**MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE**
**KYIV NATIONAL ECONOMIC UNIVERSITY**
**NAMED AFTER VADYM HETMAN**

**Faculty of International Economics and Management**
**Department of International Economics**

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|---|---|
| **BACHELOR DEGREE PROGRAM** | **«INTERNATIONAL ECONOMICS»** |
| **FIELD OF KNOWLEDGE** | **05 Social and behavioral sciences** |
| **SPECIALTY** | **051 «Economy»** |

Form of education *full-time*

# *BACHELOR THESIS*

**Title** **Global market of transport and logistics services**

**By** **Mariia Pyvovar**

*Academic Supervisor* Assosiate Professor

Apalkov Srehii

(Signature)

**Bachelor Thesis has been approved for defense at Attestation Examination Commission (EC)**

Head of the Department of International Economics
Doctor of Science, Professor
_____Y. Stoliarchuk
(Signature)

**KYIV 2023**

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**AGREED**
Head of the project group (guarantor) of the educational-professional program
_____Y. Stoliarchuk
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_____ 2023

**APPROVED**
Head of the Department
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_____ 2023

**INDIVIDUAL TASK**
**higher education applicant Mariia Pyvovar**

*full-time* forms of education

**Bachelor Thesis**
Title: Global market of transport and logistics services

**The title of the Bachelor's thesis has been approved by the Rector's Order «07» 12. 2022 №535**

**Bachelor Thesis is based on** analysis the transport and logistics services of PepsiCo in Ukraine, providing insights into their effectiveness, operational costs, and financial impact _

**Deadline for submitting the final version of Bachelor's Thesis to the Academic Supervisor** (*Deadline -20.05.2023)*

**Plan of Bachelor Thesis and the terms of it submission to the Academic Supervisor**

**Chapter 1**. The essence of transport and logistics services

**Chapter 2.** Results of the study of transport and logistics services in Ukraine based on the example of PepsiCo

**Chapter 3.** Perspectives of transport and logistics services development in the context of globalization

| | |
|---|---|
| **Object of research:** | The transport and logistics services on the global level, its challenges, and implications of Industry 4.0 in logistics |
| **Subject of research:** | Analysis of current challenges in the industry, evaluation of the efficiency of transport logistics at the enterprise level, practical study the transport logistics services in Ukraine with a focus on company PepsiCo examination the cost analysis and financial impact of logistics processes predictions about future development of logistics services |
| **The purpose of the Thesis:** | To examine and analyze the economic essence, current challenges, efficiency evaluation criteria, and development perspectives of transport and logistics services in the global market, with an emphasis on PepsiCo's transport and logistics services |

**Specific tasks applicant has to accomplish to meet the objective:**

In Chapter 1 the tasks are to investigate the economic essence of transport logistics as a type of logistics activity; to analyze the current challenges faced by the global transport and logistics services industry; to identify and evaluate the criteria and indicators for measuring the efficiency of transport logistics at the enterprise level, considering factors such as cost-effectiveness, timeliness, reliability, and customer satisfaction.

In Chapter 2 the task is to perform a comprehensive diagnostic analysis of transport logistics services in Ukraine, with a specific focus on the practices and challenges

encountered by enterprises in the country; to thoroughly examine and analyze the transport and logistics services provided by PepsiCo in Ukraine to provide valuable insights into the effectiveness of these services, as well as their impact on operational costs and financial performance.

In Chapter 3 the task is to investigate the emerging trends in the transport and logistics services market and assess their potential implications for the future of logistics services on a global scale. The aim is to gain insights into the latest developments and advancements in the industry and understand how they may shape the landscape of logistics services moving forward.

The task has been set
by the Academic Supervisor _____ Serhii Apalkov
*(Signature)* *(Name, Surname)*
"10" 01. 2023

The task has been given to
Applicant _____ Mariia Pyvovar
*(Signature)* *(Name, Surname)*
"10" 01. 2023

## ABSTRACT

The qualification bachelor's thesis contains 82 pages, 3 tables, 11 figures, a list of references of 62 titles, and appendices.

**"Global market of transport and logistics services"**

*The object of the thesis* the analysis of the challenges, efficiency criteria, and implications of Industry 4.0 in global market of transport and logistics services.

*The subject of the thesis* is the comprehensive analysis of current industry challenges, practical examination of transport logistics services in Ukraine with a focus on PepsiCo, cost analysis and financial impact.

*Purpose and objectives of the research*. The research analyzes industry challenges, evaluates efficiency, examines transport logistics services in Ukraine with a focus on PepsiCo, analyzes costs and financial impact, predicts future development, and proposes strategies for logistics at PepsiCo Ukraine.

To achieve the purpose of the research, the following objectives were set:

- investigate significance of transport and logistics in the global market;
- analyze current challenges in the global transport and logistics services industry;
- identify and evaluate criteria and indicators for measuring efficiency;
- conduct an analysis of transport logistics services in Ukraine, focusing on challenges;
- examine and analyze the transport and logistics services of PepsiCo in Ukraine, assessing effectiveness, costs, and financial impact;
- explore emerging trends in the transport and logistics services market and their potential global impact on the future of logistics services.

*Theoretical, methodological, and practical significance of the results***.** The research holds theoretical significance looking at the economic essence of transport logistics and identifying industry challenges, while providing practical insights into transport logistics services through diagnostic analysis and cost evaluation, with a focus on PepsiCo.

The year of completion of the qualifying bachelors's thesis is 2023.

The year of presentation is 2023.



Keywords: Transport and logistics service, Logistics activity, logistics KPI's, industry 4.0, logistics 4.0, logistics in the context of globalization, transport and logistics services of PepsiCo

**Review**

**of the qualifying bachelor's thesis of the applicant**

**of the Faculty of International Economics and Management of the educational and professional program "International Economy"**

**Mariia Pyvovar**

**on the topic « Global Market of Transport and Logistics Services"**

**1. The relevance of the topic:** Overall, the thesis provides a comprehensive analysis of the global market for transport and logistics services. The author has demonstrated a strong understanding of the subject matter and has effectively explored various aspects of the industry. The thesis addresses the significance of transport and logistics services in the global context, focusing on the example of PepsiCo in Ukraine. It explores the economic essence of transport logistics as a type of logistics activity and analyzes the current challenges faced by the global transport and logistics services industry. It discusses emerging trends in the transport and logistics services market and their potential influence on the future of logistics services.

**2. Positive features of the qualifying bachelor's thesis:** The thesis follows a logical structure, with each chapter building upon the previous one. The author demonstrates a good command of academic writing conventions. The introduction provides a clear overview of the thesis topic and establishes the relevance of the global market for transport and logistics services. It effectively outlines the objectives and research questions. The literature review provides an adequate analysis of existing scholarly works on the global market of transport and logistics services. The author references relevant sources and discusses key concepts and trends. The methodology describes the research approach and data collection methods used in the thesis. The analysis section presents a detailed examination of the global market for transport and logistics services. The author demonstrates a strong analytical ability by exploring various

factors such as market size, industry structure, key players, and emerging trends. To gain a comprehensive understanding of the economic essence of transport logistics, current challenges in the global transport and logistics services, criteria and indicators for evaluating efficiency, emerging trends in the market, and the implications of Industry 4.0 literature review was used. The findings are supported with relevant data and examples. The thesis specifically focuses on the case of Ukraine, with an emphasis on PepsiCo's transport and logistics services, and explores the implications of Industry 4.0 on logistics processes.

3. **The presence of the author's independent developments:** approaches to risk prediction considered and proposed by the author can be used by companies that are Global Market of Transport and Logistics Services, to make informed decisions and to anticipate potential risks and challenges. For conducting diagnostics of transport logistics services of enterprises in Ukraine, analyzing the transport and logistics services of PepsiCo Company in Ukraine, and performing cost analysis and financial impact assessment of logistics processes data analysis method was used. Case study was used in the example of PepsiCo Ukraine to examine the specific experiences and strategies in the context of transport and logistics services.

4. **The value of theoretical conclusions and practical recommendations:** The research on the global market of transport and logistics services holds theoretical significance by enhancing our understanding of the economic essence of transport logistics and identifying challenges in the industry. Methodologically, the research employs diagnostic analysis and cost evaluation to provide practical insights into transport logistics services, focusing on the case of PepsiCo in Ukraine. The findings and recommendations have practical significance, offering valuable insights for industry practitioners and policymakers to navigate emerging trends, particularly in relation to Industry 4.0, based on European countries' experiences.

5. **The presence of shortcomings:** this work is the rare case when flaws are difficult to detect. However, there are a few areas where the thesis could be further improved and

expanded. It would be beneficial to provide more details regarding the sources of data and the selection criteria for the case studies or empirical analysis. Discussing any potential limitations or challenges encountered during the research process would be valuable. To strengthen the analysis, it would be beneficial to include more comparative analysis between different regions or countries, as well as a deeper discussion of the implications of the findings.

**6. General assessment of the qualifying bachelor's thesis and its admission to the defense before the EC:** In conclusion, the qualifying bachelor's thesis on "Global Market of Transport and Logistics Services" is a commendable piece of work that showcases the applicant's understanding of the subject matter. The work was performed, in general, at the appropriate theoretical and methodological levels, meets all the regulatory requirements for qualifying bachelor's theses and is admitted to the defense before the Examination Commission with a preliminary assessment of 50 points.

**Academic supervisor: PhD, Associate Professor of the Department of International Economics**

_____ S. Apalkov

June 8, 2023

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# LIST OF ABBREVIATIONS

| | |
|---|---|
| SCML | Supply Chain Management and Logistics |
| SAP | (original German: Systemanalyse Programmentwicklung) System Analysis Program Development |
| IoT | Internet of Things |
| LTL | Less-than-truckload, also known as or less-than-load (LTL), is a shipping service for relatively small loads or quantities of freight |
| KPI | Key Performance Indicator |
| LPI | The Logistics Performance Index |
| EV | Electric vehicle |
| AI | Artificial Intelligence |
| IT | Information Technology |
| GPS | Global Positioning System |
| CC | Cloud Computing |
| WSN | Wireless Sensor Networks |
| AGV | Automatic Guided Vehicle |
| AR | Augmented Reality |
| 3PL | Third-Party Logistics |
| WHS | Warehouse |
| PT | Primary Transportation |

# INTRODUCTION

**Relevance of the research.** The thesis addresses the significance of transport and logistics services in the global context, focusing on the example of PepsiCo in Ukraine. It explores the economic essence of transport logistics as a type of logistics activity and analyzes the current challenges faced by the global transport and logistics services industry. It discusses emerging trends in the transport and logistics services market and their potential influence on the future of logistics services.

**Purpose and objectives of the research**. The purpose of the thesis is to examine and analyze the economic essence, current challenges, efficiency evaluation criteria, and development perspectives of transport and logistics services in the global market. The thesis specifically focuses on the case of Ukraine, with an emphasis on PepsiCo's transport and logistics services, and explores the implications of Industry 4.0 on logistics processes.

To achieve the purpose of the research, the following objectives were set:

- to investigate the economic essence of transport logistics as a type of logistics activity and its significance in the global market of transport and logistics services;
- to analyze the current challenges faced by the global transport and logistics services industry;
- to identify and evaluate the criteria and indicators for measuring the efficiency of transport logistics at the enterprise level, considering factors such as cost-effectiveness, timeliness, reliability, and customer satisfaction;
- to conduct a diagnostic analysis of transport logistics services in Ukraine, focusing on the practices and challenges faced by enterprises in the country;
- to examine and analyze the transport and logistics services of PepsiCo in Ukraine, providing insights into their effectiveness, operational costs, and financial impact;
- to explore emerging trends in the transport and logistics services market and their potential impact on the future of logistics services globally.

**Object of the research.** The object of the thesis is the transport and logistics services on the global level, its challenges and implications of Industry 4.0. It focuses on the case of PepsiCo in Ukraine and aims to provide insights and strategies for the development of transport and logistics services in the context of globalization.

**Subject of the research.** The subject of the thesis is the analysis of current challenges in the industry, evaluation of the efficiency of transport logistics at the enterprise level, practical study the transport logistics services in Ukraine with a focus on PepsiCo, examination the cost analysis and financial impact of logistics processes, predictions about the future development of transport and logistics, proposition of strategies for logistics of PepsiCo Ukraine.

**Research methods.** Literature review: To gain a comprehensive understanding of the economic essence of transport logistics, current challenges in the global transport and logistics services, criteria and indicators for evaluating efficiency, emerging trends in the market, and the implications of Industry 4.0 literature review was used. For conducting diagnostics of transport logistics services of enterprises in Ukraine, analyzing the transport and logistics services of PepsiCo Company in Ukraine, and performing cost analysis and financial impact assessment of logistics processes data analysis method was used. Case study was used in the example of PepsiCo Ukraine to examine the specific experiences and strategies in the context of transport and logistics services.

**Theoretical, methodological and practical significance of the results.** The research on the global market of transport and logistics services holds theoretical significance by enhancing our understanding of the economic essence of transport logistics and identifying challenges in the industry. Methodologically, the research employs diagnostic analysis and cost evaluation to provide practical insights into transport logistics services, focusing on the case of PepsiCo in Ukraine. The findings and recommendations have practical significance, offering valuable insights for industry practitioners and policymakers to navigate emerging trends, particularly in relation to Industry 4.0, based on European countries' experiences.

# CHAPTER 1
# THE ESSENCE OF TRANSPORT AND LOGISTICS SERVICE

## 1.1 The economic essence of transport logistics as a type of logistics activity

The logistics industry is a vital industry experiencing growth as a result of factors such as deregulation, mergers and alliances, including growth in logistics firms [1, p.7]

A business logistics system encompasses all the activities related to the movement of goods from a supplier to a business or from a business to a customer. The management of these activities is crucial as they constitute a unified system. For instance, drop-shipping firms have sophisticated logistics practices that enable them to deliver goods directly to customers from numerous small suppliers. A logistics management system supports this process and includes handling inbound and outbound transportation, warehouse management, fleet management, order processing, inventory control, supply and demand forecasting, as well as third-party logistics (3PL) management. [2]

Although logistics primarily concerns moving goods, it has a far-reaching impact on other areas such as efficiency, cost reduction, production rates improvement, inventory management, warehouse space optimization, customer satisfaction, and customer service improvement. Furthermore, logistics entails managing returns to maximize revenue from these products. In logistics, the movement of goods is viewed from the perspective of one company, which involves the movement of goods and materials received and managed internally by a firm, and the transportation of those products to customers. In contrast, the supply chain refers to the production or distribution of goods and services sequentially by businesses. [2]

In essence, logistics is mainly a single-company matter, while the supply chain involves multiple companies. Although logistics may be coordinated in some parts or the whole of the supply chain, each segment is the responsibility of a single entity until it hands over the product or material to another entity in the supply chain. [2]

Logistics comprises four major functions: transportation, warehousing, third- and fourth-party logistics (3PL and 4PL), and reverse logistics. Transportation involves various modes such as air, rail, water, road, or pipeline that facilitate the movement of goods through the supply chain. Efficient logistics requires selecting the most effective combination of these modes. Warehousing relates to receiving, storing, and shipping products to and from production or distribution locations. When the product is not in transit between locations, it is kept in the warehouse. Third- and fourth-party logistics (3&4 PL) refer to outsourcing a company's logistics operations to a specialized provider who integrates various services such as transportation, warehousing, cross-docking, inventory management, packaging, and freight forwarding. In contrast, a 4PL organization acts as a single interface between the client and multiple logistics service providers, managing all aspects of the client's supply chain. It is possible for a major 3PL provider to establish a 4PL organization within its existing structure. Finally, reverse logistics deals with handling returns, recycling, reusing, or disposing of materials that travel from customers to suppliers. [3, p.11]

The transportation process consists of the following components (Fig.1):

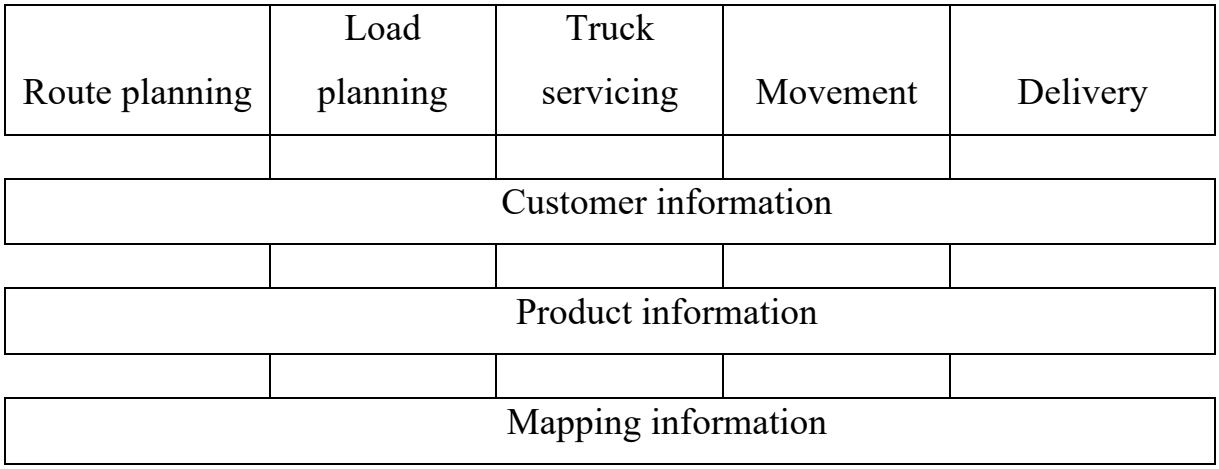


Figure 1.1. Components of transportation processes. Source: [3, p.13]

The logistics process involves several key steps that ensure timely delivery of goods to customers. The first step is route planning, which involves establishing the best route for the truck to take to make deliveries. The second step is loading planning, where shipments are arranged within the truck to minimize handling. The third step is truck servicing, which ensures that the truck is fueled and properly prepared for the trip. The fourth step is movement, which involves the physical movement of the truck along the

planned route. The fifth step is delivery, which puts the product in the buyer's hands, and a signature or delivery receipt may be collected. Each of these steps relies on customer information, product information, and mapping information. [3, p.13]

The logistics industry offers several modes of transportation, including road, rail, air, water, and pipeline. Among these, road transportation or trucking is the most widely used and has been growing for the past 50 years. [4] Freight shipment by truck has several advantages over other modes of transportation. For instance, the trucking industry is highly competitive, which leads to lower prices. This competition is a result of a relatively low capital investment in vehicles compared to other modes of transportation. Additionally, truck shipments are considered timely and regular due to high vehicle speeds. Road transportation provides much flexibility for companies in selecting the route, time schedule, and the amount of packages, with many route options available that can lead to competitive advantages and increased efficiency. Another significant advantage of road freight is the so-called door-to-door service, which guarantees timely and personal shipment of the product to the customer.

Next mean of transportation is railway transportation. It is a mode of transportation used for long-distance shipping that is cost-effective, efficient, and environmentally friendly. Although rail companies often operate in a monopoly or oligopoly situation, rail transportation is known for being a "green" system with lower energy consumption per unit load per km than road modes. But rail transportation requires also a fixed route and all transshipment of goods must be conducted at rail terminals. Due to the huge investment need in rail transportation system, the connection to freight points is limited. [3, p.22] The major components of rail transportation system are railcar, railroad, and rail terminal. While rail transportation is constrained by physical geography and the lack of a universal standard for rail gauge, it remains an efficient mode of transportation that can be easily combined with other modes for inland shipment.

Maritime transportation, also known as water transportation, is an essential aspect of international trade and globalization. Ships operate around the clock, all year round, to transport goods to all corners of the world. This mode of transportation can handle vast amounts of cargo but is limited by geography. Water transportation can be divided into

two categories: inland waterways, which have limited access to water and ports, and international shipping routes, which link the world's ports through a network of predetermined routes. [3, p.24]

The major components of maritime transportation include shipping routes, seaports, and ships. Shipping routes are a few kilometers wide and are designed to avoid the discontinuities of land transport by linking ports, which are the main interface between maritime and land transportation. Shipping routes are determined by strategic points of passage, such as coasts, winds, marine currents, depth, reefs, and ice, as well as political borders. As a result, maritime routes often follow an arc on the earth's water surface as intercontinental maritime transportation attempts to follow the shortest distance between two points on the globe. [3, p. 24]

The pipeline is a transportation method that requires a lot of capital investment and specialized knowledge. The amount of investment required depends on the size and location of the pipeline. This mode of transportation is typically used for oil and gas products, but it can also transport other liquids, such as water and beer. Pipelines are considered to be a reliable method of transportation since they connect a source of supply to a destination, such as an oil well to a refinery. Additionally, pipelines can link isolated supply points with demand points where other modes of transportation may not be viable. However, the disadvantage of pipelines is that they are inflexible since they are built to transport a specific product from a specific source. Once the product supply is exhausted, the pipeline becomes obsolete. Different products require different pipeline networks, such as natural gas and drinking water distribution. [3, p. 27]

Air transportation is a fast and reliable mode of transportation that is primarily used for time-sensitive, perishable, or high-priced products. It is an expensive mode of transportation, but it is worth the cost when transporting goods long distances. Air freight is transported in extra space on commercial airliners or through dedicated air freight companies like UPS or FedEx. This mode of transportation is becoming more popular with all partners in the supply chain, regardless of their position in the chain. Air transportation accounts for only 2% of world trade in goods by weight but more than 40% when measured by value. To compete on the global scale, air transportation requires a

large capital investment and operating budget as aircraft and airports are very expensive to build. However, high margins of revenue can offset these costs. For example, for international operations, freight can account for up to 45% of the revenue of a regular airline. Freight shipments are also an excellent method of recouping lost revenue resulting from variations in demand from seasonality or other external factors, especially for commercial airliners. [3, p. 29]

The role of logistics is critical to the economy of any country. Firstly, it is a major expense for businesses and is influenced by and influences other economic activities. Improving logistics efficiency can greatly contribute to the overall economy. Secondly, logistics supports the movement and flow of economic transactions and is crucial in facilitating the sale of all goods and services. If goods do not arrive at the right time, place, condition, to the right customer, in the right quantity, and at the right cost (following the 7R's principle), the entire supply chain will suffer. Logistics also plays a significant role within organizations. [5, p.10]

Key logistics activities: customer service, demand forecasting/planning, inventory management, logistics consumptions, material handling are required to facilitate the flow of a product from point of origin to point of consumption. [5, p.15]

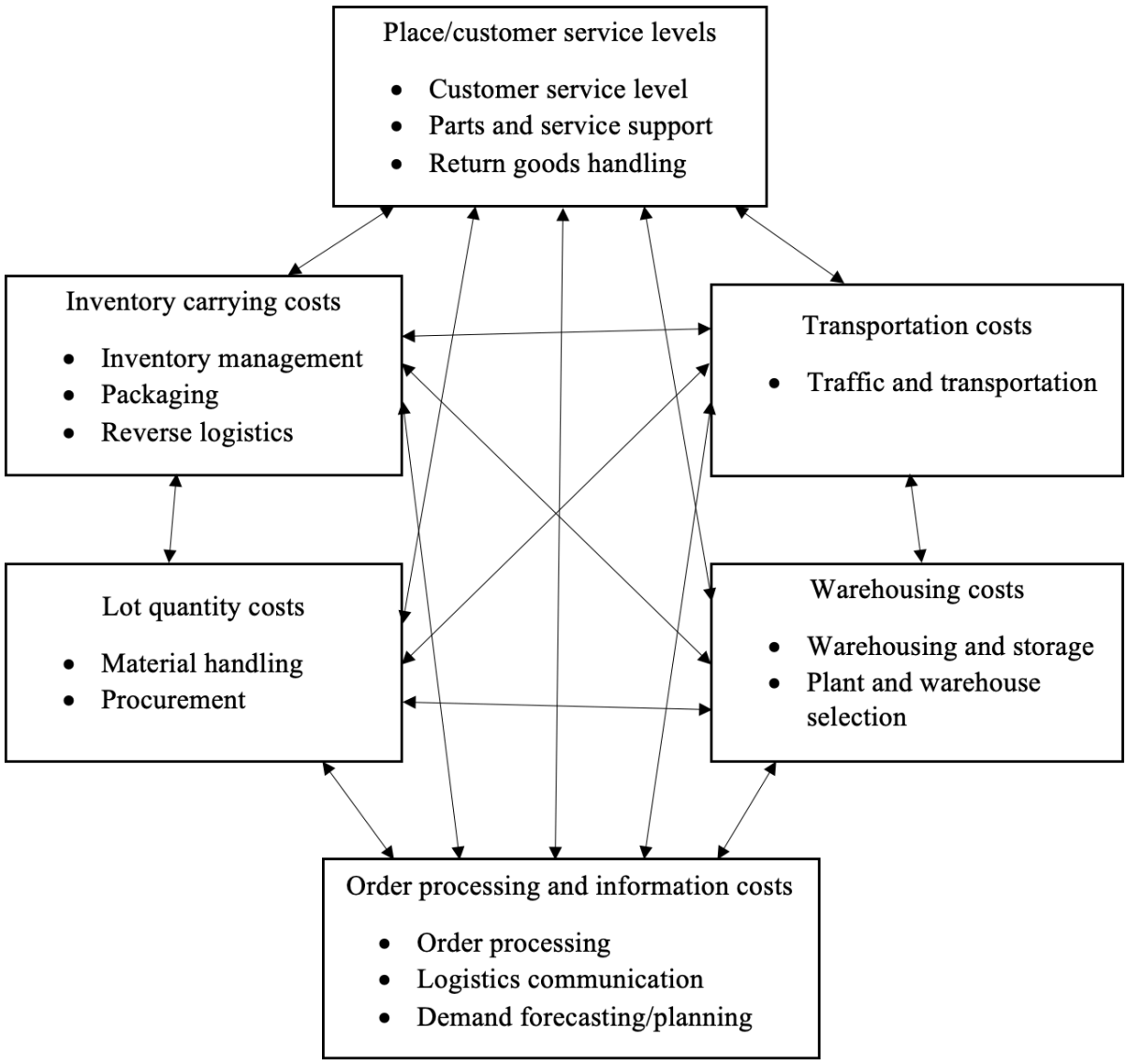


Figure 1.2. How logistics activities drive total logistics costs. Source: [6]

On the Figure 1.2 we can see logistics activities, which are, order processing, packaging, parts and service support, plant and warehouse site selection, procurement, return goods handling, reverse logistics, transportation, warehousing and storage, all these activities are part of the logistics activities, and each activity affects the logistics process. [5, p.16-17]

**Customer service** is a critical outcome of a logistics system, which aims to deliver the right product to the right customer at the right place, time, condition, and cost. Good customer service is essential to ensure customer satisfaction, which is a crucial output of the entire marketing process. [5, p.17]

**Forecasting demand** is an integral part of the organization, and there are several types of demand forecasting. Marketing forecasts customer demand based on various factors such as pricing, promotions, and competition, while manufacturing forecasts production based on sales demand forecast and current inventory levels. Logistics demand forecasting determines how much to order from suppliers or produce and deliver to each market the organization serves. Therefore, logistics must be linked with both marketing and manufacturing forecasting. [5, p.17]

Effective inventory management involves balancing the levels of inventory held to achieve high customer service levels while minimizing the costs associated with holding inventory, including capital tied up in inventory, variable storage costs, and obsolescence. [5, p.17]

**Logistics Communications** is a critical aspect of logistics, given its interactions with a diverse range of functions and organizations. This includes maintaining constant communication with suppliers, customers, and various departments within an organization such as logistics, engineering, accounting, marketing, and production. Logistics activities require coordination between different warehousing activities such as material storage, work in progress and finished goods. The ability to communicate effectively can provide an organization with a competitive advantage. [5, p.18]

**Materials handling** covers all aspects of moving raw materials, work in progress, or finished goods within a plant or warehouse. The primary goal of materials management is to minimize handling as much as possible, reducing travel distance, bottlenecks, inventory levels, waste, pilferage, and damage. [5, p.18]

**Order processing** involves an organization's systems for accepting orders from customers, providing them with status updates on their orders, and fulfilling orders to make them available to customers. Since the order processing cycle is a crucial area of customer interaction with an organization, it can have a significant impact on customer service and satisfaction. [5, p.18]

**Packaging** serves various functions in logistics. It provides crucial information to inform customers about the product and can attract consumers' attention through aesthetically pleasing packaging. From a logistics standpoint, packaging ensures product

protection during storage and transportation, which is especially critical for long-distance and international transportation. [5, p.19]

After-sale support, which involves delivering repair parts to dealers, picking up defective products from customers, and responding quickly to repair demands, is known as **Parts and Service support.** [5, p.19]

Choosing the location of the company's **plants and warehouses** is a strategic decision that affects not only the costs of inbound raw materials and outbound finished goods transportation but also customer service levels and response speed.[5, p.19]

**Procurement**, also referred to as purchasing or supply management, includes selecting suppliers, negotiating prices, terms and quantities, and assessing supplier quality.

**Return goods handling** is complex as it involves moving small quantities of goods back from the customer to the producer, which can be up to nine times more expensive than moving products forward.[5, p.20]

**Reverse logistics** involves removing and disposing of waste materials from the production, distribution, or packaging process. This could include temporary storage followed by transportation to disposal, reuse, reprocessing, or recycling locations.[5, p.20]

**Traffic and transportation** involve selecting the mode of transportation (e.g., truck, rail, air, pipeline, etc.), routing the shipment, ensuring compliance with regulations in the region of shipment, and choosing the carrier.[5, p.20-21]

**Warehousing** provides time and place utility by allowing products to be produced and held for later consumption. Warehouse activities include layout, design, ownership, automation, employee training, and other related issues. [5, p.21]

In conclusion, the logistics industry is experiencing growth and is a vital part of various sectors due to factors such as deregulation, mergers, and alliances. It encompasses the management of activities related to the movement of goods, including transportation, warehousing, third- and fourth-party logistics, and reverse logistics.

Logistics is not limited to the physical movement of goods, it has a far-reaching impact on other areas such as efficiency, cost reduction, production rate improvement, inventory management, warehouse space optimization, customer satisfaction, and customer service improvement. It involves managing returns to maximize revenue from products, making it a comprehensive and integrated system that influences and is influenced by various economic activities.

It is important to differentiate between logistics and the broader concept of the supply chain. While logistics primarily focuses on the movement of goods within a single company, the supply chain encompasses the production or distribution of goods and services sequentially by multiple businesses. Although logistics may be coordinated within certain parts or the entirety of the supply chain, each segment is the responsibility of a single entity until it hands over the product or material to another entity in the supply chain.

Logistics plays a crucial role in improving efficiency, reducing costs, optimizing production rates, managing inventory, and enhancing customer satisfaction. Different modes of transportation, such as road, rail, air, water, and pipeline, are utilized in the logistics process, each with its advantages and limitations. The key functions of logistics include customer service, demand forecasting, inventory management, logistics communication, materials handling, order processing, packaging, parts and service support, plant and warehouse site selection, procurement, return goods handling, reverse logistics, traffic and transportation, and warehousing. Effective logistics practices are essential for ensuring timely delivery, customer satisfaction, and overall economic growth.

## 1.2 Analysis of the current challenges in the global transport and logistics services

In today's rapidly evolving world, changes in business processes are being driven by various factors. One area particularly affected by these changes is logistics and transportation. The COVID-19 pandemic has served as a wake-up call for many logistics leaders, highlighting the vulnerabilities of traditional workflows within the supply chain logistics. [7]

In 2020, supply chains and flows of goods came to a halt due to the closure of plants in China and a standstill in production. This led to industries struggling to obtain goods and supplier parts, especially the automotive industry, which relies on just-in-time deliveries. Border controls in European countries caused traffic back-ups and delays, with road haulage being particularly affected by pandemic-related restrictions. The International Road Transport Union estimated losses of EUR 550 billion in the second half of 2020. [8] However, there are signs of growth in 2021, though it is difficult to predict the future due to the pandemic. Air freight suffered significantly due to border closures, lower demand, and production stops, leading to rising transport prices and a shortage of empty containers in Germany and a shortage of drivers that freight forwarders and road logistics experts still need to address.

The railway industry was comparatively less impacted by the pandemic, as special rail traffic helped solve problems faced by businesses. Deutsche Bahn provided freight transport for food items required by supermarkets when lorries were stuck in traffic jams. Due to the closure of borders across Europe, rail transport played to its strengths, such as DB Cargo's unique single wagonload transport service that could transport even small quantities. Additionally, the railway required a smaller workforce and had stable routes running throughout Europe, allowing for contact-free transportation of large quantities over long distances. However, despite these advantages, Europe's largest freight operating company, DB Cargo was still impacted by the pandemic due to their customers mainly belonging to the automotive and steel industries, which saw a decline in revenue, leading to follow-on effects for logistics providers. DB Cargo's freight trains cross at least one

border, but they have not experienced any traffic jams, unlike lorries that require additional customs procedures and coronavirus tests. A single freight train can replace 52 lorries, which translates to one coronavirus test instead of 52. Additionally, DB Cargo can arrange a train driver changeover at the border quickly if required. These advantages have maintained stable rail-based supply chains, although transportation costs have increased due to strained capacity. [8]

One of the major challenges in the logistics industry is the increasing transportation costs, which have been on the rise for the past few years due to factors like the russia-Ukraine conflict and a shortage of heavy goods vehicle drivers in Europe. This has led to a strain on capacity, with trucking businesses predicting double-digit increases in annual contract rates. In the US, road transportation rates have also gone up by 23%, driven by rising freight spending and input costs for logistics players. [9]

Another challenge is the inconsistencies in tracking, with many brands still relying on manual processes instead of utilizing IoT technology. This can decrease productivity and efficiency, leading to delays and operational inefficiencies in warehouses.

Limited visibility of shipments is also a common issue, with modern consumers expecting transparency throughout the supply chain. Without end-to-end visibility, unnecessary delays can occur, and warehouse operations can suffer.

Lastly, fragmented communication can adversely impact delivery times and efficiency, as the logistics supply chain involves various parties from manufacturing to the final delivery to the customer. A lack of an integrated communication channel can cause delays and inconsistencies in the delivery process. [9]

Empty miles, also known as non-revenue miles, have been a long-standing challenge within the logistics industry. These empty miles result in increased costs, have a negative impact on the environment, and reduce the efficiency of both carriers and shippers.

Delivery delays have been a significant consequence of the pandemic's cascading effects. Factory closures and labor shortages have disrupted supply chains, leading to delays in deliveries. Furthermore, the presence of siloed and fragmented legacy processes

further contributes to delays in delivery times. For instance, customers have had to endure extended waiting periods of up to twelve months to receive Tesla Model X or Model Y vehicles. [9] The shortage of chips has also caused significant delays in smartphone shipments, prompting several brands to postpone new product launches and drastically increase waiting times for customers who pre-order their products.

Several companies expect the COVID-era logistics challenges to persist despite the ongoing pandemic. In a survey conducted by Jabil in partnership with IndustryWeek in early 2022, 41% of supply chain professionals across various industries anticipate continued disruptions in delayed shipments beyond the pandemic. [10] Port operations worldwide may continue to experience issues such as an imbalance of containers, mispositioned containers, and railroad strikes, causing potential impacts for months or even years to come.

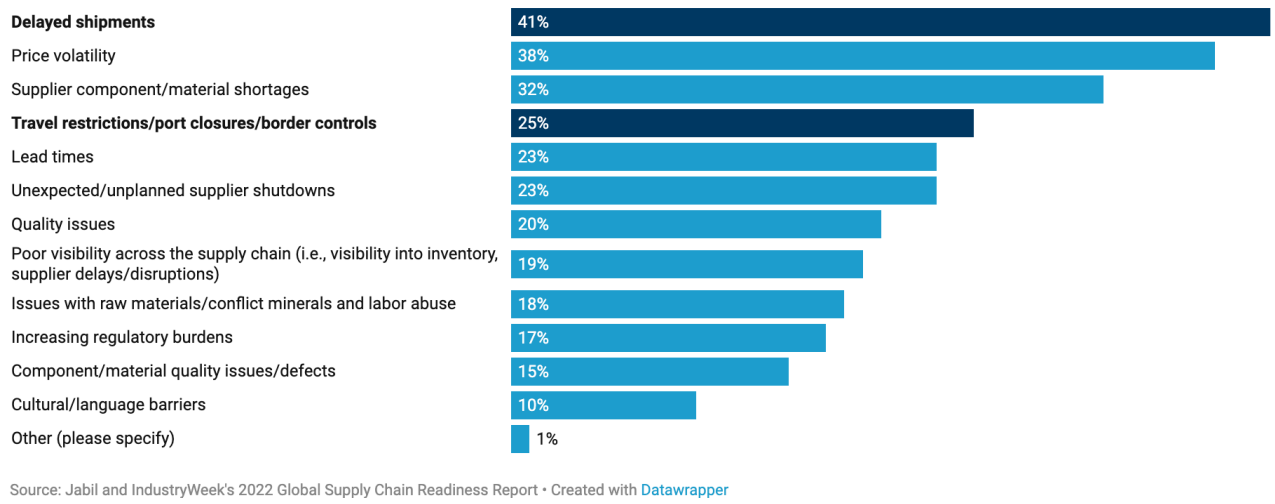


Figure 1.3. Survey on the difficulties in logistics sphere. Source: [11]

In certain aspects, ocean shipping has made strides towards returning to its pre-COVID state. Freight rates are decreasing from the historic highs witnessed in 2021, and the surge in shipments from retailers and manufacturers is slowing down in some markets due to shifting consumer buying patterns influenced by high inflation.

However, there are two persistent challenges that are expected to remain for a while. Firstly, the overall reliability of ocean freight has shown slight improvement but remains a significant concern on a global scale. In Asia, the average on-time performance

of ocean shipping stands at 40.5%, with specific lanes experiencing even lower rates. In the United States, inbound freight had an on-time average of only 35% in 2022. [10]

The second challenge arises from the displacement of ocean containers caused by the practice of "blanking" or canceling sailings by ocean carriers. Numerous blank sailings have been implemented on routes between Asia and North America to manage the balance between container supply and declining consumer demand. As a consequence, scheduled ports of call are skipped, leading to containers not being available where they are needed. This can result in time-sensitive shipments not reaching their destinations on time, leading to spoilage of goods or missed delivery dates for customers. [10]

During the summer of 2022, the demand for less-than-truckload (LTL) shipments in the United States and Mexico experienced a decline in line with consumer demand. While this decrease in freight volume provides shippers with greater flexibility in choosing between logistics modes such as railroad, LTL, or air transport, it has resulted in significant bottlenecks at warehouses.

As consumer goods remain on store shelves for longer periods, retailers have chosen to store their imported goods in warehouses rather than shipping them inland. This practice has led to substantial delays, as containers cannot be unloaded until space becomes available in warehouses that are already operating at full capacity.

Furthermore, although a U.S. railroad strike was averted in September 2022, the potential for disruption to ground logistics is being closely monitored until the union contract is signed. Recent strikes in European ports and airlines serve as examples of how labor unrest can cause congestion and disruptions across various logistics modes.

Natural disasters, economic conditions, geopolitical crises, and pandemics have the power to rapidly change the global logistics landscape, either positively or negatively. Without an optimized logistics strategy, you may miss out on opportunities for cost-effective and efficient shipping. In the worst-case scenario, your shipments could become trapped in costly and time-consuming bottlenecks when disruptions inevitably occur, or you may struggle to find a way to ship your goods at all. The key is to plan ahead during

stable periods to prepare for potential challenges that may arise in the future, whether by sea, air, or road. [10]

As COVID restrictions have become more targeted and localized, the logistics industry, including air freight, is gradually recovering some of the flexibility lost in recent years. Although belly capacity, particularly in outbound Asia, remains lower compared to pre-COVID levels, there have been significant improvements on a global scale. As of summer 2022, cargo capacity on crucial long-haul international flights, such as those between North America and Asia, is only about 12% below 2019 levels. However, experts predict that it will take until 2025 for capacity to fully rebound.

The recovery is partly driven by the steady demand for air travel worldwide, with North America seeing a return to almost pre-pandemic levels of passenger demand. In July 2022, 88% of available passenger seats on North American flights were occupied, according to IATA.

On the other hand, the demand for air freight has started to decrease, indicating potential weaker consumer demand due to inflation. Although air freight rates have been higher than in 2021, they have remained relatively stable throughout 2022. Looking ahead, geopolitical conflicts and rising energy costs may exert pressure on air freight costs. Nevertheless, shippers now have a better position than in previous years to negotiate lower prices for air cargo.

Overall, the logistics industry is witnessing a gradual recovery in air freight capacity and flexibility, driven by improved passenger demand and the ability of shippers to negotiate favorable prices. [10]

Ocean shipping is gradually returning to its pre-COVID state, with freight rates starting to decrease from the historically high levels observed in 2021. However, the influx of shipments from retailers and manufacturers is slowing down in certain markets due to shifting consumer buying patterns influenced by high inflation.

Two persistent challenges continue to impact the maritime industry. Firstly, overall reliability in ocean freight has seen slight improvements but remains a global concern. In Asia, the average on-time performance for ocean shipping stands at 40.5%,

with specific lanes experiencing even lower rates. In the United States, inbound freight has only achieved an average on-time rate of 35% in 2022.

The second challenge is the displacement of ocean containers due to the practice of "blanking" or voiding sailings by ocean carriers. To balance container supply with weakening consumer demand, numerous sailings on Asia to North America routes have been canceled. This strategy leads to skipped ports of call, containers being in the wrong locations, and potential delays for time-sensitive shipments, resulting in spoiled goods or missed delivery dates.

These canceled bookings also contribute to a slower decline in container shipping rates by artificially constraining supply. Despite this challenge, spot indexes generally indicate a consistent direction, with container shipping rates gradually decreasing in an orderly manner, rather than experiencing a sudden plunge. [10]

In summary, ocean shipping is making progress towards pre-COVID conditions, with falling freight rates, but challenges persist regarding overall reliability and container displacement caused by blank sailings. [10]

During the summer of 2022, the demand for LTL transportation decreased in the US and Mexico alongside with the decline in consumer demand. While this reduced freight volume offers shippers the option to choose between multiple transportation modes, it has caused significant congestion at warehouses. As consumer goods remain longer on the shelves, retailers are opting to leave their imported goods in warehouses, triggering lengthy delays for containers that can't be unloaded until space is available in warehouses at full capacity. Additionally, ground logistics in the US is closely monitored following the potential railway strike which was averted in September 2022. Labor unrest, natural disasters, economic conditions, geopolitical crises, and pandemics can all cause sudden disruptions to global logistics. Having an optimized transportation strategy is essential to avoid missed opportunities for more cost-effective and efficient shipping. Planning ahead of time when transportation conditions are stable allows businesses to avoid costly and time-consuming bottlenecks during disruptions. [10]

The need for optimizing supply chain management and logistics (SCML) became apparent as companies sought to address issues such as inconsistent tracking and rising

transportation costs. To tackle these challenges, businesses turned to a new generation of tools, both SAP and non-SAP, designed specifically for logistics. These tools offered the promise of building resilient and agile supply chains. [7]

While these tools provide flexibility and can adapt to the specific needs of an enterprise, it's important for businesses to carefully navigate the process of customizing software capabilities. While solution providers like SAP offer industry-specific best practices to help organizations benefit from standardization, finding the right balance between standardization and customization is crucial for effective competition in today's business ecosystem.

The main driver of qualitative development of the global logistics market is investment in technological innovation. We are talking about automated loading and unloading equipment, trailers, GPS, warehouse management software, and various technologies that help companies manage their logistics services business more efficiently. In 2014, for example, Deutsche Post DHL signed an agreement with the Escher Group that helped DHL modernize its network by initiating easier delivery and assembly in Germany. [12]

In conclusion, the logistics and transportation industry has undergone significant changes and faced numerous challenges, particularly due to the COVID-19 pandemic. The pandemic exposed vulnerabilities in supply chain logistics, leading to disruptions in global trade and the movement of goods. Industries such as automotive and steel faced significant revenue declines and struggled to obtain goods and supplier parts. Road haulage and air freight were particularly affected by restrictions and closures, resulting in traffic back-ups, delays, rising transport prices, and shortages.

The logistics industry also faces ongoing challenges, including increasing transportation costs, inconsistent tracking processes, limited visibility of shipments, fragmented communication, empty miles, and delivery delays. These challenges can impact efficiency, customer satisfaction, and the overall effectiveness of the supply chain. Natural disasters, economic conditions, geopolitical crises, and future pandemics can also have rapid and unpredictable effects on the global logistics landscape.

To address these challenges, businesses are investing in technological innovations such as automated equipment, GPS, warehouse management software, and other tools to enhance efficiency and streamline logistics processes. Optimization of supply chain management and logistics is crucial for building resilient and agile supply chains.

Despite the challenges, there are signs of recovery and improvement in the logistics industry. Air freight capacity and flexibility are gradually recovering, driven by improved passenger demand and favorable pricing negotiations. Ocean shipping rates are decreasing from their historic highs, although challenges remain in terms of overall reliability and container displacement caused by blank sailings. LTL transportation experienced a decline in demand, leading to bottlenecks at warehouses, but the flexibility in choosing logistics modes has increased.

## 1.3 Criteria and indicators for evaluating the efficiency of transport logistics at the enterprise.

In order to thrive in the market, companies must continuously explore and cultivate new potentials and capabilities that can generate long-term efficiency and growth. One effective approach to gain a competitive edge is by reducing costs across all aspects of operations and enhancing consumer satisfaction through more streamlined and effective flow of primary products and goods.

Efficiency holds great significance as an economic concept and serves as a crucial measure of a company's performance. It is utilized not only to analyze a company's operations but also to evaluate the effectiveness of logistics processes. The success of planned business endeavors heavily relies on the efficiency and effectiveness of logistics activities, making it imperative to conduct a thorough analysis to measure their effectiveness. Efficient management of logistics processes undeniably contributes to cost reduction in production or service, thereby increasing overall profitability.

Key Performance Indicators (KPIs) can be defined as a set of metrics used to assess the success of a company by measuring the performance of specific activities or processes. By analyzing the values of these indicators, managers can make informed decisions on how to enhance the performance of particular areas. Indeed, determining the priorities among a given set of KPIs is a crucial aspect of improving supply chain management. [13]

Logistics KPIs are utilized by businesses to identify areas within the flow of goods that require improvement. The importance of logistics KPIs differs across various industries. It is crucial to evaluate your business's status within its sector and select KPIs that are representative of its operations. [14]

Logistics managers rely on logistic Key Performance Indicators (KPIs) to compare their processes against industry benchmarks. These KPIs provide managers with real-time updates on production, cost, and quality metrics, allowing them to stay informed about their daily operations.

In the field of logistics, these insights enable consistent monitoring and evaluation of detailed metrics related to the supply chain. Logistic managers have various objectives, including procuring sufficient resources, conducting quality testing, ensuring proper packaging, and delivering goods to the correct location and recipient. Given the numerous tasks that need to be performed simultaneously, managers often require assistance. It is not uncommon for disruptions to occur, leading to strikes among production lines and supply chain staff. By measuring the appropriate set of logistic KPIs, managers can minimize disruptions and enhance productivity.

| | |
|---|---|
| Order Management | • Shipping Time<br>• Order Accuracy<br>• Perfect Order<br>• Number of Shipments |
| Supply | • Lead Time<br>• Capacity Utilization<br>• Productivity |
| Inventory | • Customer Backorder Rate<br>• Inventory Accuracy<br>• Inventory Turnover<br>• Inventory to Sales Ratio<br>• Inventory Days on Hand |
| Distribution | • Inventory to Sales Ratio<br>• Trailer Utilization Rate<br>• Warehousing Costs<br>• Average Dwell Time |
| Transport Management | • Delivery Time<br>• Average Days Late<br>• Truck Turning<br>• Freight Payment Accuracy<br>• Transportation Costs |

Table 1.1. KPI’s at each stage of the logistics. Source: [14]

Order management KPIs are focused on the efficient processing of orders and returns, which are critical aspects of reverse logistics. These metrics come into play when customers place an order.

Shipping time measures the duration it takes for companies to ship an order, meeting or surpassing the requested delivery date. This metric is crucial for ensuring customer satisfaction and is often coupled with the on-time shipping KPI.

Order accuracy evaluates the precision of inventory management and order picking processes. High order accuracy is essential to prevent production or sales slowdowns that can result in wasted time and financial losses. [14]

Perfect order, also referred to as perfect customer order rate, measures the percentage of orders that are shipped without any issues, such as damage, delays, or inaccuracies. This metric directly impacts customer satisfaction.

On-time in-full reflects the percentage of shipments that are delivered according to the specified quantity and schedule at the time of ordering. This customer-centric metric indicates how frequently customers receive their orders as promised.

The number of shipments tracks the total count of loads sent out by a company within a specific period. Analyzing the average of this KPI enables companies to optimize their resources and achieve their financial objectives.

Supply KPIs focus on the smooth flow of final goods through the supply chain. These measurements aid in improving operational efficiency and driving business growth. They also assist in establishing effective practices and building strong relationships with other supply chain partners.

Lead time, also known as order cycle time, measures the duration between when a customer places an order and when they receive it. This metric helps identify potential bottlenecks in the order fulfillment process. [14]

Capacity utilization quantifies the extent to which a company is utilizing its resources, whether it's the production of goods or utilization of professional services. This metric is crucial for maintenance management and resource tracking.

Productivity assesses the efficiency of a company's machinery, departments, and/or workforce. Measuring and understanding productivity enables businesses to fulfill their commitments and ensure efficient operations.

Inventory KPIs provide insights into the efficiency of inventory purchasing and production processes, as well as their impact on cash flow and productivity. To delve deeper into the subject, refer to the inventory KPIs and metrics guide for a comprehensive understanding.

The customer backorder rate indicates the frequency with which a company is unable to fulfill customer orders. This metric has a direct impact on customer satisfaction and retention.

Inventory accuracy assesses the degree to which your inventory records align with the actual items present in storage. This metric is crucial for maintaining an accurate understanding of your company's inventory levels and for making informed decisions regarding inventory purchases and forecasting. [14]

The inventory turnover ratio quantifies how many times inventory is replaced within a specific timeframe. It is expressed as the number of turns. Established facilities with efficient procurement processes typically exhibit a ratio between 6 and 12. Generally, a higher ratio indicates a lower average inventory level, reflecting better inventory management. [15]

The inventory to sales ratio compares the amount of inventory on hand to the number of completed sales. Since inventory is often a significant expense for companies, maintaining low inventory expenses relative to sales can lead to overall cost savings. [14]

The metric known as Days of Inventory on Hand (DOH) is used to assess how quickly a company utilizes its average inventory. It measures the number of days that inventory remains in stock, indicating its liquidity. Calculating the Days of Inventory on Hand enables a company to determine the length of time its cash is tied up in stock. A smaller DOH value suggests better performance, indicating efficient and frequent inventory usage, which can potentially lead to higher profits. On the other hand, a larger DOH value indicates difficulties in clearing inventory. If a company has an excessive amount of inventory, it may indicate poor investment decisions. However, having a high-

volume inventory is not entirely negative for businesses. It could be a strategic move to have excess inventory to meet sudden spikes in demand, especially during peak seasons like Christmas. [16]

Distribution KPIs are metrics that focus on managing the flow of products in a distribution system, whether it's directly to customers or through distributors. These KPIs help assess various aspects of distribution efficiency. Here are some examples:

Trailer utilization rate measures how effectively companies load their trailers. It reflects the company's load planning process and indicates whether they are minimizing costs associated with trailer usage.

Warehousing costs encompass a range of metrics that capture expenses specific to the warehouse. These costs can include equipment, energy, labor, delivery, and shipping costs involved in the movement of goods in and out of the warehouse. This KPI is useful for evaluating the efficiency of warehouse operations and identifying opportunities for cost optimization.

Average dwell time, also referred to as wait time, measures the duration that a carrier spends waiting for pickup and delivery processing. This metric provides insights into the facility's operational performance. Shippers with low average dwell times are more likely to attract drivers and incur lower costs for securing transportation services.

Transport management KPIs play a crucial role in overseeing the trucking of goods and can significantly enhance operational efficiency. The specific metrics used may vary depending on the entity seeking the information, and even federal agencies may require these numbers due to their impact on the economy. Here are some key transport management KPIs: [14]

Delivery time, also referred to as on-time delivery, measures the speed at which an order is delivered in its entirety, not just individual parts. This metric directly influences customer satisfaction and loyalty by ensuring timely order fulfillment.

Average days late quantifies the number of days between the due date of a delivery and when the customer actually receives the order. This metric provides valuable insights into the delivery process and has a direct impact on customer satisfaction and loyalty.

Truck turning, or truck turnaround rate, measures the time taken for a delivery truck to enter a facility, complete the loading or unloading of goods, and exit. Smaller truck turning rates indicate more efficient operations and allow trucks to spend more time on the road, contributing to improved transportation efficiency.

Freight payment accuracy, also known as freight bill accuracy, calculates the proportion of error-free freight bills in comparison to the total number of freight bills processed within a specific period. Given the propensity for errors in freight bills, achieving high accuracy is crucial as data errors can be costly.

Transportation costs encompass a group of metrics that track the complete price of an order from its inception to its final destination. This includes costs associated with order processing, administration, inventory carrying, warehousing, and transportation. Analyzing these costs provides insights into the efficiency of transportation operations. [14]

Logistics scorecards are valuable tools used by businesses to enhance their supplier and customer relationships, and achieve continuous improvement for inbound and outbound performance. When appropriately utilized, logistics scorecards can help maintain a healthy supply chain and bring benefits to all involved parties, including companies, customers, and suppliers. It is essential to align scorecards with corporate goals and objectives, and all parties must agree on them. Businesses use inbound and outbound logistics scorecards to measure and rate the performance of their suppliers, logistics service providers, and material suppliers. [17] A logistics metrics scorecard is a report that categorizes metrics and rates each prospective company's performance against a benchmark. Companies must address any areas of poor performance before the next review. Comparing logistics scorecards can serve as a proxy for performance and can help in selecting partners that meet the company's needs. Metrics and displays should be chosen based on the company's requirements, such as receiving, storage, shipping, putaway, and pick and pack. Each category is a scorecard on its own, with the industry benchmark set as the standard, and percentage showing how close the company's performance is to that standard. Specific KPIs for these categories can also be included. (Appendix A).

In conclusion, efficiency and effective management of logistics processes are crucial for companies to thrive in the market. By reducing costs and enhancing consumer satisfaction through streamlined operations, companies can gain a competitive edge. Key Performance Indicators (KPIs) play a vital role in measuring and improving supply chain management. Logistics KPIs differ across industries, so it's important to select metrics that are representative of a business's operations. Order management KPIs focus on efficient processing of orders and returns, while supply KPIs ensure smooth flow of goods. Inventory KPIs provide insights into inventory management and cash flow. Distribution KPIs assess aspects of distribution efficiency, and transport management KPIs enhance operational efficiency in trucking goods. Logistics scorecards and metrics are valuable tools for evaluating supplier and customer performance and achieving continuous improvement in inbound and outbound logistics. It is crucial to align scorecards with corporate goals and address areas of poor performance. By utilizing the appropriate set of logistics KPIs and scorecards, companies can minimize disruptions, enhance productivity, and make informed decisions to drive growth and profitability.

Furthermore, the implementation of logistics KPIs and scorecards enables companies to track their performance over time and identify areas for improvement. By regularly monitoring these metrics, businesses can make data-driven decisions, optimize their operations, and adapt to changing market demands. The use of KPIs also promotes transparency and accountability within the organization, as it provides a clear framework for evaluating and rewarding performance. Ultimately, by prioritizing efficiency, cost reduction, and customer satisfaction through effective logistics management, companies can position themselves for long-term success in a competitive market landscape.

# CHAPTER 2
# RESULTS OF THE STUDY OF TRANSPORT AND LOGISTICS SERVICES IN UKRAINE (BASED ON THE EXAMPLE OF PEPSICO)

## 2.1 Diagnostics of transport logistics services of enterprises in Ukraine

In the present business landscape, marked by intense competition and rapid external changes, companies are actively seeking methods to achieve operational efficiency, optimize resource utilization, and enhance customer satisfaction. One popular approach to attaining these objectives is through the outsourcing of specific logistics functions, such as warehousing, transportation, and order fulfillment. As a result, logistics companies are assuming an increasingly vital role in the sales operations of enterprises. It has been proven that the organization of logistics activities has a significant impact on the competitiveness of a business. [18]

The current trends in the Ukrainian logistics services market reflect a substantial growth in logistics activities related to export and import operations. However, in terms of logistics services, Ukraine is still in the process of developing its industry and lags behind the countries of the European Union. [19]

The Logistics Performance Index (LPI) is a metric that evaluates the efficiency and effectiveness of logistics systems at both national and international levels. It is determined through surveys conducted among logistics and warehouse operators, as well as freight forwarders. The survey consists of two parts: first, respondents assess the logistics system's efficiency in relation to eight countries with which their logistics company operates, using a five-point scale. Second, respondents evaluate the logistics system of the country in which they are based, also using a five-point scale. These assessments form the basis for calculating the LPI score and ranking among participating countries. [19]

The LPI is compiled by the World Bank every two years and covers 160 countries, taking into account six key factors. The criteria used to assess logistics efficiency include

customs processes, infrastructure quality, international shipment handling, logistics quality and competence, tracking and tracing capabilities, and timeliness of logistics operations. The LPI provides insights into the ease of supplying goods and the overall state of trade logistics, allowing countries to identify areas for improvement and benchmark their performance against others. [19]

| LPI Score | 2014 | 2016 | 2018 | 2023 |
|---|---|---|---|---|
| **Germany** | 4,12 | 4,23 | 4,20 | 4,20 |
| **Poland** | 3,49 | 3,43 | 3,54 | 3,54 |
| **Romania** | 3,26 | 2,99 | 3,12 | 3,12 |
| **Ukraine** | 2,98 | 2,74 | 2,83 | 2,83 |

*Table 2.1. Source: created by the author, basing on WorlBank data. [20]*

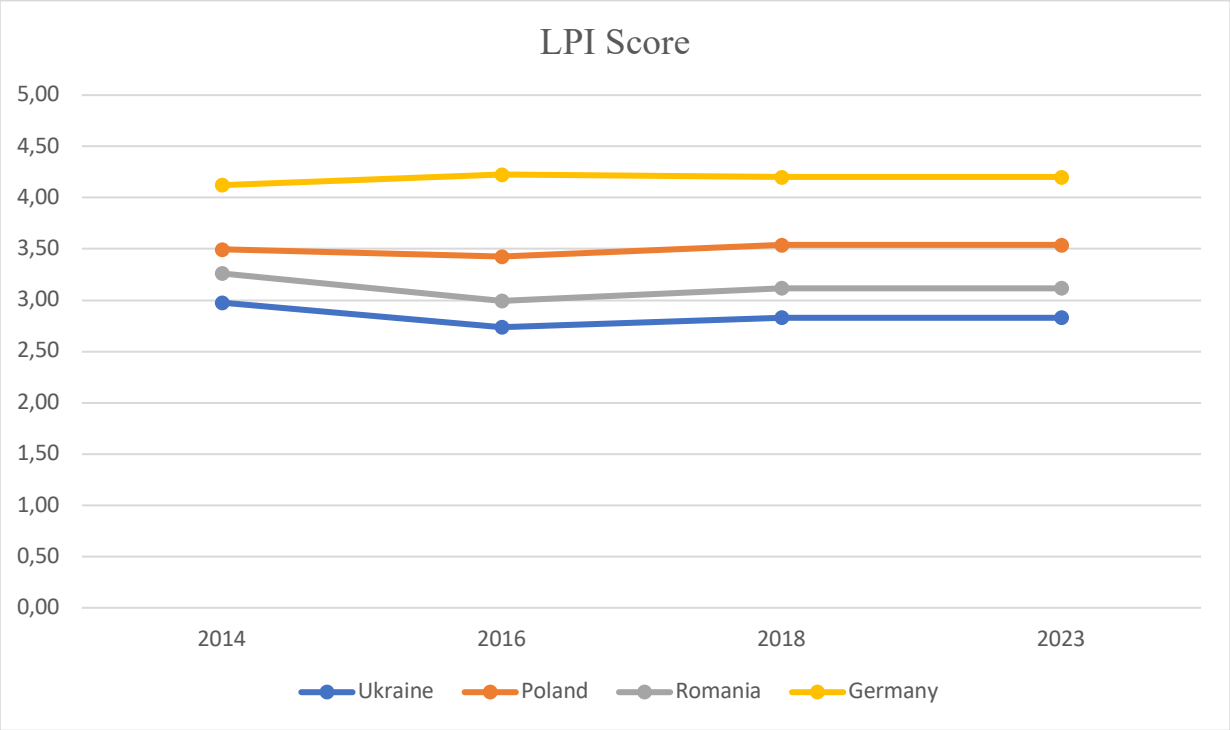


Figure 2.1. Source: created by the author, basing on WorlBank data. [20]

Based on the analysis of the Logistics Performance Index (LPI), it is evident that Ukraine's overall ranking has remained unchanged since 2014. While there has been some improvement in certain indicators, Ukraine significantly lags behind European countries such as Poland, Romania, and Germany. It is worth noting that the LPI, although currently the only comprehensive indicator for assessing logistics efficiency, has limitations and

subjective factors that necessitate further in-depth research for more objective assessments.

According to the State Statistics Service of Ukraine, transport companies increased freight traffic by 3.3% to 621,3 million tonnes in 2021 compared to 2020. At the same time, rail freight increased by 2.9% to 314.3 million tonnes, road freight by 16.2% to 224 million tonnes, and pipeline freight has fallen by 20.4% to 77.6 million tonnes. (Fig. 4, Fig 5) [21]

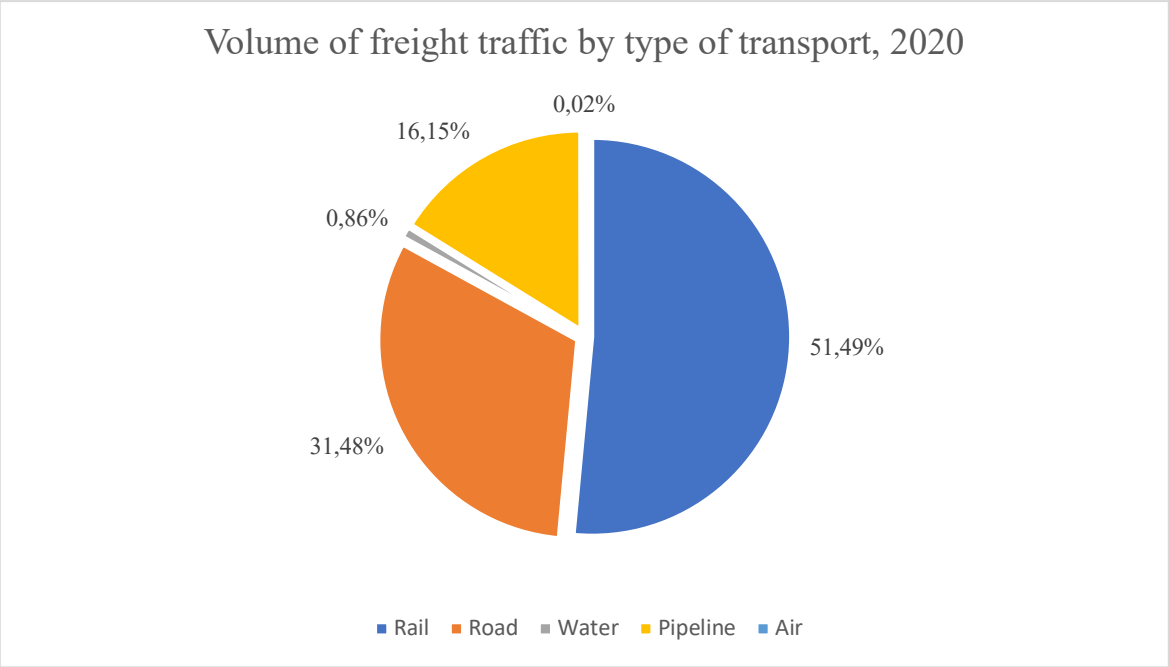


Figure 2.2. Volume of freight traffic by type of transport, 2020. Created by the author based on the source: [21]

In 2021, the shares of transport modes in the total volume of cargo transported were as follows: rail – 50,8%, road – 35,2%, water – 0,8%, pipeline – 13,2%, and air - 0.02%.

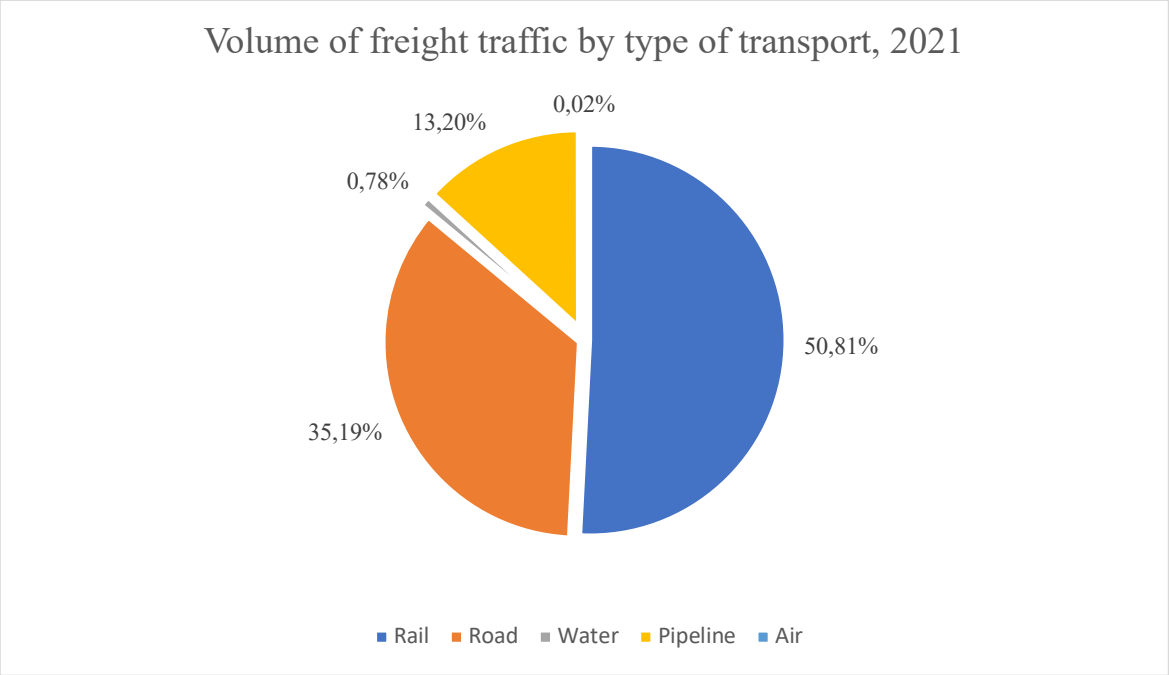


Figure 2.3. Volume of freight traffic by type of transport, 2021. Created by the author based on the source: [21]

Ukraine possesses an extensive and well-established railway infrastructure that is efficiently utilized for the transportation of substantial quantities of goods and heavy industrial cargo. The mining, construction, metallurgical industries, as well as the agricultural sector, significantly contribute to the overall cargo volumes transported via rail. While the agricultural sector also relies on road transport, railways are particularly advantageous for cost-effective delivery of heavy and oversized goods due to their comparatively lower prices.

The international logistics landscape in Ukraine faces several key challenges, including:

- Difficulties in obtaining permits for international transportation, particularly in relation to monthly quotas. The online acquisition of quotas, which accounts for 60%, has led to many carriers being unable to fulfill their obligations to customers. Shortages in transportation quotas are especially prevalent when it comes to countries like Austria, Italy, Poland, Romania, Turkey, Hungary, and Finland. [22]
- Challenges in accurately classifying imported and exported goods.
- Issues pertaining to the correct declaration of customs value and determining the country of origin for goods.

- Complicated and time-consuming phytosanitary and veterinary control procedures, as well as burdensome inspections of goods in wooden containers, leading to difficulties in customs control by enterprises collaborating with the State Service of Ukraine on Food Safety and Consumer Protection.
- Underdeveloped transport infrastructure, including poor road conditions and the highest road fatality rate in Europe.
- High logistics costs for transportation, approximately 40% higher than those in the European Union.
- Depreciation of both passenger and freight vehicles.
- Limited potential for utilizing rivers (only 3% utilization) and a low share of river transport (less than 1%) in the overall transportation services structure.
- Uncertainty surrounding the operation of closed airports and their limited availability. [22]

These challenges collectively contribute to the current state of international logistics in Ukraine, highlighting the areas that require attention and improvement for enhancing efficiency and competitiveness in the sector.

Russia's attack on Ukraine has caused significant disruptions to global shipping, exacerbating existing supply chain issues and crew crises due to Covid-19. The industry has been impacted on many levels, including loss of life and vessels in the Black Sea, disruptions to trade with russia and Ukraine, and sanctions. Day-to-day operations have been affected too, with consequences for crew, the cost and availability of fuel, and the risk of cyberattacks. The biggest impact has been on vessels operating in the Black Sea or trading with russia, with approximately 2,000 seafarers trapped in Ukrainian ports at the start of the conflict. This situation has further consequences for the already short-staffed global maritime workforce, particularly for russian and Ukrainian seafarers struggling to return home or rejoin their ships. [23]

Ukraine has access to the Black Sea, which is connected to the world's oceans. This makes it possible to ship cargo from our country to any part of the world. For this purpose, multimodal and intermodal transport is used, which may include transshipment

of cargo in the port on board a ship, or the use of transshipment-free delivery via the existing ferry service with Turkey, Bulgaria and the Transcaucasus.

But with the russian-Ukrainian conflict the Ukrainian ports blockade in the Black Sea has caused a global impact on food security, leading to a rise in food prices globally and making it difficult for many countries in Africa, Asia, and Europe to ensure a secure food supply. To address this, Türkiye, russia, Ukraine, and the UN launched the Black Sea Grain Initiative, allowing exports from various Black Sea ports through a safe maritime corridor to international waters. The Joint Coordination Centre in Istanbul guides cargo ships, and the International Maritime Organization plays a role in maritime safety and security. As of 17 November 2022, the total tonnage of foodstuffs exported from Ukrainian ports is over 11 million tonnes, with a quarter of the shipments going to lower income countries. Initially agreed for 120 days, the russian government suspended the Initiative but has since agreed to an extension of another 120 days. The Initiative has made it possible to export over 25 million tonnes of grain in combination with the existing EU Solidarity Lanes. [24]

In conclusion, the transport logistics services of enterprises in Ukraine are undergoing significant development and face several challenges. Outsourcing logistics functions has become a popular strategy for improving operational efficiency and customer satisfaction. However, Ukraine still lags behind European Union countries in terms of logistics service development. Ukraine's overall ranking in the LPI has remained unchanged since 2014, indicating the need for further improvements. The country's logistics system is evaluated based on factors such as customs processes, infrastructure quality, shipment handling, logistics competence, tracking capabilities, and timeliness of operations. Benchmarking against other countries helps identify areas for enhancement.

Transportation statistics in Ukraine reveal an increase in freight traffic, with rail and road transportation being the dominant modes. Railways are particularly advantageous for heavy and oversized goods due to their cost-effectiveness. However, challenges persist in obtaining permits for international transportation, accurate classification of goods, customs declaration, phytosanitary control, and underdeveloped transport infrastructure.

## 2.2 Analysis of the transport and logistics services of PepsiCo Company in Ukraine

PepsiCo is a major Ukrainian food and beverage producer with a strong presence in several markets. In the juice and juice products market, PepsiCo is represented by the Sandora and Sadochok brands and holds a leading position. The company also produces carbonated drinks such as Pepsi, 7UP, and Mirinda, as well as Lipton Ice Tea and Aqua Minerale mineral water. In the snack market, PepsiCo owns Lay's, Khrustteam, and Cheetos brands. Additionally, PepsiCo has a strong presence in the dairy market with its Chudo, Slovyanochka, and Marijka brands, as well as in the baby food market with its Agunya brand.

PepsiCo is a major investor in Ukraine's economy and contributes to the country's budget through taxes. The company is also one of Ukraine's largest processors of raw milk, seasonal vegetables, and fruits. PepsiCo operates three production facilities in Ukraine, including a fruit and vegetable processing plant, a juice and snack production plant, and a dairy plant that houses a high-tech baby food production facility called Agusha.

PepsiCo, a global food and beverage company, utilizes various channels to sell its products, catering to different types of customers and distribution networks. These channels include Traditional Trade (TT), Organized Trade (OT), and Away from Home (AFH). Each channel serves specific clients and redistributes goods accordingly. The clients associated with these channels are CWHE (Company Warehouses and Hubs), Distribution Centers, 3PL (Third-Party Logistics) partners, and 3PD (Third-Party Distributors).

Traditional Trade refers to the conventional retail model, which includes small grocery stores, mom-and-pop shops, and independent retailers. These establishments act as intermediaries between PepsiCo and the end consumers. Organized Trade represents modern trade formats such as supermarkets, hypermarkets, and chain stores. This channel involves larger retail entities that have established supply chain systems. PepsiCo products are distributed to Distribution Centers associated with these organized retailers.

The Away from Home channel encompasses sales to businesses and institutions rather than individual consumers. This includes restaurants, cafes, hotels, schools, offices, and other similar establishments. Within this channel, PepsiCo products are distributed to both 3PL partners and 3PD (Third-Party Distributors). 3PL partners refer to third-party logistics companies that handle the transportation, warehousing, and delivery of PepsiCo products to AFH clients. On the other hand, 3PDs are third-party distributors that directly deliver PepsiCo products to the AFH clients they serve.

From the Figure 2.4 we can see how the products are distributed via different channels.

**GTM Volume Share Structure**

| Channel | CWHE | DC | DC (rent) | 3PL | 3PD | Total |
|---|---|---|---|---|---|---|
| **OT CWHE** | 30,0% | 3,0% | 2,5% | 9,0% | | **44,5%** |
| **OT** | 7,0% | 2,0% | | | 2,5% | **11,5%** |
| **TT** | 0,5% | 3,0% | 3,5% | 15,0% | 8,0% | **30,0%** |
| **AFH** | 0,5% | 2,0% | 1,5% | 6,5% | 4,0% | **14,5%** |
| **Total** | **38,0%** | **10,0%** | **7,5%** | **30,5%** | **14,5%** | **100%** |

Figure 2.4. Go To Market (GTM) Volume share structure of PepsiCo. *Source: created by the author based on the Company's report (The figures do not correspond to reality).*

On the Figure 2.5 we can see that PepsiCo has approximately 18 warehouses spread across Ukraine. These warehouses can be classified into different types, namely Company Warehouses and Hubs (CWHE), Distribution Centers (DC), and third-party logistics (3PL) warehouses. Each warehouse serves a specific purpose in PepsiCo's supply chain. Additionally, these warehouses can either be rented or owned by PepsiCo, depending on various factors such as location, operational requirements, and strategic considerations. Furthermore, the approximate capacity of each warehouse may vary based on its size and function. The capacity of a warehouse is determined by factors like the physical space available, storage systems, and handling equipment. These capacities can range from smaller storage facilities to larger distribution centers capable of handling substantial volumes of products.

## DC Details

| City | Name | Type | Ownership | Category | Capacity, pallets |
|---|---|---|---|---|---|
| Nikolaev | 1 | CWHE | PEP | PO1 | 30 000 |
| Kiev | 2 | DC | PEP | PO1 | 4 500 |
| Kiev | 3 | 3PL | | PO1 | 4 050 |
| LVOV | 4 | DC | PEP | PO1 | 3 450 |
| KHARKOV | 5 | 3PL | | PO1 | 2 500 |
| Odessa | 6 | DC | rent | PO1 | 1 500 |
| Kiev | 7 | 3PL | | PO1 | 1 000 |
| ROVNO | 8 | DC | rent | PO1 | 1 100 |
| DNEPR | 9 | 3PL | | PO1 | 1 070 |
| Kherson | 10 | 3PL | | PO1 | 1 050 |
| Nikolaev | 11 | 3PL | | PO1 | 1 000 |
| VINNITSA | 12 | 3PL | | PO1 | 800 |
| BELAYA TSERKOV | 13 | 3PL | | PO1 | 750 |
| ZHITOMIR | 14 | 3PL | | PO1 | 700 |
| ZAPOROZHIE | 15 | 3PL | | PO1 | 700 |
| KRIVOY ROG | 16 | 3PL | | PO1 | 650 |
| SUMY | 17 | 3PL | | PO1 | 630 |
| POLTAVA | 18 | 3PL | | PO1 | 500 |

Figure 2.5. PepsiCo's warehouses around Ukraine and their types. *Source: created by the author based on the Company's report (The figures do not correspond to reality).*

One of the company's key principles is to offer its customers a wide range of high quality products. In line with this principle, all PepsiCo companies in Ukraine have implemented the ISO 9001 quality management system and the ISO 22000 food safety management system. This system is based on the principle of food safety risk analysis

and the establishment of critical control points (HACCP), which allows for the strictest control at all stages of production. [31]

PepsiCo, a global food and beverage company, relies on efficient logistics operations to ensure the smooth flow of its products from production facilities to distribution centers and ultimately to customers. One of the key elements of PepsiCo's logistics strategy is network design, which involves determining the optimal locations for warehouses and establishing efficient shipping routes. This approach plays a crucial role in streamlining the supply chain and maximizing operational efficiency.

In logistics, network design refers to the strategic planning and organization of a company's distribution network. It involves making decisions about the number and location of facilities, such as warehouses and distribution centers, and the configuration of transportation routes to ensure timely and cost-effective delivery of goods. Network design takes into account various factors, including market demand, production capabilities, transportation costs, and service requirements. [26]

The primary objective of network design is to minimize costs while meeting customer demand and service level expectations. By carefully analyzing factors such as transportation costs, inventory holding costs, and lead times, companies like PepsiCo can identify optimal warehouse locations and design efficient shipping routes. This allows them to reduce transportation expenses, minimize order fulfillment times, and improve overall customer satisfaction. [23]

In the case of PepsiCo, network design helps in determining the ideal number and placement of warehouses based on factors such as market demand, population centers, and production facilities. By strategically locating warehouses closer to high-demand areas, PepsiCo can reduce transportation distances, lower fuel consumption, and decrease delivery lead times. This results in cost savings, improved order fulfillment, and enhanced customer service. Additionally, network design enables PepsiCo to optimize shipping routes by considering factors like distance, traffic patterns, and transportation modes. By leveraging advanced routing algorithms and technology, the company can identify the most efficient routes for its fleet of trucks, reducing fuel consumption, minimizing delivery delays, and enhancing the overall sustainability of its logistics operations.

In general network design is a critical aspect of logistics operations for companies like PepsiCo. By strategically determining warehouse locations and designing efficient shipping routes, PepsiCo can optimize its supply chain, reduce costs, improve customer service, and achieve a competitive advantage in the market.

PepsiCo, as a global food and beverage company, recognizes the importance of aligning its efficiency targets with fundamental principles such as safety, sustainability, and ecology. While striving for cost efficiency, fulfillment of sales plans, and achieving operational targets, PepsiCo places a strong emphasis on ensuring the well-being of individuals, promoting sustainable practices, and minimizing its ecological impact.

Safety of Humans: PepsiCo prioritizes the safety and well-being of its employees, customers, and the communities in which it operates. The company is committed to maintaining a safe working environment, implementing robust safety protocols, and fostering a culture of safety throughout its operations. This includes rigorous quality control measures, adherence to food safety standards, and promoting health and safety best practices across its value chain. [27]

Sustainability: PepsiCo is dedicated to sustainability across its operations, focusing on environmental stewardship, resource conservation, and reducing its carbon footprint. The company has set ambitious goals to reduce greenhouse gas emissions, minimize water usage, and optimize packaging to reduce waste. PepsiCo also promotes sustainable agricultural practices, supports responsible sourcing of ingredients, and invests in renewable energy projects to drive long-term sustainability. [27]

Ecology: Recognizing the importance of protecting and preserving the natural environment, PepsiCo takes measures to minimize its ecological impact. This includes responsible waste management practices, recycling initiatives, and efforts to minimize the use of natural resources. The company actively seeks ways to reduce energy consumption, decrease emissions, and implement eco-friendly practices throughout its supply chain. [27]

While upholding these core principles, PepsiCo also focuses on cost efficiency, fulfillment of sales plans, and achieving operational targets to drive business success. By optimizing its supply chain, improving production processes, and leveraging technology

and innovation, PepsiCo aims to enhance operational efficiency and deliver high-quality products to meet consumer demand.

By aligning its efficiency targets with the principles of safety, sustainability, and ecology, PepsiCo demonstrates its commitment to responsible business practices and corporate social responsibility. The company recognizes that by integrating these principles into its operations, it can drive long-term value, strengthen stakeholder relationships, and contribute to a more sustainable future. [28]

Due to the ongoing conflict in Ukraine, company's operations in the country remain suspended, causing geopolitical and macroeconomic uncertainty. The conflict has resulted in various risks, including volatile commodity markets, supply chain disruptions, cyber incidents, reputational risk, and safety concerns for employees. It has also led to challenges such as labor shortages, currency volatility, limited access to credit markets, increased transportation and energy costs, and environmental risks. Additionally, the conflict may result in asset losses or impairment charges. The company cannot accurately predict the extent of its impact on PepsiCo's employees, operations, customers, sustainability goals, or global business. Moreover, external factors like the conflict, COVID-19 pandemic, inflation, adverse weather conditions, supply chain disruptions, and labor shortages have contributed to higher operating costs, and PepsiCo manages these risks through various strategies. Increasing prices to offset costs may impact volume, revenue, margins, and operating results. [29]

Due to the ongoing conflict in Ukraine, the company continues to face risks associated with geopolitical and macroeconomic uncertainty. Certain operations in Ukraine remain suspended, impacting PepsiCo's business, including sales of Pepsi-Cola and other global beverage brands. The conflict has led to volatile commodity markets, supply chain disruptions, cyber risks, reputational concerns, safety risks for employees, and business disruptions such as labor shortages. It has also resulted in currency volatility, limited access to credit markets, increased costs for transportation, energy, packaging, and raw materials, and environmental risks. [29]

In conclusion, PepsiCo is a major player in the Ukrainian food and beverage industry, with a diverse portfolio of brands that spans various markets, including juice,

carbonated drinks, snacks, dairy products, and baby food. The company holds a leading position in the juice market with brands like Sandora and Sadochok, and it owns popular brands such as Pepsi, Lay's, and Chudo in other segments. PepsiCo operates three production facilities in Ukraine, including a fruit and vegetable processing plant, a juice and snack production plant, and a dairy plant with a specialized baby food production facility.

To reach customers, PepsiCo utilizes multiple distribution channels tailored to different types of customers and market segments. These channels include Traditional Trade, Organized Trade, and Away from Home sales. Within these channels, PepsiCo collaborates with distribution centers, third-party logistics partners, and third-party distributors to ensure efficient product distribution.

The ongoing conflict in Ukraine has had significant impacts on PepsiCo's operations in the country. Some of the key challenges faced by the company include geopolitical and macroeconomic uncertainty, volatile commodity markets, supply chain disruptions, cyber incidents, reputational risks, and safety concerns for employees. These risks have been exacerbated by factors such as labor shortages, currency volatility, limited access to credit markets, increased transportation and energy costs, and environmental risks. Furthermore, external factors like the conflict, the COVID-19 pandemic, inflation, adverse weather conditions, supply chain disruptions, and labor shortages have contributed to higher operating costs for PepsiCo.

Despite these challenges, PepsiCo remains committed to its core principles of safety, sustainability, and ecology. The company upholds rigorous safety protocols, implements sustainable practices, and strives to minimize its ecological impact. By aligning efficiency targets with responsible business practices, PepsiCo aims to drive long-term value, strengthen stakeholder relationships, and contribute to a more sustainable future.

Overall, the conflict in Ukraine poses significant risks and uncertainties for PepsiCo's operations in the country. The company continues to monitor the situation closely and adapt its strategies to mitigate the challenges posed by the geopolitical and macroeconomic environment.

## 2.3 Cost Analysis and Financial Impact of Logistics Processes based on PepsiCo's experience

The monthly budget report in PepsiCo Ukraine is a crucial document that provides valuable insights into the financial performance of the company and highlights the factors that influenced its budget. The leadership team relies on this report to assess the company's financial health, make strategic decisions, and identify areas for cost savings and growth opportunities.

The monthly report analyzes various factors that influenced the budget of the company, both in terms of cost savings and expenditure increases. It delves into different spheres of the company's operations to provide a comprehensive understanding of the financial landscape (Figure 2.6). The main purpose of the report is to have actual P&L details by categories, volumes, cost, CPU (Cost per Unit); to analyze detailed inflation, volume and other factors effects visible by month; To see detailed overview/indexes MTD (Month To Date), YTD (Year To Date) vs. AOP (Annual Operating Plan), P4/9, PY (Previous Year).

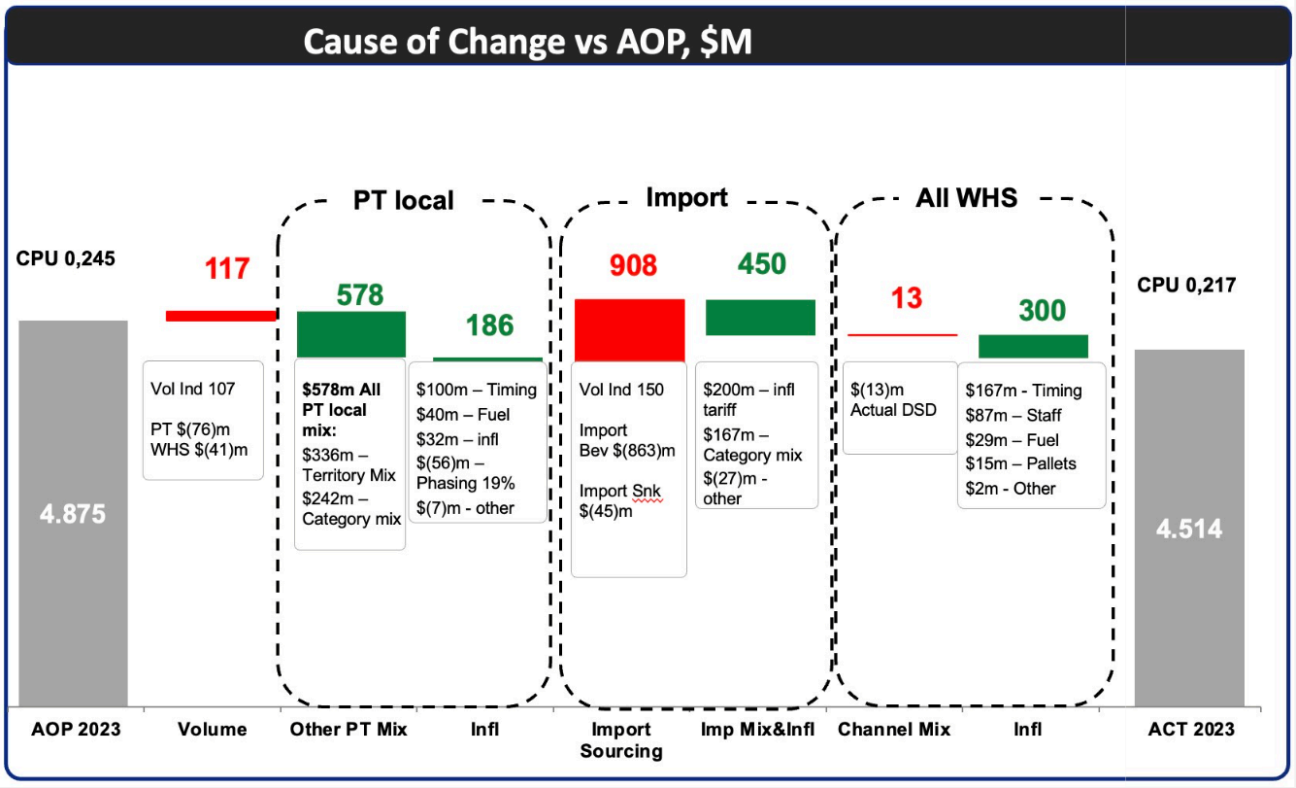

Figure 2.6. Monthly report on savings and expenditures. *Source: created by the author based on the Company's report (The figures do not correspond to reality).*

The all data in the report is stated in the millions of dollars. There are key aspects the report coveres, among them cost savings, expenditure increasements in comparison with the plan, sales and revenue volumes analysis, cost drivers and some other external factors. In the report, red indicators signify that the company has exceeded planned expenses, while green indicators represent areas where the company has successfully saved money by spending less than what was originally allocated in the AOP.

Cost Savings: The report highlights the areas where the company successfully achieved cost savings. It may include measures taken to optimize logistics and supply chain operations, streamline production processes, negotiate favorable contracts with suppliers, and implement cost reduction initiatives across departments.

Expenditure Increases: The report also addresses the factors that contributed to increased expenditures. This could involve investments in new equipment, technology upgrades, marketing and advertising campaigns, research and development activities, or expansion into new markets or product lines.

Sales and Revenue Analysis: The report provides an overview of the company's sales performance during the month, analyzing factors that influenced revenue growth or decline. It may include a breakdown of sales by product categories, regions, or customer segments to identify trends and opportunities for improvement.

Cost Drivers: The report identifies the key factors that influenced the company's costs during the month. It analyzes expenses related to raw materials, production, logistics, marketing, human resources, and other operational areas. Understanding the cost drivers helps the leadership team make informed decisions regarding resource allocation and cost management strategies.

External Factors: The report considers external factors that impacted the company's budget, such as changes in market conditions, economic trends, regulatory developments, or competitive pressures. These external influences provide valuable context for understanding the company's financial performance and inform future strategic planning.

The monthly report also examines the factors that contributed to changes in specific spheres of the company's operations. It identifies areas where money was saved and where additional funds were allocated. By analyzing these factors, the leadership team can gain insights into the effectiveness of cost-saving measures, identify opportunities for further optimization, and allocate resources strategically.

By closely monitoring and analyzing these factors, the leadership team can make data-driven decisions to maximize cost savings, allocate resources effectively, drive revenue growth, and ensure the company's financial stability and success in the Ukrainian market. The monthly report serves as a foundation for discussions, enabling the leadership team to align their strategies and actions with the financial goals of PepsiCo Ukraine.

The first indicator we look at in the Figure 2.6 is volume of the products sold. the color associated with this indicator is red, indicating that the company has spent more on selling products than initially planned in the Annual Operating Plan (AOP). However, it is important to note that a red indicator does not always indicate a negative outcome. In the context of increased sales volume, a red indicator signifies that the company has exceeded its projected sales targets and achieved higher revenue generation. Selling more products implies an increased customer demand and market share, which can lead to greater profitability in the long run. Under the main indicator we can see the explanation on which areas exactly exceeded the planned expenditures: in PT (Primary Transportation) PepsiCo spent $76 million more and in WHS (Warehouse) $41 million more.

In the next area of the Figure 2.6, Primary Transportation (PT), we observe a positive development as the indicator is in the green zone. This indicates that the company has managed to save $578 million in this area compared to the planned budget. Further examination of the report reveals that the key factor contributing to these savings is the Territory Mix - $336 million and Category Mix - $242 million.

The Territory Mix pertains to the geographical allocation and distribution of products or services. In a multinational company like PepsiCo, the Territory Mix may involve dividing the country or region into different sales territories, assigning specific products or product lines to each territory, and deploying sales teams or distributors to

cover those territories. The purpose of Territory Mix is to ensure comprehensive market coverage, effective customer management, and efficient distribution channels across different geographic areas.

The Category Mix refers to the optimal combination of products from different categories within the same truck during transportation. By strategically arranging the products within each shipment, the company has maximized the utilization of available space, reduced the number of trucks required, and achieved cost efficiencies in transportation. The Category Mix is an essential factor to consider as it directly impacts the transportation costs. By ensuring a well-balanced mix of products, the company can optimize the loading capacity of each truck, minimize empty spaces, and reduce the overall transportation expenses. This strategic approach not only helps in achieving cost savings but also enhances the efficiency of the supply chain by minimizing the number of trips and maximizing the utilization of resources.

In the area of Primary Transportation (PT), significant savings were achieved, particularly in relation to inflation. The company managed to save $186 million. One of the contributing factors to these savings is the concept of timing $100 million. Timing refers to situations where certain planned activities or expenses were originally scheduled for a particular month, and the corresponding budget was allocated accordingly. However, for various reasons, these activities did not take place as planned during that month. As a result, the company saved money in the current month since the expected expenses did not materialize. However, it's important to note that these saved funds will likely be required in the future, as the postponed activities or expenses are expected to occur in subsequent months. Therefore, while the timing effect led to savings in the present month, it's anticipated that the budget will be exceeded in the future, potentially resulting in red indicators.

Another area where significant savings were achieved is in fuel expenses. The company managed to save a $40 million in this category. This can be attributed to various factors such as efficient fuel management practices, favorable market conditions, or even technological advancements that improve fuel efficiency in transportation.

Following fuel savings, another factor that contributed to overall cost reduction is inflation. Inflation refers to the general increase in prices and the decrease in the purchasing power of money over time. In the budget planning process, the company anticipated a higher inflation rate, and as a result, allocated funds accordingly to account for the projected increase in expenses. However, in reality, the inflation rate was lower than expected, which allowed the company to save around $32 million. This means that the company benefited from lower-than-planned price increases for goods and services, resulting in cost savings. The company was able to achieve these savings due to various factors, including favorable economic conditions, effective cost control measures, or accurate forecasting of inflation trends.

From the Figure 2.6, it is evident that import costs have exceeded the planned expenses by $908 million. This increase in costs can be attributed to a strategic decision made by the company to engage in prebuilding activities. Prebuilding refers to the practice of procuring and storing a larger quantity of imported goods or materials in advance. Although this approach may result in higher immediate expenditures, it offers long-term benefits and cost savings. By ordering and storing a larger quantity of products now, the company aims to mitigate the risk of potential supply chain disruptions or shortages in the future, such as out-of-stock situations. This proactive approach helps to ensure a continuous and reliable supply of products to meet customer demand.

While the immediate impact is an increase in import costs, the company anticipates greater efficiency and profitability in the long run. By avoiding potential delays or scarcity of products, the company can maintain customer satisfaction, capture market share, and avoid lost sales opportunities due to insufficient inventory. The decision to exceed planned import costs demonstrates the company's strategic vision and focus on long-term profitability. It showcases a proactive approach to managing the supply chain, mitigating risks, and ensuring a smooth flow of goods to meet customer demands effectively.

From the import savings, it is evident that the company has achieved cost savings of $450 million due to two key factors: lower-than-expected inflation, where the company saved $200 million and the utilization of an optimized Category Mix - $167 million. The

combination of these two factors has contributed to import savings for the company. These savings provide financial flexibility and can be reinvested in other areas of the business or contribute to the overall financial performance. By actively managing these factors, the company demonstrates its ability to adapt to market conditions, optimize cost structures, and enhance its competitive position in the industry.

The next factor that influenced costs, which we can see on the Figure 2.6 is WHS (Warehouse) utilization. It is observed that the costs in this area have exceeded the planned amount by $13 million. Several factors may contribute to this variance, including the prebuilt strategy mentioned earlier. Other factors that could influence WHS utilization costs include fluctuations in demand, inefficiencies in warehouse operations, unexpected inventory holding costs, or any unforeseen changes in the supply chain. By identifying the factors contributing to the cost variance and evaluating their impact on the budget, the leadership team can make informed decisions and take corrective actions to optimize warehouse utilization costs. This may involve adjusting inventory management strategies, improving operational efficiencies, negotiating better contracts with suppliers, or implementing technology solutions to enhance inventory visibility and control.

The savings of $300 million achieved in WHS (Warehouse) can be attributed to several factors outlined in the monthly report. These factors played a role in reducing costs and contributing to the overall budget savings. One of the factors that resulted in savings of $167 million is timing. In this context, it suggests that certain repairment works or maintenance activities that were planned and allocated funds for did not occur during the reported month. This delay in executing the planned repairs led to cost savings in the current period. However, it is important to note that these expenses may be incurred in future months, potentially impacting the budget accordingly. The Staff factor indicates that the company utilized fewer personnel than originally planned. This suggests that either the workforce was optimized, work processes were streamlined, or operational efficiencies were achieved, resulting in cost savings. The monthly report highlights fuel as another factor contributing to savings in WHS. It appears that the actual cost of fuel was lower than initially projected or budgeted. The last factor mentioned in the report is pallets. While specific details may not be provided, it implies that the company achieved

savings in pallet-related costs. This could be due to factors like improved pallet management, renegotiated pricing with suppliers, or optimizing pallet usage and return processes.

The final factor being reviewed in the monthly report is CPU (Cost per Unit). CPU, or Cost per Unit, represents the total costs, including both variable and fixed costs, associated with producing and delivering a single unit of a product to the end consumer. It is an important indicator that provides insights into the cost efficiency of the company's operations. The CPU indicator is influenced by several factors, many of which have been discussed earlier. These factors can be Category or Territory Mix. The combination of different product categories or territories within the company's operations can impact the CPU. Next, inflation, it affects the overall cost structure of the company. Higher inflation can increase the costs of raw materials, labor, and other inputs, leading to an increase in the CPU. Conversely, lower-than-expected inflation can result in cost savings and a reduction in the CPU. Next factor is tariff pricing, which refers to the costs associated with import/export duties, taxes, and fees. Fluctuations in tariff rates or changes in trade policies can impact the cost structure and, subsequently, the CPU.

From the Figure 2.6 we can see that actual CPU is 0,217, which is lower than is stated in AOP. A lower CPU indicates that the company is able to produce and deliver its products at a lower cost per unit, resulting in increased profitability.

The result of this analysis provides crucial insights into the financial performance of the company. It helps to assess the company's financial health, make strategic decisions, and identify areas for cost savings and growth opportunities. The report analyzes various factors that influenced the company's budget, including cost savings and expenditure increases. The report helps identify areas where the company successfully achieved cost savings, such as optimizing logistics and supply chain operations, negotiating favorable contracts, and implementing cost reduction initiatives. The report highlights specific areas where money was saved and where additional funds were allocated. It emphasizes the importance of factors such as Territory Mix and Category Mix in achieving cost savings in transportation. It also recognizes the impact of timing, fuel savings, and lower-than-expected inflation on cost reductions.

# CHAPTER 3
# PERSPECTIVES OF TRANSPORT AND LOGISTICS SERVICES DEVELOPMENT IN THE CONTEXT OF GLOBALIZATION

## 3.1 Emerging trends in the transport and logistics services market and their impact on the future of logistics services

The logistics and transportation industry is undergoing significant transformations driven by technological advancements, changing consumer demands, and sustainability concerns.

Automation and robotics are revolutionizing the logistics and transportation industry. Advancements in robotics technology, including autonomous vehicles, drones, and robotic warehouse systems, are streamlining operations, reducing costs, and improving efficiency. Autonomous vehicles are being tested for long-haul trucking, last-mile delivery, and even urban mobility. Warehouse robots are automating tasks such as picking, sorting, and inventory management, optimizing supply chain operations. [32]

Artificial Intelligence (AI) and Big Data are transforming logistics by enabling predictive analytics, demand forecasting, and route optimization. AI-powered algorithms analyze vast amounts of data, providing valuable insights into supply chain operations, inventory management, and customer behavior. This technology enhances decision-making, improves supply chain visibility, and reduces inefficiencies, ultimately leading to cost savings and improved customer satisfaction.

Ukraine has been at the forefront of digital transformation efforts, with initiatives introduced by the government to enhance transparency, reduce corruption, and incorporate international standards. The implementation of the digital procurement system, ProZorro, has been successful in achieving these goals since its full implementation in 2016. The establishment of the Ministry of Digital Transformation in 2020 further solidifies Ukraine's commitment to becoming a digital state. Notable

achievements include the launch of the Dia mobile app, which provides a convenient platform for citizens to access public services and handle tasks such as fine payments and digital document management. [25]

To further advance digitization, Ukraine can benefit from assistance provided by donors. For instance, the European Bank for Reconstruction and Development (EBRD) issued a €13 million loan in 2021 to Nova Poshta, Ukraine's leading private postal company, to support the automation and digitalization of their parcel logistics. Through the implementation of a smart system developed by Equinox, a Lithuanian logistics firm, Nova Poshta will establish an automated sorting hub in Dnipro. This investment will yield significant benefits for the company, enabling it to double its parcel volume, enhance fleet efficiency, and reduce energy consumption. [25]

Projects like these, which require moderate investments, present an opportunity for the United States to contribute its technical expertise and add substantial value. The logistics sector in Ukraine particularly stands to benefit from this assistance, providing a platform for U.S. government agencies and companies to directly engage and leverage their competitive advantage.

The logistics market is experiencing growth due to advancements in information technology (IT). The Internet of Things (IoT) is playing a crucial role by enabling the collection and analysis of large volumes of accurate data in connected logistics services. This technology is expected to transform supply chains and accelerate the expansion of the logistics services market. Developed countries are actively adopting IT technologies such as IoT, cloud computing, mobile, GPS, and analytics to manage national and international supply chains. Developing countries are also prioritizing the integration of these advanced IT technologies into their supply chains and distribution systems. IoT is being utilized at both individual business unit and transportation levels in the logistics services market. It facilitates real-time monitoring of warehouse conditions, transportation workloads, and the management of various facilities. Overall, IoT enables companies to integrate warehouses, transportation, and millions of goods into a self-managing intelligent system. Thanks to IoT technologies, companies are able to combine

warehouses, transport and millions of units of goods into a single self-managing intelligent system (Fig. 3.1).

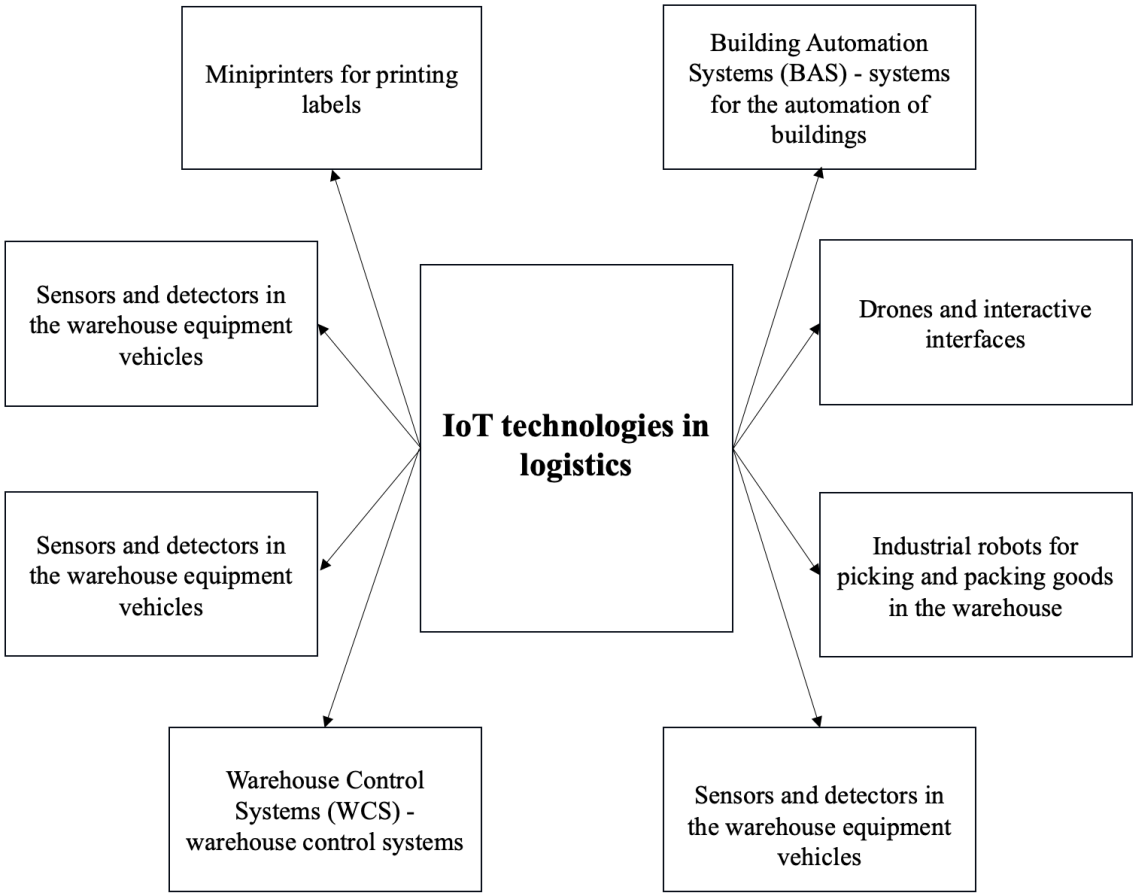


Figure 3.1. Types of IoT technologies used in the logistics services market. Source: [33]

Blockchain technology offers enhanced security, transparency, and traceability in logistics and transportation. It provides a decentralized and immutable ledger for recording transactions, ensuring trust and authenticity. Blockchain applications in logistics include supply chain traceability, smart contracts for automated and secure transactions, and streamlined documentation processes. This technology enables better collaboration, reduces fraud, and enhances supply chain efficiency.

Sustainability has become a significant focus in the logistics and transportation industry. Companies are adopting eco-friendly practices to reduce carbon emissions, minimize waste, and optimize fuel consumption. Electric vehicles and alternative fuel sources are gaining traction, offering greener transportation options. Additionally, there

is an increasing emphasis on reverse logistics and circular economy principles to minimize waste and maximize resource utilization.

PepsiCo has embraced sustainability as a core value, integrating it into its business strategies and operations worldwide. The company has set ambitious sustainability goals and initiatives to address key challenges such as climate change, water scarcity, waste reduction, and responsible sourcing.

In Ukraine, PepsiCo has implemented various sustainability initiatives to minimize its environmental footprint and positively impact local communities. One notable initiative is its commitment to water conservation. PepsiCo has implemented water stewardship programs to ensure responsible water usage in its production facilities and agricultural supply chain. This includes investing in advanced technologies for water-efficient irrigation systems and promoting responsible water management practices among farmers. [34]

Additionally, PepsiCo Ukraine has taken significant steps to reduce its carbon emissions. The company has invested in energy-efficient technologies and renewable energy sources to power its manufacturing plants. It has also focused on optimizing transportation routes and improving fleet efficiency to reduce greenhouse gas emissions throughout its supply chain. [27]

PepsiCo Ukraine is actively engaged in community initiatives, promoting sustainable agriculture and empowering local farmers. The company works closely with farmers to implement sustainable farming practices, enhance crop yields, and protect biodiversity. Through initiatives like the Sustainable Farming Program, PepsiCo supports farmers in adopting responsible agricultural practices and provides training and resources to improve productivity while minimizing environmental impacts. [36]

Furthermore, PepsiCo Ukraine has implemented waste reduction and recycling programs. It strives to minimize packaging waste and increase the use of recyclable materials in its product packaging. The company actively supports recycling initiatives in local communities, collaborating with partners and stakeholders to raise awareness and improve recycling infrastructure. [35]

Last-mile delivery, the final leg of the delivery process, is witnessing innovations to meet growing consumer expectations. Delivery drones and autonomous robots are being explored for efficient and timely last-mile delivery. Additionally, crowdshipping, which involves utilizing everyday individuals for delivery, is gaining popularity, providing cost-effective and flexible solutions.

The rapid growth of e-commerce has transformed the logistics landscape. The integration of logistics and e-commerce platforms is crucial for efficient order fulfillment, inventory management, and customer satisfaction. As e-commerce continues to expand, logistics providers are adapting their operations to handle increased volumes, faster delivery times, and reverse logistics processes.

Customer experience has become an increasingly important factor in the logistics industry in recent years, and this trend is expected to continue in 2023 and beyond. Customers are demanding more personalized and seamless logistics solutions, from order tracking to delivery. To improve the customer experience, logistics companies are investing in new technologies such as chatbots, which can provide real-time support to customers, and mobile apps, which can provide customers with updates on their shipments. Another way logistics companies are improving the customer experience is by offering more flexible delivery options, such as same-day delivery, evening delivery, and weekend delivery. This can help to meet the demands of customers who require more convenient delivery options. [37]

In recent years, there has been a growing emphasis on green innovations in logistics technologies, processes, and services. Logistics, as an integral part of the supply chain, plays a vital role in promoting sustainability, reducing environmental impact, and conserving natural resources. With the increasing awareness of environmental concerns and the urgent need to address them, companies are investing in green logistics technologies, processes, and services to achieve their sustainability goals.

Green innovations in logistics technologies focus on developing sustainable and energy-efficient transportation systems, reducing emissions, and optimizing routes. One of the most significant green innovations in logistics technologies is the use of electric and hybrid vehicles. Electric vehicles (EVs) emit zero tailpipe emissions, making them a

cleaner alternative to traditional diesel or gasoline-powered vehicles. Hybrid vehicles use a combination of electric and gasoline power, reducing emissions compared to traditional vehicles. These vehicles have been increasingly adopted by logistics companies to transport goods and reduce their carbon footprint. For example, the logistics giant UPS has already deployed more than 10,000 alternative fuel and advanced technology vehicles globally, including electric, hybrid electric, hydraulic hybrid, compressed natural gas, liquefied natural gas, and propane. [38]

Another green innovation in logistics technologies is the use of alternative fuels such as biodiesel, hydrogen, and compressed natural gas (CNG). Biodiesel is a renewable fuel made from vegetable oils or animal fats that can be used in place of petroleum diesel. Hydrogen fuel cells are another alternative to traditional fuels that can power vehicles with zero emissions. CNG is a fossil fuel alternative that produces less greenhouse gas emissions than diesel. For example, Los Angeles' Metro voted to buy 295 natural gas buses equipped with Near Zero engines from Cummins Westport. Even more exciting, the agency has a contract with Clean Energy. This contract will allow them to use renewable natural gas (RNG) in their natural gas vehicles. [39]

Route optimization is another green innovation in logistics technologies that can significantly reduce carbon emissions. By optimizing routes, logistics companies can reduce the number of miles traveled and fuel consumption, leading to lower emissions. The use of advanced software and algorithms can help companies optimize routes and reduce delivery times. For example, the logistics company DHL has implemented a route optimization system that has led to a great reduction in CO2 emissions and in line with DPDHL Group's commitment they are planning to achieve zero-emissions logistics by 2050. [40]

Finally, the use of drones for delivery is another green innovation in logistics technologies that has the potential to reduce carbon emissions. Drones can deliver goods with minimal energy consumption and can avoid traffic congestion on the roads. Although still in the early stages of development, companies like Amazon and UPS have already started experimenting with drone deliveries in select areas. [41]

Green innovations in logistics processes focus on optimizing logistics processes to reduce waste, increase efficiency, and promote sustainability. Important innovations in such processes as reducing waste and promoting sustainability is providing sustainable packaging. Packaging is an essential part of logistics operations. Sustainable packaging solutions can help reduce the environmental impact of logistics operations. Companies are increasingly using eco-friendly materials such as biodegradable plastics, recycled cardboard, and paper-based packaging to reduce the amount of waste generated by packaging materials. [38] Some companies are also using reusable packaging solutions to further reduce waste.

Route planning is a crucial part of logistics operations. Inefficient route planning can lead to increased fuel consumption, higher emissions, and increased costs. Green innovations in route planning aim to optimize routes to minimize fuel consumption and emissions. Companies are using advanced analytics and data-driven tools to optimize routes, taking into account factors such as traffic patterns, fuel efficiency, and delivery schedules. [42]

Warehousing operations can also have a significant impact on the environment. Green innovations in warehousing operations focus on reducing energy consumption, improving waste management, and increasing efficiency. Companies are using smart warehousing solutions that incorporate advanced automation and IoT technologies to optimize operations, reduce energy consumption, and minimize waste. [43]

Transportation is one of the most significant sources of emissions in logistics operations. Green innovations in transportation focus on reducing emissions by using electric and hybrid vehicles. Many companies are adopting electric and hybrid vehicles for their logistics operations, which can significantly reduce emissions and fuel costs. [44]

Reverse logistics is the process of managing the return of goods from the customer back to the manufacturer or supplier. Green innovations in reverse logistics aim to reduce waste and increase the reuse and recycling of materials. Companies are implementing strategies such as take-back programs and closed-loop supply chains to reduce waste and increase sustainability. [45]

PepsiCo understands that packaging is necessary for its business, but is also concerned about the negative effects of packaging waste. To tackle this issue, the company has adopted a comprehensive plan that includes reducing the amount of plastic used, promoting recycling and the use of recycled materials, and exploring the use of new sustainable materials. A circular economy for packaging can help ensure that valuable materials are reused instead of ending up as waste. By using renewable or recycled materials, PepsiCo can also reduce the greenhouse gas emissions caused by packaging and meet its emissions reduction goals. [46]

In the Table 3.1 you can see the goals and the progress of implementation of sustainable packaging vision:

| | |
|---|---|
| **Virgin plastic reduction goal** | Cut virgin plastic from non-renewable sources per serving across company's global beverages and convenient foods portfolios by 50%1,2 |
| **Non-renewable virgin plastic reduction goal** | Reducing our absolute tonnage of virgin plastic derived from non-renewable sources by 20% |
| **Minimize single-use packaging materials goal** | Scaling new business models that avoid or minimize single-use packaging materials |
| **Bio-based and recycled plastic reduction goal** | Use of market-leading bio-based materials and increase incorporation of recycled content (50% across plastics) |

Table 3.1. Goals & progress of implementation of sustainable packaging vision. Source: [46]

PepsiCo has announced ambitious new goals around company's aim to reduce our use of virgin plastic, use more recycled content in our plastic packaging and scale business models like SodaStream that avoid or minimize single-use plastic. These new targets complement our 2025 goal of making 100% of packaging recyclable, compostable, biodegradable or reusable.

Achieving these ambitious goals requires investment and innovation. PepsiCo faces challenges from the limitations of existing technology and regulations. But commitment to continue to strive toward these goals is unwavering. That's why PepsiCo is scaling new business models that avoid or minimize single- use packaging materials. These include models that reuse, refill, prepare at home or utilize concentrates like powders or drops. PepsiCo is also seeking to use market-leading bio-based materials and more recycled content (50% across our plastic packaging) to reduce absolute tonnage of virgin plastic from non-renewable sources across the entire portfolio. To further reduce use of single-use plastic packaging, PepsiCo plans to set a time-bound goal by the end of 2022 for a percent of volume of beverages to be delivered via strategies that avoid or minimize single-use packaging, such as reusable and refillable bottles or containers.

Sustainability has become a critical factor in the logistics industry in recent years, and this trend is expected to continue in 2023 and beyond. Customers are becoming increasingly aware of the impact of logistics operations on the environment, and they are demanding more sustainable solutions. One of the main ways logistics companies can improve their sustainability is by reducing their carbon footprint. This can be achieved through a variety of measures, such as using electric or hybrid vehicles, optimizing routes to reduce fuel consumption, and using renewable energy sources in warehouses. Another way logistics companies can improve their sustainability is by reducing waste. This can be achieved through better inventory management, using reusable packaging materials, and implementing recycling programs.

E-commerce has been a significant driver of growth in the logistics industry over the past few years. It has led to an increase in the demand for fast and efficient logistics services, particularly last-mile delivery.

In conclusion, logistics play a significant role in the overall supply chain sustainability of a company. Green innovations are becoming increasingly important as companies seek to reduce their environmental impact. Sustainable packaging, efficient route planning, smart warehousing, electric and hybrid vehicles, alternative fuels, and reverse logistics are all examples of green innovations that are being explored by logistics companies. By adopting these innovative solutions, companies can make their logistics

operations more sustainable and contribute to a more sustainable future. To support these green innovations, PepsiCo actively collaborates with local stakeholders, including suppliers, distributors, and government entities. By fostering partnerships and engaging with the local community, PepsiCo aims to drive sustainable practices across its value chain in Ukraine. Overall, PepsiCo's commitment to green innovations in Ukraine and globally demonstrates its dedication to environmental sustainability. By continuously seeking innovative solutions and collaborating with stakeholders, PepsiCo strives to minimize its ecological impact and contribute to a more sustainable future.

Moreover, technological advancements have brought significant changes to the transport and logistics services market, PepsiCo including. Automation, robotics, data analytics, and tracking tools have enabled companies to improve efficiency, reduce costs, and increase visibility in their supply chains. Furthermore, new technologies such as drones and autonomous vehicles have the potential to revolutionize the transportation of goods, making it faster, cheaper, and more efficient than ever before.

### 3.2 Industry 4.0 and its Implications for Logistics: Insights from Europe and Proposed Strategies for PepsiCo Ukraine.

Industry 4.0 refers to the incorporation and utilization of advanced information and communication technologies within the industrial sector. The primary objective is to facilitate the intelligent interconnectivity of products and processes across the value chain, enabling more effective utilization of organizational processes in the production of goods and services. This integration aims to enhance customer satisfaction by providing innovative products and services. These transformative changes in the industry are widely recognized as the fourth industrial revolution, often referred to as Industry 4.0. [46] other European nations also embarked on significant transformations in their industrial sectors, which were commonly referred to as Smart Factories, Industrial Internet of Things (IIoT), or Smart Industry initiatives. [51]

Industry 4.0, also known as the fourth industrial revolution, focuses on the advancement of digital manufacturing and the development of "smart" factories. This entails the implementation of intelligent networks that enable seamless connectivity, mobility, flexibility, and interoperability in industrial operations. It involves integrating with customers and suppliers and adopting innovative business models. A key aspect of Industry 4.0 is the utilization of cyber-physical systems (CPS), which are physical and engineered systems that can be monitored, coordinated, controlled, and integrated through computing and communication systems. CPS enables the intelligent functioning and management of industrial processes. [46] Industry 4.0 comprises several key components that shape its concept. These components include the Internet of Things (IoT), which enables interconnected devices and systems to exchange data and communicate seamlessly. The Internet of Services (IoS) facilitates the provision and utilization of services through digital platforms. Big data plays a crucial role in Industry 4.0 by capturing, analyzing, and deriving insights from large volumes of data. Robotics is a key technology that automates various processes and tasks, enhancing efficiency and productivity. Cloud Computing (CC) provides on-demand access to computing resources

and services over the internet. Augmented Reality (AR) merges digital information with the real world, offering enhanced experiences and insights. Finally, the horizontal and vertical integration of systems enables the seamless integration and collaboration between different parts of the value chain, enhancing connectivity and interoperability. [51]

The growing desire for personalized products and services has led to a need for adjustments in inbound and outbound logistics. The evolving complexity of this landscape requires more sophisticated planning and control methods that go beyond traditional practices. [49]

The term "Logistics 4.0" is commonly used to describe the integration of logistics with the advancements and applications brought about by Cyber-Physical Systems (CPS). Logistics 4.0 shares similarities with Smart Services and Smart Products. It is important to note that the technology-driven approach used to define Smart Products and Smart Services also applies to Smart Logistics. Smart products and services are those that can perform tasks typically carried out by humans, enabling the delegation of activities and allowing employees to focus on tasks that require higher levels of intelligence than what automatic processes or basic Smart Products/Services can provide.

A "Smart Logistics" system refers to a logistics system that enhances flexibility, adapts to market changes, and brings the company closer to customer needs. This leads to improved customer service levels, optimized production processes, and reduced storage and production costs. As Smart Logistics evolves with the changing technology landscape, it is important to regularly assess the state-of-the-art technology to stay current and remain competitive. [50]

This new paradigm has emerged as a result of the widespread use of the Internet, facilitating real-time communication between machines and humans, and the advancement of digitalization. For Logistics 4.0 to be efficient and robust, we believe it should leverage the following technological applications: 1) Resource Planning, 2) Warehouse Management Systems, 3) Transportation Management Systems, 4) Intelligent Transportation Systems, and 5) Information Security.

The solution lies in the digitalization of logistic activities and processes, which we refer to as digital logistics. The characteristics of digitalized logistic systems are as follows:

- Cooperation: Digitalization enables the creation of virtual logistic associations or clusters, allowing companies to exchange data and information.
- Connectivity: Digitalization facilitates horizontal and vertical integration within supply chains, providing visibility of information across all chain links.
- Adaptiveness: The system of interconnected digital resources is flexible, capable of responding to various market changes such as customer requests, user preferences, and supplier variations.
- Integration: In the digital realm, integration of logistic systems involves connecting different computer systems and software applications physically or functionally, to enable the coordination of logistic flows.
- Autonomous: Logistic systems increasingly incorporate smart objects that can communicate and make independent decisions based on data processing from their own sensors and environmental characteristics.
- Cognition: The application of devices and systems automates tasks that traditionally required human skills, knowledge, perception, and cognitive abilities such as planning, reasoning, and learning [50].

Automatic identification of all objects and participants in logistic processes, the possibility of locating them and data collection in real-time, enable quality management, planning and optimization. Data processing and analysis create new knowledge, conditions for intelligent management and new business services. There are numerous technologies that implement the stated components, and the most important are shown in Figure 3.2.

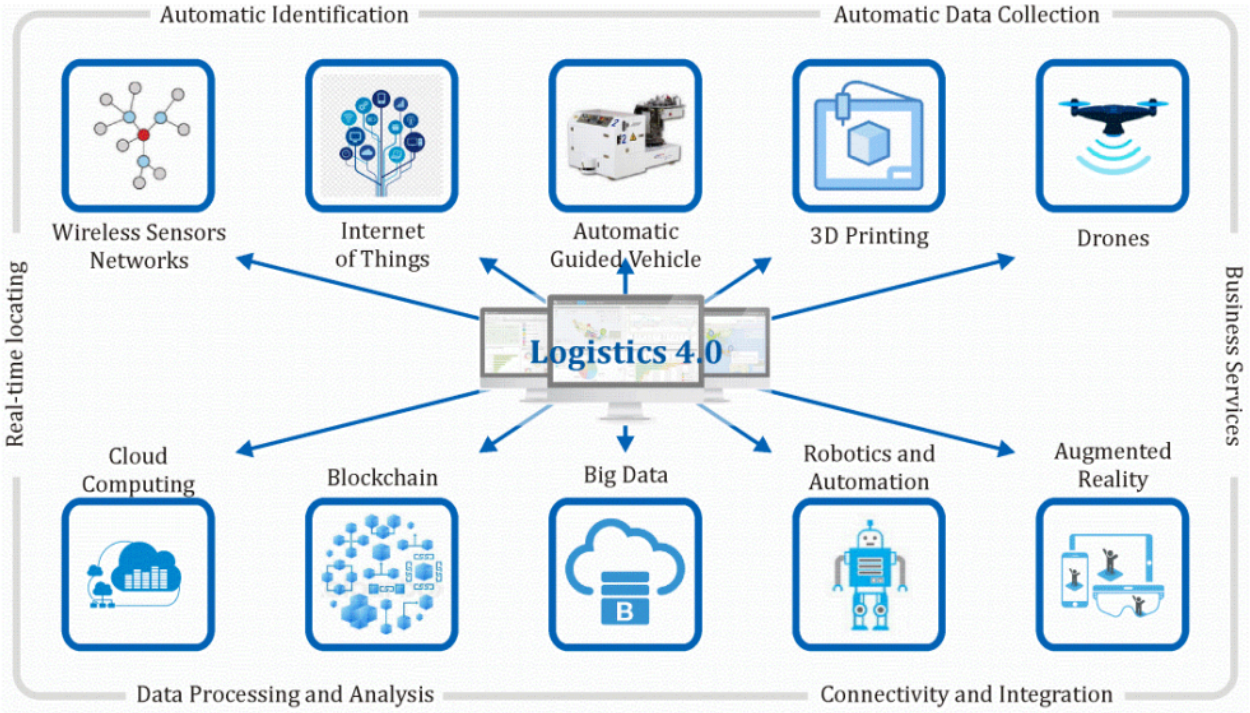


Figure 3.2. Components and technologies of Logistics 4.0. Source: [51]

Cloud Computing (CC) refers to the use of computer services via the Internet, offering on-demand services, broad network access, resource sharing, flexibility, and measured usage. It provides logistic companies with advantages such as rapid and efficient access to IT services and innovative solutions in supply chains. With CC, companies no longer need to invest in software and hardware procurement, develop internal IT departments, or manage integration with business partners.

One example of a European logistics company utilizing cloud computing is DHL, a leading global logistics provider. DHL has implemented cloud-based solutions to enhance its logistics operations and provide innovative services to its customers. DHL has adopted cloud-based warehouse management systems (WMS) to optimize inventory management, order fulfillment, and overall warehouse operations. By leveraging CC, DHL gains real-time visibility into inventory, streamlines order processing, and improves operational efficiency across its network of warehouses. DHL also utilizes cloud-based transportation management systems (TMS) to enhance its transportation planning, execution, and tracking capabilities. Through the cloud, DHL can efficiently manage its fleet, optimize routes, monitor shipments in real-time, and provide customers with accurate delivery updates. [52] DHL leverages cloud-based platforms for supply chain

collaboration, allowing seamless communication and information exchange with its customers, suppliers, and partners. This enables real-time collaboration on order management, shipment tracking, and inventory replenishment, leading to improved visibility and coordination throughout the supply chain. DHL utilizes cloud-based analytics and business intelligence tools to derive valuable insights from the vast amount of logistics data it generates. By leveraging cloud computing resources, DHL can process and analyze data in real-time, enabling better decision-making, predictive analytics, and optimization of logistics processes. [53]

Big Data encompasses technologies for storing, processing, and analyzing large volumes of data that traditional tools and databases cannot handle. Through various analytical methods, valuable insights and knowledge can be derived, influencing management and decision-making in business systems. In Logistics 4.0, the increased volume, diversity, and speed of data processing can be effectively managed using Big Data analytics and Data Mining (DM), enabling companies to create additional value and implement new business models. DM uncovers hidden information, relationships, rules, and logic within the data, facilitating market trend predictions, understanding user behavior, identifying root causes of issues, and more.

One example of a European logistics company leveraging big data is Maersk, a global leader in container shipping and logistics. Maersk has harnessed big data analytics to optimize its operations, improve decision-making, and enhance customer service. Maersk utilizes big data analytics to forecast customer demand accurately. By analyzing historical shipment data, customer behavior, economic indicators, and other relevant factors, Maersk can predict demand patterns and adjust its shipping capacity accordingly. Big data analytics is employed by Maersk to optimize shipping routes and improve fuel efficiency. By analyzing real-time data on weather conditions, sea currents, port congestion, and vessel performance, Maersk can optimize the routes taken by its vessels, minimize fuel consumption, and reduce greenhouse gas emissions. Maersk leverages big data analytics to provide customers with real-time visibility into their cargo. By integrating data from various sources such as GPS trackers, port systems, and vessel sensors, Maersk enables customers to track the status and location of their shipments.

Moreover, Big data analytics enables Maersk to proactively identify and mitigate supply chain risks. By analyzing data from multiple sources, including weather forecasts, political events, and market trends, Maersk can assess potential risks and develop contingency plans to ensure smooth operations. [54]

Blockchain technology is a decentralized and distributed system that records transactions in a specific work segment. It offers improved logistics speed and reliability in global trade, enhanced monitoring and visibility of goods in supply chains, automated contracts through smart contracts, and more. It provides security, transparency, cost savings, and the development of new business models in logistics and supply chains.

One of the very good example of a European logistics company leveraging blockchain technology is Maersk and IBM's joint venture, TradeLens. TradeLens is a blockchain-based platform that aims to digitize and streamline global supply chains, providing increased transparency, security, and efficiency. TradeLens uses blockchain technology to create an immutable ledger for supply chain transactions, providing real-time access to transparent information for all participants. This improves visibility, reduces delays, and minimizes manual paperwork. Smart contracts digitize documentation, eliminating the risk of loss or manipulation and enabling faster verification. Blockchain ensures transaction records' immutability, enhancing security and reducing risks of fraud. TradeLens also enables secure and efficient trade finance and payments through blockchain-based digital tokens, streamlining cross-border transactions for improved speed and cost-effectiveness [55].

Wireless Sensor Networks (WSN) are networks consisting of sensors and wireless communication. They enable data collection and transfer, allowing for various applications in logistics. Examples include measuring vehicle load, quality control of goods, monitoring infrastructure, and improving worker safety. WSN plays a crucial role in enhancing logistics operations.

An example of using Wireless Sensor Networks (WSN) in European companies' logistics departments is for real-time vehicle monitoring and tracking. By equipping vehicles with wireless sensors, companies can gather data on factors such as location, speed, temperature, and fuel consumption. This information can be transmitted wirelessly

to a central control system, allowing logistics managers to monitor and optimize fleet performance, plan routes more efficiently, and ensure compliance with regulations. WSN in logistics enables improved visibility, increased operational efficiency, and enhanced safety measures [57].

Applying robotics and automation in production processes improves product quality, safety, and reduces errors, labor, and costs. The development of robotics offers faster, more precise, flexible, and affordable robots, driving their increased use. In logistics, robots are utilized for tasks such as collecting, sorting, unloading containers, and delivering goods, meeting the demands for efficiency and quick responses in the market. One example of using robotics and automation in European companies in the logistics department is the implementation of automated picking systems in warehouses. These systems utilize robotic arms or autonomous mobile robots (AMRs) equipped with computer vision and machine learning algorithms to identify and pick items from storage shelves. This automation reduces manual labor, improves picking accuracy, and increases operational efficiency in the warehouse. Companies can also integrate robotic solutions with conveyor systems and sorting equipment for seamless handling and sorting of goods [58].

Augmented Reality (AR) merges the physical and digital worlds, presenting users with an enhanced reality through digital information. AR devices like glasses, tablets, and mobile phones display digital layers of information, offering real-time and location-based insights. In logistics, AR finds applications in warehouse operations, forklift handling, smart delivery, and more. Advancements in AR devices and image recognition capabilities will further enable its widespread adoption across all logistics processes.

The good example of using Augmented Reality (AR) is the implementation by DHL. The company has adopted AR technology to improve warehouse operations and enhance order fulfillment processes. In DHL's warehouses, workers wear AR glasses that overlay digital information onto their field of view, providing them with real-time guidance and information. The AR glasses display item locations, picking instructions, and navigation prompts, allowing workers to locate and pick items more efficiently. The AR system also verifies the accuracy of picked items through barcode scanning and

provides instant feedback to the workers. This implementation of AR in DHL's logistics department has resulted in increased productivity, reduced errors, and improved order accuracy. By providing workers with hands-free access to information and guidance, DHL has streamlined their warehouse operations and enhanced the overall efficiency of their logistics processes [59].

3D Printing is a technology that creates three-dimensional objects and is being applied across various industries, including pharmaceuticals, medical devices, and aerospace. Its impact on logistics processes and services is significant: regional networks will become more complex, new supply chain strategies will emerge, logistic providers can offer spare parts services, and personalization of products will be possible. 3D printing enables on-demand delivery, leading to cost savings in inventory and transportation.

Airbus, a major aerospace manufacturer, has success. Airbus has integrated 3D printing technology into their logistics processes to improve the production and supply of aircraft spare parts. With 3D printing, Airbus is able to produce complex and customized parts on-demand, reducing the need for traditional inventory storage and logistics. When a spare part is required, the design file is sent digitally to the appropriate 3D printer located either at the production facility or closer to the point of use. The 3D printer then creates the part layer by layer, eliminating the time and cost associated with traditional manufacturing and shipping processes. By leveraging 3D printing in their logistics department, Airbus has achieved several benefits. They have reduced lead times for spare parts, improved supply chain flexibility, and minimized inventory costs. Additionally, 3D printing enables Airbus to optimize their logistics network by strategically placing printers in various locations, allowing for more efficient distribution of spare parts. [60]

Automatic Guided Vehicles (AGV) have been utilized for over 60 years in various industries, including production processes and warehouse facilities. These unmanned vehicles rely on sensor, video detection, artificial intelligence, and ICT technologies. AGVs used in logistics can serve multiple purposes such as towing trailers, transporting unit loads, and handling pallets and equipment. They automate demanding tasks, resulting

in cost savings, increased reliability, productivity, safety, and improved work quality by reducing human errors and damages.

DHL has adopted AGVs to automate various tasks in their warehouses and distribution centers. In their logistics operations, DHL utilizes AGVs for tasks such as towing trailers, transporting unit loads, and handling pallets and equipment. These AGVs are equipped with sensors, video detection technology, artificial intelligence, and ICT capabilities, allowing them to operate autonomously and navigate through the facility. By employing AGVs, DHL has experienced numerous benefits in their logistics operations. AGVs have helped reduce labor costs by automating demanding and repetitive tasks, resulting in increased productivity and operational efficiency. They also enhance the safety and reliability of material handling processes by reducing the risks of human errors and damages. Additionally, AGVs contribute to better inventory management and optimize space utilization within the warehouses. The integration of AGVs in DHL's logistics department has brought about improvements in cost savings, productivity, and work quality, ultimately enhancing their overall logistics performance. [61]

Basing on the experience of the European companies, which successfully implemented the smart technologies in their everyday logistics operations, we can formulate the recommendations for PepsiCo’s activities in the logistics and transportation. First can be the implementation of the Cloud Computing (CC) solutions. PepsiCo can consider migrating its logistics operations to cloud-based platforms. This will enable rapid and efficient access to IT services and innovative solutions in supply chains. By leveraging CC, PepsiCo can eliminate the need for heavy investments in software and hardware procurement, reduce the complexity of managing internal IT departments, and streamline integration with business partners. PepsiCo can explore cloud-based logistics management systems that offer features such as real-time tracking, inventory management, route optimization, and demand forecasting. These systems will provide enhanced visibility and control over the supply chain, leading to improved operational efficiency and cost savings. PepsiCo can establish partnerships with cloud service providers specializing in logistics solutions. This collaboration can enable access

to industry-specific tools, expertise, and support, ensuring the successful implementation and integration of cloud-based logistics solutions.

The second big step for PepsiCo will be developing a comprehensive strategy for leveraging Big Data in its logistics operations. Identify the key data sources relevant to logistics, such as transportation, inventory, and customer data, and define clear objectives for data analysis and utilization. To effectively handle the increased volume and diversity of data, PepsiCo should invest in robust data infrastructure and analytics capabilities. This may involve implementing scalable storage solutions, deploying data analytics tools and platforms, and building a team of data scientists and analysts. Enable real-time data tracking and monitoring across the logistics network. This includes utilizing IoT sensors, Radio Frequency Identification (RFID) tags, and other technologies to capture data at various touchpoints, such as warehouses, transportation vehicles, and retail outlets. Real-time data insights will enable proactive decision-making and improve operational efficiency. Utilize Big Data analytics techniques, such as predictive modeling and machine learning, to forecast demand more accurately. By analyzing historical data, market trends, and external factors, PepsiCo can optimize inventory management, reduce stockouts, and minimize waste.

Next, PepsiCo can explore the adoption of blockchain technology in their logistics operations. This technology can enhance the speed, reliability, and transparency of global trade. It can also improve monitoring and visibility of goods throughout the supply chain, ensuring efficient and secure transactions. PepsiCo can consider partnering with blockchain technology providers or developing their own blockchain solutions. PepsiCo can leverage WSN to improve various aspects of their logistics operations. By deploying sensors, they can measure vehicle load, monitor the quality of goods, and enhance infrastructure monitoring. WSN can also contribute to worker safety by providing real-time data and insights. PepsiCo should invest in the development and integration of WSN technologies into their logistics network. PepsiCo should focus on developing robust data analytics capabilities to leverage the insights provided by blockchain technology and WSN. By effectively analyzing the data collected from these technologies, PepsiCo can make data-driven decisions, optimize their logistics processes, and identify areas for

improvement. Investing in data analytics tools and hiring skilled data analysts can facilitate this implementation. As technology rapidly evolves, PepsiCo should remain proactive in exploring emerging trends and innovations in logistics. Regularly assess the market for new technologies, conduct pilot projects to evaluate their feasibility, and implement scalable solutions. Embracing a culture of innovation and adaptability will ensure PepsiCo stays competitive in the dynamic logistics landscape.

In order to enhance efficiency and reduce costs of logistics operations it is crucially important for PepsiCo to conduct a thorough assessment of their logistics operations to identify areas where robotics and automation can bring significant improvements. This may include tasks such as collecting, sorting, unloading containers, and delivering goods. PepsiCo can collaborate with robotics experts and technology providers to develop customized robotic solutions that align with their specific logistics needs. Before implementing robotics on a larger scale, PepsiCo can start with pilot projects to test the feasibility and effectiveness of the chosen robotic systems. These pilots can provide valuable insights into the benefits, limitations, and potential challenges of using robotics in their logistics operations. As robotics and automation are introduced, PepsiCo should provide adequate training and support to their employees to ensure a smooth transition. This includes training employees on operating and working alongside robots, as well as addressing any concerns or misconceptions about job security. Integrating robotics into the workforce can lead to increased productivity and job satisfaction. Once robotics systems are implemented, PepsiCo should continuously monitor their performance and gather feedback from employees and stakeholders. This feedback can help identify areas for further optimization and fine-tuning, ensuring that the robotic systems deliver the expected improvements in product quality, safety, and cost reduction.

Next, PepsiCo should explore potential applications of Augmented Reality (AR) in their logistics operations. This may include areas such as warehouse operations, forklift handling, order picking, inventory management, and smart delivery. By identifying specific use cases, PepsiCo can determine how AR can enhance efficiency, accuracy, and safety in their logistics processes. Conduct pilot projects to test and evaluate the feasibility

and effectiveness of AR in real-world logistics scenarios. This will help PepsiCo assess the benefits, challenges, and potential ROI of implementing AR technology.

Integrate AR solutions with existing logistics systems and databases to provide real-time and location-based information. This integration can enable seamless communication between AR devices and backend systems, enhancing visibility, tracking, and decision-making capabilities. Forge partnerships or collaborations with AR technology providers and developers to leverage their expertise and stay updated on the latest advancements in AR capabilities. This collaboration can help PepsiCo access cutting-edge AR technologies and stay at the forefront of industry trends.

The last recommendation for PepsiCo can be implementation of Automatic Guided Vehicles (AGVs) into certain areas within logistics operations. This may include tasks such as material handling, inventory movement, order picking, and transportation between different areas of the warehouse or production facilities. Important is to determine the most critical and demanding tasks that can benefit from automation. Begin with small-scale pilot projects to evaluate the feasibility and effectiveness of AGV implementation. A specific area or process within the logistics operations should be selected to deploy AGVs and monitor their performance, reliability, and impact on productivity and safety. It is important to gather feedback from operators and other stakeholders to understand their experiences and identify any potential areas for improvement. Analyzis of the current layout of warehouses and production facilities should be conducted to optimize the flow of materials and goods for AGV deployment. Designation of the specific paths or lanes for AGVs to minimize congestion and maximize efficiency. Consider implementing smart algorithms or control systems to coordinate the movement of AGVs and ensure smooth operation within the logistics network.

In conclusion, by leveraging cloud-based solutions, PepsiCo can adapt to evolving customer demands, optimize supply chain processes, and drive operational efficiency.

The company should learn to optimally leverage data-driven insights for better decision-making, optimization of operations, and the creation of new business models in the logistics domain. To achieve higher levels of efficiency, quality, and cost-effectiveness PepsiCo should think about strategically implementing robotics and

automation in logistics. Automation can help minimize errors, reduce labor costs, and enhance overall competitiveness. AR can contribute to improved productivity, reduced errors, and an enhanced logistics experience for PepsiCo and its customers. Implementation of the AGVs can handle demanding tasks, minimize human errors, and contribute to a streamlined logistics process. The company can consider deployment of WSN technologies to improve various aspects of logistics operations, including vehicle load measurement, goods quality monitoring, infrastructure monitoring, and worker safety. It is very important to develop data analytics capabilities, to focus on developing robust data analytics capabilities to leverage insights from blockchain technology and WSN.

By implementing these recommendations, PepsiCo can enhance its logistics operations, improve efficiency, reduce costs, and ultimately strengthen its position in the market.

# CONCLUSIONS

The logistics industry is a dynamic and essential component of various sectors, driven by factors such as deregulation, mergers, and alliances. It encompasses a wide range of activities involved in the movement of goods, including transportation, warehousing, third- and fourth-party logistics, and reverse logistics.

It is important to distinguish logistics from the broader concept of the supply chain. While logistics primarily focuses on the internal movement of goods within a single company, the supply chain involves the sequential production or distribution of goods and services by multiple businesses.

Logistics plays a critical role in enhancing efficiency, reducing costs, optimizing production rates, managing inventory, and improving customer satisfaction. Various modes of transportation, such as road, rail, air, water, and pipeline, are utilized in the logistics process, each offering distinct advantages and limitations. The key functions of logistics encompass customer service, demand forecasting, inventory management, logistics communication, materials handling, order processing, packaging, parts and service support, plant and warehouse site selection, procurement, return goods handling, reverse logistics, traffic and transportation, and warehousing.

There were a lot of challenges logistics faced in the last several years. Among them disruptions due to the COVID-19 pandemic; increasing transportation costs; inconsistent tracking and limited visibility; empty miles and delivery delays; uncertainty and continued disruptions; bottlenecks at warehouses, etc.

The pandemic led to the closure of plants, halting supply chains and causing struggles in obtaining goods and supplier parts. Non-revenue miles, where carriers and shippers transport empty containers or vehicles, increase costs, have a negative environmental impact, and reduce efficiency. Factory closures, labor shortages, and fragmented legacy processes have disrupted supply chains, leading to delays in deliveries. Customers have had to endure extended waiting periods for certain products, such as Tesla vehicles and smartphones, due to these delays. The logistics industry expects

ongoing disruptions and challenges even beyond the COVID-19 pandemic. Factors such as port operations issues, geopolitical crises, labor unrest, and natural disasters can continue to impact logistics operations for months or even years. Decreased demand for less-than-truckload (LTL) transportation has caused congestion at warehouses, as retailers choose to store imported goods rather than shipping them inland.

Factors like the Russia-Ukraine conflict and a shortage of heavy goods vehicle drivers in Europe have contributed to rising transportation costs. Many brands still rely on manual processes instead of utilizing IoT technology for tracking shipments. This can decrease productivity and efficiency, leading to delays and operational inefficiencies in warehouses. For example, bottlenecks leads to significant delays as containers cannot be unloaded until space becomes available in warehouses operating at full capacity.

Addressing these challenges requires optimizing supply chain management and logistics, investing in technological innovations, and planning ahead during stable periods to prepare for potential disruptions.

By focusing on reducing costs and enhancing consumer satisfaction through streamlined operations, businesses can improve their performance. Key Performance Indicators (KPIs) play a crucial role in measuring and improving supply chain management. It is important for companies to select metrics that accurately represent their specific operations and align with their corporate goals.

Different industries have different logistics KPIs, such as order management KPIs, supply KPIs, inventory KPIs, distribution KPIs, and transport management KPIs. These metrics provide insights into various aspects of logistics and help evaluate supplier and customer performance. Logistics scorecards and metrics are valuable tools for continuous improvement in inbound and outbound logistics. By utilizing the appropriate set of KPIs and scorecards, companies can minimize disruptions, enhance productivity, and make informed decisions to drive growth and profitability. Ultimately, by prioritizing efficiency, cost reduction, and customer satisfaction through effective logistics management, companies can position themselves for long-term success in a competitive market landscape. Continuous improvement in logistics processes, guided by KPIs and

scorecards, helps businesses stay agile and responsive, ensuring their ability to meet evolving customer needs and achieve sustainable growth.

The transport logistics services in Ukraine are undergoing significant development while facing several challenges. Ukraine still lags behind European Union countries in terms of logistics service development, as indicated by its unchanged overall ranking in the Logistics Performance Index (LPI) since 2014. This highlights the need for further improvements in the country's logistics system. To overcome challenges and improve the transport logistics services, Ukraine should focus on enhancing its customs processes, upgrading transport infrastructure, streamlining permit procedures, and strengthening phytosanitary control. Collaborative efforts between the government, logistics companies, and relevant stakeholders are crucial to address these issues effectively.

The analysis of PepsiCo's transport and logistics services in Ukraine reveals its significant presence in the food and beverage industry, with a diverse portfolio of brands and a leading position in the juice market. The company operates multiple production facilities and utilizes tailored distribution channels to reach its customers effectively. However, PepsiCo faces various challenges, including the ongoing conflict in Ukraine, geopolitical and macroeconomic uncertainty, supply chain disruptions, and safety concerns for employees. These challenges are further intensified by factors such as labor shortages, currency volatility, increased operating costs, and environmental risks. Despite these obstacles, PepsiCo remains committed to its core principles of safety, sustainability, and ecology.

The cost analysis conducted is crucial for gaining valuable insights into the company's financial performance. It allows for the evaluation of the company's financial well-being, aids in making strategic decisions, and identifies opportunities for both cost reduction and growth. The report examines various factors that have influenced the company's budget, including areas where costs were reduced and expenditures increased. It specifically highlights successful cost-saving measures implemented by the company, such as streamlining logistics and supply chain operations, negotiating favorable contracts, and implementing initiatives aimed at reducing expenses. Additionally, the report draws attention to specific areas where money was saved and where additional

funds were allocated. It underscores the significance of factors like Territory Mix and Category Mix in achieving cost savings in transportation, while also acknowledging the impact of timing, fuel savings, and lower-than-expected inflation on reducing costs.

Considering recommendations and future development it is important to state that logistics is crucial for supply chain sustainability, and companies are increasingly focusing on green innovations to reduce their environmental footprint. Sustainable packaging, efficient route planning, smart warehousing, electric/hybrid vehicles, alternative fuels, and reverse logistics are all examples of eco-friendly solutions explored by logistics firms. PepsiCo collaborates with local stakeholders in Ukraine to drive sustainable practices and supports green innovations. Technological advancements like automation, robotics, data analytics, and tracking tools have improved efficiency and visibility in supply chains. Emerging technologies such as drones and autonomous vehicles have the potential to revolutionize transportation, making it faster, cheaper, and more efficient. PepsiCo's commitment to green innovations and embracing technology showcases its dedication to environmental sustainability and a more sustainable future.

Industry 4.0 also presents significant implications for logistics, and PepsiCo Ukraine can leverage various strategies to optimize its operations and stay competitive. By embracing cloud-based solutions, the company can adapt to changing customer demands, optimize supply chain processes, and achieve operational efficiency. Utilizing data-driven insights for decision-making and the creation of new business models is crucial. PepsiCo should strategically implement robotics and automation to enhance efficiency, quality, and cost-effectiveness. Augmented reality (AR) can contribute to improved productivity and logistics experience. Automated guided vehicles (AGVs) can handle demanding tasks and streamline the logistics process. Deployment of wireless sensor network (WSN) technologies can improve various aspects of logistics, including load measurement, goods quality monitoring, infrastructure monitoring, and worker safety. Developing robust data analytics capabilities and leveraging insights from blockchain technology and WSN are essential. By implementing these strategies, PepsiCo can enhance its logistics operations, improve efficiency, reduce costs, and strengthen its market position in Ukraine and beyond.

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# APPENDICES

*Appendix A*

| | |
|---|---|
| **Receiving Scorecard** | ▪ Cost of Receiving<br>▪ Productivity of Receiving Labor<br>▪ Efficiency of Receiving<br>▪ Receiving Accuracy<br>▪ Dock Utilization<br>▪ Receiving Cycle Time |
| **Shipping Scorecard** | ▪ Shipping cost per line<br>▪ Dock Utilization<br>▪ Shipping Accuracy<br>▪ Back Order Rate<br>▪ Rate Orders Received Damage-Free<br>▪ Average Time to Customer |
| **Pick & Pack Scorecard** | ▪ Cost of Pick & Pack<br>▪ Picking Productivity<br>▪ Packing Material Use Rate<br>▪ Equipment Dock Utilization<br>▪ Picking Accuracy Rate<br>▪ Returns Rate<br>▪ Returns Cost<br>▪ Pick & Pack Cycle Time |
| **Putaway Scorecard** | ▪ Cost per Line<br>▪ Staff Productivity<br>▪ Space Utilization<br>▪ Putaway Accuracy<br>▪ Putaway Cycle Time |

| | |
|---|---|
| **Safety Scorecard** | ▪ Costs of Safety Prevention<br>▪ Cost of Poor Safety Measures<br>▪ Lost Time to Injuries<br>▪ Number of Safety Trainings per Period |
| **Customer Service Scorecard** | ▪ First Response Time<br>▪ Customer Retention Rate<br>▪ Customer Satisfaction Score<br>▪ First Contact Resolution<br>▪ Average Resolution Time<br>▪ Cost per Conversation<br>▪ Net Promoter Score (NPS) |

Scorecards by categories. Source [11]

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**КИЇВСЬКИЙ НАЦІОНАЛЬНИЙ ЕКОНОМІЧНИЙ УНІВЕРСИТЕТ**
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**Факультет міжнародної економіки і менеджменту**

# ЗБІРНИК ДОПОВІДЕЙ
## Ювілейної 90-ї щорічної студентської наукової конференції

# «ІННОВАЦІЙНІ ПРОЄКТИ ДЛЯ ПІСЛЯВОЄННОГО ВІДНОВЛЕННЯ ТА РОЗВИТКУ УКРАЇНИ»

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## GREEN INNOVATIONS IN LOGISTICS TECHNOLOGIES, PROCESSES AND SERVICES

In recent years, there has been a growing emphasis on green innovations in logistics technologies, processes, and services. Logistics, as an integral part of the supply chain, plays a vital role in promoting sustainability, reducing environmental impact, and conserving natural resources. With the increasing awareness of environmental concerns and the urgent need to address them, companies are investing in green logistics technologies, processes, and services to achieve their sustainability goals.

Green innovations in logistics technologies focus on developing sustainable and energy-efficient transportation systems, reducing emissions, and optimizing routes. One of the most significant green innovations in logistics technologies is the use of electric and hybrid vehicles. Electric vehicles (EVs) emit zero tailpipe emissions, making them a cleaner alternative to traditional diesel or gasoline-powered vehicles. Hybrid vehicles use a combination of electric and gasoline power, reducing emissions compared to traditional vehicles. These vehicles have been increasingly adopted by logistics companies to transport goods and reduce their carbon footprint. For example, the logistics giant UPS has already deployed more than 10,000 alternative fuel and advanced technology vehicles globally, including electric, hybrid electric, hydraulic hybrid, compressed natural gas, liquefied natural gas, and propane. [1]

Another green innovation in logistics technologies is the use of alternative fuels such as biodiesel, hydrogen, and compressed natural gas (CNG). Biodiesel is a renewable fuel made from vegetable oils or animal fats that can be used in place of petroleum diesel. Hydrogen fuel cells are another alternative to traditional fuels that can power vehicles with zero emissions. CNG is a fossil fuel alternative that produces less greenhouse gas emissions than diesel. For example, LA Metro voted to buy 295 natural gas buses equipped with Near Zero engines from Cummins Westport. Even more exciting, the agency has a contract with Clean Energy. This contract will allow them to use renewable natural gas (RNG) in their natural gas vehicles. [2]

Route optimization is another green innovation in logistics technologies that can significantly reduce carbon emissions. By optimizing routes, logistics companies can reduce the number of miles traveled and fuel consumption, leading to lower emissions. The use of advanced software and algorithms can help companies optimize routes and reduce delivery times. For example, the logistics company DHL has implemented a route optimization system that has led to a great reduction in CO2 emissions and in line with DPDHL Group’s commitment they are planning to achieve zero-emissions logistics by 2050. [3]

Finally, the use of drones for delivery is another green innovation in logistics technologies that has the potential to reduce carbon emissions. Drones can deliver goods with minimal energy consumption and can avoid traffic congestion on the roads. Although still in the early stages of development, companies like Amazon and UPS have already started experimenting with drone deliveries in select areas. [4]

Green innovations in logistics processes focus on optimizing logistics processes to reduce waste, increase efficiency, and promote sustainability. Important innovations in such processes as reducing waste and promoting sustainability is providing sustainable packaging. Packaging is an essential part of logistics operations. Sustainable packaging solutions can help reduce the environmental impact of logistics operations. Companies are increasingly using eco-friendly materials such as biodegradable plastics, recycled cardboard, and paper-based packaging to reduce the amount of waste generated by packaging materials. [5] Some companies are also using reusable packaging solutions to further reduce waste.

Route planning is a crucial part of logistics operations. Inefficient route planning can lead to increased fuel consumption, higher emissions, and increased costs. Green innovations in route planning aim to optimize routes to minimize fuel consumption and emissions. Companies are using advanced analytics and data-driven tools to optimize routes, taking into account factors such as traffic patterns, fuel efficiency, and delivery schedules. [5]

Warehousing operations can also have a significant impact on the environment. Green innovations in warehousing operations focus on reducing energy consumption, improving waste management, and increasing efficiency. Companies are using smart warehousing solutions that incorporate advanced automation and IoT technologies to optimize operations, reduce energy consumption, and minimize waste. [6]

Transportation is one of the most significant sources of emissions in logistics operations. Green innovations in transportation focus on reducing emissions by using electric and hybrid vehicles. Many companies are adopting electric and hybrid vehicles for their logistics operations, which can significantly reduce emissions and fuel costs. [7]

Reverse logistics is the process of managing the return of goods from the customer back to the manufacturer or supplier. Green innovations in reverse logistics aim to reduce waste and increase the reuse and recycling of materials. Companies are implementing strategies such as take-back programs and closed-loop supply chains to reduce waste and increase sustainability. [8]

In conclusion, logistics play a significant role in the overall supply chain sustainability of a company. Green innovations are becoming increasingly important as companies seek to reduce their environmental impact. Sustainable packaging, efficient route planning, smart warehousing, electric and hybrid vehicles, alternative fuels, and reverse logistics are all examples of green innovations that are being explored by logistics companies. By adopting these innovative solutions, companies can make their logistics operations more sustainable and contribute to a more sustainable future.

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## OUTSOURCING IN THE TIME OF A GLOBAL RECESSION

Recent years’ economic crisis has started with Covid-19 pandemic that impacted the world in several different ways, pushing markets into a global economic and geopolitical recession. An induced increase in uncertainty made professionals and companies of all scales, governments, economies and most of markets to alter their trajectories, shift, adapt or even suspend their operations making never thought about changes to become a common practice. Companies needed to reassure their stakeholders that they are able to manage hurdles and respond to an occurred unprecedented crisis in customer behaviour and market risks, which led to considering digital and operations transformation to be one of the key enablers of change and development of their business.

According to OECD Economic Outlook, russia’s war of aggression against Ukraine persistently overshadows the world economy and, in spite of recent signs of improvement, recovery over the next 2 years is expected to be moderate. Even higher than before, uncertainty leaves outlooks fragile with a high downside risk, it takes a heavy toll on activities, trade tensions and financial vulnerabilities have increased. Although inflation has started to decline, it might persist longer and remains elevated. Global GDP growth slowed in 2022 to 3.2%, that is more than 1 percentage point weaker than it was expected at the 2021 end, mainly pinned down by war and the associated cost-of-living crisis in many countries. GDP growth is projected to remain at below-trend rates in 2023/2024 (OECD Economic outlook, 2023).

The existent economic environment created a ground for businesses to realise that funds utilisation and expenses optimisation have become increasingly crucial for staying afloat and, even more so, developing and growing. Peter Drucker’s advice to “*do what you do best and outsource the rest,”* has become especially relevant. Channelling capital towards core business operation and using outsourcing in this case could be the most effective and efficient strategy.