SILESIAN UNIVERSITY OF TECHNOLOGY PUBLISHING HOUSE

SCIENTIFIC PAPERS OF SILESIAN UNIVERSITY OF TECHNOLOGY 2024
ORGANIZATION AND MANAGEMENT SERIES NO. 207

SUSTAINABLE DEVELOPMENT CHALLENGES AND PRACTICES IN THE LOGISTICS INDUSTRY

Jakub FIKUS[1*], Natalia LISZKA[2]

[1] Politechnika Śląska, Wydział Organizacji i Zarządzania; jfikus@polsl.pl, ORCID: 0000-0002-6647-7800
[2] Politechnika Śląska, Wydział Organizacji i Zarządzania; natalis015@student.polsl.pl, ORCID: 0009-0002-9950-6484
* Correspondence author

Purpose: The main aim of the article is to analyze the challenges and innovative solutions regarding ways of achieving sustainable development goals in the logistics industry.
Design/methodology/approach: To achieve the main objective of the article, a review of the literature on currently functioning solutions in the field of achieving sustainable development goals was conducted. First, the focus was on the analysis of approaches to defining the concept of sustainable development and ecology. To learn the perspective of companies representing the logistics industry, it was decided to use research using an interview questionnaire. Thanks to the applied methodology, the main challenges, and methods of achieving sustainable development goals in the logistics industry were identified.
Findings: The article presents a set of activities undertaken by the studied entities of the logistics industry in the context of realizing the goals of sustainable development. The research also focused on an attempt to identify the main challenges in the context of realizing these goals. According to the presented results, these challenges can be divided into: economic, technological, infrastructural, operational, organizational, regulatory and communication challenges.
Research limitations/implications: The main limitation was the number of companies that took part in the research. This limitation resulted from the necessity of conducting personal interviews in the companies. At the same time, it should be noted that in the future there is a possibility of expanding the research to include other companies in the logistics industry.
Practical implications: The research results may constitute an example of activities related to the environmental and social areas for enterprises in the logistics industry. In addition, they can be the basis for conducting further research on an attempt to eliminate the identified challenges.
Originality/value: The research presents the main actions that logistics companies can take to achieve sustainable development goals.
Keywords: Sustainable development, logistics industry, ecologistics.
Category of the paper: research paper.

1. Introduction

Sustainable development is becoming one of the most important challenges of the modern world. The popularity of these issues is particularly visible in the number of publications in both domestic and foreign literature. In the face of climate change, environmental degradation and limited natural resources, the need to take action to protect the planet is becoming particularly important. Both societies and governments increasingly expect companies to actively participate in building an economy based on the principles of sustainable development. These activities are aimed not only at protecting the environment, but also at long-term economic and social stability. In the context of these challenges, the logistics industry is under increasing pressure to adapt its operations. Due to its huge impact on the environment in terms of greenhouse gas emissions and fossil fuel consumption - this sector must face the need to introduce significant changes. Logistics companies recognize that traditional methods of operation are no longer sufficient, and changes are necessary to meet growing regulatory requirements and social expectations. More and more companies in the industry are realizing that implementing sustainable practices is no longer just an option, but a necessity to remain competitive and build a responsible image on the market. The main goal of this article is to analyze the challenges faced by companies in the logistics industry in terms of implementing the assumptions of the sustainable development goals.

2. Sustainable development in logistics activities

The concept of sustainable development appeared in the 1960s as a response to global challenges related to environmental degradation, depletion of natural resources and growing social inequalities. Its dissemination was mainly contributed to by the United Nations. However, the official definition was created only in 1987 in a report presented by the UN World Commission on Environment and Development, chaired by Norwegian Prime Minister Gro Harlem Brundtland (Bargieł, 2023). Sustainable development has been defined as „development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Elliot, 2013, p. 29).

In Polish law, the principle of sustainable development is regulated at the constitutional level. According to Article 5 of the Constitution of the Republic of Poland, "The Republic of Poland guards the independence and inviolability of its territory, ensures the freedoms and rights of man and citizen and the security of citizens, guards the national heritage and ensures environmental protection, guided by the principle of sustainable development" (Olejarczyk,

2016, p. 128). The inclusion of this provision in the highest-ranking legal act highlights the importance and significance of the concept of sustainable development.

At the 1992 United Nations Conference on Environment and Development held in Rio De Janeiro, 27 principles of sustainable development were established, which included social, economic and environmental issues. Regulations concerning society indicate that every person has the right to a healthy life and access to natural resources. The equality of all countries was emphasized, both the wealthy and highly developed ones, as well as those in the development phase. The assumptions also specify the necessity of cooperation between states at the level of exchange of information, knowledge and new technologies. In the event of a dispute, it should be resolved peacefully, while in the event of an armed conflict, states are obliged to protect the natural environment to prevent its degradation. The principles also emphasize the importance of maintaining the identity of national minorities and educating society. In the economic area, cooperation between states was provided for in order to promote the international economic system. Countries are obliged to inform each other about any disasters or threats that occur. It was also emphasized that the perpetrator of environmental pollution or its degradation must be punished. In addition, states should ensure that pollutants do not move beyond the area of contamination or environmental disaster (Universität Viadrina, 2002).

The concept is based on the 17 Sustainable Development Goals. The 17 Sustainable Development Goals are a common plan that aims to ensure peace, prosperity for people and the protection of our planet for current and future generations. These goals were set out in the 2030 Agenda for Sustainable Development, adopted by all UN member states in 2015. These assumptions are presented in figure 1.

Figure 1. Sustainable Development Goals.

Source: https://www.gov.pl/web/polishaid/sustainable-development-goals, 16.10.2024.

The Sustainable Development Goals address, among others: poverty, hunger, health and well-being, education, gender equality, water, energy, employment, economy, inequality, urbanization, responsible consumption, climate, life on land and under water, peace and partnership. The goals are universal and indivisible. They must be implemented together, because achieving progress in one area affects the implementation of another goal (Ratschka, 2021).

The aforementioned Agenda 2030 addresses the global community's commitment to achieve sustainable development in its three dimensions - economic, social and environmental - in a balanced and integrated manner. At the same time, it emphasizes the need to integrate the economic, social and environmental dimensions as the key to achieving sustainable development in the world (Integrating, 2015).

The Agenda focuses on three main areas of sustainable development (Transforming, 2015):

- Equality and social solidarity: equality of opportunity for people, including well-being, quality of life and sustainable social development – development should release individual abilities and meet human needs, which in turn will contribute to combating poverty and improving the quality of life of individuals. In the long term, this is to ensure a safe life, full of rights and freedoms, and promote social cohesion;
- Environmental responsibility: the ability to use natural resources in a way that does not disturb the balance and integrity of ecosystems, reducing the burden on the environment;
- Economic efficiency: efficiency of activities in the field of economy and technology, promotion of investment and efficiency, economic development, taking care of the potential of economic production.

In terms of business management, sustainable development means implementing ecological operating practices that simultaneously meet the expectations of all interested parties, including the financial requirements of owners and shareholders and the needs of safety and stability of employees and other stakeholders. Additionally, sustainable development in the context of management, in its simplest form, refers to the way an organization is managed in accordance with the principles and goals resulting from this idea (Grudzewski et al., 2015).

Nowadays, most economic activities require the transport of cargo and people, which is associated with increasing pressure related to the protection of the natural environment. In this situation, there is an urgent need to adapt the logistics sector, especially the quality and level of services provided, to the requirements of the surrounding environment (Bąk-Sokołowska, 2018).

2.1. Approach to defining ecologistics

Ecologistics is gaining importance in the logistics industry due to growing ecological awareness and the need to adapt to environmental protection requirements. In the face of global challenges such as climate change and the degradation of natural resources, ecologistics is

becoming not only a way to improve operational efficiency, but also a key element of a sustainable development strategy.

In recent years, many definitions of ecology have been created, however, according to Dr. A. Baraniecka, ecology can be defined as "the application of the concept of logistics to residues in order to limit their formation, including (which is very important) preventing their formation and causing their economically and ecologically effective flow, with simultaneous spatial and temporal transformation, including changing the quantity and species". This definition emphasizes the essence of preventive measures and the relationship between logistics and ecological issues (Baraniecka, 2019, p. 6). A summary of the remaining definitions of ecologistics is presented in Table 1.

Table 1.
Definitions of ecologistics

Definition	Source
Ecologistics is an integrated system that: is based on the concept of managing recirculating flows of waste material streams in the economy and the flows of information coupled with them	(Korzeń, 2001)
Eclogistics is a manifestation of the desire to develop tools that allow for the elimination or minimization of the pressure of the technosphere on the biosphere, focusing on the area controlled by the logistics sphere in the enterprise	(Piniecki, 2002)
Green logistics is the management of the flow of knowledge, materials and funds between institutions whose goal is to grow with an emphasis on sustainable social and environmental development, while paying attention to the requirements of all stakeholders	(Seuring i Müller, 2008)
Green logistics is green supply chain management, which can be defined as an organization's action that takes into account environmental issues and integrates them with supply chain management	(Lee i Klassen, 2008)
Actions in the field of green logistics include measuring the impact of various distribution strategies on the environment, reducing energy consumption in logistics activities, reducing the amount of waste and managing their processing	(Sibihi i Eglese, 2009)
Eclogistics is a field that primarily deals with eliminating the negative impact of companies' activities on the environment natural	(Michniewska, 2012)
The term "green logistics" is defined as supply chain management practices and strategies that reduce the environmental and energy footprint of goods distribution, which focuses on material handling, waste management, packaging and transportation	(Rodrigue et al., 2012, cf.: Seroka-Stolka, 2014)

Source: own study based on: Baraniecka, 2019, p. 7.

One of the components of ecology is reverse logistics, also known as waste or disposal logistics. It involves planning, implementing, and controlling the efficient and cost-effective flow of materials, in-process inventory, finished goods, and related information from the point of consumption to the point of creation to recover value or dispose of them in an appropriate manner (Merkisz-Guranowska, 2010).

Ecologistics used in various organizations includes two main goals, economic and ecological. The first one is directly related to logistics and concerns cost reduction and simultaneous improvement of logistics customer service. On the other hand, the ecological goal concerns protection of natural resources and reduction of pollution coming directly from

logistics processes. Ecologistics places greater emphasis on limiting waste generation than on appropriate management of existing waste.

The high rank of preventive actions in ecologistics is reflected in the creation of the ecologistics subsystem in the company. Its input includes other subsystems of the organization, including processes occurring in them and generated waste, while the output is economic and environmental benefits resulting from rational waste management. The ecologistics subsystem consists of the following stages: waste prevention, collection, transport and use of waste. The ecologistics subsystem is presented in figure 2.

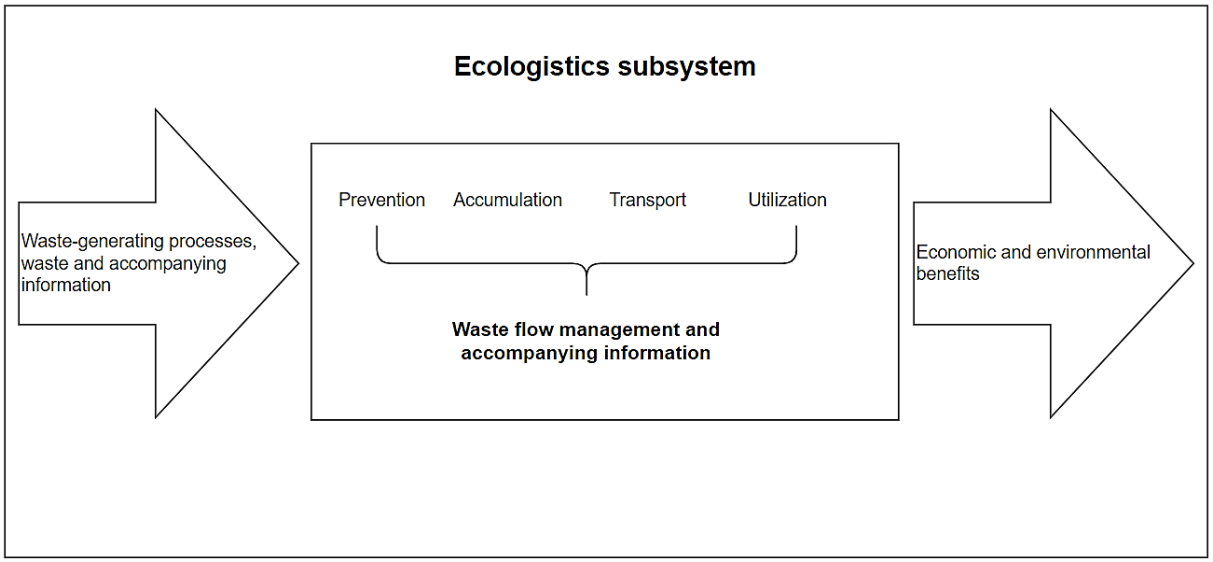

Figure 2. Ecologistics subsystem.

Source: own study based on: Baraniecka, 2019, p. 8.

A systems approach to ecology suggests that, like other subsystems (e.g. supply or distribution), it should be closely linked to the strategic goals of the organization and other areas of activity and coordinated by people responsible for achieving ecological goals (Baraniecka, 2019).

2.2. CSR strategy in logistics activities

More and more companies in the logistics sector are recognizing the need for pro-ecological activities, not only for the purpose of generating profits. Transport, considered a sector that degrades the environment, encourages European companies to compete by implementing CSR (Corporate Social Responsibility) goals, considering ecological aspects in their activities.

CSR is an effective strategy for managing an organization in order to strengthen its position on the market, increase its competitiveness while simultaneously achieving sustainable development goals. The definition proposed by Dr. Dyczkowska presents the CSR strategy as "the company's commitment to conduct such a social policy and make such decisions that are desirable from the point of view of the goals and values of society. According to the idea of

CSR, the company has not only economic and legal obligations, but also specific obligations in society that go beyond the first two limitations mentioned above" (Dyczkowska, 2015, p. 99).

It should be noted, however, that there are more definitions of CSR Strategy. Selected ones are presented in Table 2.

Table 2.
Selected definitions of CSR strategy

Definition	Source
The organisation's commitment to integrating social and environmental considerations into its decision-making process and taking responsibility for the impact of its decisions and activities on society and the environment.	International standard – ISO 26000
The concept whereby businesses voluntarily decide to contribute to a better society and a cleaner environment.	European Commission
The commitment of business to ethical behavior and to contribute to economic development by improving the quality of life of employees and their families, as well as local communities and society as a whole.	World Business Council for Sustainable Development
The management approach and response to social, environmental, broader economic and ethical issues and to the expectations of stakeholders on these issues to the extent to which the business can respond to them.	United Nations Development Programme (UNDP)
The extent to which social, environmental and ethical risks and benefits are managed to protect and increase shareholder value.	PWN

Source: own study based on: Wypych, 2013, p. 209.

The CSR strategy can therefore be understood as a message in which the organisation commits to considering social and environmental areas in the decision-making process so that they contribute to the implementation of the concept of sustainable development.

To systematize the knowledge about CSR strategy, the first international standard of social responsibility was created in 2010, known as the ISO 26000 Standard. The document contains seven key areas of the strategy, within which companies can gain benefits. These areas are: (Wypych, 2013, p. 210):

- organizational governance – the decision-making process in an organization;
- human rights – all inalienable rights that people are entitled to by virtue of being persons endowed with dignity;
- employee relations – all relationships that occur in the organization’s practice with employees who work for it, both inside and outside the organization;
- environment – the impact of the organization’s decisions and actions on the natural environment;
- fair market practices – ethical conduct of the organization towards all other entities;
- consumer relations – responsibility for goods and services offered to consumers;
- social involvement and development – the organization’s relations with other organizations present in its area of operations and contributing to improving the quality of life in all its dimensions.

To better present the above-mentioned areas, their key issues are presented in Table 3.

Table 3.
Key issues of CSR areas in ISO 26000

Id.	CSR areas in the meaning of ISO 26000	Key issues
1.	Organizational governance	– transparency and clarity of activities – responsibility, ethical conduct – dialogue and cooperation with stakeholders – compliance with the law
2.	Human rights	– the right of employees to free association – prohibition of child labour and elimination of forced labour – diversity and equal rights in the workplace (elimination of all forms of discrimination)
3.	Employee relations	– the right to fair remuneration, fair treatment and non-discrimination – the right to fair working conditions, safety and health of employees – employee development, training
4.	Environment	– reduction of raw material and energy consumption – reduction of hazardous waste and other pollutants production – undertaking initiatives for environmental protection – raising awareness of the impact of activities on the natural environment – considering environmental assumptions at the stage of designing innovative products and technologies
5.	Fair market practices	– combating corruption, fraud and money laundering – fair competition – respect for property rights – promotion of social responsibility
6.	Consumer relations	– fair and transparent marketing – access to information and to the contracting process – limiting risks resulting from the use of products and services – stimulating sustainable consumption
7.	Social involvement and development	– actions contributing to improving the quality of life of society – establishing partnerships for development – undertaking social investments – respecting the rights of members of local communities

Source: own study based on: Wypych, 2013, p. 210.

Examples of the application of Corporate Social Responsibility strategy are the activities of Raben Group Polska. This company has an extensive sector related to social activities, which includes, among others, activities such as providing help to children and people in difficult life situations through a noble package, organizing charity transport or volunteering. Raben is happy to share its knowledge at meetings organized in kindergartens, schools or universities. They also provide support for local communities through educational programs regarding, among others, road safety, ecology or raising awareness of the importance of transport and Logistics (Raben, 18.10.2024).

The application of the discussed strategy may also manifest itself as running a foundation. Inpost, as part of supporting the community of its enterprise, runs the Inpost foundation. Its aim is to provide assistance to employees and enable their further development. It also helps employees in difficult life situations and in conducting their own charitable activities (InPost, 18.10.2024).

The described examples of CSR strategy application are not the only ones. Many organizations are increasingly more willing to engage in pro-social activities.

2.3. Examples of ecological activities in the logistics industry

In response to the growing need to protect the environment logistics companies are introducing innovative, ecological solutions. These activities are aimed at both reducing the negative impact on the environment and improving economic efficiency. Below are examples of such pro-ecological initiatives in the logistics sector.

The concept of the Internet of Things is based on connecting various devices that collect, transmit and process data without the need for human intervention. InPost used this solution when introducing parcel lockers to its services. Thanks to this, couriers deliver a large amount of shipments to one place, without the need for additional travel. This prevents the formation of congestion, lower fuel consumption, shorter transport times, a decrease in the number of road accidents, and a reduction in the level of pollutant emissions and noise (Guzowski et al., 2024). Transporting a parcel through a parcel locker emits 98% less CO2 compared to home delivery (InPost, 25.10.2024). Another example of a company supporting sustainability using the Internet of Things is CarryPicker from Hamburg. It optimizes the payload of trucks, avoiding empty runs with AI using Big Data. This solution increases efficiency by reducing the number of vehicles on the road. The reduced use of high-emission tractors leads to lower fuel consumption and reduced emissions (Guzowski et al., 2024).

Intermodal transport, combining different means of transport, plays a key role in reducing pollutant emissions. Thanks to more efficient use of infrastructure and reduced fuel consumption, it is an ecological solution for the TSL industry, contributing to sustainable development. The use of intermodal transport can help relieve the overly congested road network of some freight transport and, as a consequence, increase traffic safety and reduce the negative effects and external costs caused by road transport on human health and life and the natural environment (Wronka, 2012). Pipeline transport, used to transport crude oil and its derivatives, takes up the least amount of space in relation to the transport work performed. Another form of transport that saves land is inland navigation, which largely uses natural waterways, not requiring significant use of land. Rail transport is characterized by an average level of occupied space in relation to the transport work performed, but its land consumption depends on the type of traction and the wagons used. Compared to road transport, rail and inland navigation emit significantly less pollutants into the atmosphere. Electric rail vehicles (electric locomotives) do not affect air quality, and diesel locomotives pollute it ten times less per ton of transported cargo than trucks. Similar effects can be observed in the case of river transport. In addition, the noise generated by trains is relatively low compared to other means of transport, which means that their acoustic impact on the environment is minimal (Pokusa, Ohijenko, 2023).

Electromobility is gaining importance not only in the passenger car sector, but also in the case of vans and trucks, in response to increasingly stringent emission standards. In 2019, the European Union institutions set emission targets for heavy-duty road transport for

the first time. The new regulations, which came into force on 14 August 2019, stipulate that from 2025 all manufacturers of trucks sold in the EU will have to reduce average CO2 emissions from new vehicles by 15% compared to the level from 1 July 2019 to 30 June 2020. In addition, a further 30% reduction in emissions will be required from 2030. In the years 2019-2024, a super-credit system will be introduced to support the development of zero- and low-emission cars. These EU regulations will certainly accelerate the popularisation of electric vehicles, which are characterised by numerous benefits for the environment. Both fully electric (BEV) and hydrogen (FCEV) models are virtually emission-free – they do not produce carbon dioxide, particulate matter, or nitrogen and sulfur oxides, which are typical for combustion vehicles. The introduction of these regulations and the development of electromobility will significantly contribute to improving air quality, reducing the emission of harmful gases and pollutants, which in the long term will have a positive impact on the natural environment and human health (Łęgownik, Jankiewicz, 2020).

3. Methods

To identify and analyze the actions that can be taken by logistics companies and to compare them with the results of literature research, it was decided to conduct research using an interview questionnaire. Representatives of 5 logistics companies in the Silesian Voivodeship participated in the study. It was decided to select companies of different sizes and specializing in other market areas to learn about different perspectives on the challenges and actions taken by companies. The companies participating in the research wished to remain anonymous and did not consent to the publication of their names in the article. The answers to the questions were provided by people holding managerial positions. The surveyed entities include: a 3PL and 4PL logistics service providers and three transport and forwarding companies. The research was conducted from July to September 2024. The average duration of the interview was from 30 to 60 minutes. The interview questionnaire consisted of 15 questions focusing on issues related to sustainable development, which are presented in Table 4. When creating the questionnaire, it was decided to focus on both issues related to the strategy of the companies themselves and technical aspects. Thanks to such a structure, the questionnaire provided qualitative data on the challenges and practices of sustainable development, relations with stakeholders, and social and ecological initiatives undertaken by companies in the industry.

Table 4.
Interview Questionnaire

Id.	Interview questions:
1.	Has the company implemented a sustainable development strategy?
2.	What key sustainability principles have been included in the company's strategy?
3.	What are the company's long-term sustainability goals, and how is their progress being monitored?
4.	What innovative sustainability solutions have been implemented to reduce environmental impact?
5.	What measures are being taken to reduce the consumption of resources and energy in logistics and transport operations?
6.	How does the company comply with legal regulations related to sustainability, such as greenhouse gas emissions or climate policies, and how are these addressed?
7.	Is the company using environmental certifications or standards to monitor and optimize logistics processes, and if so, which ones?
8.	What social initiatives are being undertaken as part of the company's sustainability strategy?
9.	What sustainability practices are applied in managing relationships with stakeholders?
10.	What role do employees play in the implementation of the sustainability strategy, and are training and educational programs on sustainability offered?
11.	What challenges are seen in reducing exhaust emissions and introducing low-emission transport solutions in the logistics industry?
12.	What difficulties are encountered in the process of implementing sustainable practices in the supply chain, especially in the context of optimizing the use of natural resources?
13.	What barriers are identified in the introduction of alternative energy sources in transport operations, as well as their impact on competitiveness and operating costs?
14.	What challenges are encountered when trying to introduce more ecological packaging?
15.	What difficulties are seen in cooperation with partners and suppliers to jointly achieve goals related to sustainable development throughout the supply chain?

Source: own elaboration.

4. Results

The collected answers from the interview questionnaire were used to analyze and identify activities and challenges related to sustainable development in the logistics industry. The analysis was divided into four parts in accordance with the issues in the questionnaire. The first part concerned the company's strategy, its assumptions, and goals (questions 1-3). The second part focused on identifying the activities undertaken by the company (questions 4-7). This part also included questions regarding the impact of legal aspects and certification methods. The third part concerned social aspects and activities undertaken by the company in this area (questions 8-10). The questions in the fourth part directly concerned the challenges that companies face in implementing activities related to sustainable development (questions 11-15). The entire analysis allowed for a better understanding of the perspectives of various companies on issues related to sustainable development and their comparison with the perspective included in the literature research.

Analyzing the answers from the first part of the interview questionnaire, it can be noticed that the companies that took part in the study presented different approaches to formulating a sustainable development strategy. It should be noted that the larger the size of the company,

the more precise and detailed the sustainable development strategy was. An example of such a relationship is particularly visible when comparing 3PL and 4PL logistics service providers with transport and forwarding companies. The LSP had much more detailed and measurable goals compared to carriers. However, it should be noted that each of the analyzed companies saw the need to consider aspects related to sustainable development in their activities and set specific goals, which are monitored using defined indicators. The goals set in the organization's strategies were divided in accordance with the three pillars of sustainable development presented in the literature part: environmental, social, and organizational aspects. The results indicate that all companies recognize the need to implement sustainable solutions, but their strategies differ in terms of ambition and scope.

The second part of the analysis focused on identifying specific actions taken by companies to implement their strategies. During the analysis of the results, it was decided to divide these activities into two main categories in accordance with the classification presented in the literature studies, which are presented in Table 5. It should be noted that the activities presented in the table are a collection of responses obtained from all companies. It is worth noting that there was a strong correlation between the size of the company and the number of initiatives that were implemented by it in the scope of achieving the goals of sustainable development. Regardless of the size and scope of the services provided, the largest number of activities was shown in the environmental category. This situation results mainly from the fact that legal regulations to a large extent force companies to take steps to reduce greenhouse gas emissions.

Environmental activities most often focused on reducing greenhouse gas emissions. All the entities surveyed took certain steps in this respect, which most often consisted of modernizing the fleet to a less emission-prone one and, in the case of having their own storage facilities, saving energy and solutions concerning renewable energy sources. The largest of the entities surveyed also conducted work and talks with clients on the implementation of the use of fully electrified trucks in the case of transport for a selected client. The questionnaire also asked a question about the measures used, which were divided according to the previous classification. The most frequently used environmental measures concerned the measurement of total greenhouse gas emissions expressed in CO2e (carbon dioxide equivalent), while in the case of measuring social activities, they most often concerned the number of social initiatives and, in the case of employees, the measurement of job satisfaction using surveys. The analyzed companies also had implemented standards - most often ISO 9001 and 14001. When indicating the motivation for implementing new solutions concerning the reduction of CO2e emissions, companies most often indicated legal regulations, but also the growing requirements in terms of the ecological awareness of their customers.

Table 5.
Activities undertaken by logistics enterprises in the context of sustainable development

Environmental activities	Social activities
low emission fleet	charitable activities
use of biofuels	social campaigns
implementation of an electric fleet	ensuring appropriate employee training
route optimization	ensuring compliance with occupational health and safety
elimination of empty runs	counteracting mobbing
use of recyclable packaging	health promotion activities
use of renewable energy sources	promoting gender equality in the workplace
minimization of energy consumption through appropriate management of lighting in warehouses	ensuring equal pay
	promoting work-life balance
increased share of intermodal transport	facilities for working parents
carbon credits (CO2 offset)	enabling student internships
emission reporting	implementing a stakeholder relationship management system
certification and standards	

Source: own elaboration.

During the analysis of the third part of the interview questionnaire, the focus was on the social activities undertaken by individual companies. Examples of activities mentioned by the companies are also presented in Table 5. In the case of social activities, companies with a significant position on the market were characterized by a much greater number of initiatives. The interviews conducted show that this dependence is determined by the fact of having separate departments directly involved in creating such initiatives. Among the social aspects, the activities could most often be divided into those focused on internal and external stakeholders. In the case of internal activities, the focus was mainly on ensuring appropriate working conditions and implementing actions aimed at integrating employees. In turn, logistics operators often had actions related to supporting diversity and equality in the workplace.

An example of an action aimed at internal stakeholders concerned one of the companies, which had an action promoting a healthy lifestyle among employees by participating in competitions organized by applications for measuring kilometers traveled. External activities most often concerned charitable activities. Examples of such activities included both direct financial support for non-profit organizations and organizing collections in kind. One of the logistics operators also began cooperation with an orphanage to provide young people with appropriate education and, if they wanted, easier job finding. However, regardless of the size of the company or the scope of services provided, it should be noted that companies see the need for social involvement and carry out certain initiatives in this step.

The last part of the analysis focused on identifying the main challenges in the implementation of the mentioned solutions concerning sustainable development. Even though companies in the logistics industry see the need to implement sustainable solutions, they encounter numerous challenges. In the environmental aspect, the biggest barrier to implementing new activities is most often the financial issue. According to most companies, the optimal solution to this problem is currently investment in low-emission vehicles. Investment in fully electric trucks at the moment incurs very high costs. In addition to the cost

barrier, one of the surveyed entities, which is working on the implementation of electric vehicles for one of its clients, emphasizes that, in addition to the cost barrier, an important issue is also the aspect related to the availability of infrastructure for charging vehicles. The challenge, which was emphasized in particular by smaller companies, concerned the uncertainty about future ecological standards, which additionally made it difficult to plan long-term investments. Numerous comments were also directed at the context of customer requirements, for which the priority is mostly the price and quality of the logistics services provided, and their impact on the environment is put in the background. Regardless of the approach to this problem, the main challenges related to the implementation of activities related to sustainable development were decided to be divided into 7 categories:

- Economic challenges;
- Technological challenges;
- Infrastructure challenges;
- Operational challenges;
- Organizational challenges;
- Regulatory challenges;
- Communication challenges.

All these factors together indicate that despite the growing environmental awareness, the path to full sustainability in the logistics industry requires overcoming numerous barriers. However, as research has shown, there is a strong desire on the part of both logistics companies and their customers to overcome these challenges together.

5. Discussion and Conclusion

According to the presented research results, issues related to sustainable development are currently an important aspect in logistics industry. The activities and challenges faced by enterprises may vary depending on their size and the scope of logistics services they provide, but the article made it possible to identify the general challenges faced by the entire industry, The literature research allowed us to get acquainted with the theoretical perspective on sustainable development and to develop an interview questionnaire that was used in the study. The main challenges that logistics companies should overcome were identified, including: economic, technological, infrastructural, operational, organizational, regulatory and communication barriers. According to the research results, economic barriers are the biggest obstacle and result from the high costs of investing in new technologies and ecological solutions. To solve the economic challenge, logistics companies should try to take advantage of subsidies or tax breaks for investments. Technological barriers are also an important aspect, concerning access to modern tools and their integration with current systems. Infrastructure

often does not fully support sustainable transport, such as the lack of electric vehicle charging stations. Operational challenges are related to the optimization of logistics processes in accordance with the principles of ecology. Organizational problems concern changes management and employee engagement. Legal regulations require constant monitoring and adaptation of logistics companies' activities to changing regulations. In turn, communication barriers include difficulties in transmitting information about pro-ecological activities inside and outside the company. Solving these challenges requires comprehensive actions and further research into building appropriate strategies to support sustainable development in the industry.

It should be noted that the research results also have practical significance for companies, indicating possible actions in the environmental and social area and providing a basis for further scientific analyses. The research indicates the need for further actions aimed at eliminating these barriers and introducing more ecological and effective processes. In the future, it is possible to extend the research to a larger group of companies from the logistics sector, which will contribute to a more comprehensive understanding of the issue.

References

1. Baraniecka, A. (2019). Ekologistyka jako odpowiedź przedsiębiorstw na kryzys środowiskowy. *Zeszyty Naukowe. Marketing i Rynek [Journal of Marketing and Market Studies], Vol. XXVI, Iss. 11*, pp. 3-14, doi: 10.33226/1231-7853.2019.11.1
2. Bargieł, R. (2023). Innowacje ekologiczne w kontekście zrównoważonego rozwoju organizacji. *Zeszyty Naukowe Zachodniopomorskiej Szkoły Biznesu Firma i Rynek, Iss. 2(64)*, pp. 79-90.
3. Bąk-Sokołowska, M. (2018). Rola logistyki zrównoważonej w realizacji kluczowych procesów firm z branży TSL. In: *Nauka, Badania i Doniesienia Naukowe. Nauki humanistyczne i społeczne* (pp. 28-37). Place: Idea Knowledge Future.
4. Dyczkowska, J. (2015). CSR in TSL companies. *Transport Problems, Vol. 10, Iss. 1*. Wydawnictwo Politechniki Śląskiej, pp. 97-104.
5. Elliott, J. (2013). *An Introduction to Sustainable Development*. Place: Routledge - Taylor & Francis Group.
6. *Fundacja InPost*. Retrieved from: https://inpost.pl/fundacja-inpost, 18.10.2024.
7. Grudzewski, W.M., Hejduk, I.K., Sankowska, A., Wańtuchowicz, M. (2013). *Sustainability w biznesie, czyli przedsiębiorstwo przyszłości. Zmiany paradygmatów i koncepcji zarządzania.* Place: POLTEXT.
8. Guzowski, M., Aneszko, W., Giegiel, B., Szpilko, D. (2024). Zastosowanie Internetu Rzeczy w kontekście zrównoważonego rozwoju przedsiębiorstw w branży TSL. *Akademia Zarządzania, Vol. 8, Iss. 3,* pp. 261-276, doi: 10.24427/az-2024-0047

9. *InPost dla ekologii*. Retrieved from: https://inpost.pl/inpost-dla-ekologii, 25.10.2024.
10. *Integrating the Three Dimentions of Sustainable Development. A framework and tools, Greening of Economic Growth Series, United Nations ESCAP* (2015).
11. Łęgownik, A., Jankiewicz, S. (2020). Zastosowanie innowacyjnych źródeł energii jako element budowania przewagi konkurencyjnej w przedsiębiorstwach z branży TSL na przykładzie projektu energetycznego zaprojektowanego dla FM Logistics. In: *Nowoczesne trendy w logistyce i zarządzaniu łańcuchem dostaw* (pp. 81-91). Wydawnictwo Uniwersytetu Łódzkiego.
12. Merkisz-Guranowska, A. (2010). Logistyka recyklingu odpadów jako jeden z elementów systemu logistycznego Polski. *Prace naukowe Politechniki Warszawskiej, Vol. 75*.
13. *Odpowiedzialność społeczna*. Retrieved from: https://polska.raben-group.com/o-nas/odpowiedzialnosc-spoleczna/wplyw-spoleczny, 18.10.2024.
14. Olejarczyk, E. (2016). Zasada zrównoważonego rozwoju w systemie prawa polskiego: wybrane zagadnienia. *Przegląd Prawa Ochrony Środowiska, Vol. 2*, pp. 119-140, doi: 10.12775/PPOS.2016.013
15. Pokusa, T., Ohijenko, M. (2023). Transport intermodalny i jego wymiar środowiskowy. In: *Collection Of Theses reports VI International Scientific and Practical Conference "Motor transport and infrastructure"* (pp. 4-8). National University of Bioresources and Nature Management of Ukraine.
16. Ratschka, M. (2021). Cele zrównoważonego rozwoju naprawiają świat. *Biuletyn EBIB, Zrównoważony rozwój a biblioteki, Vol. 4, Iss. 199*, pp. 1-6.
17. *Transforming our world: the 2030 Agenda for Sustainable Development, Resolution adopted by the General Assembly on 25 September 2015* (2015).
18. Wronka, J. (2012). *Transport kombinowany w aspekcie wymogów zrównoważonego rozwoju.* Wydawnictwo Naukowe Ośrodka Badań Ekonomiki Transportu.
19. Wypych, I. (2013). Obszary CSR w przedsiębiorstwach z branży TSL na przykładzie firm Adampol SA, Grupy Raben oraz PKP Cargo SA. *Zeszyty Naukowe. Problemy Transportu i Logistyki, Vol. 790, Iss. 23.* Uniwersytet Szczeciński, pp. 207-217.
20. *Zasady ogólnych praw i obowiązków, Deklaracja z Rio de Janeiro w sprawie środowiska i rozwoju, Konferencja Narodów Zjednoczonych" Środowisko i Rozwój"* (2002). Frankfurt (Oder): Europa-Universität Viadrina.