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Emerging Trends in Eco-Logistics: A Review of Sustainable Practices in Szczecin (Poland) from the Residents' Perspective

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Abstract: This article offers an interdisciplinary analysis of eco-friendly urban logistics in Szczecin. It includes a review of innovative ecological solutions, results from a survey on residents' awareness and acceptance and a case study on the implementation of these solutions in Szczecin. The theoretical part discusses the latest trends in eco-logistics, emphasising urban-specific solutions. The empirical section presents survey findings and explores the practical application of eco-friendly practices in Szczecin, analysing the associated benefits and challenges. The respondents demonstrated a high level of awareness and acceptance of city logistics solutions, such as urban pick-up points and electric scooters, which indicates support for sustainable urban transport. The residents of Szczecin appreciate the practical benefits and positive environmental impact of these eco-friendly investments, which they believe enhance city life by improving air quality and mobility. This article aims to provide a detailed perspective on eco-logistics in Szczecin, focusing on both the social and practical aspects of implementing sustainable solutions.

Keywords: management; sustainable transportation; eco-logistics; sustainable development; city logistics

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1. Introduction

The intensification of urbanisation processes has made it necessary to develop and implement concepts and solutions to improve the flow of people and cargo in urban areas. Consequently, the concept of urban logistics has emerged in the literature as a branch of logistics that focuses on the organisation and management of the flow of goods, people and information in urban areas [1]. It is a concept that combines elements of logistics, transport, urban planning, urban management and information and communication technologies. Urban logistics fulfils several tasks, which include the following:

- Managing urban public transport by optimising bus and tram routes and frequencies;
- Management and scheduling of goods deliveries in urban areas considering capacity constraints;
- Urban waste management—collection, segregation, processing and disposal;
- Optimised spatial planning, taking into account the distribution of transport infrastructure, industrial zones and parking spaces;
- Information management—collection and analysis of data from urban transport systems, with the aim of optimising the movement of people and goods as well as planning and implementing intelligent transport systems.

City logistics has been increasingly discussed in the context of sustainability policy in recent years. One concept [2] refers to stocks and flows—it is assumed that stocks in the context of sustainable urban development are broadly defined living conditions (sustainable society) and also environmental resources (sustainable ecosystem). A visualisation of this concept in the area of sustainable urban development is presented in Figure 1.



Figure 1. The concept of sustainable urban development in the context of resources. Source: [2].

A city therefore requires a multi-faceted approach to the concept of sustainability, i.e., one that considers the social, economic and environmental dimensions, often additionally taking into account spatial and institutional aspects [3–5]. The components of urban sustainability thus defined are illustrated in Figure 2.

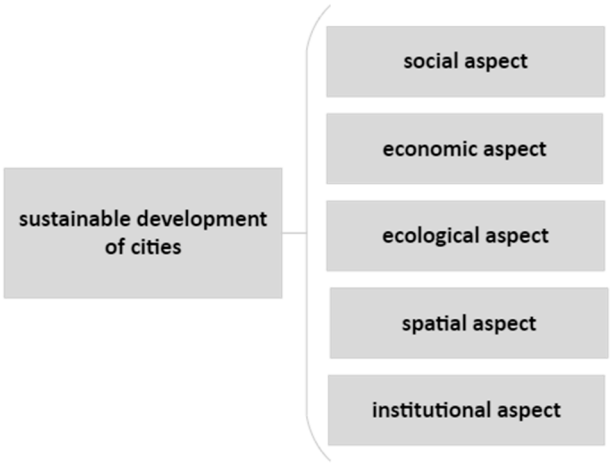

Figure 2. Dimensions of sustainability cities. Source: [6].

Each of these aspects constitutes an independent but interrelated element that together shape a sustainable and integrated structure for sustainable urbanisation. This model emphasises the need for a holistic approach to urban development planning and management that balances the needs of present and future generations.

Given the above, this article examines eco-logistics practices in the city of Szczecin from the residents' perspective, which has not been discussed in the literature to date. The degree of development and familiarity with tools to improve the sustainable management of people and cargo flows were examined using a survey questionnaire that was made available via the Internet and social media among Szczecin residents. Based on the survey, it can be indicated that a number of eco-logistics solutions exist in Szczecin and that residents are aware of the presence and operation of these facilities, but they themselves indicate that further development and expansion are needed in some areas.

2. Literature Review

The increase in individual motorisation and freight transport has led to an active search for solutions to prevent congestion, especially in urban areas. Urban logistics is the subject of numerous publications with varying degrees of detail. There are publications that present a broad overview of the literature on urban logistics, broken down into the thematic areas covered by the authors [7–9]. Some sources discuss in general terms what city logistics is, combining issues of theory and practice, relating to urban management, urban economy, goods delivery and traffic engineering [10,11]. Another author extensively covering city logistics issues is [1], who, in this publication, described, among other things,

the essence, goals and tasks of city logistics, the problem of shaping the flow of people in cities, the logistics of material goods flows in cities and its impact on the transport service of suppliers and recipients of these goods. Another category of sources is those in which the authors present a comparative analysis of good urban logistics practices in different cities [12,13] and discuss general urban logistics solutions and their impact on the functioning of cities and the population [14,15]. Some authors also discuss city logistics issues from an environmental and social perspective, considering sustainability policy and social responsibility [16–18]. Furthermore, numerous sources can be found where researchers focus on single, selected city logistics solutions, such as the following:

- Electric/hybrid delivery vehicles—the authors look at the viability of electric vehicles in urban courier logistics, with a particular focus on their potential to reduce emissions and noise, despite the challenges posed by high costs and limited range [19–21];
- Collection points—the authors look at the role of parcel lockers in enhancing logistics security and reducing the risks of traditional delivery methods [22];
- Intelligent parking systems—the article presents an overview of intelligent parking systems, with a particular emphasis on their functionalities and benefits in the context of urban traffic management [23];
- Park & Ride and Bike & Ride—the authors analyse the effectiveness of the park-and-ride system in reducing urban congestion and promoting sustainable transport [24–26];
- Carsharing—the objective is to review carsharing research, identify key trends and challenges and propose a research agenda to advance understanding of carsharing service management [27];
- Urban bicycle—the authors examine the role of city bike systems in urban transport, highlighting their advantages in urban environments [28,29];
- Freight tram—the authors investigate the potential of cargo trams as a means of alleviating congestion and reducing the environmental impact of freight transportation in urban areas [30,31];
- Cargo bike—the authors investigate the potential of electric cargo bikes as a sustainable mode of urban transportation, with a particular focus on their capacity to alleviate congestion and reduce emissions in urban environments [32];
- Low-emission zones—the authors examine the influence of low-emission zones on public health, showcasing how these zones can enhance air quality and facilitate enhanced health outcomes for urban populations [33,34];
- Transport telematics (ITS)—studies evaluate intelligent transport systems on urban and intercity roads, analysing their effectiveness in lowering pollution levels and user satisfaction among professional truck drivers and other road users [35,36].

In addition to the abovementioned, numerous publications present case studies on the implementation of city logistics solutions in Poland and worldwide [37,38]. Some publications explicitly discuss the example of the city of Szczecin [39,40] and the citizens' awareness of city logistics and sustainable mobility [41], which corresponds to the aims of this article.

As can be seen from the analysis presented above, there are numerous articles in the literature discussing various aspects related to eco-logistics and sustainable cities. There are also studies discussing the city of Szczecin, its sustainable urban infrastructure and the way it operates. However, none of the authors has so far focused on analysing this infrastructure and greening solutions from the standpoint of their users. And it should be borne in mind that the opinion of the users themselves should be the most important since it is they who use this infrastructure, and its tasks and further development should be best suited to the needs of the people using it.

3. Overview of Innovative Practices and Solutions at Eco-Logistics in the City of Szczecin

The biggest issues according to Szczecin's residents, regardless of age, are high road congestion, underdeveloped public transport and air pollution [41]. All these problems

are interrelated—poor development of public transport forces residents of Szczecin and neighbouring towns to use the car, which in turn leads to congestion and emissions of exhaust fumes and noise. Young people also see the lack of cycle paths as a concern [42], although there has been a great improvement in this area in recent years due to several vibrant investments.

Residents of Szczecin jokingly refer to the city as a huge construction site, due to the numerous road investments carried out over the last ten years or so and planned for the years to come. This is another factor that contributes to traffic congestion, but in this case, these are temporary phenomena that persist until the investment is completed. Ultimately, all reconstructions contribute to improving traffic flows, reducing emissions and improving the well-being of residents, through the following [43,44]:

- Construction of pavements and cycle paths;
- Extending the tram network and building new tram and bus stops;
- Construction of integrated interchanges;
- Narrowing streets in favour of pavements and relaxation areas with planting;
- Establishing zones where the speed limit for cars is 30 km/h.

As indicated above, there are a few pro-environmental practices in urban logistics that aim to reduce the negative impact of transport within a city on the environment and the well-being of its inhabitants. In a scientific context, integrated urban transport management strategies include comprehensive measures to increase the efficiency of urban transport and minimise its negative environmental impact. These elements include the application of technological solutions such as the electrification of vehicle fleets, the use of alternative energy sources and intelligent information systems to optimise routes. The promotion of public transport and infrastructure for pedestrians and cyclists aims to reduce congestion and greenhouse gas emissions. The use of advanced real-time urban logistics management systems and innovations such as smart parking systems allow for the efficient use of urban space and the reduction of traffic-seeking parking spaces. In addition, environmental education and investment in green urban infrastructure are key to promoting sustainability and improving the quality of life in cities.

Environmental objectives are achieved by the implementation of numerous technical–technological and organisational solutions to improve the flow of people and cargo in urban areas. For this article, 16 such solutions were selected and later used in a survey. Table 1 characterises the individual tools and services and indicates which of them are currently used in Szczecin and to what extent. The pro-environmental urban logistics solutions presented in the table and later used in the survey questionnaire were selected through unstructured observation in Szczecin and other large cities in Poland and abroad (e.g., Warsaw, Berlin) and based on the available literature sources listed in the 'Literature review' section.

Table 1. Pro-environmental solutions, their functional areas and implementation in the city of Szczecin.

Name	Description	In Szczecin?	Scope of Use
Electric and hybrid passenger and commercial vehicles	These are vehicles powered solely by electricity stored in batteries or combining an internal combustion engine with an electric motor and battery.	Yes	Public transport (many companies subordinate to Roads and Public Transport Authority), courier companies.
Parcel collection points	These are designated places where consignments are stored until they are collected by recipients.	Yes	Parcel machines (InPost, Orlen Paczka, DPD Pickup) and stationary parcel collection points.
Smart parking systems	They use sensors and communication technologies such as RFID, video cameras and ultrasonic sensors to monitor parking space availability, thus providing drivers with up-to-date information on available parking spaces.	Yes	Shopping mall car parks.
Bike & Ride	Links the use of bicycles with public transport modes such as buses, trams or trains, allowing easy transfer from bicycle to other transport modes, such as public transport.	Yes	Urban Bike Stations (Bike_S) located in the Szczecin city area as well as in neighbouring municipalities.

Table 1. *Cont.*

Name	Description	In Szczecin?	Scope of Use
Park & Ride	It is a solution that allows drivers to leave their vehicle in a designated car park, from where they can then use public transport to continue their journey.	Yes	P+R Głębokie; P+R Hangarowa; P+R Podjuchy; P+R Turkusowa.
Carpooling	It is a form of transport in which several people share the same vehicle to travel to the same or a similar destination.	Yes	The blablacar app and portal.
Carsharing	This is a car rental model in which people rent cars for short periods of time—by the hour, minute or distance travelled.	Yes	Panek, Traficar.
Urban bicycle	It is a system of providing bicycles for short-term use, usually as part of an urban transport infrastructure.	Yes	Szczecin City Bicycle (Bike_S).
Electric city scooter	Used primarily for personal transport over short distances; systems for sharing these vehicles usually operate on a shared basis.	Yes	Bolt, Lime, Tier and Quick.
City scooter	A form of urban personal transport using small, usually two-wheeled vehicles powered by an electric or internal combustion engine, urban scooter systems often operate on a sharing model, allowing users to rent the vehicle on a short-term basis.	Not	EcoShare withdrew from Szczecin in July 2023 after four years of operation.
Overnight delivery of goods	It is a logistical process of transporting and delivering goods overnight; this approach aims to reduce congestion and optimise delivery times.	Yes	Retail and catering outlets located in areas with high exposure to congestion.
Freight tram	This is an innovative urban transport concept that uses trams to transport goods; it can involve transporting light parcels, courier parcels and even waste.	No	
Freight bike	This is a two- or three-wheeled vehicle equipped with specially designed loading spaces; they are mainly used for the distribution of goods over short distances in urban areas, where traditional delivery vehicles may encounter parking and manoeuvring difficulties.	Yes	Courier companies.
Low-emission zones	It is areas in cities where access is restricted or prohibited for high emitting vehicles that often introduce restrictions on certain types of vehicles, for example, older diesel cars.	No	
Intelligent transport systems	These are advanced technological applications aimed at increasing the efficiency, safety and productivity of transport systems; they use information and communication technologies to optimise traffic management, monitor and control the flow of vehicles and provide better information flow between traffic participants.	Yes	Information boards at the Brama Portowa Square (outbound direction) and Struga Street (inbound direction).
Integrated interchanges	These are transport points that connect different modes of public transport, such as trains, buses, and trams, as well as other modes of transport, including bicycles and private vehicles.	Yes	Głębokie, Dąbie, Podjuchy and Łękno Basen Górniczy.

Source: own elaboration based on [19–36].

As can be seen from the overview presented above, Szczecin has a number of more or less elaborate city logistics solutions aimed at improving the safety and fluidity of the movement of people and goods, while at the same time enabling pro-environmental practices.

4. Research Analysis

4.1. Research Methodology

During this research, the authors carried out a review of the literature on the subject, during which they noticed that researchers largely focused on the assumed functionality of selected pro-environmental solutions in cities. Thus, a research gap was diagnosed in the perception of selected solutions by urban communities, as research conducted to date in the context of Szczecin has not been replicated by researchers to update this issue.

To identify the impact of pro-environmental investments in the area of city logistics on residents, the first stage of the research process was based on the use of an unstructured method of observing the areas of application of selected solutions located in the urbanised

area of the city of Szczecin. In the next stage of the research process, a preliminary survey questionnaire was prepared based on the observations obtained and distributed to a purposively selected control group of three academics in order to detect logical and factual errors. The verification phase took place in the first half of February 2024. Subsequently, the authors of this article began conducting the study using a suitable and structured survey questionnaire. The questionnaire consisted of a metric that included the gender, age and educational level of the respondents and nine closed- and open-ended questions, as follows:

- Three questions are closed single-choice questions;
- Three questions are closed multiple-choice questions;
- Two questions are Likert scale;
- One is an open-ended question in which respondents typed in the answers themselves.

This research was conducted online, and the data collected from the online surveys were compiled into a single database for further analysis of the collected research material. Data were collected from 19 February 2024 to 30 March 2024.

4.2. Characteristics of the Research Sample

The study area was the city of Szczecin in north-western Poland. As the main city of the Szczecin agglomeration and the Szczecin metropolitan area, it plays an important administrative, economic and transport role in the country.

The survey was targeted at a purposively selected group of respondents, which consisted only of people of working age. Such an approach was taken because this group has the legal capacity to use the analysed tools (including Park & Ride) and is characterised by a significant demand for transport services for professional or educational purposes and the highest level of environmental awareness among the entire population. Referring to data from the Central Statistical Office, there were 227,971 people in the target age group living in Szczecin in 2022 (access to the local database via the Office's website: stat.gov.pl, accessed on 5 November 2024). Quantitative research was conducted on a sample of 208 people, including 76 men (36.5%) and 132 women (63.5%). Participants represented all age groups by generation covered by the survey: 92 people aged 18–27 (generation Z) or 44.2% of the research sample; 100 people aged 28–43 (generation Y) or 41.8% of the research sample; and 16 people aged 44–59 (generation X) or 7.7% of the research sample. Most of the respondents had a university degree (53.8%), 40.4% of the respondents had a secondary education and 5.8% of the respondents indicated that they had a basic vocational education. Assuming a fraction size of 0.5, a confidence level of $\alpha = 0.85$ and a measurement error of 5%, it can be concluded that the adopted research sample was correctly selected.

5. Results

The first question of the core part of the questionnaire was a semi-open multiple-choice question with the aim of identifying which environmentally friendly solutions in city logistics were known to the respondents. A summary of the responses is presented in Figure 3.

The most widely known solutions among the survey sample were collective pick-up points and the urban electric scooter (88.5% each). Other solutions also well known to the majority of respondents were electric/hybrid public transport or delivery vehicles and the urban bicycle (86.5% of indications in each survey sample). In this question, none of the respondents took the opportunity to add their own suggestion of an environmentally friendly practice within city logistics.

In the following questions, respondents were asked to declare whether they noticed any of the listed solutions in their neighbourhood and to indicate them in a multiple-choice list (Figure 4).

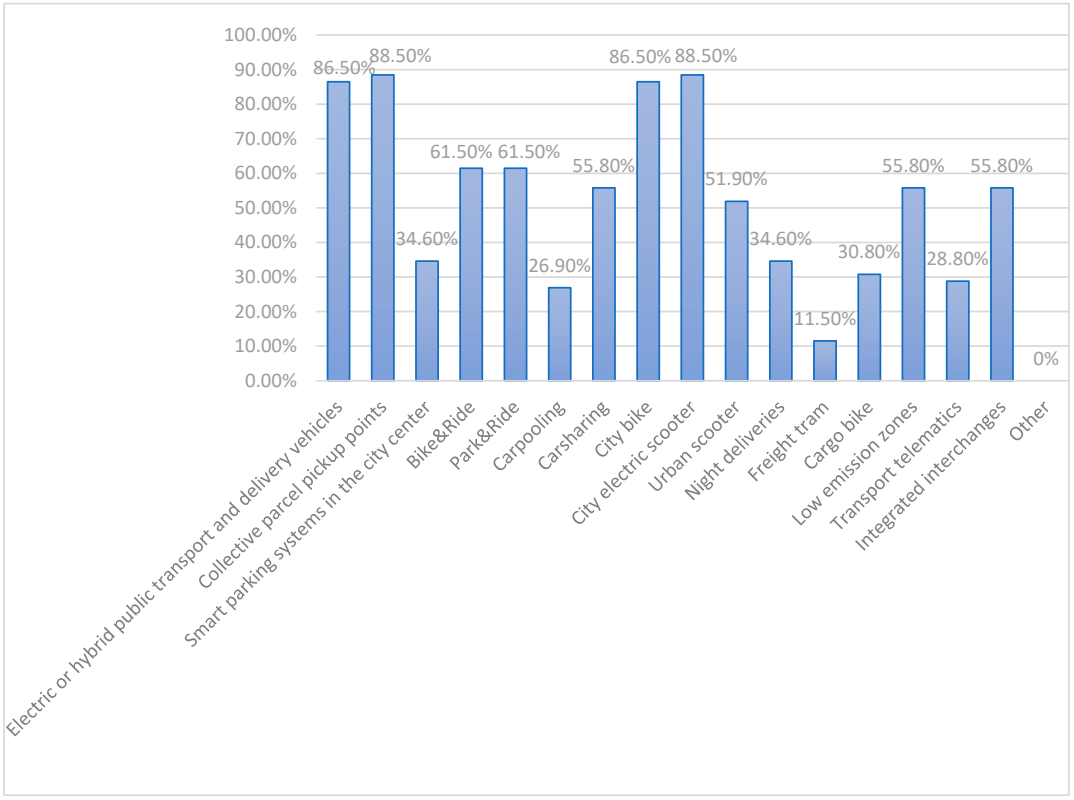

Figure 3. Knowledge of environmentally friendly practices in city logistics among Szczecin residents. Source: own elaboration.

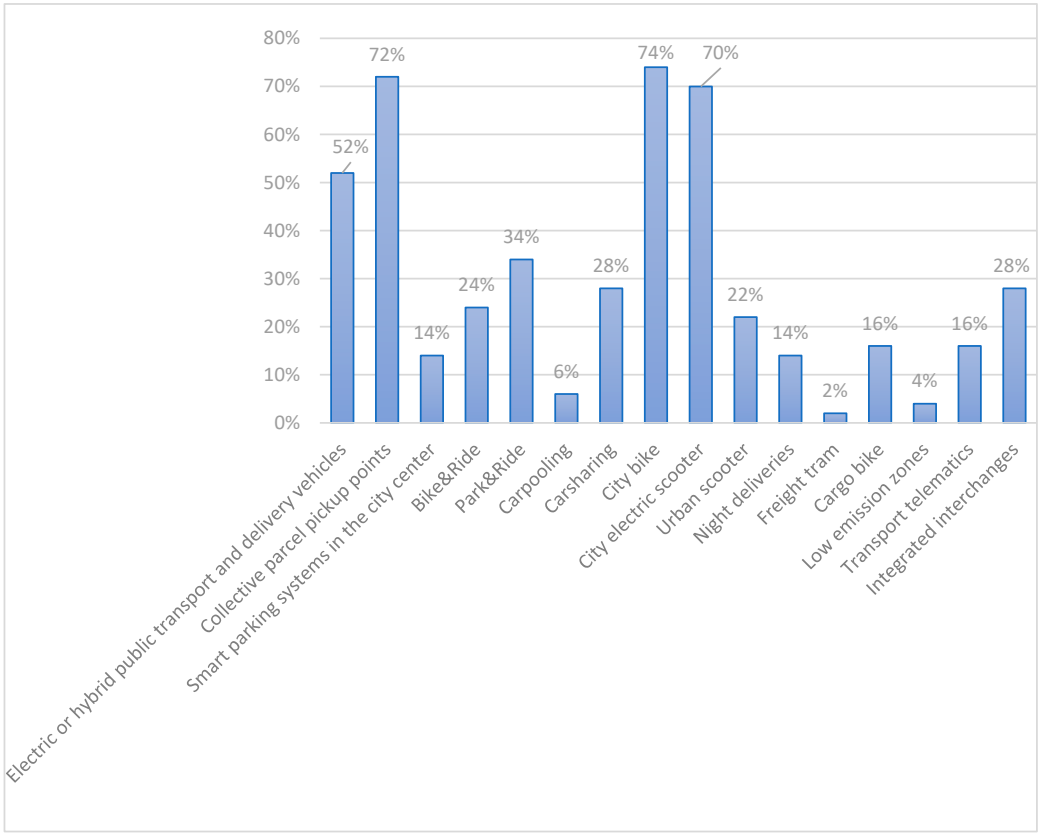

Figure 4. Environmentally friendly practices in city logistics noted in the surroundings of the surveyed residents of Szczecin. Source: own elaboration.

The vast majority, 96.2% of respondents (that is, 200 out of 208), indicated that they had observed at least one such solution in their area. The most frequently selected responses were urban bicycles, collective pick-up points and urban electric scooters (74%, 72% and 70% of responses, respectively). Half of the respondents (52%) also indicated that they had encountered electric or hybrid public transport or freight vehicles in their area. It is also noteworthy that solutions not found in Szczecin, i.e., freight trams and low-emission zones, also received a tick mark.

The next question of the questionnaire asked whether the respondents felt the impact of the analysed solutions (Figure 5) and what the perception of this impact was in the surveyed group (Figure 6). One in three respondents (38.4%) indicated that they felt an average impact of pro-environmental investments in city logistics in Szczecin. A second large group was made up of people declaring that they did not feel any impact (25% of responses), while, in opposition to this group of respondents, there were respondents who felt that the impact was high (21.2%).

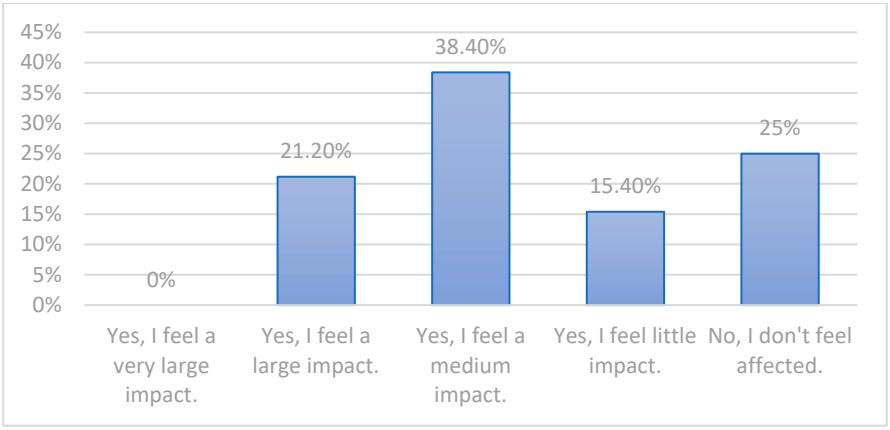

Figure 5. Level of impact of pro-environmental solutions in city logistics on surveyed residents of the city of Szczecin. Source: own elaboration.

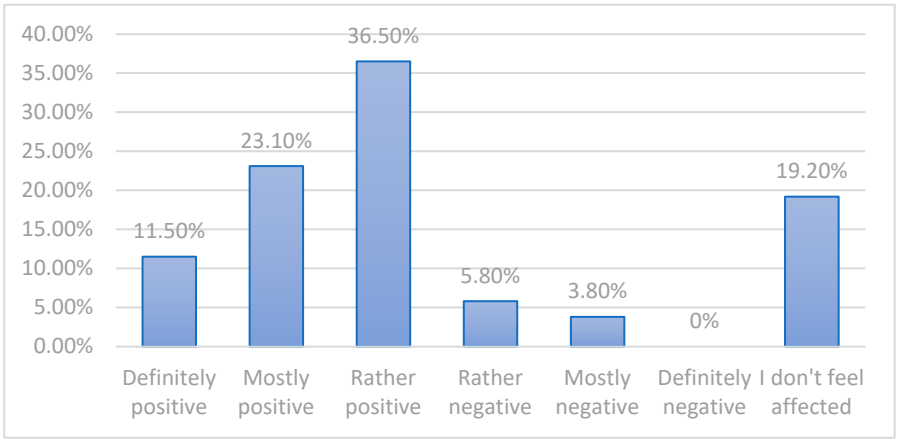

Figure 6. Assessment of pro-environmental solutions in city logistics according to surveyed residents of Szczecin. Source: own elaboration.

In the context of the inhabitants' assessment of pro-environmental solutions, the opinion that they perceive them positively prevailed (the sum of definite positive, mostly positive and rather positive opinions amounted to 71.1% of all answers; detailed data are presented in Figure 6). Collective collection points, integrated interchanges and urban bicycles received the highest ratings (62%, 54% and 50% of the survey sample in terms of votes for each solution separately, respectively). A negative rating was given by less than 10% of the respondents, while no impact was indicated by 19.2% of the respondents (this

result is particularly noteworthy, as, in the previous question, this answer was supported by ¼ of the respondents, so it can be assumed that, despite the lack of perceived impact, more than 5% of the respondents have a position on environmentally friendly practices in city logistics).

As part of the rationale for their assessments, respondents indicated the following.

- Positive aspects:
  - The solutions analysed offer great opportunities and freedom of movement within the urban area;
  - Environmentally friendly solutions contribute to a perceptible improvement in the city's air quality;
  - Collective collection points significantly reduce the emissions produced by delivery trucks and reduce delivery times;
  - Integrated interchanges reduce travel time and improve comfort.
- Negative aspects:
  - Low culture of electric scooter users (devices abandoned in random places or inappropriate use obstructing other traffic on pavements and roads);
  - The expansion of the network of cycle paths contributes to congestion on the roads narrowed in their favour, which further hinders the creation of a passage for services (ambulances, police cars, fire engines) within the so-called "Corridor of Life";
  - The scale of application of the solutions is so low that the environment is not significantly affected;
  - Low-emission zones make it difficult to get around within the city.

In the penultimate semi-open multiple-choice question, respondents were asked to indicate which of the proposed areas were influenced by environmentally friendly urban logistics solutions (Figure 7). According to the respondents, the most noticeable impact is in the context of mobility, transport time and air quality (67.3%, 65.4% and 61.5% of the survey sample, respectively).

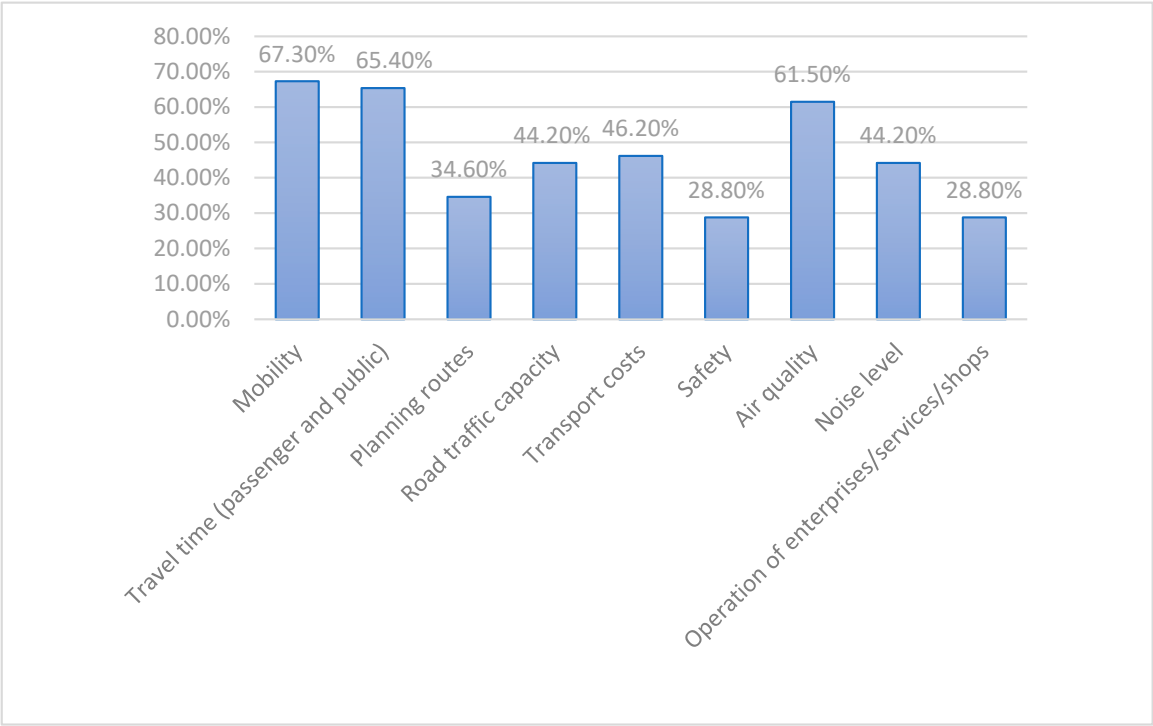

Figure 7. Areas of influence for environmentally friendly solutions in city logistics. Source: own elaboration.

In the final question of the main part of the survey, the inhabitants of Szczecin were asked how they rated the appropriateness of introducing pro-environmental solutions that had not yet been implemented as part of city logistics (Figure 8). The first solution assessed was a smart parking system in the city centre. Such a solution would reduce exhaust fumes by shortening the time drivers spend searching for a parking space.

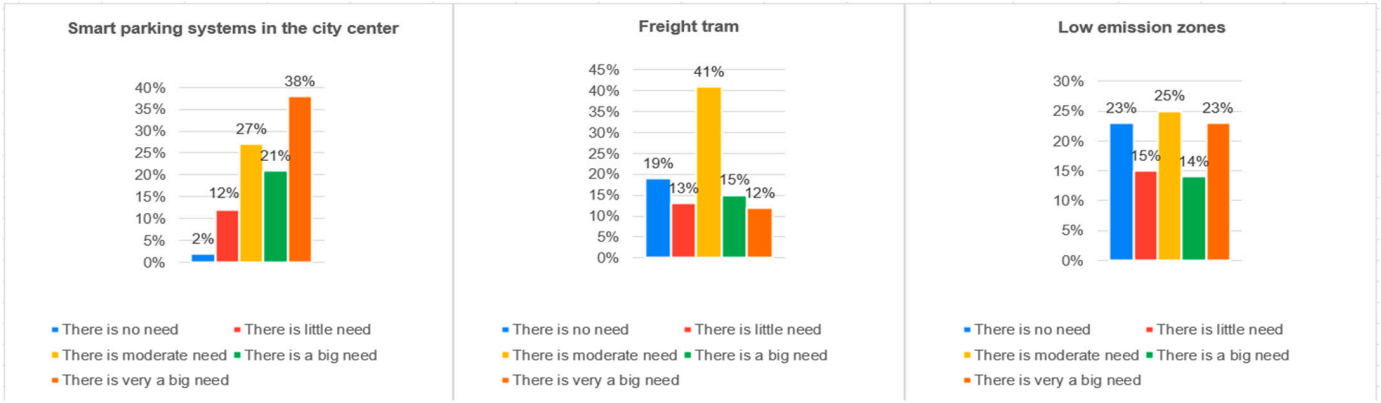

Figure 8. Assessment of the rationale for introducing pro-environmental solutions in Szczecin according to respondents. Source: own elaboration.

According to the majority of respondents, there is a very high and high need for such a solution in Szczecin (38% and 21% of the survey sample, respectively). Only 2% of the respondents felt that such a solution was not needed in Szczecin. Another trend in city logistics that also has a positive impact on environmental aspects in this area is freight trams. These trams would make it possible to support the supply system for businesses in the city centre and, on the outskirts, within the available track network. Respondents largely considered (41% of votes) that there was a moderate need for its implementation. The percentage of votes for the other responses individually did not exceed 20%.

The last solution evaluated was the low-emission zones, which, in many European countries, have made it possible to relieve traffic in city centres and reduce the accumulation of exhaust fumes in their surroundings. When asked to evaluate this possibility, the inhabitants of Szczecin were divided. While a quarter of respondents (25%) felt there was a moderate need for low-emission zones in Szczecin and 23% felt there was a very high need, there was also a large number of respondents (23% of the survey sample) saying, in opposition, that there was no need for such a zone in Szczecin.

6. Discussion

Analysing the results obtained in the survey, it was concluded that the most popular and at the same time best evaluated environmentally friendly solutions are hybrid or electric vehicles (mass passenger and freight transport), collective collection points, electric scooters and city bicycles. The solutions identified are, in the opinion of those surveyed, largely reflected in improved air quality in the city (as a result of lower emissions), passenger mobility and travel comfort. Of the proposed solutions that could be introduced in Szczecin as part of green trends in city logistics, intelligent parking systems in the city centre received the most support. This solution, as part of sustainable city development by shortening the time needed to find a parking space, would help to further improve air quality because of lower emissions and would also improve travelling comfort in the Szczecin city centre area.

Based on the survey on green practices in city logistics in Szczecin, some scientific conclusions can be drawn. Respondents showed a high level of awareness and acceptance of city logistics solutions such as urban pick-up points and electric scooters, suggesting an extensive understanding of the need to implement sustainable transport methods in an urban context. The public reception of these initiatives has been positive, indicating that Szczecin residents appreciate not only the practical benefits of their implementation, but

also their impact on improving the urban environment. The data collected suggest that the presence of these green investments translates into an improved quality of life in the city, manifested through better air quality and more efficient mobility.

Among the objections to the present state of environmentally friendly practices in city logistics, particular attention is drawn to the fact that the respondents consider that the extension of the network of cycle lanes contributes to congestion on the narrowed road sections in their favour and thus hinders the creation of a passage for the emergency services. Moreover, some of the respondents argued that the scale of application of the discussed solutions is too low (including the marginalisation of the role of peripheral areas such as Szczecin North) to attribute to them a significant impact on the environment in the city.

In summary, the research shows that green investments have a significant impact on the functioning of the city of Szczecin, with residents actively noticing and positively evaluating their presence and effectiveness. At the same time, they express an expectation towards the introduction of further innovations in sustainable urban development.

Table 2 compares the results and conclusions of the survey with the results of other studies on sustainable urban logistics in Poland and worldwide. Citizens' behaviour and attitudes towards the subject are similar in many aspects, regardless of geographical and environmental differences.

Table 2. Comparison of research results on sustainable city logistics in Szczecin and other parts of Poland and the world.

	The Study of Szczecin	**Other Studies**
Awareness and Acceptance of Eco-Friendly Transport Solutions	In Szczecin, the implementation of solutions such as urban pick-up points, electric scooters and public bicycles was met with considerable approval, with a high percentage of residents observing a positive impact on air quality and urban mobility.	This finding is consistent with the results of other studies on tourism destinations, which indicate that pro-environmental behaviours are influenced by facilities and environmental attitudes [45].
Impact on Quality of Life and Urban Mobility	The residents of Szczecin expressed appreciation for the role of these sustainable logistics measures in enhancing mobility, reducing congestion and improving air quality. Eco-friendly investments, such as the expansion of tram and bike paths, have a tangible impact on urban environments.	As with the survey-based research conducted in southern Anhui, the motivations and environmental commitments of residents were found to play a facilitating role regarding the adoption of sustainable behaviours [46]. A study in Singapore on green buildings found that green infrastructure enhances residents' satisfaction and quality of life [47].
City Logistics and Stakeholder Perspectives	Szczecin's findings indicate that alignment on pro-environmental goals is crucial, yet challenging due to differing objectives.	A study in the Tricity region of Poland found that those involved in sustainable urban logistics have different priorities, which affects the acceptance of city logistics solutions [48].
Battery Electric Vehicles in Urban Logistics	The incorporation of electric transport in Szczecin exemplifies the viability of battery electric vehicles (BEVs) in mitigating urban pollution and advancing sustainable logistics.	A Lisbon study on battery electric vehicles in urban logistics revealed a significant CO_2 reduction without operational performance compromise [49].
Public Attitudes Toward Smart Transport	The Szczecin survey showed that residents had positive views of green solutions, highlighting the importance of public awareness in supporting urban sustainability.	In Łódź, Poland, there has been a notable increase in the level of support for sustainable transport solutions among residents, which can be attributed to an enhanced awareness of intelligent transport systems (ITS) [50].
Challenges of Pro-Environmental Behavioural Adoption	Feedback from Szczecin residents shows the complexity of changing behaviours for sustainable urban logistics.	A UK case study showed that residents' perceptions of their new, energy-efficient lifestyles as sustainable did not match their actual behaviours [51].

Source: own elaboration.

7. Conclusions

Urban logistics is becoming an increasingly important area due to increasing urbanisation, leading to a growing demand for efficient management of the flow of people, goods and information in cities. Optimising these processes can contribute to an improved quality of life for residents and sustainable urban development. A number of approaches to the issue of city logistics can be found in the literature, in which authors focus both on the classic areas it manages and their interactions through a comparative analysis of good city logistics practices in different cities and individual trends or solutions, and, finally, to the framing of city logistics in the context of the environment and society—taking into account sustainability policy and social responsibility.

Analysing the case of the city of Szczecin, the development of city logistics is characterised by a fairly high level of development, as numerous solutions to improve the flow of people, goods and vehicles can be found in the city, such as electric scooters, Park & Ride or intelligent transport systems. The respondents themselves also note the presence of these solutions and their utilitarianism for daily operations, although, at the same time, they note that they are not free of drawbacks, with improvements for one mode of transport sometimes causing problems in other modes.

It is also important to recognise several key scientific limitations in the research conducted on urban logistics in Szczecin. Firstly, the representativeness of the sample may not fully reflect the demographic and social diversity of the residents of Szczecin, which may affect the overall nature of the conclusions. It is also worth noting that the subjective assessments of respondents on which the findings are based may not reflect the full objective situation. The authors believe that it is advisable to continue the research to obtain an expert assessment of the validity of implementing specific solutions. In addition, activities should be initiated to disseminate knowledge among the urban community and businesses about good practices and their impact on environmental quality in Szczecin.

The data obtained can serve as valuable information for municipal decision-makers in shaping future infrastructure investments and transport policies that are in line with residents' expectations.

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