ADOPTION OF ELECTRIC VEHICLES: AN ANALYSIS OF THE BARRIERS TO PURCHASE

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Abstract. Innovation and the transition toward greener economies are essential for ensuring environmental sustainability and the well-being of future generations. The transport sector, which accounts for approximately 25% of global greenhouse gas emissions, faces increasing pressure to adopt cleaner and more sustainable mobility solutions. In this context, electric vehicles (EVs) have emerged as a promising alternative capable of reducing dependence on fossil fuels and mitigating environmental impacts associated with conventional transportation systems. Despite the growing interest in EVs worldwide, their adoption remains limited due to several economic, technological, infrastructural, and informational barriers.

This study aims to identify and analyze the main barriers affecting the intention to purchase electric vehicles among Portuguese consumers. Based on a review of the existing literature, the research examines factors such as purchase cost, vehicle range, engine reliability, battery confidence, lack of available information, insufficient financial and fiscal incentives, inadequate charging infrastructure, charging time, and limited consumer knowledge regarding EVs. To achieve the research objectives, an online questionnaire was administered to Portuguese residents aged 18 or older. The collected data were analyzed using descriptive statistics, cross-tabulations, t-tests, and one-way ANOVA to determine the most significant barriers and the influence of demographic characteristics on perceptions.

The findings indicate that cost remains the most significant obstacle to EV adoption, followed by charging time, insufficient charging infrastructure, and concerns related to autonomy. The results also reveal differences in perceptions of certain barriers by age and educational level. The study contributes to the discussion on sustainable mobility and technological transformation by offering practical recommendations for policymakers, businesses, and other stakeholders seeking to accelerate the adoption of electric vehicles and support the transition to greener transport systems.

Keywords: sustainability; electric mobility; electric vehicle; barriers.

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Introduction

Mobility is a hot issue in today's society. With rising energy costs and climate change, the automotive industry has become one of the sectors where the most resources have been invested in researching and developing technologies to reduce emissions and dependence on fossil fuels (Faria et al., 2012). We are thus in a period

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of great transformation, where electrification and automation are seen as the way forward.

The transport sector is responsible for 25% of greenhouse gas emissions (EEA, 2021). Intending to reduce dependence on fossil fuels and CO2 emissions, governments have begun introducing guidelines to address these issues (Jansson et al., 2017). With the increasing number of passenger vehicles worldwide, it is necessary to act and adopt more sustainable transportation to achieve the Sustainable Development Goals (SDGs) (Jansson et al., 2017; Kowalska-Pyzalska et al., 2021).

Electric vehicles thus emerge as an ecological innovation and a potential solution to global challenges of energy scarcity and environmental pollution (He et al., 2018). Electric vehicles (EVs), including Battery Electric Vehicles (BEVs) and Plug-in Hybrid Electric Vehicles (PHEVs), have gained popularity due to their multiple environmental, social, and health benefits (IEA, 2020). These vehicles have all the features that make them "the mobility of the future," and there are more and more reasons for consumers to switch to this type of vehicle (e.g., promoting common well-being, zero emissions during circulation, reduced daily tariffs, tax exemption, institutional benefits and discounts, reliability, and incentives).

In 2010, there were about 17,000 EVs in circulation worldwide, and by 2019, that number had grown exponentially to 7.2 million, with 47% in the People's Republic of China (IEA, 2020). By 2020, that number had increased to 10 million EVs, and for the first time, Europe became the world's largest EV market, surpassing the People's Republic of China (IEA, 2021a). It should be noted that these numbers are relevant because they occurred in an atypical year when the COVID-19 pandemic impacted EV sales markets. However, despite a rise in sales, the market share in 2020, referring to global EV sales, was only 4.6% (IEA, 2021b).

The development and growth of the EV market are thus crucial to the goal of the clean energy transition (IEA, 2021c). Therefore, it is particularly important to understand which factors may be hindering the large-scale adoption of these vehicles. Through the literature, it is possible to verify that several barriers compromise the adoption of EVs, such as price, infrastructure, incentives, autonomy, and reliability (Lane & Potter, 2007; Egbue & Long, 2012; Jensen et al., 2014; Larson et al., 2015; Mersky et al., 2016; She et al., 2017; Vassileva et al., 2017; Jansson et al., 2017; Higueras-Castillo et al., 2019; Orlov & Kallbekken, 2019; Liu et al., 2020; Higueras-Castillo et al., 2021; Kowalska-Pyzalska et al., 2021); the little knowledge of the population about this technology; and the little motivation for its acquisition (Larson et al., 2015; Rezvani et al., 2018; Orlov & Kallbekken, 2019; Kowalska-Pyzalska et al., 2021).

Thus, this research aims to verify whether the barriers to EV adoption identified in the literature are also those identified by Portuguese consumers. This research has two objectives. The first is to verify if the study sample perceives the presented barriers. The second is to understand if there are differences in demographic characteristics, such as age, gender, and level of education, regarding the perception of different barriers. In this sense, two research questions were formulated: (i) Are the

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barriers found in the literature perceived by the sample?; and (ii) Are there significant differences, in terms of demographic characteristics, regarding the perception of different barriers?.

Literature Review

1. The market of electric vehicles (EVs)

Although there is a great interest in these vehicles, they have been in the market since 1880, with their first appearance around 1834 (Larson et al., 2015; Vassileva et al., 2017). France and England took the first steps in developing EVs, and the US began to get involved in 1895 by developing innovations. From 1920 onward, EVs declined due to lower gasoline prices, the need for more autonomous vehicles, and the beginning of mass production of combustion-engine vehicles by Henry Ford. By 1935, EVs had disappeared; from then until 1960, there was no further development. Due to the scarcity of alternative vehicles that could reduce emissions and dependence on fossil fuels, several attempts were made between 1960 and 1990 to position EVs in the market as an alternative. In 1990, EVs re-emerged with the entry into force of several legal diplomas and incentive policies. 2010 was a promising year for introducing electric vehicles in the market (IEA, 2020). Automobile industry companies such as Chrysler, Ford, General Motors, Honda, and Toyota, as well as the US Department of Energy, began to get involved in EV development. During this period, companies introduced models with lighter, more powerful vehicles and advances in battery technology.

Currently, EVs are gaining traction in the market due to their ability to reduce emissions and decrease dependence on fossil-fuel transportation (Larminie & Lowry, 2012), with many companies investing heavily in electrifying their fleets (Tu & Yang, 2019). Automobile industry companies are now announcing major electrification plans, including the top 20 automotive organizations, which together represent 90% of new registrations in 2020. Of these 20 companies, 18 have already announced they will add new EV models to their portfolios and increase production (IEA, 2021a).

If we look closely at the European spectrum, despite the effects of the pandemic, EV registrations more than doubled to 1.4 million, representing a market share of 10%. In Germany, France, and the United Kingdom, 395,000, 185,000, and 176,000 were registered, respectively. In 2020, Norway recorded a record sales participation of 75%, up from 50% in 2019. This increase was also visible in Iceland, Sweden, and the Netherlands. In Europe, 54% of EV registrations were for BEVs (pure electric), which continue to outpace PHEVs (plug-in hybrids). However, BEV registrations doubled from 2019, while PHEV registrations tripled. Looking at China, the market was generally the least affected by the pandemic; however, total registrations fell by 9%. The sales participation rate was 5.7%, up from 4.7% the previous year, and BEVs accounted for 80% of EV registrations. In the United States, EV registrations declined by 23%, but EV registrations fell less than the overall market, with 295,000 EVs registered, of which 78% were BEVs (IEA, 2021c).

Another important indicator that cannot be overlooked is the increase in EV charging stations. As EVs become more prevalent in people's daily lives, these

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infrastructures must keep pace. There has been a steady increase in these infrastructures every year. In 2020, there were 922,216 slow charging stations and 385,678 fast charging stations. This growth trend must continue, as the literature continues to cite this indicator as a barrier to EV adoption. That is, the lack of charging infrastructure is one of the factors cited as a possible cause of low EV adoption (Higueras-Castillo et al., 2019; Liu et al., 2020; Higueras-Castillo et al., 2021).

Currently, in Portugal, a significant range of EV models can already be purchased. There are more than 153 electric and plug-in hybrid vehicles in the website's database, of which 94 are already available for purchase, 41 are coming soon, seven are in prototype, and 11 are not commercially available. There are 34 registered automotive brands in the market. It is then possible to understand that there is a great variety of EV models throughout the national territory (Wattson - Mercado, 2021).

2. Barriers to adoption

Despite a rise in sales over the last decade, the number of electric passenger cars remains very low (IEA, 2020). Now, the focus is on developing these vehicles, making them more efficient and reinforcing their benefits. Governments and companies worldwide have been working on this through proposals and a range of policies, mechanisms, and investments of billions of dollars in EV development (Du et al., 2015; He et al., 2018).

Even though EVs have huge potential, many economic, legal, infrastructure, and social barriers exist. For consumers, there is a great deal of anxiety that these vehicles travel shorter distances than combustion engines and have fewer "refueling" infrastructure (Egbue & Long, 2012; Vassileva et al., 2017). Initially, governments began introducing policies to help overcome the barriers to adoption, the most strongly felt being the cost of EVs compared to conventional cars, the availability of charging infrastructure, the insufficient knowledge of these technologies, and anxiety about the vehicle's range (IEA, 2020).

Autonomy and reliability appear to be major barriers to adoption. In some studies (e.g., Mersky et al., 2016; Liu et al., 2020; Higueras-Castillo et al., 2021), the limited range, fear of running out of power between trips, high battery costs, and reliability are factors that discourage adoption. The study by Orlov and Kallbekken (2019) found that many people remain unconvinced of the reliability and efficiency of these vehicles, and 30% of respondents said they did not know how much they would save if they bought an EV.

The high cost of these vehicles appears to be the main barrier to adoption, according to the literature (e.g., Egbue and Long, 2012; Larson et al., 2015; Orlov & Kallbekken, 2019; Kowalska-Pyzalska et al., 2021). Although many governments across countries are introducing incentives and subsidies, these are, in many cases, still insufficient or inaccessible to the entire population (Vassileva et al., 2017; Orlov & Kallbekken, 2019). Many European countries offer incentives such as purchase subsidies, toll exemptions, access to charging infrastructure, zero taxes at the time of purchase, and access to lanes reserved for public transport for those who choose to

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adopt EVs, especially BEVs (Mersky et al., 2016). According to a 2018 EAFO study, France, Norway, and Germany offer the most incentives, with Portugal in 7th place (Higueras-Castillo et al., 2021).

The lack of charging infrastructure and the time required are additional barriers to EV adoption. These charging stations are essential for adopting these vehicles (She et al., 2017), and EV batteries take several hours to charge (Lane & Potter, 2007; Jensen et al., 2014). The study by Dagsvik et al. (2002) found that EV adoption rates are higher when an infrastructure is in place to support them.

Another barrier to adoption is a lack of literacy on the subject. Most users of conventional vehicles have little knowledge and misconceptions about electric vehicles (Liu et al., 2020). The Jansson et al. (2017) study suggests that social effects and influence can be more effective than conventional communication methods. The social environment facilitates the spread of knowledge and information (Jansson et al., 2017). In Portugal, some brands have begun addressing this issue through initiatives focused on social sustainability that educate people about sustainable mobility.

Methodology

This research collected data through an online questionnaire available for about a month. The questionnaire was open to Portuguese residents aged 18 or older and promoted on Portuguese online platforms. A pilot test was conducted with eight people whose feedback greatly improved the questionnaire. The sample comprises 110 individuals, with 75% male respondents and 25% female. Most respondents are between 45 and 64 years old, representing 32% of the sample, followed by 24% aged 25 to 34. The level of education indicator shows a predominance of bachelor's degrees at 43%. Next, 20% have completed secondary education.

The questionnaire is brief and concise, with an average response time of 5 minutes. It consists of 12 questions to understand the respondents' views on the topic under study. At the beginning of the questionnaire, questions about gender, age group, municipality of residence, level of education, and the length of time they have had a driver's license are included.

In this study, the interest of individuals in acquiring an EV and their level of familiarity with the different types of EVs were assessed using a 5-point Likert scale. Next, they were asked to mark the types of EVs they were familiar with. Other questions aimed to assess whether information about EVs is easily accessible and whether respondents are aware of the fiscal incentives offered to EV purchasers.

Finally, the last question aimed to analyze whether Portuguese respondents also perceived the barriers found in the literature. The respondents were asked to indicate whether the factors presented could constitute a barrier to acquiring an EV. The factors that respondents had to opine on were cost, autonomy, motor reliability, battery confidence, lack of available information, lack of financial incentives, lack of fiscal incentives, lack of charging infrastructure, charging time, and lack of knowledge about EVs. The questions used were adapted from studies such as Egbue and Long (2012) and Higueras-Castillo et al. (2021).

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The data were analyzed using SPSS (version 28). Cross-tabulations were performed, and differences between group means were tested using t-tests and a One-Way ANOVA.

Results

This section presents the descriptive analysis of the data. The analyses aimed at answering the research questions of this study are presented below. It was found that 42% of the sample is very interested in purchasing an EV, and almost 26% indicated they would be extremely interested. Of the respondents, 44% indicated they were somewhat knowledgeable about EVs, 24% stated they were not knowledgeable, and 14% indicated they were not knowledgeable. Approximately 82% of the sample indicated they were somewhat knowledgeable or below, demonstrating a medium-low knowledge level.

Of the total sample, 36% are somewhat familiar with the different types of EVs, but a significant portion reports little or no familiarity, with some diversity in responses. It is also found that 37% of the sample is unfamiliar with the fiscal incentives, while 26% indicates they are somewhat familiar. Regarding the research questions, for the first research question, "Are the barriers found in the literature perceived by the sample?" a descriptive statistical analysis was conducted to understand better if this sample also perceives some of the barriers found in the literature. This type of analysis helps organize and describe the sample data (Table 1).

Table 1. **Descriptive analysis regarding the barriers**

Var.	Items	N	Mean	Median	Mode	Stant. Dev.	Variance
BARRIERS	Cost	110	4.22	4.00	4	.839	.704
	Autonomy	110	3.50	4.00	4	1.073	1.151
	Engine reliability	110	2.25	2.00	1	1.112	1.237
	Battery reliability	110	2.87	3.00	4	1.150	1.323
	Lack of available information	110	3.20	3.00	4	.956	.914
	Lack of financial incentives	110	3.25	3.00	3	.911	.829
	Lack of tax incentives	110	2.84	3.00	3	.963	.927
	Lack of charging infrastructure	110	3.76	4.00	4	.957	.916
	Charging time	110	3.77	4.00	4	1.001	1.003
	Limited knowledge about EVs (electric vehicles)	110	3.58	4.00	4	.990	.979

Source: compiled by the authors.

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With a descriptive analysis (Table 1), it was observed that cost, range, battery confidence, lack of available information, lack of incentives (financial and fiscal), lack of charging infrastructure, charging time, and knowledge are barriers to purchasing EVs, with special attention to cost, which has the highest agreement scores. On the other hand, limited battery reliability information, limited available information, and the lack of financial and fiscal incentives indicate neutrality in the sample. Motor reliability shows some disagreement in the sample, as its value is below the midpoint.

Specifically, through Table 1, it is possible to verify that the variable with the highest mean is "Cost" (4.22), followed by "Charging Time" (3.77), while the variable "Motor reliability" has the lowest average value (2.25); however, the variable with the highest standard deviation is "Battery Confidence" (1.323), indicating that it is the variable with the greatest variability in the given responses. However, the "Motor reliability" variable also has a significant standard deviation (1.237). The variable with the lowest standard deviation is "Cost" (0.704). Notably, the most frequently marked response for most questions was the "Agree" option (mode=4).

In the first research question, we verified whether the study sample perceived the barriers found in the literature. The sample indicates that cost, range, battery confidence, lack of available information, lack of incentives (financial and fiscal), lack of charging infrastructure, charging time, and knowledge are obstacles to adoption. For the second research question (Are there significant differences in demographic characteristics regarding the perception of different barriers?), the barriers identified by the sample were used, and t-tests and one-way ANOVA were performed.

First, we conducted a t-test comparing the barriers and respondents' gender. The results indicate that all barriers were rejected in the Student's t-test. Thus, it can be concluded that the female and male elements of the sample do not show significant differences in their perceptions of the barriers to EV adoption. To complement the analysis, a cross-tabulation was conducted between variables related to interest in purchasing EVs, familiarity and knowledge, access to information, and the demographic variable gender (Table 2).

Table 2. **Cross-tabulation by gender with questions 6, 7, 8, and 10**

Gender	Pearson and Cases	Value	Significance Asymptotic (Bilateral)
Question 6 - How would you rate your interest in acquiring an electric vehicle (EV)?	Pearson's chi-square	4.599	.331
	N valid cases	110	
Question 7 - In general, what is your level of knowledge about EVs?	Pearson's chi-square	27.478	**<.001**
	N valid cases	110	
Question 8 - In general, are you familiar with the different types of EVs?	Pearson's chi-square	29.759	**<.001**
	N valid cases	110	
Question 10 - Do you believe that information about EVs is easily accessible?	Pearson's chi-square	8.117	.087
	N valid cases	110	

Source: compiled by the authors.

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In the conducted tests, questions 7 (level of knowledge) and 8 (familiarity) both showed significant association values with the gender variable (sig=<.001; p<0.05). However, questions 6 and 10 did not show any significant association values. Then, a one-way ANOVA was conducted to determine whether age groups differed in their perceptions of the barriers.

With this test, it was possible to verify that the cost barrier differed across age groups (sig=.017; p<0.05). In other words, the cost can be perceived as a barrier according to age groups. The other barriers did not show differences within or between age groups.

Once again, a cross-tabulation was performed between the variables of interest in purchasing an EV, knowledge familiarity, and access to information, with the age group variable (Table 3).

Table 3. **Cross-tabulation by age group for Questions 6, 7, 8, and 10**

Age	Pearson and Cases	Value	Signif. Asympt. (Bil)
Question 6 - How would you rate your interest in acquiring an electric vehicle (EV)?	Pearson's chi-square	30.872	**.014**
	N valid cases	110	
Question 7 - In general, what is your level of knowledge about EVs?	Pearson's chi-square	10.714	.827
	N valid cases	110	
Question 8 - In general, are you familiar with the different types of EVs?	Pearson's chi-square	20.459	.200
	N valid cases	110	
Question 10 - Do you believe that information about EVs is easily accessible?	Pearson's chi-square	22.232	.136
	N valid cases	110	

Source: compiled by the authors.

In this test, question 6 (interest) showed a significant association with the age range variable (sig=0.014; p<0.05). However, the other questions (7, 8, and 10) did not show significant associations with age.

Next, it was tested whether the barriers varied by level of education. For this, the one-way ANOVA test was used again. Once again, the cost barrier showed differences by level of education (sig=0.043; p<0.05). This means the cost may or may not be perceived as a barrier depending on educational level. The other barriers, again, did not show variance within or between groups at different levels of education.

Once again, a cross-tabulation was carried out between the variables of interest in purchasing EVs, knowledge and familiarity, and access to information, with the variable of the age range (Table 4).

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Table 4. **Cross-tabulation by education level for Questions 6, 7, 8, and 10**

Education level	Pearson and Cases	Value	Significance Asymptotic (Bilateral)
Question 6 - How would you rate your interest in acquiring an electric vehicle (EV)?	Pearson's chi-square	32.892	.423
	N valid cases	110	
Question 7 - In general, what is your level of knowledge about EVs?	Pearson's chi-square	43.424	.086
	N valid cases	110	
Question 8 - In general, are you familiar with the different types of EVs?	Pearson's chi-square	35.302	.315
	N valid cases	110	
Question 10 - Do you believe that information about EVs is easily accessible?	Pearson's chi-square	16.686	.988
	N valid cases	110	

Source: compiled by the authors.

In this test, none of the questions (interest, knowledge, familiarity, and access to information) showed any significant values associated with the education level variable.

Discussion

The results show that barriers to adopting electric vehicles remain, with some standing out more than others. The study reveals that 62% of the sample is interested in acquiring an electric vehicle. The study highlights barriers such as cost, range anxiety, low knowledge of EVs, lack of charging infrastructure, and charging time, with cost being the most dominant barrier. The cost has been identified as the primary barrier in numerous studies (e.g., Egbue and Long, 2012; Larson et al., 2015; Orlov & Kallbekken, 2019; Tu & Yang, 2019; Kowalska-Pyzalska et al., 2021; Higueras-Castillo et al., 2021). The range anxiety among drivers due to limited range may be why 55% of respondents indicated range anxiety as a barrier, consistent with the results of studies by Mersky et al. (2016) and Liu et al. (2020).

Knowledge was also highlighted as a barrier, with respondents reporting a medium-low level of literacy in the subject. In Larson et al.'s (2015) study, participants reported needing more information about EVs. Current incentives that help in EV purchases may have little effect on the market. A significant percentage of the sample indicated that incentives remain a barrier (they are not sufficiently attractive). Consistent with Orlov and Kallbekken's (2019) study, the lack of access to these funds/support may hinder EV adoption. The lack of charging infrastructure may impact EV purchases, with 69% of respondents indicating that this insufficient charging infrastructure is a barrier. In Liu et al.'s (2020) study, the authors indicated that the lack of infrastructure also leads to range anxiety, along with limited range,

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causing reluctance to adopt. Charging time also shows significant values, with approximately 71% of the sample indicating that this factor is a barrier to adoption.

This study also conducted tests to determine whether different demographic characteristics affect perceptions of barriers. The results regarding the relationship/influence of demographic characteristics are diverse (White & Sintov, 2017). First, the t-test found that female and male respondents in the sample did not differ significantly in their perceptions of barriers to EV adoption. That is, we can say that gender in this sample is unrelated to recognizing different barriers. This is consistent with the results of Jensen et al.'s (2014) study, which found that gender does not affect intention to adopt. However, in the studies by Egbue and Long (2012) and He and Hu (2022), gender mediates the relationship between barriers and intention to adopt. However, cross-tabulations indicated that gender and overall knowledge about EVs (Q7) and familiarity with different types of EVs (Q8) are significantly associated.

Using a one-way ANOVA, we tested for differences in group means regarding barriers across age groups and education levels. The tests indicated that cost shows differences in variance across age groups and levels of education. According to the results of Barth et al. (2016) and He and Hu (2022), age group significantly affects intention to adopt an EV. Still, educational level does not affect the intention to adopt. In other studies, age and level of education have no significant effect on the intention to purchase an EV (e.g., Egbue and Long, 2012; He et al., 2018). Cross-tabulations also indicated that age group and interest in acquiring an EV (Q7) were significantly associated, whereas level of education was not.

Although interest in EVs is significant, these results indicate that much work remains to be done to increase EV adoption rates. Continuing studies identifying barriers that may slow EV adoption are crucial. In the next section, we show the implications for the stakeholders in this business area.

Identifying the key factors hindering EV adoption can be strategic for companies in the sector (Higueras-Castillo et al., 2021). Therefore, the following recommendations are suggested:

— Lack of knowledge is a barrier, so governments must promote research and information dissemination to educate consumers (Larson et al., 2015). Companies that produce these vehicles, as well as retailers, must take into account the social environment in order to facilitate knowledge (Jansson et al., 2017). EV information should be more objective and reliable (for example, referring to consumption values and operating costs) (Larson et al., 2015; Vassileva et al., 2017).
— Communication and promotion of these vehicles should also be considered. When designing marketing strategies for these products, it is important to

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clearly present the advantages of EVs over combustion vehicles, including their main benefits (Rezvani et al., 2018; Orlov & Kallbekken, 2019).

— Incentives should be maintained and, if possible, improved. Since EVs are more expensive than conventional vehicles, it is important to maintain this type of strategy to increase adoption rates (Orlov & Kallbekken, 2019; Higueras-Castillo et al., 2021). In this study, many respondents indicated that incentives were a barrier to their participation. Portugal should develop and increase incentives in order to improve EV adoption rates.

— Portugal has about 5000 charging stations; however, it is important to continue increasing this number, preferably with fast charging stations to keep up with EV growth. Incentives for purchasing and installing these infrastructures are essential (IEA, 2020). This measure can reduce people's anxiety about EVs' autonomy (Egbue & Long, 2012; Vassileva et al., 2017). These stations are essential for successful EV adoption (She et al., 2017). Dagsvik et al. (2002) found that EVs have higher adoption rates when infrastructures support them.

Companies in the sector should continue to improve EV technology by increasing range, developing batteries, reducing charging times, and improving incentives (Higueras-Castillo et al., 2021). Higher autonomy is essential to alleviate buyers' concerns (Higueras-Castillo et al., 2021).

Conclusions

This study aims to address two questions. The first is to verify if the studied sample perceives the barriers presented. The second is to understand if there are differences in terms of demographic characteristics, such as age, gender, and education, regarding the perception of different barriers. The literature evidenced that numerous barriers affect the intention to purchase EVs. The consulted literature identifies barriers such as cost, autonomy, motor reliability, battery confidence, lack of available information, lack of incentives (financial, fiscal), lack of charging infrastructure, charging time, and little knowledge about EVs.

This study presents limitations that can serve as a basis for future research. Since the results of this study, specifically the relationships between barriers and demographic characteristics, were mixed, the importance of future studies to better understand these relationships is heightened. The second limitation is that this study uses barriers identified in the literature analysis, rather than an exploratory approach. A study like this could benefit from an exploratory analysis of other barriers and demographic characteristics, such as annual income, ethnicity, and psychographic factors (e.g., values or personality). Factors such as range anxiety and charging infrastructure should be further studied in the future. Another limitation is that the sample is not representative of the population and is small. The data collection technique only considered those with internet access, who could fill out online forms.

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A future line of research will be to examine the level of knowledge among EV promoters. Much of the misinformation identified may stem from dealerships and sales outlets' inability to pass information along. Evaluating the knowledge and information these agents provide could be an asset in facilitating EV adoption.

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ПОШИРЕННЯ ЕЛЕКТРИЧНИХ ТРАНСПОРТНИХ ЗАСОБІВ: АНАЛІЗ БАР'ЄРІВ ДО ПРИДБАННЯ

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Анотація. Інновації та перехід до екологічніших моделей економіки є критично важливими для забезпечення сталого майбутнього планети та наступних поколінь. Транспортний сектор, на який припадає 25% викидів парникових газів, шукає рішення для подолання цієї проблеми. Електромобілі можуть стати частиною такого рішення. Це дослідження має на меті вивчити бар'єри до придбання електромобіля, зокрема вартість, запас ходу, надійність двигуна, довіру до акумулятора, нестачу інформації, недостатність стимулів (фінансових і фіскальних), брак інфраструктури, тривалість заряджання та недостатній рівень знань про електромобілі, визначені в науковій літературі. Попереднє опитування стало важливим етапом для розроблення інструменту збору даних (онлайн-анкетування), що дозволило визначити, які саме чинники є найбільш значущими для вибірки та чи по-різному вони сприймаються залежно від демографічних характеристик. Результати засвідчили, що саме «вартість» є найчастіше згадуваним чинником, у зв'язку з чим також запропоновано низку рекомендацій для учасників галузі.

Ключові слова: сталий розвиток; електрична мобільність; електромобіль; бар'єри.