Received: 06 May 2025; Revised: 15 Dec. 2025; Accepted: 10 Feb. 2026
https://doi.org/10.22306/al.v13i1.712

Fiscal and regulatory incentives for electric vehicle adoption in Polish micro-enterprises: economic analysis and policy recommendations

Joanna Wyrobek
Faculty of Corporate Finance, Krakow University of Economics, ul. Rakowicka 27, 31-510 Kraków, Poland, EU, wyrobekj@uek.krakow.pl
Lukasz Poplawski
Faculty of Public Finance, Krakow University of Economics, ul. Rakowicka 27, 31-510 Kraków, Poland, EU, poplawsl@uek.krakow.pl (corresponding author)
Marek Lesniak
Faculty of Corporate Finance, Krakow University of Economics, ul. Rakowicka 27, 31-510 Kraków, Poland, EU, lesniakm@uek.krakow.pl
Marcin Surowka
Faculty of Corporate Finance, Krakow University of Economics, ul. Rakowicka 27, 31-510 Kraków, Poland, EU, marcin.surowka@uek.krakow.pl
Bogusław Waclawik
Faculty of Financial Accounting, Krakow University of Economics, ul. Rakowicka 27, 31-510 Kraków, Poland, EU, boguslaw.waclawik@uek.krakow.pl

Keywords: electric cars, microenterprises, BEV, last-mile logistics, micro-logistics.
Abstract: Microenterprises constitute the dominant group of companies in Poland, but rarely adopt electric vehicles (BEVs) due to high purchase costs, limited range, underdeveloped charging infrastructure, and the typical short-term investment horizons of microenterprises. This study aims to analyze microenterprises' opinions on BEVs in Malopolskie voivodship and to evaluate the effectiveness of incentives. A CAWI survey of 307 respondents (90% confidence, 10% margin of error) tested the hypothesis that BEVs would become more popular among microenterprises if there were more incentives for their purchase (even though according to respondents, BEVs are suited to city-center access (where combustion engines are banned) or serve as second cars for long trips, given their lower versatility and longer charging times). Results of the survey show that 84.4% of journeys are below 300 km (BEV range), but 65-78% of respondents provide the following barriers to BEV adoption: high price, range anxiety, insufficient charging stations, and long charging times. According to the survey, the following are significant incentives to buy BEVs: subsidies up to PLN 40,000 (8.5%), free city parking, and free city access to low-emission zones. The survey also showed that 20.5% of respondents planned to buy passenger BEVs, and 7.5% planned to buy delivery BEVs.

1 Introduction

Global pressure to decarbonise and the requirements of the EU Green Deal have forced companies worldwide to incorporate sustainable transport into their operations, particularly through the use of battery-electric vehicles (BEVs) to reduce emissions and achieve net-zero targets. Micro-enterprises (MEs), which form the backbone of emerging economies, play a key role in this transition by driving the diffusion of local innovation, job creation, and poverty reduction. These entities stimulate technology adoption, capital mobilisation, and local entrepreneurship in global value chains. In Poland, micro-enterprises dominate, accounting for 97-98% of all businesses and generating around 30% of GDP, yet despite legal requirements and subsidies, their vehicle fleets are predominantly powered by combustion engines.

Micro-enterprises differ significantly from larger companies: they are owner-managed, undercapitalised, informally managed, unstable, and have limited productivity, often operating outside formal institutions but within informal ones. They prefer versatile, easy-to-maintain compact cars or vans that support logistics flows, particularly the management of materials for deliveries, human flows during customer visits, and information flows during business trips, prioritising manoeuvrability and cost-effectiveness. However, despite the operational need for vehicles, the implementation of electric vehicles among Polish micro-enterprises remains negligible – well below 1% in small businesses [1]. This delay persists despite the introduction of low-emission zones by the EU and programmes such as NaszEauto (subsidies of up to PLN 40,000 for leasing).

In the discussion on electric cars, three main barriers to their use are mainly pointed out, namely: high initial costs, range limitations and access to charging [1]. No one seems to deny the high initial costs of owning a BEV. However, opinions on the total cost of ownership (TCO) are ambiguous: some authors argue that the TCO of electric cars is lower than that of combustion engine cars [2], while others claim that this is only true under particular conditions (high subsidies, entry bans, specific climate [3,4], while still others argue that the TCO of electric cars still exceeds the TCO of combustion engine cars by approximately 25-30% [5]. When it comes to range issues, a journey beyond the car's range must undoubtedly take into account the need to recharge. However, it should also be noted that relatively few journeys exceed this range, especially for micro-enterprises. Therefore, the question is whether this argument is based on real experience with electric cars or whether it stems more from a lack of experience [6]. As for the objection regarding the limited infrastructure for electric car charging , the question arises as to whether this is of great importance to micro-entrepreneurs in Poland, given that a combination of own photovoltaics and electric cars is widespread there.

It seems that all three arguments can be overcome with an appropriate system of legal and tax incentives, if they were to cover micro-entrepreneurs. Polish incentives in 2025 included excise duty exemptions, depreciation limits, and VAT deductions. However, these incentives were not explicitly targeted at micro-enterprises, but rather at individuals and large entities making infrastructure investments. In short, capital constraints for microenterprises were ignored, except for sole proprietorships, where the incentives covered only leasing and rental.

The above discussion raises two key questions that remain unanswered: (1) What barriers prevent Polish MEs from adopting BEVs despite at least partial incentives, and how do the characteristics of MEs reinforce these barriers? (2) Which fiscal/regulatory incentives are most effective in increasing popularity among MEs?

Given the extremely low number of publications on microenterprises, the topic should be treated as a research gap. To fill this gap, this study analysed opinions on BEVs and the effectiveness of incentives using a CAWI survey conducted among 307 small and medium-sized enterprises from the Małopolska region. The hypothesis that the most important incentives for micro-enterprises are subsidies, free parking in city centres and free city access to low-emission zones was tested.

The contribution of this publication to the literature on electromobility and scientific novum includes empirical confirmation of barriers to electric vehicles in Poland, the need to enrich policy design with subsidies specifically for electric vehicles and chargers in rural areas, and the development of RBV theory by taking into account human/and institutional factors in the process of implementing sustainable transport. This is of significant importance for the 353,300 electric vehicles driving the Polish economy.

2 Literature review

In recent years, more and more companies, including micro-enterprises, have begun considering purchasing electric cars. However, while about 1% of small businesses already own an electric car, the figure is much lower for micro-enterprises, with electric vehicles a rare sight in this [7]. Research by Shub et al. [7] suggests that the low popularity of electric cars among this group may be due to concerns about three key issues: high purchase costs, range, and access to charging. These concerns will be addressed in light of the results of other studies.

Regarding the argument about purchase costs, the research results are inconclusive. According to Parker et al. [5], for households in the US, the cost of owning an electric car for five years does indeed exceed the cost of ownership of a combustion car by approximately 25-30% (based on the typical mileage of a family car in the US, i.e., 19,300 km per year). This thesis is also confirmed by research conducted by Xu Hao and et al. (2020) [3], who showed that in China, electric cars with a range of up to 250 km had a lower total cost of ownership only in cities with restrictions on combustion cars, and electric cars with a range of up to 450 km had a lower TCO only in cities with a cold climate. In other variants, combustion engine cars had a lower TCO.

However, research by Soszyńska et al., conducted three years later [2] for North America, shows that thanks to government subsidies, cheaper energy, and lower service costs, the higher purchase costs of BEVs were offset by cheaper operating costs, resulting in a lower TCO than combustion engine cars over a five-year period. Similar conclusions were also reached by Figenbaum [4], who conducted research in Norway, and by Hagman et al. [8], who conducted research in Sweden. Figenbaum's research showed that, thanks to a combination of factors, electric cars in Norway had been cheaper than combustion engine cars since 2012. These factors included: exemption from registration tax (since 1990), exemption from VAT (since 2001), exemption or reduction of annual insurance tax, free or cheap access to toll roads, parking lots and ferries, access to bus lanes, cheaper electricity than fuel, lower service costs, falling battery prices, increased range and availability of fast charging stations, and a long-term and stable BEV support policy. Hagman et al. [8] reached similar conclusions for Sweden.

In Poland, an interesting experiment was conducted by WebFleet in cooperation with EV Klub Polska, in which four electric cars were tested at small companies powered by their own photovoltaic installations. Over the course of a year, each car traveled approximately 24,000 kilometers and saved approximately PLN 15,000 in fuel costs. Even if the price difference between a combustion engine car and an electric car was PLN 75,000, after five years of such driving, the electric car costs the same as the combustion engine car [9]. Due to the motor's greater durability and the easier replacement of individual motors at the wheels, even if the battery had to be replaced every 8-10 years, the subsequent savings would still compensate for this. Nevertheless, in light of changes in regulations concerning private photovoltaic networks and reducing their profitability, an important observation arises: the decline in the financial efficiency of photovoltaic installations may reduce the profitability of electric cars in Poland, as in the experiment by Kania and Wisniewski [9], electricity from their own installation was a significant element of the cost advantage of such cars.

In summary, regulations, tax breaks, and the research method strongly influence the profitability of electric cars. Electric cars are undoubtedly more expensive, while their operating costs are lower. In many Western countries, tax incentives are very high, making these cars quickly more cost-effective than combustion-engine cars. However, even without subsidies, an electric car makes economic sense if you have your own photovoltaic installation. So, the first argument against electric cars is valid in terms of purchase costs, but with the right infrastructure providing cheap electricity, the higher purchase costs are quickly offset by lower refueling costs. However, this cheap electricity must not become more expensive.

The second argument often cited by micro-enterprises against purchasing electric cars is the short range of electric cars. However, these ranges have increased significantly over the last 15 years and are now three times longer than before – standard electric cars achieve an average of 300 to 450 kilometers, and long-range cars 500 to 700 km. Comparing these distances with the typical daily journeys of micro-entrepreneurs, it is hard not to notice that such ranges should be sufficient.

Numerous empirical sources show that the vast majority of micro-enterprises operate in the local market, and their range of activity is usually limited to travel within the city or the immediate vicinity, with commutes lasting approximately 15-30 minutes. This can be translated into a distance not exceeding 30 kilometers from the company's headquarters. However, sometimes there can be a large number of such trips, for example, in the case of services representing elements of logistics (typical types of activities related to micro-enterprises in which many kilometers are traveled daily):

- courier services involving flows,
- delivery as flow, management, or material,
- local and regional transport with technical elements of logistics,
- mobile services (e.g., repairs, tire repair, cleaning).

In practice, the average courier optimising logistics travels about 31 km per day for meal deliveries in the city (occasionally up to 120 km) [10,11]. For car couriers who deliver parcels, daily mileage can range from around 100 km to as much as 300 km, especially outside the city [11,12]. Bicycle couriers in large cities can travel an average of 70 km per day, up to 80 km [11].

Urban delivery vehicles managing flow or management of financial through efficient routes typically cover distances of approximately 70 km to 300 km per day, depending on the nature of the work and the delivery area. For comparison, heavy trucks travel up to 500 km per day [13]. Therefore, electric urban delivery vehicles, which usually have a range of 150-200 km per day, meet the needs of couriers or delivery drivers in the city.

In the case of regional transport, a bus covering such routes travels between 9,000 km and 15,000 km per year, which gives a daily mileage of 40-60 km. As was also the case with delivery and courier companies, the range of electric cars also meets these needs [13].

However, it must be admitted that electric cars have limitations in range, so on long journeys, the need to recharge the battery returns. We will come back to this issue a little later.

According to Msosa [1], the third argument against purchasing an electric car, often raised by micro-enterprises, is concern about access to charging stations. Indeed, the network of charging stations in Poland is less developed than in Western European countries such as Germany, France, the Netherlands, or Norway [14], but it is quite well developed in large cities [15] and the ratio of electric cars to charging stations is one of the best in Europe. The cost of charging at such a station is also one of the lowest in Europe [15]. Therefore, this argument does not seem to be a real obstacle. In addition, the company can charge cars at night and replace batteries as needed (quick replacements). Indeed, the experiment described by Kania and Wisniewski [9] confirms an average charging time of 2.5 hours as too long compared to expectations (20 minutes), but the experiment also showed that the cars did not drive long enough for this to be a problem – they stood between routes in parking lots long enough that they could easily be charged for 2.5 hours. In addition, the cars were mainly charged at night from their own photovoltaic installation. Therefore, despite the existence of ultra-fast chargers (where charging from 20% to 80% takes 15 to 30 minutes), their availability in Poland is not yet sufficient for entrepreneurs to have no legitimate concerns that they will need to carefully plan long routes to access fast chargers. This suggests the first important incentive for drivers in the form of expanding the charger infrastructure to provide full coverage of the road network in Poland – they do not necessarily have to be at gas stations, as a suitable app is enough to find them (e.g., Plugshare, ChargePoint, Chargemap, Ultra-Fast by ADS-TEC Energy, PowerX App, Google Maps).

Other reasons for micro-enterprises' reluctance to use electric vehicles are given by Badowski et al. [6]. Their research, based on a panel of micro-entrepreneurs from Poland, showed that the most important factor encouraging or discouraging the purchase of electric cars was access to information and knowledge about electric vehicles, followed by financial costs and benefits. A significant increase in interest in electric vehicles occurred after the COVID-19 pandemic, likely due to the rapid growth of last-mile deliveries during this period and the broader dissemination of information about electric cars resulting from European Union policy [16]. This argument seems quite valid, given certain characteristics of the investment process in microenterprises. This, in turn, allows us to develop another proposal to enhance the attractiveness of electric cars, namely, appropriate training for micro-entrepreneurs and the dissemination of reliable and comprehensive information about electric cars and their operation.

According to our conversations with small business owners, such entities often find it more difficult to obtain the necessary funds for the purchase, even if they are later recouped through cheaper fuel costs, greater conservatism and reliance on tried and tested technologies for fear of problems that decision-makers may not be aware of, and a strong dependence of investment decisions on the opinion of the owner, who often has conservative views (even though other employees may want to purchase electric vehicles). This is a common problem for micro-enterprises concerning all micro-enterprise investments, affecting all investments requiring credit financing (short history, lack of collateral, high credit costs, high vulnerability to economic changes) [17-19]. This, in turn, shows that another factor that can positively influence the purchase of electric cars is support for investment loans (which is partly implemented, among others, by the Polish NaszEauto program supporting the rental and leasing of electric cars for sole proprietorships, which very often belong to the group of micro-enterprises, and a program of preferential loans for micro-enterprises with long repayment periods).

In addition, microenterprises are usually highly concentrated around the owner-founder, who personally manages most of the company. In small and medium-sized enterprises, the structure is more complex, with separate functions and formal management processes. Therefore, the decision to purchase an electric car depends on the views of one person [20]. A single person burdened with so much work in the company does not have time to develop their knowledge about electric cars.

According to the research by Majchrzak and Ratajczak-Mrozek [20], micro-enterprises are less inclined and less capable of implementing new technologies (for the reasons outlined above). Due to capital constraints and limited knowledge, micro-enterprises are more conservative about investing in EVs and more sensitive to current operational barriers (e.g., access to chargers) because they operate in a small geographic area [21].

Research by Majchrzak and Ratajczak-Mrozek [20] also shows that micro-enterprises often operate more reactively, focusing on current needs rather than long-term planning, which hinders the implementation of new technologies requiring a strategic approach, such as EVs [20].

In addition, micro-enterprises are more concerned about initial costs and operational barriers (e.g., charging), as many of them quickly cease to exist, while small and medium-sized enterprises often see greater benefits from lower operating costs [20].

Small and medium-sized companies are more willing to implement EVs in their fleets, using leasing, support systems, and long-term cost-effectiveness strategies. Microenterprises often lack such opportunities [20]. If they are treated the same way as the SME sector, which offers much greater financial opportunities, micro-enterprises have no chance of purchasing electric vehicles [22]. This, in turn, leads to another element of motivating the purchase of EVs: taking into account the specific nature of micro-enterprises and not treating them simply as part of SMEs (this is partially implemented by the NaszEauto program). Therefore, as the research results show, micro-enterprises have specific characteristics, indicating that programs designed to support EV adoption must be tailored to their needs and capabilities.

In addition to limited access to capital and infrastructure barriers, micro-enterprises also face the following problems:

- Lack of human resources and skills: Micro-enterprises often do not have specialized staff, which limits their ability to manage innovation and technological change, including the implementation of electromobility or new IT solutions [21].
- High level of market uncertainty: Due to their smaller scale of operation and shorter history, micro-enterprises are more exposed to market volatility and find it more difficult to cope with it; hence, they choose investments with a short return period, and EVs do not fall into this category [23,24].
- Complex legal and administrative procedures: Micro-enterprises often find it difficult to navigate the bureaucracy and formalities associated with grants, tax breaks, or support programs, which can discourage them from taking advantage of available forms of assistance [18].
- Short-term perspective: Focusing on current, immediate needs leads to a lack of sufficient strategic planning, which hinders development and adaptation to change [25].
- Strong dependence on the owner: Decisions are often centralized and dependent on the individual views of the owner, which can slow down decision-making processes and limit the adoption of new ideas [26,27].

Summing up, micro-enterprises commonly face flow or financial management constraints together with limitations on human flows, requiring technical elements of logistics adaptation.

3 Methodology

3.1 Electric car purchase support programs available to micro-enterprises in 2025

In Poland in 2025, numerous regulations and support programs for electric car users were designed to encourage companies to electrify their fleets.

An important institution for the development of electromobility in 2025 was the National Fund for Environmental Protection and Water Management (NFOŚiGW), which managed programs financed from national funds, the National Recovery Plan (KPO), and the Modernization Fund.

In 2025, when purchasing an electric car, it was possible to benefit from tax reliefs such as an exemption from road tax, discounts on registration tax, and the possibility of deducting VAT.

In particular, when purchasing an electric car [28], micro-entrepreneurs could count on:

- exemption from excise duty when purchasing an electric car,
- the possibility of taking advantage of a higher depreciation limit for entrepreneurs,
- VAT deduction for investments in electromobility,
- tax relief for individuals and companies investing in charging infrastructure,
- financial support from the National Fund for Environmental Protection and Water Management (NFOŚiGW), the National Development Plan (KPO), and the Modernization Fund, and financial support for expanding the charging infrastructure.

In 2025, new regulations were also introduced requiring the installation of charging points in new commercial buildings, intended to increase the availability of infrastructure for companies.

In 2025, sole traders were eligible for PLN 30,000 in support for leasing or long-term rental of an electric vehicle under the "NaszEauto" program, which was a continuation of the "Mój Elektryk" program but with a new, less favorable formula for entrepreneurs.

The previous "Mój Elektryk" program subsidized the purchase of electric cars for companies, including micro-entrepreneurs (it operated from November 22, 2021, to December 31, 2024, although application acceptance was suspended on September 1, 2024).

Under the "NaszEauto" program, sole traders could receive PLN 30,000 in subsidies for leasing or renting an electric car, provided the net price did not exceed PLN 225,000. In addition to the PLN 30,000 subsidy, sole proprietorships could also receive a PLN 10,000 bonus for scrapping a vehicle. The total amount of the subsidy could not exceed PLN 40,000. In the case of leasing or rental, the contract must be valid for at least 2 years [29].

In addition to direct subsidies, another form of support for the development of electromobility, including among micro-enterprises, was the subsidization of the expansion of electric vehicle charging infrastructure. Programs operating in Poland focused on creating high-power public stations and points for heavy transport.

Distribution system operators could obtain support covering up to 100% of eligible costs for the construction or modernization of power grids necessary for charging station operation, with a particular focus on the country's main arteries [30]. Similarly high support could be obtained by entrepreneurs installing chargers for heavy goods vehicles (up to 85% in the project finance model). The programs also covered large companies producing components for the electromobility sector, including chargers, energy management systems, and energy infrastructure elements [30].

Unfortunately, in 2025, projects to subsidize charging network construction focused only on public or commercial projects and did not include subsidies for private charging points intended for individuals or small businesses. Nevertheless, publicly accessible charging stations were intended to support electromobility also for micro-enterprises (with the possibility of including such costs as tax-deductible expenses) [29].

In addition to programs supporting electromobility through subsidies, favorable tax regulations were also applied. The most important relief for entrepreneurs was the exemption of electric cars and hydrogen-powered vehicles from excise duty. In addition, plug-in hybrids were subject to lower excise duty rates than traditional combustion engine cars (until 2029) [30].

In 2025, companies using electric cars also had the option to set a higher depreciation limit – in their case, up to PLN 225,000 - while for combustion engine vehicles the limit was only PLN 150,000 [29].

Another tax benefit for companies using electric cars was the ability to deduct VAT on expenses related to their purchase. If the vehicle was used for both business and private purposes, half of the VAT was deductible. However, if the car was used exclusively for business purposes and met certain criteria, it was possible to deduct 100 percent of the VAT [29].

Yet another tax relief offered in connection with the development of electromobility was the possibility of treating the costs of building charging stations as income-generating expenses and, for VAT purposes, deducting them under standard rules. This applied to both individuals and businesses [30].

If we were to point out the limitations of the programs described, we would note a few key points. In the "NaszEauto" program, the car's value could not exceed PLN 225,000 (approx. EUR 53,000), and it had to be new or a demonstration model with a maximum mileage of 6,000 km. The program's funds were limited, and applications were considered on a first-come, first-served basis until the budget was exhausted. The subsidy was provided on a reimbursement basis, i.e., the entity first had to obtain sufficient funds to make the purchase, and only then could it apply for a refund (the costs were reimbursed only after the applicant had paid the entire amount [30].

Another drawback of the electromobility support programs from the perspective of micro-enterprises was that funding for charging infrastructure and charging station construction was directed exclusively to public and commercial investments, and therefore went only to larger entities implementing projects relevant to the public network. The subsidy programs also did not provide for subsidies for used vehicles or cars imported from outside the EU, nor did they apply to vehicles previously registered to other companies or individuals [30].

3.2 Description of the research method

As part of their research, the authors prepared a survey to determine the main reasons for micro-entrepreneurs' reluctance to purchase electric cars and the possible incentives that would effectively remove these barriers. To this end, the authors used a research questionnaire to gather opinions from micro-enterprises on the usefulness of electric cars, their plans to purchase them, their experiences with them, and the perceived advantages and disadvantages of such vehicles. The survey was conducted using the CAWI (Computer-Assisted Web Interview) method, which involves conducting online surveys. The authors sent requests electronically and by telephone, and the average response rate was approximately 0.5%. Respondents completed the questionnaires online themselves. Ultimately, surveys were collected from 307 participants representing various business sectors in Poland.

4 Results

A total of 307 people working in micro-enterprises in the Małopolska Province provided useful responses in the survey (according to the Central Statistical Office in Małopolska, there were approximately 353,300 active micro-enterprises in 2024). Figure 1 shows the gender structure. When selecting respondents, we tried to maintain proportions appropriate to the issue being analyzed. We originally planned to maintain a 30:70 ratio (the ratio of women to men in terms of microenterprise ownership), but due to the difficulty in reaching owners, we focused on employees of microenterprises involved in investment decisions and therefore maintained a 50:50 ratio (women to men), as this is the gender structure of people of working age in Poland. In terms of the number of respondents, we collected a sample representative at the 90% significance level (i.e., with a margin of error of 10%).

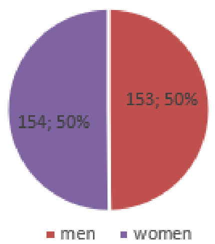

Figure 1 Gender structure of the respondents (out of 307 respondents)

As for the age structure of the respondents, we did not have accurate statistics on the age of micro-enterprise employees, apart from information (from PARP) that the average age of people working in the micro-enterprise sector exceeded 40 years (Figure 2). Therefore, we aimed to ensure that at least half of the research sample consisted of individuals aged 40 or older.

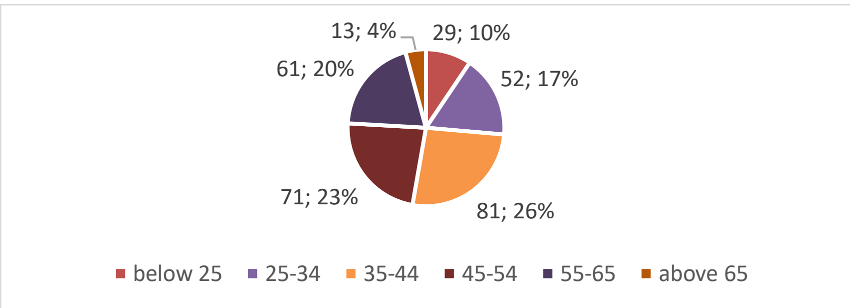

Figure 2 Age structure of respondents

Published by Acta Logistica, www.actalogistica.eu

Similarly, given the population structure of the Małopolska Province, we adjusted the research sample to reflect the rural-to-urban ratio. According to data from the Central Statistical Office (GUS), approximately 52% of the population of Małopolska Province lived in rural areas, with the remainder living in cities (Figure 3).

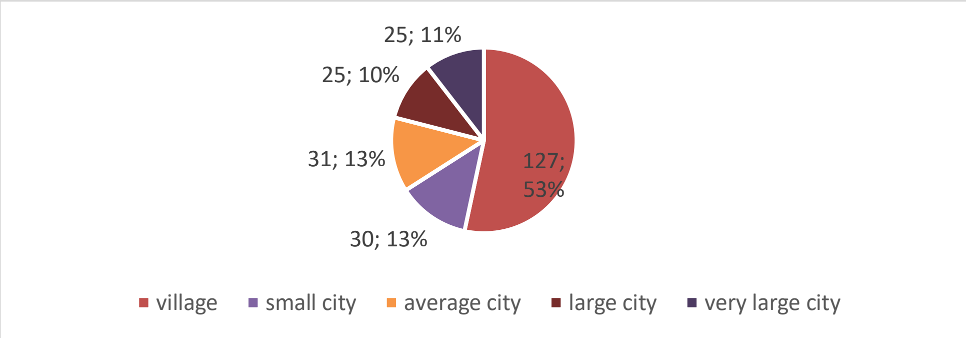

Figure 3 Place of residence of respondents (rural or urban)

Figure 4 and Figure 5 show the distribution of responses to the question about access to a car in a microenterprise. Respondents could give several answers, which is why they do not add up to 307 (a total of 341 responses were given). The most common response among respondents (41.1%, or 140 responses) was that the company had its own cars. The second most common response was no car (27.6% of responses; 88% of respondents said the company had no need for one, and the rest said there was no money for one), and the third was leasing (19.9% of responses). The least common responses were the use of employees' cars (6.5%) and rental (5%). In two cases, respondents added that although the company did not own any cars, it used taxis.

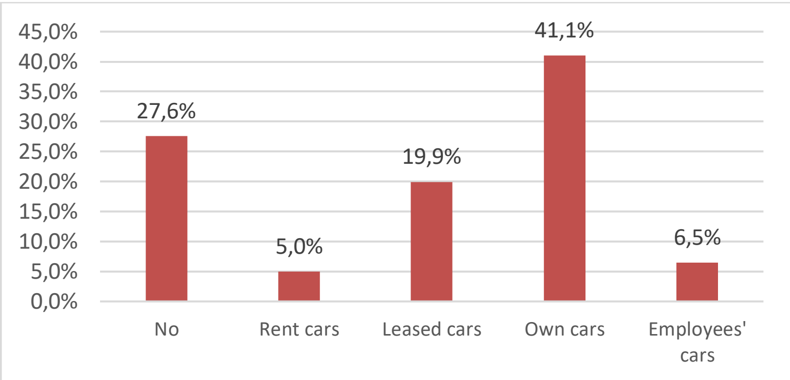

Figure 4 Access to a car in a microenterprise

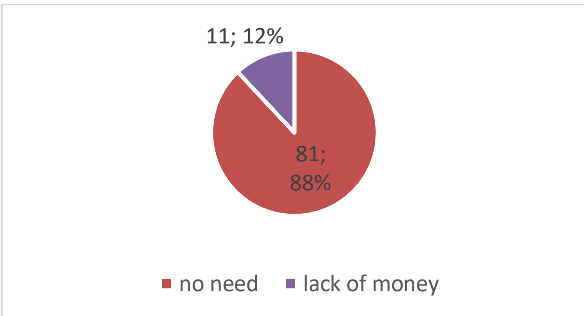

Figure 5 Reasons for not having a car in the company

When asked about the means of transport used by the company, we received 484 responses, as respondents could select multiple answers. The most common types of transport used by the micro-enterprises surveyed were passenger cars (41.3% of responses) and delivery vans up to 3.5t (20.7% of responses). The third most popular means of transport among the surveyed companies was trucks over 3.5t (10.3% of responses), followed by trains (also 10.3% of responses). Finally, 5% of responses were for planes, motorcycles and scooters, and bicycles. Only 1.9% of responses were for special-purpose vehicles (Figure 6).

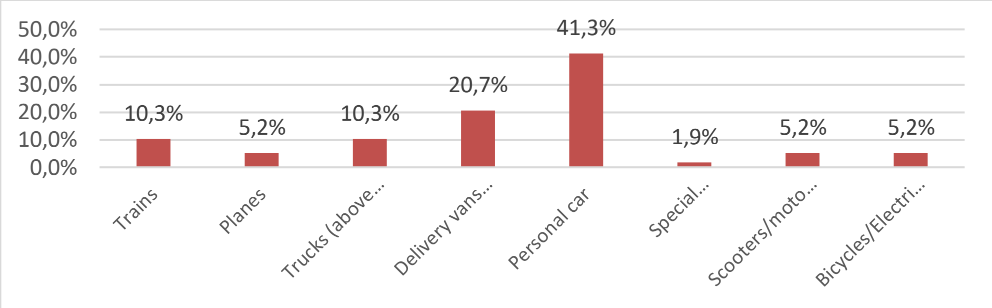

Figure 6 Types of transport used by the company

Figure 7 shows the distribution of responses to the question of the range of 95% of journeys made as part of the company's operations (a total of 307 responses were provided). The distribution of responses shows that most respondents traveled a maximum of 100 km from their headquarters (29%), followed by trips within the city (village) and trips of less than 20 km (20% each). To summarize the responses, 84.4% of flows were below 300 km from the headquarters, routes that can be covered by an electric car. Only 15.6% of responses indicated routes that may be too long for a typical electric car (however, only 6.2% of responses exceed the range of a long-range electric car).

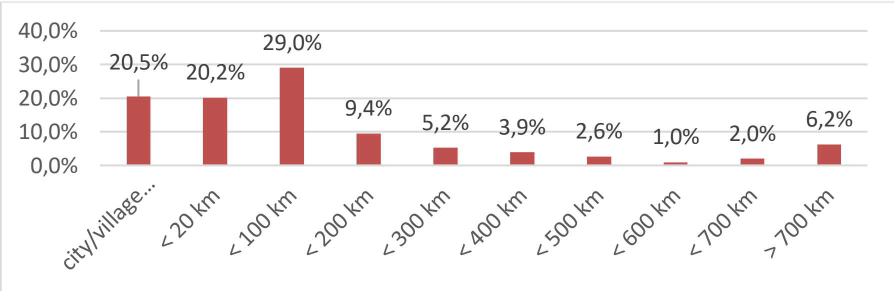

Figure 7 A range of 95% of routes in relation to the headquarters

Figure 8 shows the distribution of responses (1,537 in total) regarding the criteria used by companies when purchasing or leasing (or renting) a car. As can be seen from the responses, the most important criteria were reliability (10.9%, or 167 responses), cost-effectiveness (10%, or 154 responses), and a positive experience or opinion (8.4%, or 129 responses). Other important factors in choosing a car were: covering long distances without breaks or problems (7.5%, 115 responses), durability (7.2%, 111 responses), large luggage space (6.8%, 104 responses), and low price (5.7%, 88 responses). The responses indicate that the primary criteria for choosing a car were not price, but good reputation, reliability, and the ability to cover long distances easily. The question of what micro-entrepreneurs understand as a long distance remains open to discussion, given that 84.4% of them do not travel more than 300 km from their headquarters on 95% of their journeys. However, it is likely that this refers to the potential to make very long journeys if the need arises, which is not currently a strong point of electric cars – they allow for long journeys, but require stopping to recharge the battery. Respondents also added their own criteria: brand preferences, engine power, the number of kilometers a given model will travel during its lifetime (to suit the company's needs), and appearance.

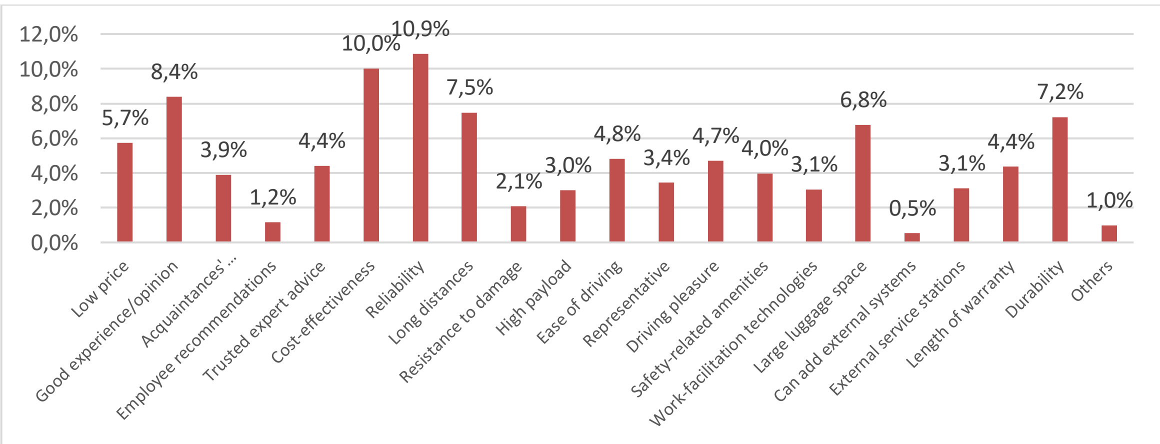

Figure 8 Criteria for choosing a car when buying or leasing (or renting)

Published by Acta Logistica, www.actalogistica.eu

Figure 9 shows the distribution of respondents' opinions on electric cars. As can be seen from the responses, the majority of respondents (65%) believed that hybrid electric vehicles are good, but inferior to electric cars. 14% of respondents had a negative opinion of electric cars, and 21% believed they are better than combustion-engine cars.

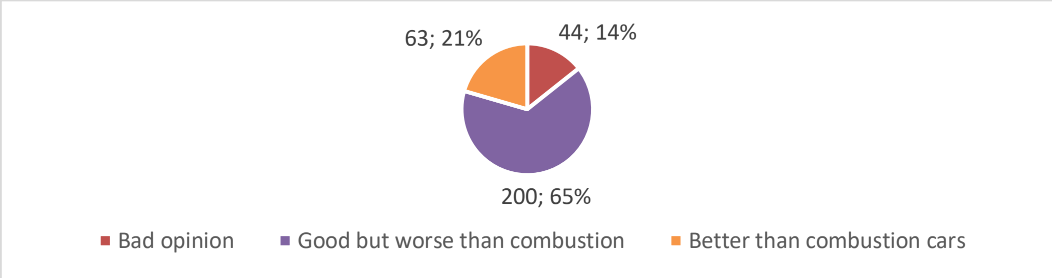

Figure 9 Opinion on electric cars

Figure 10 shows the distribution of responses regarding the advantages of electric cars. In total, respondents gave 938 responses (multiple answers were possible). The most common advantages (15.1% of responses) were low daily running costs, environmental friendliness (13.9%), ease of driving (10.9%), technologies that make work easier (9.7%), safety features (9.4%), and driving pleasure (9.3%). Those who answered the previous question that they had a negative opinion of electric cars listed the following as advantages: environmental friendliness, representativeness (worthy representation of the company), long-term financial profitability, cost-effectiveness in everyday use, ease of driving, warranty length, safety features, and driving pleasure. These respondents did not mention long-distance driving, reliability, or low price as advantages (in general, such responses were rare). Some of them indicated a complete lack of advantages. Respondents cited comfort and modern interior, noise reduction, quiet operation, free parking in the city center, and higher cost deduction limits as additional advantages.

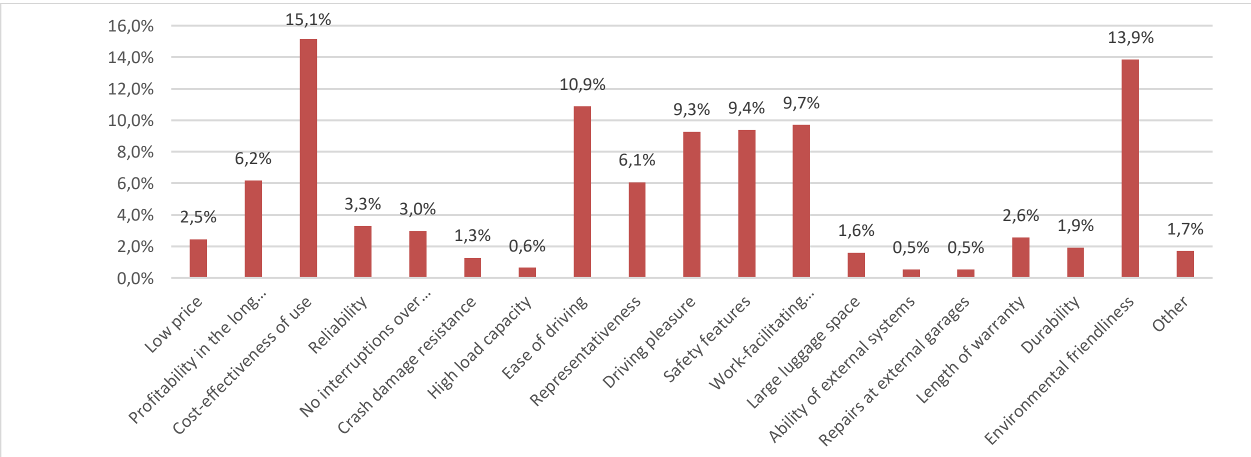

Figure 1 Advantages of electric cars

Figure 11 shows the distribution of respondents' opinions on the statement that electric cars are very impractical because they require frequent charging. As shown in Figure 11, 65% of respondents considered this statement to be true.

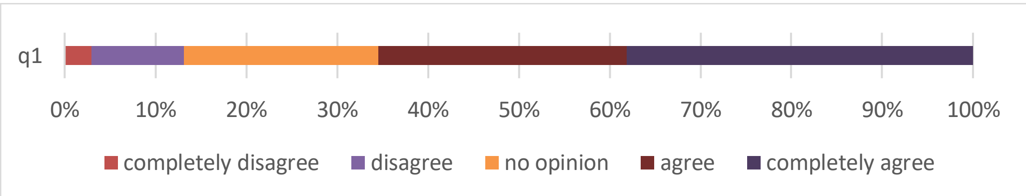

Figure 2 Electric cars are very impractical due to the need for frequent charging

Figure 12 shows the distribution of respondents' opinions on the statement that using an electric car requires careful trip planning. As shown in Figure 12, 75% of respondents considered this statement to be true.

Published by Acta Logistica, www.actalogistica.eu

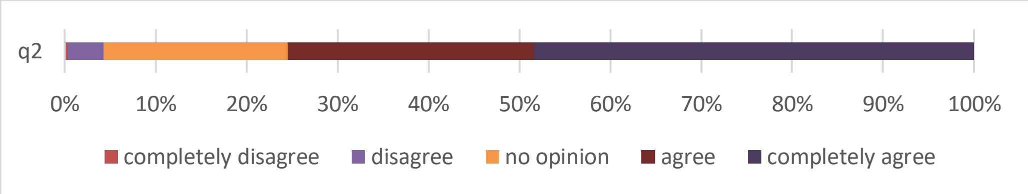

Figure 3 Using an electric car requires careful trip planning

Figure 13 shows respondents' opinions on the likelihood of losing range in an electric car and the costs of emergency charging. 69% of respondents agreed with this statement.

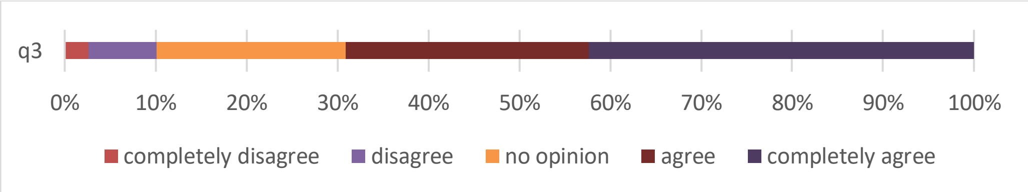

Figure 4 Fear of losing range in an electric car and the costs associated with emergency charging

Figure 14 shows the distribution of respondents' opinions on the excessive charging time of electric cars during long journeys. 75% of respondents agreed with this opinion.

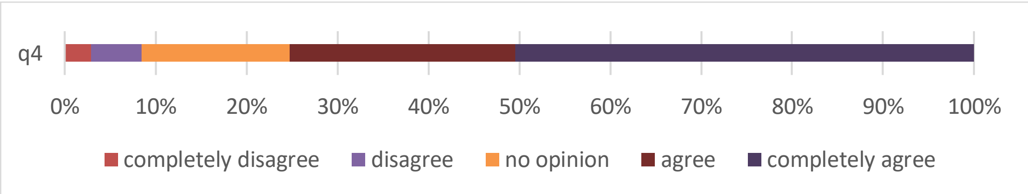

Figure 5 Charging an electric car during a trip takes too long

Figure 15 shows the distribution of respondents' opinions on the insufficient number of charging stations in Poland. Over 78% of respondents agreed with this statement.

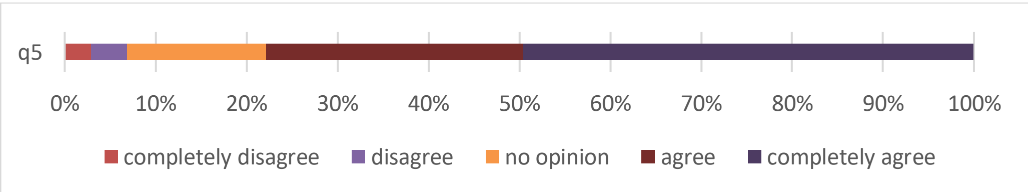

Figure 6 Insufficient number of charging stations to purchase an electric car

Figure 16 shows respondents' opinions on the cost of installing electric-car charging stations. 49% of respondents agreed with this statement. Therefore, the respondents do not fully agree with this opinion.

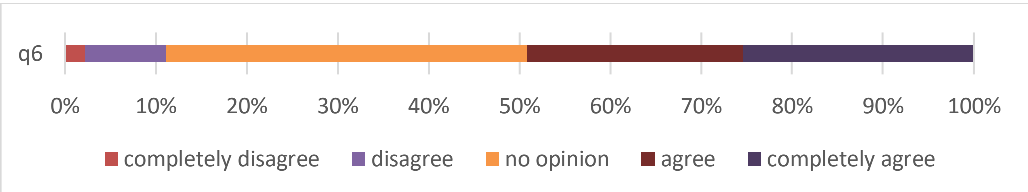

Figure 7 Very high costs of creating electric car charging stations

Figure 17 shows respondents' opinions on the increase in electricity bills caused by driving an electric car. 64% of respondents agreed with this statement.

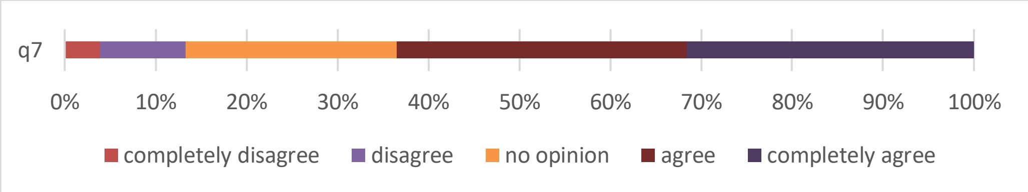

Figure 8 Using an electric car is associated with increased electricity bills

Figure 18 shows respondents' opinions on the risk of fire in electric cars. Concerns about fire were reported by 55% of respondents.

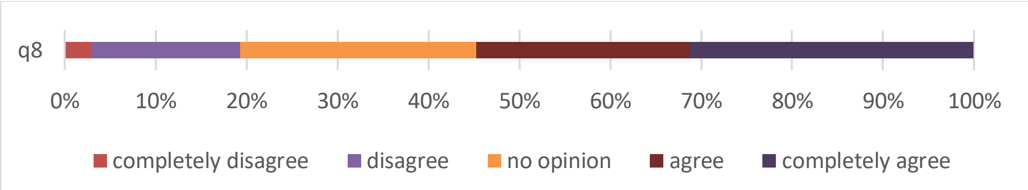

Figure 9 Fire risk when using an electric car

Figure 19 shows that 53% of respondents have doubts about the environmental friendliness of electric cars because electricity is generated from coal and oil.

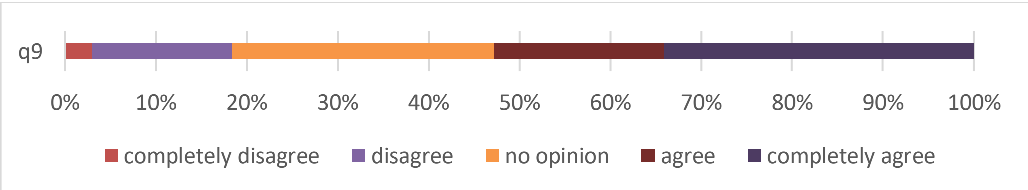

Figure 10 Doubts about the environmental friendliness of electric cars due to the production of electricity from coal and oil

Figure 20 shows that 66% of respondents are concerned about the environmental impact of battery disposal and believe that this reduces the environmental friendliness of electric cars.

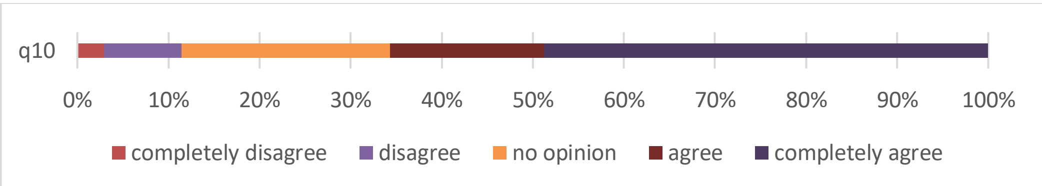

Figure 11 Doubts about the environmental friendliness of electric cars due to the need to dispose of batteries

Figure 21 shows the distribution of respondents' opinions on the durability of electric-car batteries. As can be seen in Figure 21, 69% of respondents had such concerns.

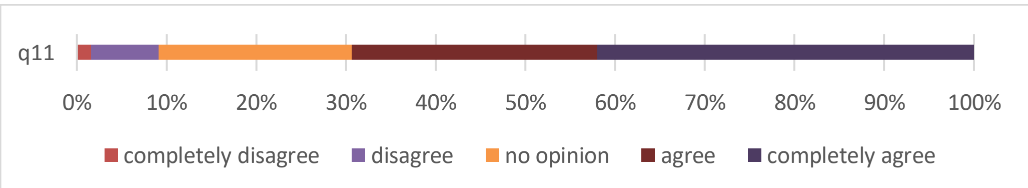

Figure 12 Batteries in electric cars are expensive, and it is not known how long they will last in cold climates

Figure 22 shows the distribution of responses regarding the purchase price of electric cars. As shown in Figure 22, 56% of respondents believe they are still too expensive.

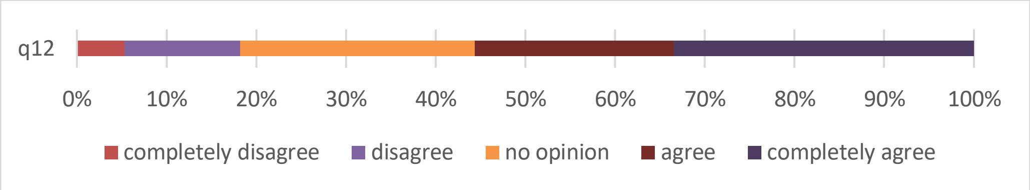

Figure 13 The purchase price of an electric car is too high

Figure 23 shows that 66% of respondents fear that as the number of electric car users increases, electricity prices will rise, making the purchase of such cars less and less profitable.

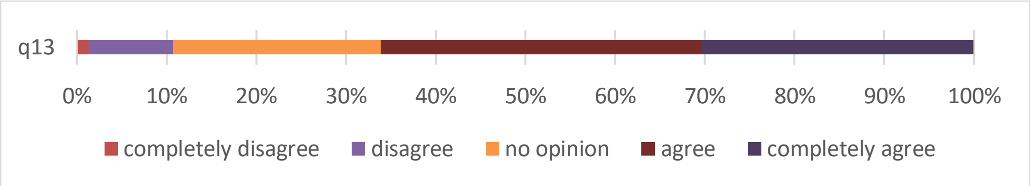

Figure 14 The risk of energy price increases limits the appeal of electric cars

Figure 24 shows that 56% of respondents were concerned about the depreciation of electric cars. Devaluation results, among other things, from technological progress, which causes older versions to quickly lose value, concerns about battery life, uncertainty about resale (the electric car market is less predictable than the combustion engine car market), and the rapid impact of subsidies and government programs on supply and demand.

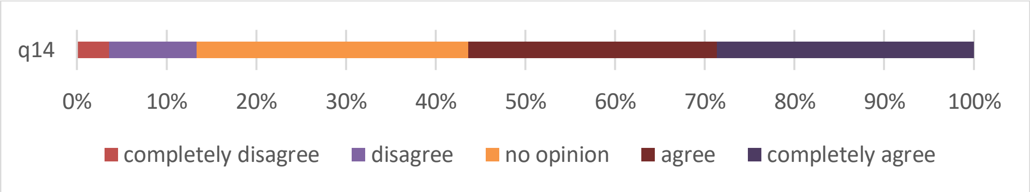

Figure 15 There is a high risk that an electric car purchased today would quickly depreciate

Figure 25 shows the distribution of respondents' answers regarding problems with finding electric car repair shops. 66% of respondents agreed with this opinion.

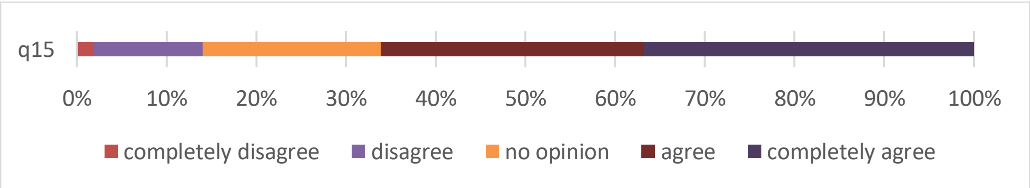

Figure 16 Few electric car repair shops

Figure 26 shows that only 22% of respondents believe that electric cars have poor acceleration. As these cars generally have very good acceleration, this shows that respondents have a relatively good understanding of e-car technology.

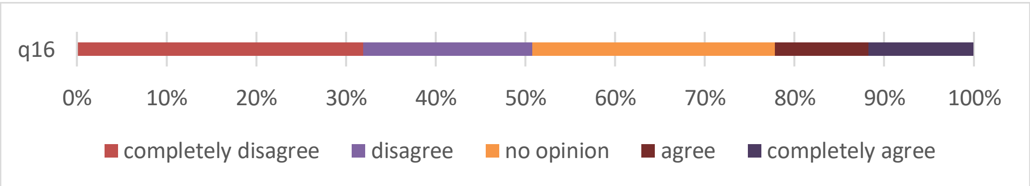

Figure 17 Electric cars do not have sufficient acceleration

Figure 27 shows that only 42% of respondents believe that electric cars offer less driving pleasure than combustion engine cars because they are silent. For most respondents, this was not important.

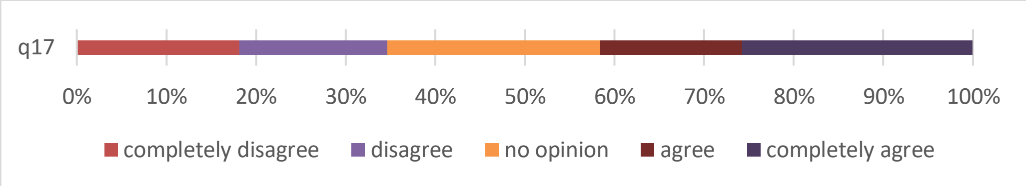

Figure 18 Less driving pleasure than a combustion engine car

Figure 28 shows what respondents consider the advantages of electric cars over combustion-engine cars. Because respondents could provide multiple answers, a total of 1,218 responses were collected. Most respondents believed that the biggest advantage of electric cars is that they can be parked for free (12.8% of responses), no noise (12.5%), the ability to use bus lanes (12.4%), the ability to enter city centers (12%), and subsidies, grants, and tax breaks (8.5%).

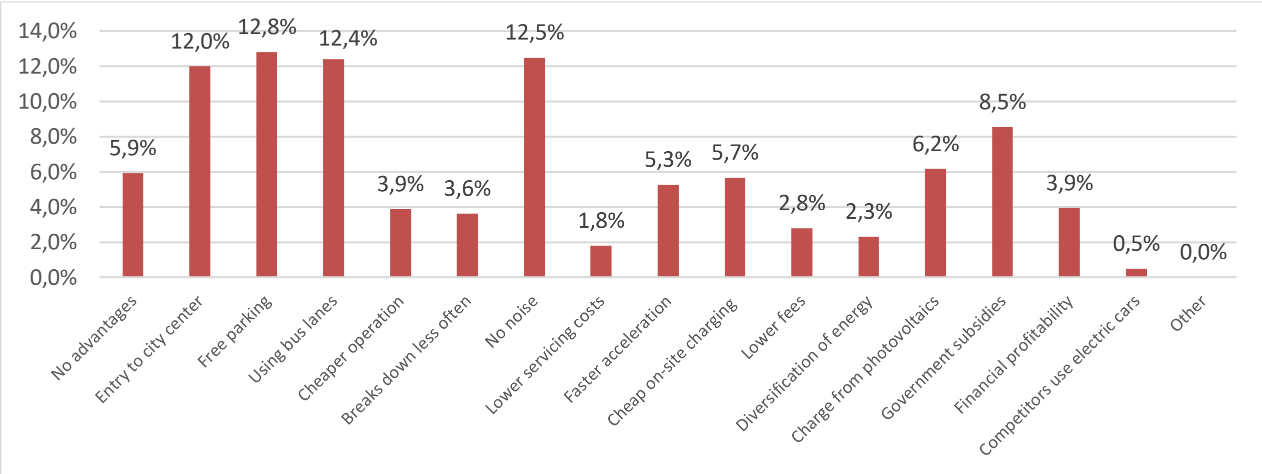

Figure 19 Advantages of electric cars over combustion engine cars

Figure 29 shows the most important advantages of combustion-engine cars compared to electric cars (1,158 respondents). As shown in Figure 29, the most important factors are trouble-free and quick refueling (18.9% of responses), a lower purchase price (17.9%), easier repairs and servicing (16.5%), and cheaper parts (16.4%).

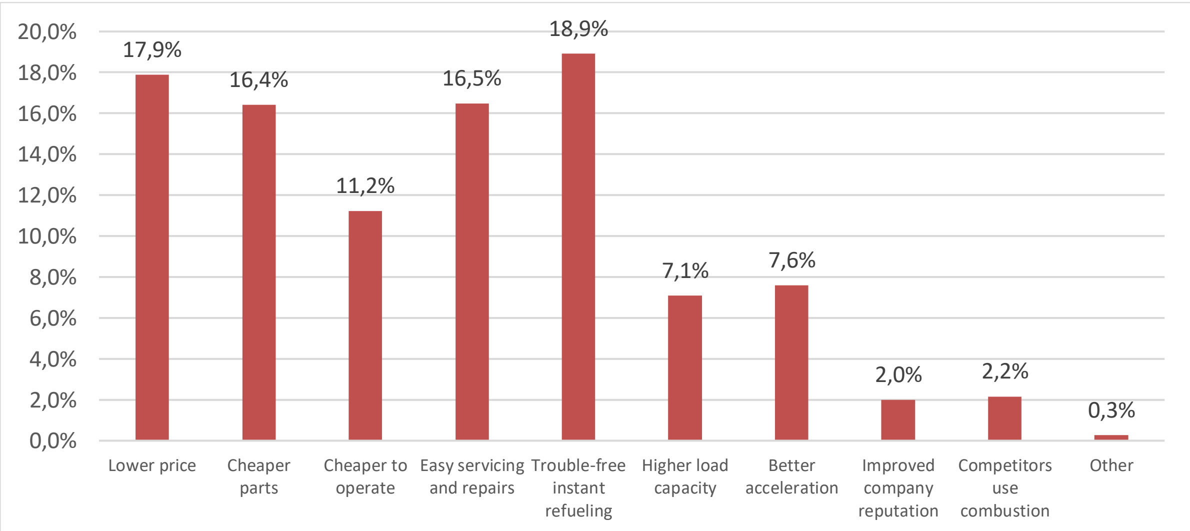

Figure 20 Advantages of combustion engine cars over electric cars

Among 307 respondents, 20.5% have purchased (1%) or plan (19.5%) to purchase a passenger electric car, and 7.5% have purchased (1%) or plan (6.5%) to purchase a delivery vehicle. One company also purchased an electric bicycle. The comments in the survey showed that the main reasons were the possibility of entering the city center (mainly the inability to enter with combustion engine cars and the fear that the zone would expand) and free parking, lower registration fees, subsidies, tax breaks, a very good offer (better than for a combustion engine car), the possibility of charging from photovoltaic panels, engine durability, the desire to try out such cars, and convenience. The most frequently repeated arguments were: the possibility of entering the city center, tax breaks, subsidies, and grants (until the end of 2024, companies could participate in a program to subsidize such cars), and the cost-effectiveness of this technology when using their own photovoltaic cells.

Table 1 shows the distribution of responses to the question of which incentives, in respondents' opinions, are most likely to encourage the purchase of an electric car. Unfortunately, some respondents did not read that they were asked to indicate a maximum of 5 incentives, and some marked more. The most popular incentives were the electric car subsidy program (up to PLN 40,000, 8.5% of responses), free or cheaper parking in city centers (7.5% of responses), grants for the purchase of electric cars (7% of responses), access to bus lanes (6.5%), tax exemptions (6.4%), lower motorway tolls (4.4%), access to city centers (4%), and subsidies and exemptions from registration fees (3.5%). The exact distribution of responses is presented in Table 1.

Table 1 List of the most desirable incentives for purchasing an electric car

Facility	Votes	Percentage
Grant program for electric car purchase up to PLN 40,000	**166**	**8.5**
Free or discounted parking in cities	**147**	**7.5**
Grants for electric car purchase (lump sum or percentage)	**138**	**7.0**
Access to bus lanes	**127**	**6.5**
VAT exemption for electric car purchases (no VAT on EV purchase)	**125**	**6.4**
Personal Income Tax (PIT) deductions	**119**	**6.1**
Lower road or highway fees for EVs	**87**	**4.4**
Entry to low-emission zones (where combustion vehicles are banned or charged)	**79**	**4.0**
Subsidies for electric cars to equalize their price with combustion vehicles	**69**	**3.5**
Exemption from or reduction of registration fees	**69**	**3.5**
Tax reliefs for leasing	**60**	**3.1**
Excise tax exemption for electric car purchases	**58**	**3.0**
No such incentives	**53**	**2.7**
Cheap electricity from renewable energy sources	**52**	**2.7**
Higher depreciation limits for entrepreneurs or VAT deductions	**45**	**2.3**
Grants for building charging stations (for companies and local governments)	**42**	**2.1**
No import duties	**42**	**2.1**
Free ferries, highway toll discounts	**41**	**2.1**
Fast EV charging stations at every gas station in Poland	**40**	**2.0**
Fast EV charging stations at every gas station in the EU	**37**	**1.9**
EV charging stations at every gas station in Europe	**35**	**1.8**
Tax reliefs for companies leasing electric vehicles	**35**	**1.8**
EV charging stations at every gas station in Poland	**34**	**1.7**
Fast EV charging stations at every gas station in Europe	**34**	**1.7**
Higher taxes on combustion engine vehicles	**31**	**1.6**
Tax credit up to PLN 30,000	**29**	**1.5**
Massive investments in charging infrastructure	**27**	**1.4**
Developed the battery industry and cheap domestic electricity	**24**	**1.2**
Charging stations at borders (where customs clearance takes place)	**21**	**1.1**
Bonus for scrapping a combustion engine car (an extra PLN 5,000 for an electric car purchase)	**21**	**1.1**
Charging stations at our main customers (target locations where we travel)	**17**	**0.9**
Ban on buying electric cars in 2035	**16**	**0.8**
For high mileage, an electric car pays off twice as fast as a combustion car	**14**	**0.7**
Preferences in public procurement (postal fleets, buses)	**12**	**0.6**
Registration restrictions for combustion cars in big cities (license plate lotteries)	**11**	**0.6**
Increasing restrictions for EVs	**5**	**0.3**

Figure 30 shows the distribution of respondents' answers to the question about the maximum acceptable charging time for an electric car during a trip. The most popular answers were 15 minutes (45.4%) and 5 minutes (33.8%). Each respondent could choose only one answer.

Acta Logistica, Volume 13, Issue 1, Pages 12-30, 2026 ISSN 1339-5629

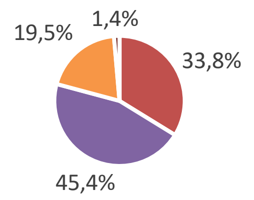

Figure 21 Maximum acceptable battery charging time during a trip

Table 2 shows the distribution of responses to the last question in the survey, which asked about the reasons for lack of interest in electric cars (purchase, rental, leasing, 1,639 responses). In line with the findings of other researchers, the most important arguments were the high purchase price (7.7% of responses), limited range (7.7% of responses), too frequent charging (7.3%), high battery costs (6.4%), the need to purchase a charging station for the company (6%), uncertainty about future charging costs (5.7%), charging time too long (5.6%), too few charging stations outside cities (4.9%), lack of adequate knowledge and experience (4.5%), and lack of mechanics (3.7%).

Table 2 Reasons for the lack of interest in electric vehicles

Item	Votes	Percentage
The price of the car is too high	**126**	**7.7**
The car has a limited driving range	**126**	**7.7**
Need to charge the car too often	**119**	**7.3**
High battery cost	**104**	**6.4**
Need to buy a charging station for the company	**98**	**6.0**
Uncertainty about charging costs	**93**	**5.7**
Charging time is too long	**91**	**5.6**
Very few charging stations in rural areas	**80**	**4.9**
Lack of sufficient knowledge	**74**	**4.5**
No experience with using an electric car	**74**	**4.5**
Lack of charging stations and difficulty in finding them	**70**	**4.3**
Lack of repair and service workshops	**61**	**3.7**
Less durable than a combustion vehicle in cold weather	**5**	**3.1**
Low resale value of electric cars	**5**	**3.1**
Lack of reliability (e.g., due to weather conditions)	**49**	**3.0**
Working in rural areas without electricity, I would have to take a diesel generator with me, which needs to be refueled — and that makes no sense.	**46**	**2.8**
Limited range when transporting heavy cargo	**43**	**2.6**
For our clients, it doesn't matter whether we use an electric or petrol car. So it doesn't affect our reputation.	**42**	**2.6**
If I forgot to charge my EV in the evening, and it was below zero and snowing in the morning, the car would have half power, and you'd have to drive 50 km/h. Charging takes longer; you have to wait 45 minutes at the charger. I think it's really inconvenient.	**41**	**2.5**
I don't know where at the office we could park and charge all our company cars overnight? Besides, charger prices are also high. There's a high risk of theft and fire.	**38**	**2.3**
The negative side of BEV is anxiety about loss of range on longer routes, which is a major problem.	**30**	**1.8**
Insufficient incentives from the authorities	**28**	**1.7**
I've heard stories of someone stuck in a traffic jam when it was a bit cold outside, then the car died and just stayed there.	**25**	**1.5**
We have quite heavily loaded cars and trailers, which eliminate 'optimal driving conditions', and significantly reduce the range on a single charge.	**19**	**1.2**
You have to plan completely differently if you want to use a BEV, which makes our work much harder.	**18**	**1.1**
Besides environmental benefits, cheap charging, and convenience, there are no economic benefits.	**16**	**1.0**
For diesel and petrol cars, you get the same government compensation as for electric cars. The government hasn't done enough for electric cars.	**13**	**0.8**

Item	Votes	Percentage
For most electric car problems, as a company, we have solutions, but who among us has the time for them?	**12**	**0.7**
Our biggest problem with these cars is that our employees start their workday from home. If they had a battery-electric vehicle (BEV), they would need to charge it at home, which is costly. We have quite a lot of employee turnover, so we would need to install a charging station at the home of someone who might leave our company next year.	**0**	**0**
A company car can be electric, but not a work vehicle. A work vehicle is never charged at the office and very often travels long distances. It does not make sense for us to spend time researching and pursuing an electric work vehicle, since the technology generally does not yet meet our range needs.	**0**	**0**
The problem with electric cars is planning. It takes too much time — who should handle and implement it? The issue isn't just the car's performance today. It's also an economic question — someone needs to take care of it, it takes time, and time costs money, and we don't have the time.	**0**	**0**
For small and medium-sized enterprises, the transition to electric vehicles is very difficult. SMEs have many cars (unlike micro firms) but lack the human resources to handle purchasing and later planning for EVs (large companies have more resources for this).	**0**	**0**

5 Discussion

The survey confirmed the reasons for the low interest in electric cars among micro-enterprises. The main reason was the high purchase price (7.7% of responses, Figure 22) and battery costs (6.4%, Figure 21), which pose a serious challenge for micro-entrepreneurs with limited capital and high uncertainty about future operations (which is consistent with the observations of other researchers, including [1,6].

Logistics in micro-enterprises requires reliable short-range vehicles and micro-entrepreneurs recognise the long-term cost-effectiveness of electric cars and the durability of their engines, but buy almost exclusively combustion-engine cars because they are more versatile and cheaper to purchase. Entrepreneurs are familiar with this technology, have mechanics, and do not have to spend money on charging stations and photovoltaics (this is also confirmed by [20,21]). According to the respondents, electric cars are most cost-effective when the company has its own photovoltaic installation and surplus power (consistent with the research by [9]).

On the other hand, if we look at the distance from the headquarters, where 95% of journeys are made, the vast majority of micro-enterprises cover distances shorter than the range of electric cars, and in many cases, replacing a combustion engine car with an electric one would not affect driving comfort and charging time (main charging would take place at night on the company's premises), which shows that in the case of micro-enterprises, BEV distances are sufficient for unrestricted movement.

Analysis of survey (which the authors consider to be the scientific novum introduced by this research) data showed that micro-entrepreneurs follow technological developments and price changes and are considering purchasing an electric car, if only to see for themselves the advantages and disadvantages of such a car. Whether they ultimately make a purchase seems to depend on the scale of the economic benefits they can obtain. For these companies, the present is more important than the future, given the high uncertainty about the continuation of their business in the coming years and the small scale of their operations (consistent with [24]**)**.

Micro-enterprises were most interested in subsidies for the purchase of electric cars (see Table 1), free parking (see Figure 28), access to bus lanes (see Figure 28), tax exemptions, lower motorway tolls and access to city centres. The main factors encouraging purchase were subsidies and grants (8.5-7.0%, Table 1), as well as necessity – in large cities, combustion engine cars are often banned from city centres (12%, Figure 28). This confirms the article's hypothesis that these are the most important incentives for micro-entrepreneurs to purchase BEVs.

As for the limitations of the study, it is worth mentioning that the CAWI method encourages self-selection (response rate 0.5%), the research sample was limited to Małopolska (no generalisation to Poland), TCO was not modelled in the article, and few qualitative comments were obtained. These limitations can be overcome by conducting longitudinal tracking, using a nationwide sample, and performing an economic analysis.

6 Conclusions

Analysis of the survey results shows that micro-enterprises in Małopolska show little interest in electric vehicles (BEVs), mainly due to their high purchase price and battery costs, even though 84.4% of their routes are within the range of BEVs (Figure 7). For the above reasons, it is not surprising that the most effective incentives indicated by entrepreneurs included: subsidies (8.5%), free parking (7.5%), and bus lanes (6.5%) (Table 1). As our research shows, the length of travel routes was not the major obstacle to BEV adoption among microenterprises; instead, it was a steep initial price, which is the scientific novum this paper introduced.

From the perspective of micro-enterprises, therefore, an important measure to promote BEVs would be to extend the NaszEauto programme to all businesses and to use a prepayment system instead of refunds. In addition, micro-enterprises would expect subsidies for private rural chargers (despite the popularity of photovoltaics). The results of the study also show the need for information programmes for micro-enterprise owners and for stability in the incentive system, e.g., maintaining a uniform formula for 5 years rather than annual changes and the resulting uncertainty. In many cases, it would be sufficient to maintain free parking for BEVs and to extend access to city centres for a longer period, which is a much cheaper solution than a subsidy programme.

These changes should unlock electromobility among Polish micro-enterprises, supporting decarbonisation and the EU's Green Deal objectives.

If we look at the problem more broadly, from the perspective of the European Union as a whole, it seems that the implementation of electric cars (similar to renewable energy sources) should be in the interest of the entire European Union, and not be treated solely as an obligation and a goal for member states which, like Poland, cannot afford the incentives that entrepreneurs expect. Poland may be the 20th-largest economy in the world. However, its GDP per capita is less than half the EU average, and it cannot compete with countries such as Germany or Norway (which is not an EU member), as mentioned earlier in the article. Poland is unable to significantly increase the share of renewable energy in electricity production or increase the share of electric cars because it cannot afford to do so, either as a country or as citizens. The European Union Emissions Trading System and the Carbon Border Adjustment Mechanism raise electricity prices most for the poorest countries, further depriving them of money. This creates a vicious circle, created in the hope that the penalty system would fulfil its function. The 50% difference in GDP per capita is striking and should give pause for thought as to whether the current system is really beneficial for the EU as a whole. The near-zero investment in BEVs by a large group of entities, such as microenterprises, suggests this is a road to nowhere. The current system only exacerbates the barriers for poorer countries and poorer micro-enterprises. This shows that flexible targets are needed, adjusted to GDP/per capita and ME dominance (97% of companies). Without policies that take into account the realities of Polish micro-enterprises (capital, rural areas, PV synergy), the Green Deal targets will bypass 30% of GDP generated by micro-enterprises.

Acknowledgement
The article presents the result of the Project no PRW/PPOT/2025/0007 financed from the subsidy granted to the Krakow University of Economics. The publication was financed from the subsidy granted to the Krakow University of Economics - Project nr 059/EFP/2025/POT.

References

[1] MSOSA, S.K.: Demystifying Customer Perception of Electric Vehicle Adoption in South Africa Using the Technology Acceptance Model, *The Problems of Economy*, Vol. 4, No. 58, pp. 32-40, 2023. https://doi.org/10.32983/2222-0712-2023-4-32-40

[2] SOSZYNSKA, P., SALEH, H., KAR, H., IYER, L.V., VIANA, C., KAR, N.C.: Driving the Future: An Analysis of Total Cost of Ownership for Electrified Vehicles in North America, *World Electric Vehicle Journal*, Vol. 15, No. 11, 492, pp. 1-16, 2024. https://doi.org/10.3390/wevj15110492

[3] HAO, X., WANG, H., LIN, Z., OUYANG, M.: Seasonal effects on electric vehicle energy consumption and driving range: A case study on personal, taxi, and ridesharing vehicles, *Journal of Cleaner Production*, Vol. 249, No. March, 119403, 2020. https://doi.org/10.1016/j.jclepro.2019.119403

[4] FIGENBAUM, E.: Retrospective Total cost of ownership analysis of battery electric vehicles in Norway, *Transportation Research Part D: Transport and Environment*, Vol. 105, 103246, pp. 1-27, 2022. https://doi.org/10.1016/j.trd.2022.103246

[5] PARKER, N., BREETZ, H.L., SALON, D., CONWAY, M.W., WILLIAMS, J., PATTERSON, M.: Who saves money buying electric vehicles? Heterogeneity in total cost of ownership, *Transportation Research Part D: Transport and Environment*, Vol. 96, No. July, 102893, 2021. https://doi.org/10.1016/j.trd.2021.102893

[6] SKOWROŃSKA-SZMER, A., KOWALSKA-PYZALSKA, A.: Key factors of development of electromobility among microentrepreneurs: A case study from Poland, *Energies*, Vol. 14, No. 3, 764, pp. 1-25, 2021. https://doi.org/10.3390/en14030764

[7] SCHUB, H., PLÖTZ, P., SPREI, F.: Electrifying company cars? The effects of incentives and tax benefits on electric vehicle sales in 31 European countries, *Energy Research and Social Science*, Vol. 120, pp. 1-14, 2025. https://doi.org/10.1016/j.erss.2024.103914

[8] HAGMAN, J., RITZÉN, S., STIER, J.J., SUSILO, Y.: Total cost of ownership and its potential implications for battery electric vehicle diffusion, *Research in Transportation Business and Management*, Vol. 18, pp. 11-17, 2016. https://doi.org/10.1016/j.rtbm.2016.01.003

[9] KANIA, A., WIŚNIEWSKI, J.: Poland's first annual study of the operational characteristics of electric passenger cars in a small business, [Online], Available: https://psnm.org/?raporty=ev365-pierwsze-w-polsce-roczne-badanie-

charakterystyki-eksploatacyjnej-osobowych-samochodow-elektrycznych-w-malym-przedsiebiorstwie [15 Dec 2025], 2025. (Original in Polish)

[10] MOHD, A., RASHID, R.A., ABDUL HAMID, A.H.F., SARIJARI, M.A., RAHIM, M.R.A., SAYUTI, H., ABDUL RASHID, M.R.: Development of android-based apps for courier service management, *Indonesian Journal of Electrical Engineering and Computer Science*, Vol. 15, No. 2, pp. 1027-1036, 2019. https://doi.org/10.11591/ijeecs.v15.i2.pp1027-1036

[11] BADOWSKI, M.: *How many kilometers does a food delivery courier travel per day? What is the average delivery waiting time? Today is Courier Day*, Gazeta Wrocławska, 2020.

[12] COLOMA, J.F., GARCÍA, M., FERNÁNDEZ, G., MONZÓN, A.: Environmental effects of eco-driving on courier delivery, *Sustainability*, Vol. 13, No. 3, 1415, pp. 1-21, 2021. https://doi.org/10.3390/su13031415

[13] MCLEOD, F.N., CHERRETT, T.J., BEKTAS, T., ALLEN, J., MARTINEZ-SYKORA, A., LAMAS-FERNANDEZ, C., BATES, O., CHELIOTIS, K., FRIDAY, A., PIECYK, M., WISE, S.: Quantifying environmental and financial benefits of using porters and cycle couriers for last-mile parcel delivery, *Transportation Research Part D: Transport and Environment*, Vol. 82, No. May, 102311, 2020. https://doi.org/10.1016/j.trd.2020.102311

[14] GĄSIOREK-KOWALEWICZ, A., WASILEWSKI, W., WORACH, K., NATTKE, M.: Electric Vehicle Charging Infrastructure in Poland and the European Union, *Scientific Papers of Silesian University of Technology, Organization and Management Series*, Vol. 2025, No. 229, pp. 121-146, 2025. https://doi.org/10.29119/1641-3466.2025.229.7

[15] CHARGE PLANNER: Europe's EV Charging Market Report, [Online], Available: https://chargeplanner.retailsonar.com/ev-market-report-europe [15 Dec 2025], 2025.

[16] MAURITZEN, J.: Adoption of Chinese cars and the shift to electric vehicles: Early evidence from Norway, *Transportation Policy*, Vol. 158, pp. 1-12, 2024. https://doi.org/10.1016/j.tranpol.2024.09.012

[17] Indonesia, IMF Staff Country Reports, International Monetary Fund, Vol. 2024, No. 24/271, pp. 1-51, 2024. https://doi.org/10.5089/9798400284663.002

[18] BELÁS, J., VOJTOVIČ, S., KLJUČNIKOV, A.: Microenterprises and significant risk factors in loan process, *Economics and Sociology*, Vol. 9, No. 1, pp. 43-59, 2016. https://doi.org/10.14254/2071-789X.2016/9-1/3

[19] JOHRI, A., ASIF, M., TARKAR, P., KHAN, W., RAHISHA, WASIQ, M.: Digital financial inclusion in micro enterprises: understanding the determinants and impact on ease of doing business from World Bank survey, *Humanities and Social Sciences Communications*, Vol. 11, No. 1, pp. 1-10, 2024. https://doi.org/10.1057/s41599-024-02856-2

[20] MAJCHRZAK, A., RATAJCZAK-MROZEK, M.: Rola inwestycji w rozwoju mikro i małych przedsiębiorstw w Polsce, *Economic Studies*, Vol. 455, No. 1, pp. 45-65, 2022. https://doi.org/10.24425/oes.2022.142019 (Original in Polish)

[21] Polish Economic Institute: Micro-enterprises under the microscope in 2019, Warsaw, Nov. 2025, [Online], Available: https://pie.net.pl/wp-content/uploads/2020/04/Mikrofirmy-2019.pdf [15 Dec 2025], 2020. (Original in Polish)

[22] BOGUSZEWSKI, R., DOMAGAŁA, J., PIŁAT, A., PODSIAD, A., ROMAN, M., SAMOŁYK, O., WĘGRZYN, P.: Greening Urban Mobility: Examining the Adoption of Zero-Emission Public Transport, *Archives of Transport*, Vol. 76, No. 4, pp. 93-114, 2025. https://doi.org/10.61089/aot2025.en5gm606

[23] NICOLAS, T.: Short-term financial constraints and SMEs' investment decision: evidence from the working capital channel, *Small Business Economics*, Vol. 58, No. 4, pp. 1885-1914, 2022. https://doi.org/10.1007/s11187-021-00488-3

[24] STEINEROWSKA-STREB, I.: Innovations in Polish Microenterprises, *Economic Studies*, University of Economics in Katowice, Vol. 183, No. 1, pp. 256-266, 2014. (Original in Polish)

[25] MAJAMA, N., MAGANG, T.I.: Strategic planning in small and medium enterprises (SMEs): A case study of Botswana SMEs, *Journal of Management and Strategy*, Vol. 8, No. 1, pp. 74-103, 2017. https://doi.org/10.5430/jms.v8n1p74

[26] THAPA, A.: Determinants of microenterprise performance in Nepal, *Small Business Economics*, Vol. 45, No. 3, pp. 581-594, 2015. https://doi.org/10.1007/s11187-015-9654-0

[27] AL MAMUN, A., IBRAHIM, M.D., BIN YUSOFF, M.N.H., FAZAL, S.A.: Entrepreneurial leadership, performance, and sustainability of micro-enterprises in Malaysia, *Sustainability*, Vol. 10, No. 5, 1591, pp. 1-23, 2018. https://doi.org/10.3390/su10051591

[28] KANIA, A., WIŚNIEWSKI, J., WITKOWSKI, Ł.: New Mobility Barometer 2025, PSNM, [Online], Available: https://psnm.org/wp-content/uploads/2025/01/PSNM_Barometr_Nowej_Mobilnosci_2025_Raport.pdf [15 Dec 2025], 2025. (Original in Polish)

[29] Narodowy Fundusz Ochrony Środowiska i Gospodarki Wodnej: Program „NaszEauto". Do 40 tys. zł dopłaty do samochodu elektrycznego, [Online], Available: https://www.gov.pl/web/nfosigw/program-naszeauto-do-40-tys-zl-doplaty-do-samochodu-elektrycznego [15 Dec 2025], 2025. (Original in Polish)

[30] KOT, A.: Purchasing an electric car with a subsidy, How to receive up to PLN 40,000 in subsidies for the purchase of an electric car in 2025?, INFOR, [Online], Available: https://www.infor.pl/twoje-pieniadze/swiadczenia/7457972,zakup-samochodu-elektrycznego-z-dofinansowaniem-jak-otrzymac-nawet-40-000-zl-doplaty-do-zakupu-samochodu-elektrycznego-w-2025-roku.html [15 Dec 2025], 2025. (Original in Polish)

Review process
Single-blind peer review process.