

The EU Logistics Sector

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Abstract

Logistics and efficient transportation are crucial for the European Union economy. For economies to thrive and remain competitive, logistics and transportation networks must operate in an organized, economical and ecological manner. They facilitate the movement of goods within and outside the EU, giving businesses access to bigger markets and a wider range of consumer items. As a result, there were more prospects for employment and greater success in trade and the economy. An outline of the fundamental trends in the European logistics industry is given in this study. We anticipate the current study will add to our knowledge of the EU logistics industry.

Keywords

logistics, EU27, statistic analysis

1 Introduction

The efficient flow and storage of goods, services, and information from the point of origin to the site of consumption are based on planning, implementation, and management of logistics. It is essential in many sectors, including manufacturing, transportation, retail, and more. While minimising costs and maximising efficiency, logistics' main objective is to ensure that supplies and resources are available when and where they are needed, in the right quantity, and in the proper condition. Important elements of logistics include:

- **Transportation:** this includes the selection of a suitable mode of transportation (such as road, railway, sea and air) that moves goods efficiently from one place to another. It also includes route planning, carrier selection and tracking (Bartuška et al., 2023).
- **Warehousing:** warehouses serve as storage facilities for goods before they are distributed to their final destinations. Efficient warehouse management is essential to ensure the smooth flow of products (Bajec et al., 2020).
- **Inventory management:** this involves keeping track of inventory levels, reorder points, and safety stock to prevent stock shortages and overstock situations. Effective inventory management helps optimise supply chain operations (Dobrota and Vujošević, 2014).

- **Order processing:** this includes receiving, processing, and fulfilling customer orders accurately and promptly. It often involves picking, packing, and shipping products.
- **Demand forecasting:** predicting future product demand is critical to ensure enough inventory to meet customer needs without excess inventory that can tie up capital (Filina-Dawidowicz et al., 2022).
- **Supply chain management:** logistics is closely tied to supply chain management, which involves coordinating all activities from raw material suppliers to end customers. Effective supply chain management seeks to optimise processes, reduce costs, and enhance overall performance (Hruška et al., 2021).
- **Information systems:** modern logistics relies heavily on information technology and systems for real-time tracking, data analysis, and communication within the supply chain (Ogrizović et al., 2021).
- **Reverse logistics:** this aspect deals with the return of goods, recycling, and managing product recalls or defective products (Vimpolšek and Lisec, 2022).

By optimising processes, lowering costs, and enhancing customer satisfaction through on-time and dependable delivery of goods and services, logistics plays a crucial role

in guaranteeing the competitiveness and profitability of enterprises. It is a complicated and dynamic industry still developing due to globalisation, technological improvements, and shifting consumer expectations. The authors of this article examined transportation trends in the EU. The essay is set up as follows. Following the introduction, the methodology, the findings, the analysis, and the conclusion are presented.

2 Methodology

Structured data analysis refers to examining and extracting valuable insights from structured data sets. Structured data is organised and formatted in an easily searchable and sortable way, typically stored in relational databases or tabular formats such as spreadsheets. This data type is highly organised and follows a specific schema or model.

Key aspects of structured data analysis include:

- Data collection: gathering of structured data from various sources, such as databases, spreadsheets, APIs, or other data repositories. This data is typically well-defined and organised into rows and columns.
- Data preprocessing: cleaning and preparation of the data for analysis. This includes handling missing values, removing duplicates, standardising formats, and transforming data.
- Data exploration: exploring the data to understand its characteristics, such as distribution, central tendencies, and relationships between variables. Data visualisation techniques like histograms, scatter plots, and summary statistics are often used.
- Data analysis techniques: applying various statistical and data analysis methods to gain insights from the structured data. Common techniques include regression analysis, hypothesis testing, clustering, classification, and time series analysis.
- Data visualisation: creating visual representations of the data to communicate findings effectively. This includes charts, graphs, heat maps, and dashboards.
- Reporting and interpretation: summarising the analysis results and drawing meaningful conclusions. Interpretation often involves making data-driven decisions or recommendations based on the analysis.
- Machine learning: in some cases, structured data analysis may involve machine learning algorithms to make predictions, classify data, or discover patterns and trends.

Structured data analysis is widely used in various domains, including business analytics, finance, healthcare, and marketing. It helps organisations make informed decisions, optimise processes, identify trends, and discover hidden insights within their data. The authors used the "EU transport in figures – Statistical pocketbook 2022" of the European Commission, Directorate-General for Mobility and Transport (2022) in this article. The organisation responsible for data collection, data preprocessing, and data exploration was Eurostat. The authors performed data analysis and visualisation.

3 Results

In this article, European logistics-related data were collected, such as goods transportation (1995–2020 in % based on 1995–Fig. 1), economic activity described by GDP (2001–2020 in % compared to the previous year), Number of enterprises by mode of transport in 2019, population (1970–2020 in person), trade import (for 2020 in billion EUR), trade export (for 2020 in billion EUR), logistics performance index and finally the values of the global maritime container freight index is analysed.

We could conclude that goods transport plays an important role in economic activity. Further on, the enterprise structure of the sector is analysed (Fig. 2).

In Fig. 2 the dominance of road transport can be easily spotted. These companies need to fulfil increasing demand (Fig. 3).

Logistics could also be described with import and export activity. Therefore, the authors analysed the import of EU member states (Fig. 4). The export activities were also analysed in Fig. 5.

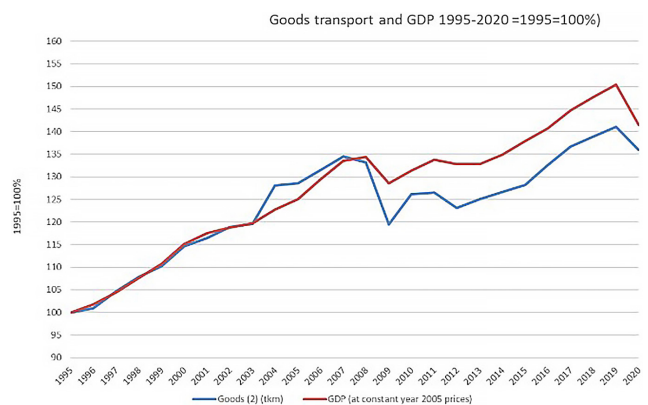


Fig. 1 Connection of economic activity (GDP) and goods transport, Source: own edition based on European Commission, Directorate-General for Mobility and Transport (2022)

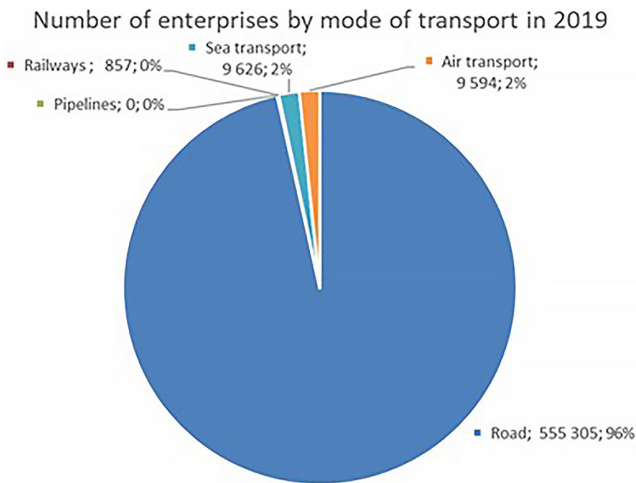


Fig. 2 Number of enterprises by mode of transport in 2019, Source: own edition based on European Commission, Directorate-General for Mobility and Transport (2022)

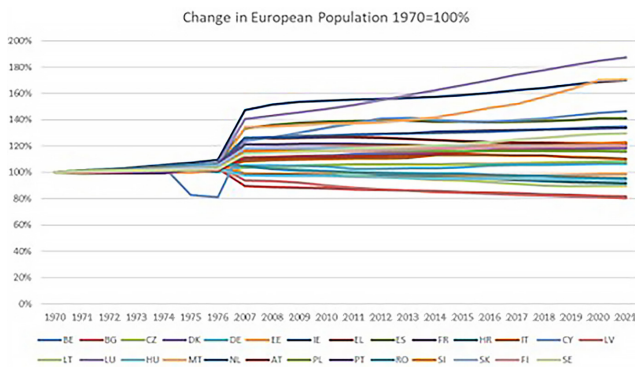


Fig. 3 Change in population 1970 = 100%, Source: own edition based on European Commission, Directorate-General for Mobility and Transport (2022)

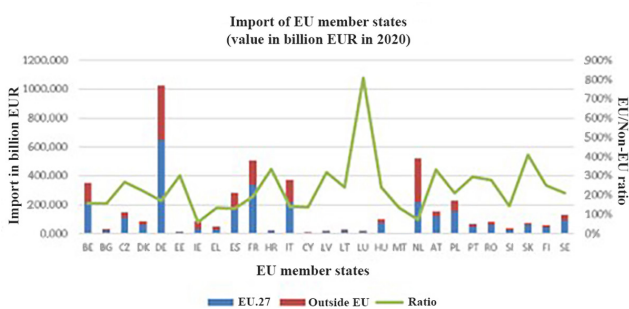


Fig. 4 Import of EU member states (value in billion EUR in 2020), Source: own edition based on European Commission, Directorate-General for Mobility and Transport (2022)

4 Analysis

As can be seen in Fig. 1 that economic activity and goods transport moves together, the authors investigated if there is a correlation between them (Fig. 6).

As it can be seen correlation was found between economic activity and goods transport in EU. Meanwhile, the total population of the EU has continuously increased (Fig. 7).



Fig. 5 Export of EU member states (value in billion euros in 2020), Source: own edition based on European Commission, Directorate-General for Mobility and Transport (2022)

Connection between economic activity and goods transport in EU 1995 to 2020

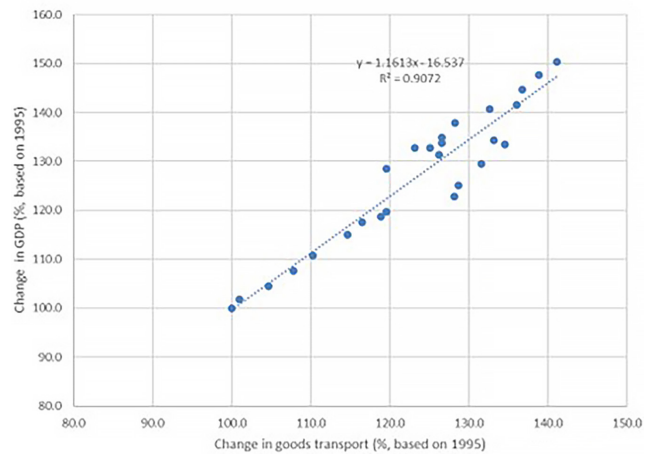


Fig. 6 Correlation between economic activity (GDP) and goods transport in the EU in 1995–2020 Source: own edition based on European Commission, Directorate-General for Mobility and Transport (2022)

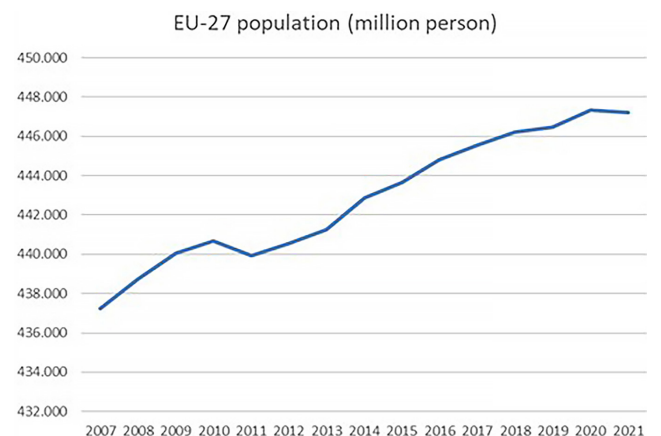


Fig. 7 EU–27 population (million people), Source: own edition based on European Commission, Directorate-General for Mobility and Transport (2022)

Fig. 7 is very interesting concerning Fig. 3, where some countries have doubled their population. Meanwhile, some have lost 20 % in the last decades.

In Fig. 8, the blue line represents the EU and non-EU export ratios of each EU member country. The red line represents the ratios of EU and non-EU import of each EU member country. The green line represents the ratios of EU and non-EU import and export of each EU member country.

Maritime transport represents the most prominent transport mode on global scale, and it is crucial for the successful world trade. Around 90% of world trade is performed via oceans and seas (Allianz Global Corporate and Specialty, 2022), which is the best indicator of what consequences the increase of the freight rates in maritime container shipping can have on many economies. Maritime industry has always played the key role in driving prosperity (Wilke et al., 2021).

The values of the global maritime container freight index for the period from the beginning of the COVID-19 pandemic till the end of May 2022 are displayed in Fig. 9. It shows that the index value slightly dropped in March and April of 2021, after a steady growth from April 2020 to February 2021. It peaked in September 2021, however, it can be concluded that, the values of this index have been continuously dropping since February 2022. On the other hand, it is important to note that in September 2021,

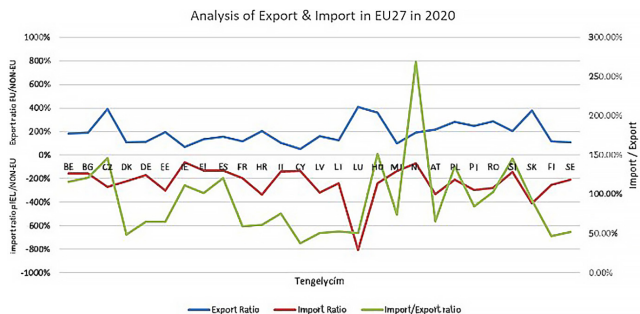


Fig. 8 Analysis of Export and Import in EU27 in 2020 Source: own edition based on European Commission, Directorate-General for Mobility and Transport (2022)

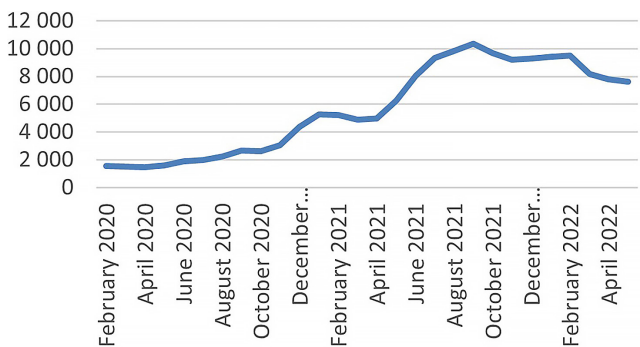


Fig. 9 Global maritime container freight rate index, February 29, 2020 – May 31, 2022., Source: compiled by the author according to Statista (2022)

the freight rates reached their record values of almost 10 400 USD, which is 6.8 times the price from February 2020. (Rožić et al., 2022; Zajac et al., 2023).

The impact of the increase of freight rates on the maritime container industry not only brings the speed of the recovery of the entire global economy into question, but also (United Nations Conference on Trade and Development, 2021):

1. Causes increase of import and consumer prices.
2. Price fluctuations affect entire economies and various goods and are not occurring only in underdeveloped or developing countries.
3. Affects global production and costs.

5 Conclusions

Logistics and good transportation are critically important for the European Union:

- Economic growth: efficient logistics and transportation systems are essential for economic growth and competitiveness. They facilitate the movement of goods within and beyond the EU, enabling businesses to access larger markets and consumers to access a wider variety of products. This stimulates trade and economic activity, increasing job opportunities and prosperity (Boldizsár and Mészáros, 2022).
- Trade: the EU is one of the world’s largest trading blocs, and a significant portion of its GDP comes from international trade. Effective logistics and transportation networks are vital for importing and exporting goods, ensuring that EU member states can access global markets and maintain competitiveness (Hsu et al., 2021).
- Supply chain integration: the EU comprises 27 member states with diverse economies and industries. Efficient logistics and transportation systems help integrate supply chains across borders, enabling the seamless movement of goods within a single European market. This integration is crucial for maintaining economic cohesion and reducing trade barriers.
- Energy security: logistics is closely linked to energy consumption. The EU’s efforts to reduce greenhouse gas emissions and dependence on fossil fuels require more efficient and sustainable logistic systems, including investments in clean energy and alternative fuels (Zsombók, 2023).
- Regional development: good transport infrastructure, including roads, railways, ports, and airports, is essential for balanced regional development

within the EU. It helps connect less developed regions to major economic centres, reducing disparities in wealth and promoting economic convergence (Boldizsár et al., 2022).

- Environmental considerations: the EU is committed to reducing its environmental footprint and combating climate change (Andrej, 2022). An efficient and sustainable logistic system is crucial for achieving these goals by reducing emissions, promoting alternative modes of transportation, and supporting the shift to electric and low-emission vehicles.
- Resilience and security: having robust logistics and transportation networks enhances the EU's resilience to disruptions caused by natural disasters, accidents, or security threats. Ensuring the continuity of supply chains and transportation in times of crisis is a priority. Companies must develop more flexible capacities to be able to adapt more quickly to the crises in the future. Flexibility of the available capacities

is what has been an ideal response to the pandemic and the disruptions it has caused in the supply chains. Flexibility can be increased by directing the efforts towards static and adjustable components of the capacities at container ports.

- Innovation and digitalisation: the EU invests in digitalisation and innovation in logistics and transportation, including technologies like the Internet of Things (IoT), autonomous vehicles, and smart logistics systems. These innovations are expected to improve efficiency and sustainability (Lekić et al., 2021).

In conclusion, effective logistics and transportation systems are essential to the nation's economy, trade relations, regional development, environmental objectives, and residents' overall quality of life. The EU understands the value of continuously funding and enhancing these vital aspects of its society and economy.

References

- Allianz Global Corporate and Specialty (2022) "Safety and shipping review 2022", [pdf] AGCS, Munich, Germany. Available at: <https://www.agcs.allianz.com/content/dam/onemarketing/agcs/agcs/reports/AGCS-Safety-Shipping-Review-2022.pdf> [Accessed: 23 September 2023]
- Andrej, D. (2022) "Carbon emission trading as a climate change mitigation tool", *Cognitive Sustainability*, 1(3), 33. <https://doi.org/10.55343/cogsust.33>
- Bajec, P., Tuljak-Suban, D., Bajor, I. (2020) "A warehouse social and environmental performance metrics of the framework", *Promet – Traffic and Transportation*, 32(4), pp. 513–526. <https://doi.org/10.7307/ptt.v32i4.3390>
- Bartuška, L., Hanzl, J., Kampf, R., Brlek, P. (2023) "Indicators as a tool to assess the level of sustainable urban freight logistics", *Promet – Traffic and Transportation*, 35(4), pp. 485–499. <https://doi.org/10.7307/ptt.v35i4.137>
- Boldizsár, A., Mészáros, F. (2022) "A spatial economic study of rail freight in the european economic area", *Promet – Traffic and Transportation*, 34(5), pp. 687–698. <https://doi.org/10.7307/ptt.v34i5.4054>
- Boldizsár, A., Mészáros, F., Torok, E. (2022) "Social and economic analysis of the EU road freight transport fleet", *Cognitive Sustainability*, 1(2), 16. <https://doi.org/10.55343/cogsust.16>
- Dobrota, M., Vujošević, M. (2014) "Forecasting and inventory performance in direct-store delivery supply chain: case of retailer in Serbia". *International Journal for Traffic and Transport Engineering*, 5(1), pp. 9–16. [https://doi.org/10.7708/ijtte.2015.5\(1\).02](https://doi.org/10.7708/ijtte.2015.5(1).02)
- European Commission, Directorate-General for Mobility and Transport (2022) "EU transport in figures – Statistical pocketbook 2022", Publications Office of the European Union. ISBN 978-92-76-53698-7 <https://doi.org/10.2832/216553>
- Filina-Dawidowicz, L., Stankiewicz, S., Čičiūnienė, K., Matijošius, J. (2022) "Factors influencing intermodal transport efficiency and sustainability", *Cognitive Sustainability*, 1(1), 9. <https://doi.org/10.55343/cogsust.9>
- Hruška, R., Kmetík, M., Chocholáč, J. (2021) "Selection of the transport mode using the AHP method within distribution logistics of motor fuels", *Promet – Traffic and Transportation*, 33(6), pp. 905–917. <https://doi.org/10.7307/ptt.v33i6.3940>
- Hsu, W.-K. K., Huang, S.-H. S., Huynh, N. T. (2021) "An evaluation model for foreign direct investment performance of free trade port zones", *Promet-Traffic and Transportation*, 33(6), pp. 859–870. <https://doi.org/10.7307/ptt.v33i6.3844>
- Lekić, M., Rogić, K., Boldizsár, A., Zöldy, M., Török, Á. (2021) "Big data in logistics", *Periodica Polytechnica Transportation Engineering*, 49(1), pp. 60–65. <https://doi.org/10.3311/PPtr.14589>
- Ogrizović, D., Perić Hadžić, A., Jardas, M. (2021) "Fully immersive virtual reality in logistics modelling and simulation education", *Promet – Traffic and Transportation*, 33(6), pp. 799–806. <https://doi.org/10.7307/ptt.v33i6.3941>
- Rožić, T., Naletina, D., Zajac, M. (2022) "Volatile freight rates in maritime container industry in times of crises", *Applied Sciences*, 12(17), 8452. <https://doi.org/10.3390/app12178452>

- Statista (2022) "Global maritime container freight rate index, February 29, 2020 – May 31, 2022", Statista Research Department, Available at: <https://www.statista.com/statistics/1250636/global-container-freight-index/> [Accessed: 19 December 2023]
- United Nations Conference on Trade and Development (2021) "Review of maritime transport 2021", United Nations. ISBN 978-92-1-113026-3 [online] Available at: https://unctad.org/system/files/official-document/rmt2021_en_0.pdf [Accessed: 23 September 2023]
- Vilke, S., Mance, D., Debelić, B., Maslarić, M. (2021) "Correlation between freight transport industry and economic growth – Panel analysis of CEE countries", *Promet – Traffic and Transportation*, 33(4), pp. 517–526.
<https://doi.org/10.7307/ptt.v33i4.3688>
- Vimpolšek, B., Lisec, A. (2022) "CATWOOD–Reverse logistics process model for quantitative assessment of recovered wood management", *Promet – Traffic and Transportation*, 34(6), pp. 881–892.
<https://doi.org/10.7307/ptt.v34i6.4101>
- Zajac, M., Rožić, T., Bajor, I. (2023) "Model for evaluating the effectiveness of cargo operation strategy in an inland container terminal", *Applied Sciences*, 13(12), 7127.
<https://doi.org/10.3390/app13127127>
- Zsombók, I. (2023) "Sustainable operation? Measuring the actual consumption of a hybrid car and determining its consumption curve", *Cognitive Sustainability*, 2(3), 70.
<https://doi.org/10.55343/CogSust.70>