and fleet management, as well as to more data-driven and adaptable logistics system performance.

3.3. SUSTAINABLE MOBILITY AND TRANSPORT LABORATORY

The Sustainable Mobility and Transport Laboratory focuses its research on sustainable and integrated transport planning, traffic safety, sustainable supply chains, and transport economics. Within integrated transport planning, it addresses measures such as parking management, transport infrastructure planning, traffic calming, promotion of walking and cycling, development of public transport, as well as mobility management and freight transport (Faculty of Logistics, University of Maribor, n.d.).
In addition, the laboratory studies sustainable supply chains in connection with electric mobility, energy efficiency, and renewable energy sources, as well as assessing environmental impacts throughout the entire life cycle. In the field of transport economics, research includes the analysis of transport supply and demand, transport policy, cost structures, and the organisation of the transport sector. A particular emphasis is placed on strategic urban mobility planning using multi-criteria decision-making models (Faculty of Logistics, University of Maribor, n.d.).
The laboratory's research directly addresses environmental megatrends, urbanisation, and the technological development of transport systems. In the field of integrated transport planning and urban mobility, it is linked to the challenges of increasing urbanisation and changes in travel behaviour, while traffic safety reflects the importance of the human factor in increasingly complex transport systems. Furthermore, the study of sustainable supply chains, electric mobility, and energy efficiency is directly related to environmental megatrends and the need to reduce the environmental impacts of transport.

3.4. MANAGEMENT IN LOGISTICS AND SUPPLY CHAINS LABORATORY

The Management in Logistics and Supply Chains Laboratory focuses on the impact of technological and socio-economic changes on the transformation of modern supply chains. Its research includes the analysis of new organisational forms of logistics systems and the impact of changes in business models and stakeholder integration.
An important research area also includes human resource management, social responsibility, and the adaptation of competencies in logistics in the context of technological and organisational change (Faculty of Logistics, University of Maribor, n.d.).
Such a research orientation primarily addresses technological and socio-economic megatrends and supports the development of new organisational and business models in logistics. Particular emphasis is also placed on demographic and social changes that influence work organisation in logistics, labour availability, and the long-term sustainability of supply chain management.

In addition, the laboratory examines the importance of collaboration and integration from the perspective of strategic partnerships, the formation of network-based business models, and the strengthening of supply chain resilience in conditions of increased uncertainty. In this way, it contributes to understanding how logistics system management adapts to broader changes in the global environment.
The following Table 1 presents a summary of the key research areas of individual laboratories and their links to major and secondary megatrends in logistics and supply chains.

Table 1. Overview of laboratory research areas and their relation to megatrends in logistics and supply chains

LABORATORY	CORE RESEARCH AREA	MAIN MEGATREND	SECONDARY MEGATRENDS
Cognitive Systems in Logistics	Development, modelling, and optimisation of mechatronic systems and intralogistics, robotics, automation	Technological development	Globalisation; Demographic changes
Quantitative Modelling in Logistics	Mathematical modelling and optimisation of logistics networks	Technological development	Globalisation; Demographic changes; Cooperation and integration
Sustainable Mobility and Transport	Sustainable transport planning and transport economics	Environmental factors and transport	Demographic changes; Technological development; Globalisation
Logistics and Supply Chain Management	Organisation and management of socially responsible supply chains	Cooperation and integration	Demographic changes; Technological development

CONCLUSION

Megatrends in logistics and supply chains are not a new phenomenon; however, their influence is becoming increasingly pronounced as the global economy continues to evolve. Among the key megatrends shaping modern logistics systems are demographic changes and urbanisation, technological development, collaboration and integration, globalisation, as well as environmental factors and sustainability. These megatrends operate in an interconnected and interdependent manner, collectively creating new requirements and opportunities for the development of logistics and supply chains.
Their impact is reflected in the transformation of logistics from a traditionally operationally oriented activity into a strategic, data-driven, and technologically advanced field. Increasing demands for speed, flexibility, and service reliability are driving the development of innovative solutions such as automation, artificial intelligence, advanced analytics, and digital platforms. At the same time, globalisation and its associated risks highlight the importance of supply chain resilience and adaptability, while sustainability is becoming a key element of long-term competitiveness.

Research institutions play a particularly important role in addressing these challenges, as they contribute to the development of innovative solutions through their work. The findings of this paper indicate that the laboratories of the Faculty of Logistics, University of Maribor, actively address key megatrends through their research orientations. Their work is reflected in the development of advanced technologies, optimisation methods, sustainable approaches, and new organisational models that contribute to more efficient and sustainable logistics system performance. In this way, they significantly co-create both the scientific and applied foundations for the future development of logistics.

In the future, the performance of logistics systems will largely depend on the ability to integrate these megatrends into strategic planning and operational implementation. Organizations that timely recognize their importance and develop appropriate competencies and solutions will be better prepared for the challenges of the global environment and will be more capable of exploiting opportunities for sustainable growth and long-term competitive advantage.

REFERENCES

[1] Anshari, M., Almunawar, M. N., Lim, S. A., & Al-Mudimigh, A. (2018). Customer relationship management and big data enabled: Personalization & customization of services. *Applied Computing and Informatics, 15*(2), 94–101. https://doi.org/10.1016/j.aci.2018.05.004

[2] Antai, I., & Olson, H. (2013). Interaction: A new focus for supply chain vs supply chain competition. *International Journal of Physical Distribution & Logistics Management, 43*(7), 511–528.

[3] Ballou, R. H. (2004). *Business logistics/supply chain management: Planning, organizing, and controlling the supply chain*. Pearson Education. ISBN 0-13-123010-7.

[4] Ballou, R. H. (2007). The evolution and future of logistics and supply chain management. *European Business Review, 19*(4), 332–348.

[5] Barratt, M. (2004). Understanding the meaning of collaboration in the supply chain. *Supply Chain Management: An International Journal, 9*(1), 30–42.

[6] Christopher, M. (2011). *Logistics and supply chain management: Creating value-adding networks* (4th ed.). Financial Times Prentice Hall. ISBN 978-0-273-73112-2.

[7] Dey, A., LaGuardia, P., & Srinivasan, M. (2011). Building sustainability in logistics operations: A research agenda. *Management Research Review, 34*(11), 1237–1259.

[8] Fakulteta za logistiko, Univerza v Mariboru. (n. d.). *Laboratorij za kognitivne sisteme v logistiki*. https://fl.um.si/raziskovanje/laboratoriji/laboratorij-za-kognitivne-sisteme/

[9] Galińska, B. (2018). Logistics megatrends and their influence on supply chains. In *Business logistics in modern management* (Vol. 18, pp. 583–601). Josip Juraj Strossmayer University of Osijek, Faculty of Economics.

[10] Gernandt, K. (2012). Megatrends and their impact on logistics. In *Think Logistics 2012: The impact of severe disruptions on global supply chains*. Singapore.

[11] Gue, K., Akcali, E., Erera, A., Ferrell, B., & Forger, G. (2014). *Material handling & logistics U.S. roadmap*.

[12] Harish, A. R., Liu, X., Wang, X., Pan, S., Dai, H.-N., Li, M., & Huang, G. Q. (2025). Blockchain for logistics 4.0: A systematic review and prospects. *Transportation Research Part E: Logistics and Transportation Review, 201*, 104269. https://doi.org/10.1016/j.tre.2025.104269

[13] Kalaitzi, D., Matopoulos, A., Fornasiero, R., Sardesai, S., Barros, A. C., Balech, S., & Muerza, V. (2021). Megatrends and trends shaping supply chain innovation. In *Lecture notes in management and industrial engineering* (pp. 3–34). Springer. https://doi.org/10.1007/978-3-030-63505-3_1

[14] Kartnig, G., Grösel, B., & Zrnic, N. (2012). Past, state-of-the-art and future of intralogistics in relation to megatrends. *Proceedings of [conference name not provided]*, 40, 193–200.
[15] Kersten, W., von See, B., & Skirde, H. (2014). Identification of megatrends affecting complexity in logistics systems. In W. Kersten, T. Blecker, & C. Ringle (Eds.), *Next generation supply chains: Trends and opportunities*. *Proceedings of the Hamburg International Conference of Logistics (HICL)* (Vol. 18, pp. 3–27). Hamburg University of Technology. https://www.econstor.eu/bitstream/10419/209198/1/hicl-2014-18-003.pdf
[16] Kumar, Y., & Sharma, A. (2021). A review on artificial intelligence (AI). *International Journal of Engineering Research & Technology*. https://d1wqtxts1xzle7.cloudfront.net/75931003/3147-libre.pdf
[17] Lekić, M., Rogić, K., Boldizsár, A., Zöldy, M., & Török, Á. (2021). *Big data in logistics*. Periodica Polytechnica Transportation Engineering, 49(1), 60–65. https://doi.org/10.3311/PPtr.14589
[18] Lekić, M., Rogić, K., Boldizsár, A., Zöldy, M., & Török, Á. (2021). Big data in logistics. *Periodica Polytechnica Transportation Engineering, 49*(1), 60–65. https://doi.org/10.3311/PPtr.14589
[19] Liimatainen, H., Hovi, I. B., Arvidsson, N., & Nykänen, L. (2015). Driving forces of road freight CO_2 in 2030. *International Journal of Physical Distribution & Logistics Management, 45*(3), 260–285.
[20] Muszyński, J. (2001). *Megatrendy a polityka*. Wyd. Atla 2.
[21] Naisbitt, J. (1984). *Megatrends: Ten new directions transforming our lives*. Warner Books.
[22] Rohner, P. (2018). Water: A megatrends perspective. In A. K. Biswas & C. Tortajada (Eds.), *Water resources development and management* (pp. 27–39). Springer. https://doi.org/10.1007/978-981-10-6695-5_2
[23] Savič, N. (2021). *Umetna inteligenca v logistiki* (zaključna strokovna naloga). Univerza v Ljubljani, Ekonomska fakulteta.

[24] Seppälä, M. (2016). *Logistics megatrends and their potential effects on demand for logistics premises in Finland* (Master's thesis). Aalto University.
[25] Stank, T., Autry, C., Daugherty, P., & Closs, D. (2015). Reimagining the 10 megatrends that will revolutionize supply chain logistics. *Transportation Journal, 54*(1), 7–32.
[26] Stevens, G. C., & Johnson, M. (2016). Integrating the supply chain … 25 years on. *International Journal of Physical Distribution & Logistics Management, 46*(1), 19–42.
[27] Takyar, A. (2024). The role of AI in logistics and supply chain. LeewayHertz. https://www.leewayhertz.com/ai-in-logistics-and-supply-chain/
[28] The Investopedia Team. (2025, October 12). Artificial intelligence (AI): What it is, how it works, types, and uses. *Investopedia*. https://www.investopedia.com/terms/a/artificial-intelligence-ai.asp
[29] Vejlgaard, H. (2008). *Anatomy of trend*. McGraw-Hill.
[30] Wang, S.-T., Li, M.-H., & Lien, C.-C. (2021). Analysis of the optimal application of blockchain-based smart lockers in the logistics industry based on FFD-SAGA and grey decision-making. *Symmetry, 13*(2), 329. https://doi.org/10.3390/sym13020329
[31] Wicker, G. (2010). *Der Ökologie-Megatrend in der Wirtschaft: Identifikation und zukünftige Entwicklung*. Diplomica Verlag.
[32] Zhu, X., Liu, N., & Shi, Y. (2022). Artificial intelligence technology in modern logistics system. *International Journal of Technology, Policy and Management*, 66–81.