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Statistics and Information Management

HOW TO INFLUENCE CONSUMERS' PURCHASE INTENTION TOWARD ELECTRIC VEHICLES

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Dissertation

presented as partial requirement for obtaining the Master's Degree Program in Statistics and Information Management

NOVA Information Management School
Instituto Superior de Estatística e Gestão de Informação
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HOW TO INFLUENCE CONSUMERS' PURCHASE INTENTION TOWARD ELECTRIC VEHICLES

By

João Coelho

Master Thesis presented as partial requirement for obtaining the Master's degree in Statistics and Information Management, with a specialization in Marketing research and CRM.

Supervisor/Orientador(a): Tiago Oliveira

November 2022

ABSTRACT

We cannot maintain our Earth's ecosystems or continue to function as we do if more sustainable choices are not made. If harmful processes are maintained with no change, it is likely that we will run out of fossil fuels, huge numbers of animal species will become extinct, and the atmosphere will be irreparably damaged.

The transportation sector is threatening the sustainable balance, being one of the major sources of carbon dioxide and greenhouse gas emissions. Electrical Vehicles (EVs) are evolving, and its technology could be presented as a consistent solution to fight against gas emissions. Therefore, this research will be focusing on understanding the driving factors associated with electric vehicle (EV) purchases, such as consumer social attributes, EV attributes, and policy perceptions. With these findings, this research intends to help all environment participants to accelerate EVs adoption by providing insights on what Portuguese consumer's value the most.

The analysis was conducted using Structural Equation Model (SEM). As data source, information was collected through an online survey performed to Portuguese consumers. The results have proven, with high significance, that attitude acts as a mediator between the factors included in the categories described above and purchase intention. Several factors have shown significance, mostly with attitude towards EV that indirectly influences purchase intention. The following variables have shown significance with attitude: perceived informative policy; perceived convenience policy; perceived green value; perceived behavior control; face-consciousness; charging risk. Additionally, the variables that showed significance with purchase intention: perceived behavior control; charging risk; attitude.

Furthermore, a moderating effect was found. Gender seems to moderate the relationship of attitude with purchase intention.

KEYWORDS

Electric Vehicles; Purchase Intention; Attitude towards EVs, Influence Factors, Policy perceptions; Consumer social attributes; EV technical attributes, Social Influence, Portugal

Sustainable Development Goals (SGD):

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LIST OF ABBREVIATIONS AND ACRONYMS

EV	Electrical Vehicle
EU	European Union
ICEV	Internal combustion engine vehicle
OFV	“Opplysningsrådet for Veitrafikken” - Road Traffic Information Council (Norway)
SEM	Structural Equation Model
TPB	Theory of Planned Behavior
US	United States

1. INTRODUCTION

The devastating effects of global warming caused by excessive greenhouse gases emissions are well known. Gas emissions levels are still high, being now imperative to manage them in order to prevent the devastating natural disasters that could threaten our planet's lives. In this sense, all EU countries are required to monitor their emissions under the EU's Climate Monitoring Mechanism, which sets the EU's internal reporting rules based on internationally agreed obligations. According to the European Commission Directorate-General for Climate Action, Portugal's gas emissions have decreased 22% in comparison to 2005 and its proposed objective is to achieve a 23% extra decrease until 2033. This trend applies to most Europe countries (EU-27) and the same source claims that the main responsible for these results is the Energy sector in opposition to the Transports sector, which has not registered any significant variations over the past years. Transportation sector is one of the major sources of carbon and greenhouse gas emissions, contributing to nearly one-fourth of the global carbon dioxide (CO2) emissions (Lai et al., 2015; UNEP, 2014). The deterioration of the air quality, the increase of greenhouse gas emissions and a large-scale consumption of fossil fuels are the major challenges of urban transport planning when managing market economies. Electric Vehicles (EVs) can be perceived as a sustainable alternative/solution to the existing and most used internal combustion engine vehicles (ICEVs), due to its advantages like improved fuel efficiency and reduced carbon emissions (Han et al., 2017; Park et al., 2018). According to Degirmenci and Breitner, 2017 and Park et al., 2018, an EV is defined as a vehicle that uses energy stored onboard for its propulsion and has zero-emission potential when the electricity is generated from renewable resources. Despite the obvious advantages, the diffusion of EVs remains slow (CATARC et al., 2019). EV sales versus total vehicles sales in the generality of world's main countries are far below 5% (CATARC et al., 2019). In the specific case of Portugal, EVs sales (against total vehicles sales) have presented values around 6% according to data referent to the first half of 2020. Such low values against such high advantages makes it crucial to understand the driving factors associated with EV purchases (Hardman, 2019).

In recent years, several studies have investigated the public acceptance of electric vehicles and which factors may lead to their adoption. Most of them were concentrated predominantly on bigger countries, such as China, India or US, due to their higher population density and consequently high values on gas emissions. Despite the existence of some studies on this matter for EU countries, the research in the case of Portugal is still scarce. The percentages of Portugal's gas emissions are well aligned with the other EU countries. However, in absolute terms, these values have a low weight compared to bigger countries, due to the fact of being a small country in terms of populational or industrial dimensions. Nevertheless, this does not mean that further research on this subject should be disregarded. In fact, being a small territory (92 212 km²) could be an opportunity for the adoption of this early technology where the average batteries' range is still around 350km and the number of charging points per Km is still low. Portugal could have the perfect conditions to lead the adoption of EVs and this study pretends to understand how to expedite it. Beyond demographics, the study of perceptions on the application of potential government policies is crucial in this matter. Countries with similar dimensions to Portugal in terms of population numbers and its concentration in small areas such as Sweden or Norway, due to the application of tight policies by their governments are getting EV's market shares of 30% and 54.3% (Norwegian Road Federation – OFV, 2020) respectively. Norway is the actual worldwide leader in terms of EVs adoption, and its results are brought about, not by generous subsidization, but by stiff taxation. This research will cross check financial and non-financial

policies that are being applied in Portugal against other countries trying to conclude which could result better having in consideration their influence on Portuguese consumer's purchase intention. Furthermore, literature background suggests that other consumer social attribute variables encompassing a wider range, such as social influence (Zhang et al., 2020), should be considered in future studies. The tendency for consumption is to pay more attention to society's perception and social face, which is labeled as face consumption (Li and Su, 2007). In other words, people are caring more and more about other people's perception and social influence when consuming which could constitute a crucial factor that influences people to go with more sustainable solutions as EVs. Literature also suggests that work should consider more attributes derived from environmental psychology, such as low-carbon awareness and ascription of responsibility (Du et al., 2018; He and Zhan, 2018). This study will provide insights on how both psychological benefits and environmental concerns could influence Portuguese consumers on EVs purchase intention.

2. LITERATURE REVIEW

Electrical vehicles global adoption is imminent and knowing the determinants that might influence consumers is critical for the success of EVs' spreading. The triumph of EVs, as transportation solution, relies on consumers' well acceptance on how they see this technology (Han et al., 2017; Lieven et al., 2011). Therefore, the research community has been working to find out which aspects could influence, either positive or negatively, consumer attitudes towards EVs and consequently purchase intention. These factors could be classified into three different types of categories (Bjerkan et al., 2016; Sierzchula et al.,2014): context factors, consumers characteristics, and technological factors.

Context factors, referred in this research as policies perceptions influence, reflect the behavior of the environment when influenced by aspects implemented by market intervenient, for instance, when policy makers apply incentives to promote a certain product. In what regards to EVs, the efficiency of incentive policies applied by the governments is complex to study and to understand due to its big variety and constant flotation. To better comprehend the impact of the application of these policies on consumers' perceptions, most studies have split it into monetary and non-monetary policies (e.g.: Mersky et al., 2016; Huang et al., 2019). Because consumers perceptions are pointed out as main influent factors on EV adoption (Rezvani et al., 2015), some researchers went further in terms of policies classification. That's the case of Wang et al. (2017), who divided policies perceptions into three: perceived financial policies, information provision policies and convenience policies.

Consumers characteristics, represented in this study as consumer social attributes and demographic influence, relate to demographics such as age, gender, routine travel distance or age, as well as personality traits related to personal feelings, values, or concerns as environment or social status. Anfinsen et al. (2019) found that traditional gender stereotypes are still applicable in some EVs consumer groups. Beyond age or gender, it was also stated that people who drive daily distances that are lower than the EV's average range and people who do not own a private car have more probability to acquire an EV (Baptista et al., 2012). This implies that socio-demographic factors such as age, gender, or travel distance, affect EV purchase intention. In what regards to personality traits, face-consciousness is often significantly related to green products adoption. Face-consciousness reflects consumers' willingness to enrich, preserve, and avoid losing face in relation to someone they consider to be important such as friends, family, or social network (Bao et al. 2003). The fact that consumers are worried about what others might think, may influence them to acquire green products due to reasons such as signaling altruism and identification with certain norms and values (Griskevicius et al. 2010). This behavior is verified especially if there is the possibility to spread it through public sphere (Millet and Dewitte 2007).

Many studies are focused on studying only the effects of consumers characteristics on their attitudes and purchase intention. However, it is proven that their perceptions have also a strong influence (Rezvani et al., 2015). That is the case of perceived green value that represents the overall assessment that consumers make among what is obtained and offered having in consideration consumers' vision for sustainability matters (Chen et al, 2012). It is pointed out that perceived value is an important factor not only to promote long term relationships with customers but also purchase intentions (Zhuang et al., 2010). Likewise, perceived behavior control is also indicated by empirical studies as a factor that might influence purchase intention (Ajzen, 1991). Perceived behavioral control stands for the perception that consumers have regarding their existing knowledge, resources, and abilities to

perform a behavior such as product adoption (Graf, 2013). If consumers believe to have the necessary capabilities to own an EV, it is most likely that they will acquire one.

The latest, technological factors, presented as EV attributes influence in this research, are strictly related to the EVs inherent attributes such as EVs' brands, price, costs and charging risk. If there is a company that is successful in terms of brand awareness, this means that its products have a good reputation in the market and they are generally well accepted by consumers (Gustafson et al., 2007). The higher the brand awareness levels are, the bigger consumer's confidence, as well as consumers' adoption (purchase) will be (Aaker et al.,1990). As for the evaluation of EVs price as an influent factor on consumer's willingness to buy, He et al. (2018) and Degirmenci et al. (2017) found out that price does matter, mostly because EVs are still more expensive to own than equivalent conventional vehicles. Higher prices and maintenance costs without the proper incentives applied could lead consumers to abandon the idea of getting an EV, even for those who see themselves as enthusiasts of pro-environmental products (Liao et al., 2017). Still in the technological factors influence topic, the lack of charging facilities, limited driving range and time to charge are seen as barriers for EV adoption (Jabeen et al., 2012). There is plenty of research on this matter (Sierzchula et al.,2014; Junquera et al.,2016; Hidrue et al., 2011) that shows that both EVs' performance and charging risks are main factors considered by consumers before adopting EVs. Despite being clear that infrastructure investment is required, players (either governments or EV companies) are facing classic chicken - egg dilemma, infrastructures and battery technology development is required, however this may not make sense in terms of economic viability if there are not enough vehicles circulating (Junquera et al.,2016)

3. RESEARCH HYPHOTHESIS DEVELOPMENT

3.1. POLICIES PERCEPTION INFLUENCE

The success of the EV market depends on how well consumers will accept/adopt it and therefore, governments must do their part by constantly announcing new strategies to boost and optimize this industry. TPB framework suggests that people's attitudes are influenced by their expectations (Ajzen et al., 1975). If policies implemented by governments are seen as a benefit (Wang et al., 2017), then this will have a direct effect on consumer attitudes.

To emphasize EVs as the perfect replacement solution, institutions may apply monetary policies, also known as financial (e.g.: purchase price subsidies, tax reduction) and/or non-financial measures (eg: dedicated parking, green number plate, exemption from traffic regulations). Several studies found out that government incentives may positively motivate the attitudes towards EV and purchase intention. (Sierzchula et al., 2014).

Furthermore, it is also stated that both convenience (Kumar et al., 2020) and product information strategies (Cerri et al., 2018) are as well critical for leveraging pro-environmental attitudes and consequently increase willingness to buy green products such EVs.

Hence, the following hypothesis summarize these arguments:

H1: Perceived financial policies have a significant effect in attitude towards EVs (**H1a**) and purchase intention (**H1b**).

H2: Perceived information policies have a significant effect in attitude towards EVs (**H2a**) and purchase intention (**H2b**).

H3: Perceived convenience policies have a significant effect in attitude towards EVs (**H3a**) and purchase intention (**H3b**).

3.2. CONSUMER SOCIAL ATTRIBUTES INFLUENCE

Face-consciousness describes the consumers' need to promote, preserve and avoid losing face in social networks, friends, and family. Studies have found that the opinions of family members, friends, colleagues or even neighbors can influence how individuals consider EVs for their transportation solution. Moreover, similar studies suggest that EVs adoption could be driven by prosocial considerations of consumers image and social status (Graham-Rowe et al., 2012) meaning that, to reap their psychological benefits, they are willing to buy an EV even if this technology is highly priced.

Behaviors focused on sustainability are nowadays more and more trendy which means that consumers may also believe that having an EV can help them to express their position in terms of environmentally friendly behavior. Lai et al. (2015) studies have confirmed that environmental concerns Delang et al. (2012) and perceptions of economic benefits positively influence the purchase intention of EVs. The perceived green value is pointed out as one of the attributes that might influence consumers on getting an EV, as it represents EV green advantages when compared to other transportation solutions

(conventional vehicles). The more advantages the consumer recognizes in a product or service, the more value he attributes to it, and this will contribute to their willingness to buy green products.

Perceived behavioral control is also pointed by most research as a variable that influences attitudes and purchase intention. It represents the subjectively perceived difficultness or easiness of performing a determined behavior (Ajzen, 1991; Graf, 2013). Studies stated that, due to the fact that EVs are associated to high prices and risks, consumers might even not begin to consider it if they fell not to be able to pay for it (Ajzen, 1991; Afroz et al. 2015).

Hence, the following hypothesis summarize these arguments:

H4: Perceived green value has a significant effect in attitude towards EVs (**H4a**) and purchase intention (**H4b**).

H5: Perceived behavioral control has a significant effect in attitude towards EVs (**H5a**) and purchase intention (**H5b**).

H6: Face-consciousness has a significant effect in attitude towards EVs (**H6a**) and purchase intention (**H6b**).

3.3. EV ATTRIBUTES INFLUENCE

EVs technology is relatively new and despite many efforts to develop it as soon as possible, there are still limitations inherent to it. Battery range and planning of charging infrastructures are examples of complex technical issues that are not just dependent on a single intervenient such as the producers but on others as well such as governments that are responsible for infrastructures planning.

Through the last years, researchers have been pointing out that limited choice of EV models, the need for overnight charging, finding charging stations and planning in accordance with range and charging constraints are serious drawbacks when consumers think on adopt EVs (Wang et al., 2018; Jabeen et al., 2012; Lebeau et al., 2013). Egbue and Long (2012), Giffi et al. (2011) have even stated that there are 6 main technical barriers that could influence, either positive or negatively, consumers on EVs adoption: 1) battery range and degradation, 2) higher purchasing costs, 3) limited charging infrastructure and long recharging time, 4) perceived risks, 5) running costs and 6) the evolution of technology.

Besides the referred technical factor, EV brand's image is also critical. Brand awareness is vital to brand equity because it is the first step on building and enhancing brand value Wang et al., (2018). If the customer knows the brand, this will result in a better odd of that brand being part of his consideration set when making a purchase decision (Baker et al., 1986; Chakravarti et al., 2003).

Therefore, this research hypothesizes that:

H7: Price and cost battery have a negative significant effect in attitude towards EVs (**H7a**) and purchase intention (**H4b**).

H8: Charging risk has a negative significant effect in attitude towards EVs (**H8a**) and purchase intention (**H8b**).

H9: Brand awareness has a significant effect in attitude towards EVs (**H9a**) and purchase intention (**H9b**).

3.4. ATTITUDE INFLUENCE

In this research, attitude refers to consumers' general assessment on their willingness to buy EVs.

Attitude can be defined as the typical emotional assessment of consumers' actions (Ajzen, 1991). Ajzen claims that consumers' attitudes and perceptions influence buying behavior, and this is validated by many other researchers such as Manstead (2000). Further research also claimed that consumers who are positively inclined towards EVs (positive attitude) do have a higher willingness to buy EVs, if compared to those who have negative attitudes. (Ziegler, 2012). This assumption is supported by several research that points attitude as the leading factor with a positive effect on purchase intention (Schmalfuß et al., 2017; Li et al., 2018; Shalender et al., 2018).

It is proven that attitudes have a close relation with purchase intentions, however this research doesn't want only to validate this relation, but also to understand how the attitudes towards EVs can be influenced. The attitude factor will be settled as mediation to access the indirect effect of related EVs attributes with purchase intention. Attitudes could be positively and negatively influenced by many different types of attributes. An example of proven positive influence in attitudes towards EVs could be the image and social status that EVs ownership brings (Skippon et al., 2016). Emotional attitudes such as environmental concerns are also highly referenced in background research as influential in consumer's willingness to buy (Skippon et al., 2016; Haustein et al., 2018). On the other hand, there are also factors that influence negatively attitudes towards EVs, and they are usually factors that are perceived as difficulties or hindrances to consumer's routines. Time to fully charge, batteries range, charging stations scarcity are factors already proven by most researchers as components that negative influence attitudes and purchase intention (Rezvani et al., 2015).

Therefore, this research hypothesizes that:

H10: Attitude, acting as a mediator for several factors, has a significant effect in Purchase Intention.

3.5. DEMOGRAPHICS INFLUENCE - GENDER

Anfinsen et al. (2019) found that traditional gender stereotypes are still applicable in some EVs consumer groups.

Several studies learned that men (vs women) are more willing to acquire EVs (He et al., 2018) and (Kumar et al. ,2020). However, it was also revealed that women (Yang et al., 2019) have a more positive attitude towards EVs and attribute is pointed by the literature as one of the most effective in influencing purchase intention. This could be related to the fact of women being, in general, more concerned about environmental issues and hence have a better attitude with products that they might

consider as environmentally friendly ((Schahn et al., 1990). Zelezny et al. (2000) discovered that females present a stronger environmental attitude (vs males) over fourteen countries.

Therefore, this research hypothesizes that:

H11: Gender positively moderates the effect of attitude in purchase intention.

4. METHODOLOGY

Being the issue identified, this study design is causal/ explanatory research. The main objective is to obtain significant evidence that there are cause-effect (causal) relationships, in other words, to understand the effects between the independent (demographics, policies perceptions, EVs' attributes, and consumer social attributes) and the dependent variables (purchase intention and attitude towards EV).

4.1. CONSTRUCTS AND MEASURES

The research model was first designed by taking into consideration current literature background and inherent research gaps. To complement literature background, online qualitative interviews were conducted to a total of 10 Portuguese consumers to assess their perceptions regarding EV adoption. Each participant was interviewed individually and invited to answer a total of 6 open questions (table 1) and 5 multiple choice questions in a scale of 1, strongly disagree, to 7, strongly agree (table 2).

Table 1 - Analysis qualitative research – Open questions

Respondent profiles (n=10).

		Frequency	Percentage
What first comes to your mind when you think of EVs?	Brand	7	70%
	Price	4	40%
	Sustainability	4	40%
	Innovation	3	30%
What do you know about EVs?	Expensive	4	40%
	Range	4	40%
	Charging risk	3	30%
	Policies	2	20%
Have you ever had an experience with Electrical Vehicles?	Yes	9	90%
	No	1	10%
What are the most relevant factors that could influence you purchasing an EV?	Price	9	90%
	Maintenance Cost	7	70%
	Range	2	20%
	Sustainability	2	20%
Do you think it is possible to adopt an EV in Portugal nowadays?	Yes	5	50%
	No	5	50%
Do you know anything about incentive policies applied to EV owners?	Yes, monetary	7	70%
	Yes, non-monetary	6	60%
	No	3	30%

Table 2 - Analysis qualitative research – Ordinal questions

Question : To what extent do you agree with the following statements? (	$\tilde{x}$
The social approval (Social Status) inherent to owning an Electric Vehicle may influence me obtaining an Electric Vehicle (Face Consciousness).	2
Price is a factor that can influence me buying an Electric Vehicle (Price and Battery Cost).	6
Cost is a factor that can influence me buying an Electric Vehicle (Price and Battery Cost).	7
Monetary benefit policies are a factor that can influence me buying an Electric Vehicle (Financial Policies).	7
Non-monetary benefit policies are a factor that can influence me buying an Electric Vehicle (Convenience Policies).	5

The results of these interviews helped to narrow down the constructs included in the research model, once only the ones that were considered as important for Portuguese consumers were included (table 3). As soon as the measures were defined, their validity and reliability were tested. All the outer loadings with values between 0.40 and 0.70 were removed, but only if this action leads to an increase in the composite reliability. Therefore, despite some of the items having presented loadings a little below of 0.7, only one item was eliminated and not included in the study, PCB 2 – "EVs have high costs to replace a battery".

Table 3 - Measurement items

Construct	Measurement items
PFP Perceived Financial Policy (Wang et al., 2021)	For adopting BEVs, a government direct subsidy policy is attractive to me. For adopting BEVs, toll road exemptions are valuable to me. For adopting BEVs, exemption from sales tax is helpful to me. For adopting BEVs, exemption from VAT is useful to me.
PIP Perceived Information Policy (Wang et al., 2021)	For adopting BEVs, information on the practicality and reliability of BEVs is useful to me. For adopting BEVs, information on the charging time and battery life of BEVs is helpful to me. For adopting BEVs, information on the fuel consumption and environmental performance of BEVs is valuable to me. For adopting BEVs, information on the driving range of BEVs is important to me.
PCP Perceived Convenience Policy (Wang et al., 2021)	For adopting BEVs, the fact that BEVs are permitted to access highoccupancy vehicle (HOV) lanes is important to me. For adopting BEVs, the fact that BEVs are permitted to have a dedicated parking space and are thus easy to park is helpful to me. For adopting BEVs, the fact that BEVs are unrestricted by the rules related to even- and odd-numbered license plates is useful to me. For adopting BEVs, the fact that BEVs are not required to line up when conducting the annual vehicle inspection is attractive to me.
PGV Perceived Green Value (Hamzah & Tanwir, 2021)	I know that hybrid cars offer to save on energy costs. I know that hybrid cars have better fuel consumption as compared to conventional cars. I know that hybrid cars produce lesser harmful emission as compared to conventional cars. I know that hybrid cars give me more savings from higher tax exemption as compared to conventional cars.
PBC Perceived Behaviour Control (Hamzah & Tanwir, 2021)	I believe I have the ability to purchase a hybrid car. If it were entirely up to me, I am confident that I will purchase a hybrid car. I see myself as capable of purchasing a hybrid car in the future. I have the willingness to purchase a hybrid car.

	There are likely to be plenty of opportunities for me to purchase a hybrid car.
	I feel that purchasing a hybrid car is totally within my control.
FC Face Consciousness (Wang et al., 2021)	Purchasing a EV can help show to others than I am socially responsible with regard to environmental protection.
	Purchasing a EV will bring me much more social approval.
	Purchasing a EV can improve people's impression of me.
PCB Price and Cost Battery (Kim et al., 2018)	The costs of purchase and batteries reduce the attractiveness of EVs compared to conventional vehicles.
	EVs are expensive to purchase.
CR Charging Risk (Kim et al., 2018)	EVs do not satisfy my expectations in terms of driving range.
	EVs do not satisfy my expectations in terms of charging time.
	EVs do not satisfy my expectations in terms of available charging infrastructure.
	Charging stations for EVs are difficult to find and make me anxious.
	I would rather be willing to reduce my unsustainable consumption to help protect the environment.
BA Brand Awareness (Yoo et al, 2000; Netemeyer et al, 2004)	I am aware of brand X.
	When I think of EV, brand X is one of the brands that comes to mind.
	X is a brand of PC I am very familiar with.
	I know what brand X looks like.
	I can recognize brand X among other competing brands of EV.
ATT Attitude (Ye et al., 2021)	I think buying an EV is a good choice.
	I think it is very necessary to use EVs.
	I think buying an EV is a wise idea.
	I am interested in EVs.
PI Purchase Intention (Ye et al., 2021)	I intend to buy an EV in the near future.
	If I replace my car, I will consider an EV first.
	I recommend that others buy an EV.

4.2. DATA COLLECTION

Quantitative primary data was collected through the realization of an online (electronic) questionnaire, using different measures to assess the factors that may influence Portuguese consumers to adopt EVs. Despite the target being Portuguese consumers, the survey was exclusively drafted in English to avoid potential miss alignments in translation. The survey was divided into two parts, where the first part assessed all the constructs with a seven-point Likert scale (ranging from "strongly disagree" (1) to "strongly agree" (7)). The second part was fully dedicated to demographics data collection.

This survey was conducted during the second half of 2022 to respondents over 18 years old (legal age to drive in Portugal) using Qualtrics XM. A total of 357 responses were collected, however, after data treatment, where incomplete and out of study scope responses (Living Country ≠ Portugal; Origin Country ≠ Portugal; Gender ≠ Male or Female) were removed, it was left a total of 216 respondents (n=216).

4.3. SAMPLE CHARACTERISTICS

By consulting table 4, it is possible to conclude that despite well balanced, the number of males (52.8%) is higher than the number of females (47.2%). It is also clear that a big part of the sample, 48.5%, is young (18-29). This percentage increases to 69% of the total respondents if we consider people between 18 and 39 years old. More than half of the sample is highly educated and around three thirds were observed to travel less than 400 Km per week, which is very close to the average driving range (336 Km) of full Electric Vehicles according to last figures shared in electric vehicles data base website. This means that current available EV technology would allow three thirds to perform their personal transportation routines with a single charge per week.

Table 4 - Analysis results of the demographic variables

Respondent profiles (n=216).

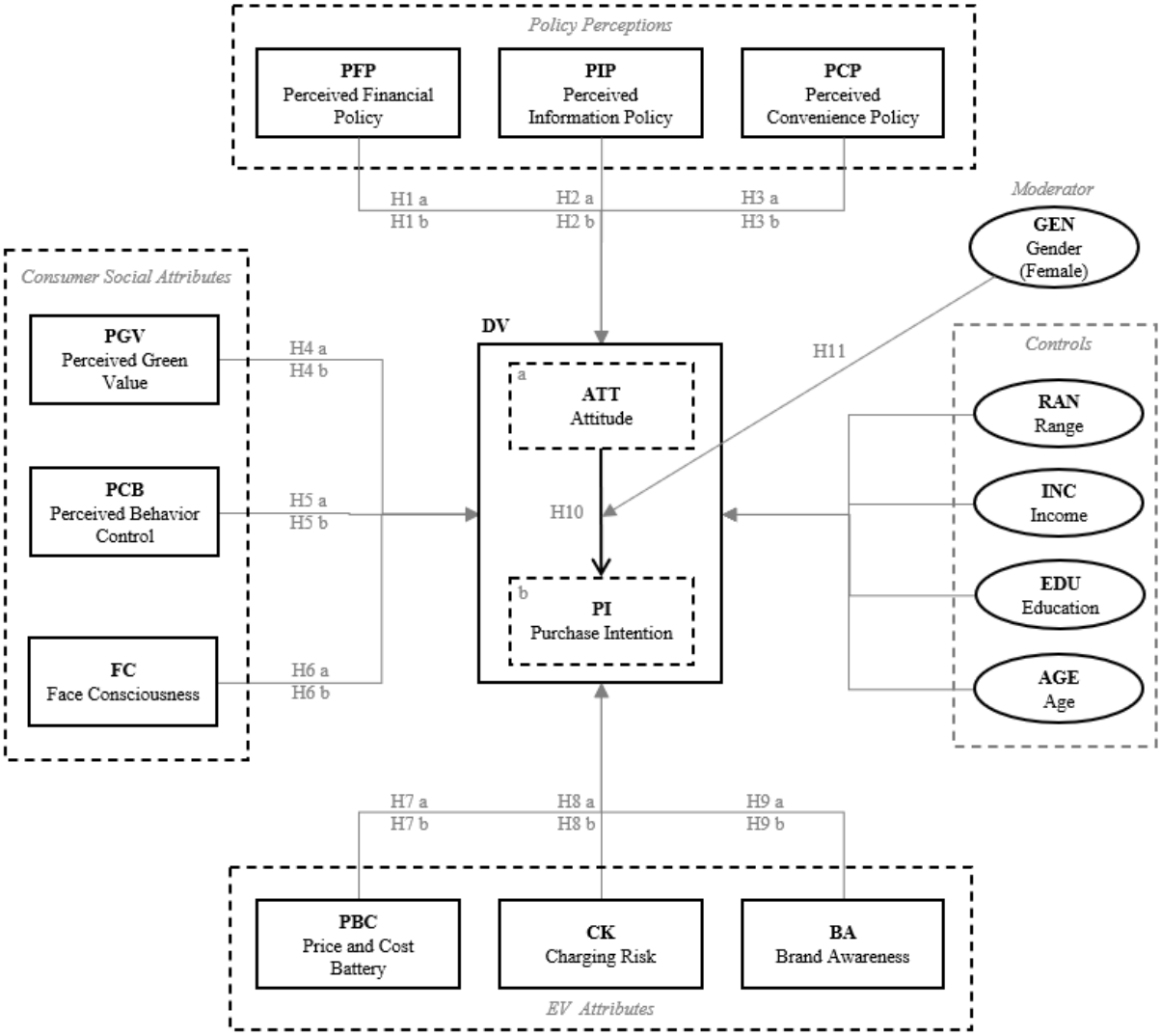
Category		Percentage	Category		Percentage
Gender	Male	52.8%	**Employment Status**	Not current employed	3.2%
	Female	47.2%		Student	4.2%
Age	18 - 29	43.5%		Self-Employed	9.7%
	30 - 39	25.5%		Employed	82.9%
	40 - 49	14.8%	**Income**	Prefer not to answer	5.1%
	> 50	16.2%		No Income	2.8%
Origin Country	Portugal	100.0%		< 500€	1.4%
	Others	0.0%		501 € - 1000 €	15.3%
Living Country	Portugal	100.0%		1001 € - 2000 €	52.3%
	Others	0.0%		2001 € - 3000 €	14.8%
Education	Less than High School diploma	0.5%		> 3000 €	8.3%
	High School diploma	8.3%	**Range**	< 200 Km	44.4%
	Some university, but no degree	7.4%	(Driving distance per week)	201 Km - 400 Km	35.6%
	Bachelor's degree	30.1%		401 Km - 600 Km	10.6%
	Master's degree	51.9%		601 Km - 800 Km	5.1%
	Doctorate	1.9%		801 Km - 1000 Km	2.3%
				> 1001 Km	1.9%

4.4. STRUCTURAL EQUATION MODEL

Smart PLS version 4.0 was used to perform multivariate statistical analysis through Structural Equation Modeling (SEM). The intuit of using this procedure was to test the previously defined hypotheses about the factor structure for a set of variables. The variance based PLS approach was chosen once it can get strong estimates with small sample sizes (n = 216) such is the case of this study. Additionally, PLS does not require multivariate normal distribution for the underlying data (Bhattacherjee et al., 2004; Fornell et al., 1982; Hsieh et al., 2008). PLS is as well pointed out as good approach for early stages of research (Gefen et al., 2000; Thong et al., 1996) such as in the case of EV research regarding consumer purchase intentions.

All the constructs presented in the structural model (fig 1) are reflective and were grouped by Consumer social attributes (3), Policy perceptions (3), Electric vehicles attributes (3), Controls (4), Moderator (1) and Dependent variables (2).

Fig 1 – Structural model



5. DATA ANALYSIS AND RESULTS

5.1. VALIDITY AND RELIABILITY

To establish discriminant validity, all the constructs presented in the model were tested by using three different approaches: Fornell-Lacker criterion, heterotrait-monotrait ratio of correlations (HTMT) and cross loadings. According to background literature these three approaches can only be applied to models with reflective constructs, which is the case.

By checking table 5, providing Fornell-Lacker criterion values, the square roots of AVE (diagonal values) are higher than 0.5 and larger than all values presented in non-diagonal lines, which demonstrates that the discriminant validity is proven and can be further analyzed (Fornell et al., 1981). AVE value of 0.50 or higher indicates that, on average, the construct explains more than half of the variance of its indicators.

Table 5 - Analysis of discriminant validity (Fornell-Larcker criterion)

Construct	ATT	BA	CR	FC	PBC	PCB	PCP	PFP	PGV	PI	PIP
ATT Attitude	0.864										
BA Brand Awarness	0.19	0.822									
CK Charging Risk	-0.162	0.021	0.751								
FC Face Consciousness	0.336	0.078	-0.098	0.794							
PBC Perceived Behaviour Control	0.65	0.236	-0.052	0.216	0.752						
PCB Price & Cost Batery	0.068	0.065	0.194	-0.012	-0.002	0.805					
PCP Perceived Convenience Policy	0.393	0.141	-0.075	0.261	0.398	-0.114	0.784				
PFP Perceived Financial Policy	0.421	0.249	-0.01	0.127	0.476	0.041	0.408	0.878			
PGV Percived Green Value	0.517	0.322	-0.021	0.248	0.406	0.015	0.238	0.464	0.803		
PI Purchase Intention	0.712	0.114	-0.182	0.293	0.744	-0.002	0.364	0.378	0.324	0.84	
PIP Perceived Information Policy	0.399	0.221	0.006	0.032	0.372	0.181	0.149	0.514	0.307	0.317	0.878

Research results provided by Henseler (2015) stated that Fornell-Larcker criterion approach is not always able to detect lack of discriminant validity in common research situations. Therefore, as an alternative, they proposed a new approach based on a multimethod matrix, the heterotrait-monotrait ratio of correlations (HTMT). The same study states that ratio values should be under 0.9, which is verified in this research and confirms discriminant validity (table 6).

Table 6 - Analysis of discriminant validity (HTMT)

Construct	ATT	BA	CR	FC	PBC	PCB	PCP	PFP	PGV	PI	PIP
ATT Attitude	1										
BA Brand Awarness	0.202	1									
CK Charging Risk	0.139	0.141	1								
FC Face Consciousness	0.339	0.102	0.112	1							
PBC Perceived Behaviour Control	0.67	0.264	0.132	0.224	1						
PCB Price & Cost Batery	0.061	0.115	0.369	0.096	0.158	1					
PCP Perceived Convenience Policy	0.46	0.159	0.129	0.38	0.472	0.123	1				
PFP Perceived Financial Policy	0.458	0.294	0.117	0.134	0.505	0.138	0.466	1			
PGV Percived Green Value	0.642	0.419	0.157	0.25	0.488	0.138	0.306	0.568	1		
PI Purchase Intention	0.845	0.134	0.203	0.324	0.841	0.059	0.45	0.437	0.42	1	
PIP Perceived Information Policy	0.439	0.258	0.093	0.061	0.386	0.291	0.176	0.583	0.378	0.375	1

Also, the third approach (cross loadings) was successful in confirming discriminant validity. As per table 7, the outer loading of each item on its associated construct is higher than the loading of the items on other constructs (Henseler et al., 2015).

Table 7 - Analysis of cross-loadings

Item / Construct	ATT	BA	CR	FC	PBC	PCB	PCP	PFP	PGV	PI	PIP
ATT1	**0.898**	0.206	-0.208	0.295	0.569	0.071	0.367	0.428	0.486	0.614	0.393
ATT2	**0.812**	0.061	-0.107	0.33	0.425	0.04	0.298	0.226	0.525	0.523	0.236
ATT3	**0.909**	0.101	-0.147	0.33	0.537	0.031	0.403	0.345	0.398	0.619	0.311
ATT4	**0.832**	0.267	-0.095	0.216	0.69	0.09	0.288	0.433	0.39	0.688	0.417
BA1	0.169	**0.807**	0	0.066	0.165	0.083	0.077	0.161	0.209	0.054	0.18
BA2	0.191	**0.841**	0.035	0.097	0.244	0.012	0.135	0.228	0.276	0.143	0.169
BA3	0.138	**0.861**	-0.008	0.044	0.187	0.076	0.152	0.232	0.293	0.086	0.182

BA4	0.098	**0.775**	0.045	0.025	0.152	0.062	0.089	0.188	0.292	0.069	0.214
CR1	-0.166	-0.062	**0.848**	-0.097	-0.107	0.205	-0.134	-0.032	-0.033	-0.179	0.006
CR2	-0.162	0.048	**0.861**	-0.062	-0.018	0.117	-0.033	-0.045	-0.08	-0.149	-0.033
CR3	0.008	0.13	**0.654**	-0.093	0.04	0.14	0.021	0.095	0.157	-0.09	0.125
CR4	-0.016	0.114	**0.603**	-0.058	0.053	0.119	0.061	0.119	0.1	-0.064	0.012
FC1	0.383	0.055	-0.136	**0.871**	0.214	0.019	0.158	0.136	0.313	0.311	0.048
FC2	0.159	0.045	-0.045	**0.76**	0.136	-0.092	0.261	0.05	0.053	0.166	-0.012
FC3	0.136	0.107	0.02	**0.745**	0.129	0.016	0.297	0.085	0.099	0.143	0.016
PBC1	0.649	0.126	-0.097	0.21	**0.834**	0.08	0.318	0.372	0.35	0.707	0.302
PBC2	0.5	0.243	-0.085	0.166	**0.789**	0.056	0.315	0.415	0.422	0.567	0.401
PBC3	0.671	0.232	-0.119	0.245	**0.898**	0.043	0.358	0.513	0.397	0.754	0.381
PBC4	0.363	0.225	0.095	0.069	**0.744**	-0.052	0.231	0.307	0.239	0.421	0.202
PBC5	0.187	0.131	0.08	0.093	**0.541**	-0.182	0.259	0.198	0.098	0.291	0.071
PBC6	0.312	0.108	0.057	0.106	**0.652**	-0.153	0.324	0.218	0.18	0.402	0.174
PCB1	0.006	0.08	0.258	-0.047	0.029	**0.551**	0.007	0.118	0.123	-0.031	0.214
PCB3	0.071	0.06	0.178	-0.008	-0.005	**0.996**	-0.121	0.031	0.003	0.001	0.169
PCP1	0.302	0.158	-0.001	0.202	0.333	-0.054	**0.8**	0.347	0.2	0.298	0.098
PCP2	0.373	0.137	-0.094	0.159	0.396	-0.116	**0.819**	0.409	0.238	0.34	0.217
PCP3	0.287	0.072	-0.091	0.293	0.227	-0.06	**0.778**	0.163	0.11	0.253	0.045
PCP4	0.249	0.057	-0.042	0.181	0.263	-0.13	**0.735**	0.336	0.184	0.231	0.074
PFP1	0.426	0.088	-0.077	0.127	0.433	-0.031	0.428	**0.876**	0.425	0.413	0.34
PFP2	0.345	0.254	-0.004	0.116	0.366	0.028	0.347	**0.839**	0.367	0.259	0.488
PFP3	0.369	0.265	0.013	0.103	0.452	0.067	0.33	**0.92**	0.461	0.329	0.516
PFP4	0.322	0.309	0.053	0.097	0.411	0.098	0.307	**0.877**	0.365	0.298	0.494
PGV1	0.372	0.269	-0.07	0.185	0.343	0.014	0.154	0.353	**0.8**	0.225	0.241
PGV2	0.462	0.182	0.014	0.258	0.278	0.051	0.191	0.356	**0.796**	0.298	0.254
PGV3	0.4	0.338	-0.003	0.142	0.366	-0.036	0.226	0.408	**0.812**	0.247	0.244
PI1	0.533	0.107	-0.044	0.191	0.68	0.02	0.295	0.366	0.282	**0.834**	0.277
PI2	0.57	0.042	-0.211	0.193	0.616	0.001	0.255	0.256	0.198	**0.883**	0.273
PI3	0.69	0.138	-0.203	0.352	0.58	-0.027	0.366	0.329	0.333	**0.803**	0.248
PIP1	0.354	0.243	-0.066	0.044	0.324	0.107	0.177	0.478	0.29	0.257	**0.846**
PIP2	0.391	0.221	-0.002	-0.026	0.32	0.201	0.096	0.427	0.289	0.291	**0.909**
PIP3	0.348	0.117	0.015	0.033	0.33	0.169	0.148	0.439	0.257	0.283	**0.908**
PIP4	0.303	0.194	0.077	0.07	0.336	0.154	0.104	0.466	0.24	0.281	**0.845**

Moreover, the figures presented in table 8 prove that the model is consistent in what regards to the construct's reliability. All the values for both Composite Reliability and Cronbach's Alpha exceeded 0.70 (Hair et al., 1998].

Therefore, the convergence and discriminant validity of the measurement tools in this study are good, indicating that the scale in this study has good structural validity and can be further analyzed.

Table 8 - Analysis of discriminant validity

Construct	Indicators	Factor Loading	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
ATT Attitude	ATT1	0.898	0.866	0.921	0.746
	ATT2	0.812			
	ATT3	0.909			
	ATT4	0.832			
BA Brand Awareness	BA1	0.807	0.845	0.892	0.675
	BA2	0.841			
	BA3	0.861			
	BA4	0.775			
CR Charging Risk	CR1	0.848	0.787	0.834	0.563
	CR2	0.861			
	CR3	0.654			
	CR4	0.603			
FC Face Consciousness	FC1	0.871	0.758	0.836	0.63
	FC2	0.76			
	FC3	0.745			
PBC Perceived Behaviour Control	PBC1	0.834	0.853	0.884	0.566
	PBC2	0.789			
	PBC3	0.898			
	PBC4	0.744			
	PBC5	0.541			
	PBC6	0.652			
PCB Price and Cost Battery	PCB1	0.551	0.647	0.773	0.648
	PCB3	0.996			
PCP Perceived Convenience Policy	PCP1	0.8	0.793	0.864	0.614
	PCP2	0.819			
	PCP3	0.778			
	PCP4	0.735			
PFP Perceived Financial Policy	PFP1	0.876	0.902	0.931	0.772
	PFP2	0.839			
	PFP3	0.92			
	PFP4	0.877			
PGV Perceived Green Value	PGV1	0.8	0.726	0.845	0.644
	PGV2	0.796			
	PGV3	0.812			
PI Purchase Intention	PI1	0.834	0.791	0.878	0.706
	PI2	0.883			
	PI3	0.803			
PIP Perceived Information Policy	PIP1	0.846	0.900	0.930	0.770
	PIP2	0.909			
	PIP3	0.908			
	PIP4	0.845			

5.2. MODEL TEST RESULTS

The total variance of EV purchase intention explained by attitude is 57.1%. The following hypotheses were supported: H2a, H3a, H4a, H5a, H5b, H6a, H8a, H8b, H10 and H11. This means that most attributes failed on explaining purchase intention but succeeded on explaining attitude. Consequently,

attitude, that presents a very strong significance with purchase intention (β = 0.512, p < 0.00), is acting as a mediator between most of the factors included in structural model and purchase intention (H10 is validated). Model test results for each one of the hypotheses are labeled in both Table 9 and Fig.2.

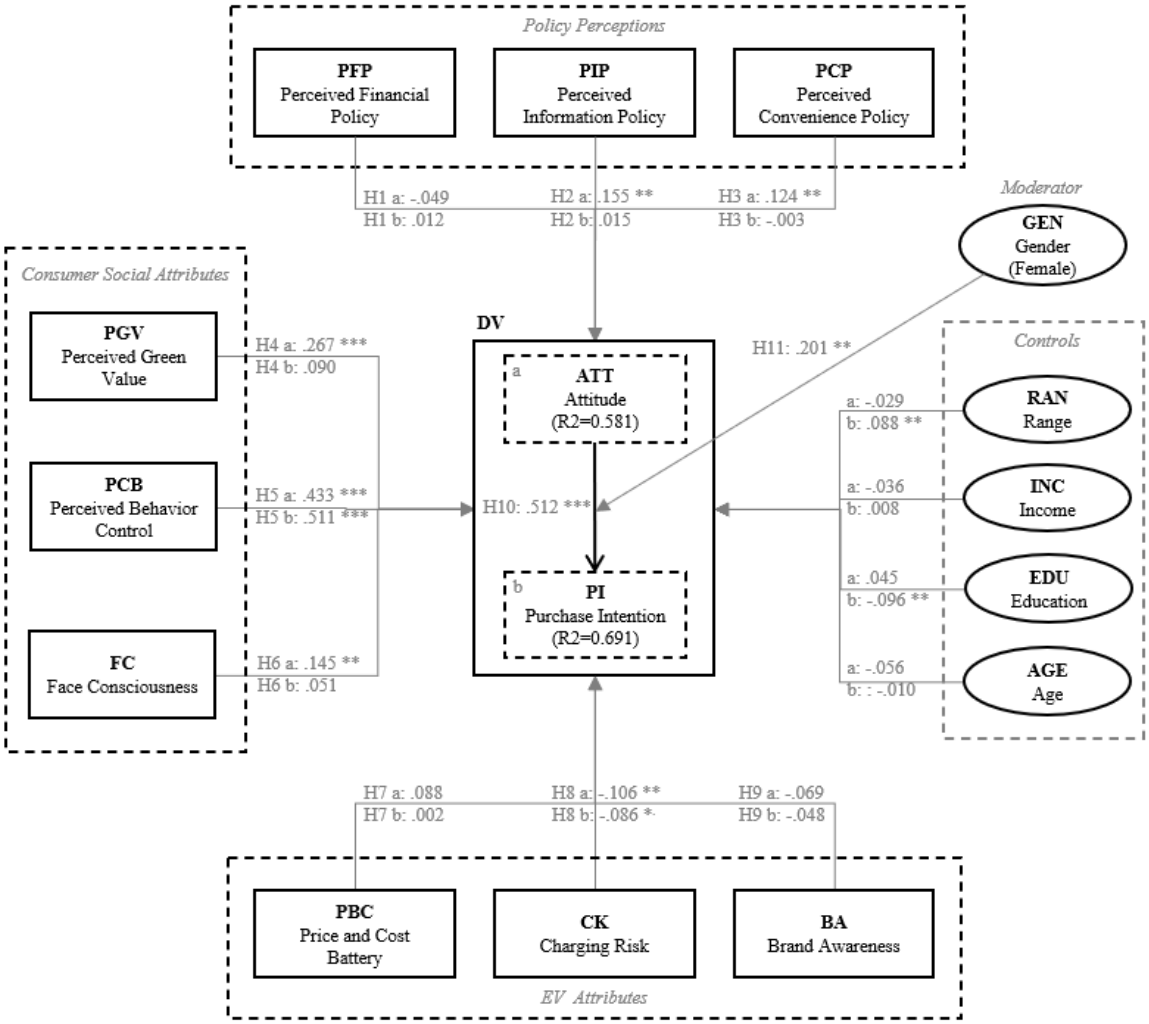
Table 9 – Hypothesis testing results

Hypo.	Path	β	S.E.	t-value	P values
Direct Effects					
H1a	Perceived Financial Policy → ATT	-0,049	0,059	0,827	0,408
H1b	Perceived Financial Policy → PI	0,012	0,055	0,224	0,823
H2a	Perceived Informative Policy → ATT	0,155	0,060	2,566	0,010**
H2b	Perceived Informative Policy → PI	0,015	0,047	0,317	0,751
H3a	Perceived Convenience Policy → ATT	0,124	0,059	2,103	0,036**
H3b	Perceived Convenience Policy → PI	-0,003	0,051	0,062	0,950
H4a	Perceived Green Value → ATT	0,267	0,059	4,492	0,000***
H4b	Perceived Green Value → PI	0,090	0,058	1,548	0,122
H5a	Perceived Behavior Control → ATT	0,433	0,070	6,215	0,000***
H5b	Perceived Behavior Control → PI	0,511	0,055	9,342	0,000***
H6a	Face Consciousness → ATT	0,145	0,047	3,088	0,002**
H6b	Face Consciousness → PI	0,051	0,045	1,129	0,259
H7a	Price & Cost Battery → ATT	0,088	0,081	1,080	0,280
H7b	Price & Cost Battery → PI	0,002	0,038	0,049	0,961
H8a	Charging risk → ATT	-0,106	0,054	1,972	0,049**
H8b	Charging risk → PI	-0,086	0,047	1,813	0,070*
H9a	BA → ATT	-0,069	0,056	1,239	0,215
H9b	BA → PI	-0,048	0,051	0,928	0,353
H10	ATT → PI	0,512	0,071	7,217	0,000***
Interaction Effects					
H11	Gender x ATT -> PI	0,201	0,087	2,308	0,021**

Notes: * p < .10 ; ** p < .05 ; *** p < .00; S.E. = Standard error.

Starting with policy perceptions, neither perceived financial policy, perceived informative policy, nor perceived convenience policy have shown significance with purchase intention, thus H1a, H2a and H3a are not supported. In fact, it seems that perceived financial policy has not shown significance with attitude also, which means that H1a is also not supported. By looking into the results of the policies studied in this research, it is concluded that both perceived informative policy (β = 0.155, p < 0.05) and perceived convenience policy (β = 0.124, p < 0.05) have positive effects in attitude, which means that H2a and H3a are supported.

Fig 2 – Structural model (results)



Going with consumer social attributes, which aggregates perceived green value, perceived behavior control and face consciousness, only perceived behavior control has showed a positive significant effect in purchase intention ($\beta = 0.511$, $p < 0.00$), therefore H5b is validated whereas H4b and H6b don't. Regarding its effect on attitude, all three factors, perceived green value ($\beta = 0.267$, $p < 0.00$), perceived behavior control ($\beta = 0.433$, $p < 0.00$) and face consciousness ($\beta = 0.145$, $p < 0.05$) have showed positive significance in attitude. Hence, H4a, H5a and H6a are validated.

Lastly, EV attributes haven't demonstrated to be very efficient in explaining attitude and purchase intention. In fact, just one out of the three studied in this research, charging risk, has shown to be negatively significant with both attitude ($\beta = -0.106$, $p < 0.05$) and purchase intention ($\beta = -0.086$, $p < 0.1$), thereby H8a and H8b are supported. As for price and cost battery and brand awareness, they both fail in explaining attitude and purchase intention, consequently H7a, H7b, H9a and H9b are not valid. This research also assessed the moderation effect of gender that shows significant values when explaining the effect of attitudes in purchase intention. ($\beta = 0.201$, $p < 0.05$). H11 is supported.

6. DISCUSSION

6.1. POLICY PERCEPTIONS

Study results indicated that financial policy perception does not have any effects on neither attitude nor purchase intention. This failure is against this study's expectations, and it is not aligned to most of research on this matter. Several studies have proven that financial policies, known as well as monetary policies, do have a significant effect on purchase intention (Huang, X et al., 2019) and attitude (Sierzchula et al., 2014). EV implementation is in its earliest stage in Portugal, which means that these results might be explained by the fact that Portuguese consumers might not be well informed about current fiscal policies in place, as well as they might considering it insufficient.

As for information and convenience perceived policies, both succeeded in explaining attitude with a positive significant effect. In opposite to monetary policies, non-monetary policies results suggest that well educated / informed consumers (Coad et al.,2009), as well as usage-based incentive policies promoted by governments (Kumar et al., 2020) might have an influence on promoting a better consumer attitude towards green products. However, it is also concluded that both non-monetary policies (information and convenience policies) failed in explaining purchase intention. Despite these unexpected results, it is true that its non-significant relation can also be found in some other studies results. Mersky et al. (2016) found out that there is no correlation between incentive policies and EVs sales.

6.2. CONSUMER SOCIAL ATTRIBUTES

Perceived green value presents a positive significant effect in attitude but not in purchase intention. These results aren't totally aligned to the literature once it was expected that this attribute was significant for both: the more advantages the consumer recognizes in a product or service, the more value he will assign to it. New technology products, such as EVs, are no rule exception: the perception of a good value leads to a positive influence in both consumers' attitude and purchase intention (Yu. J et al., 2017).

Perceived behavior control also shows a strong positive correlation with attitude and this is aligned o the literature. Perceived behavioral control is strictly related to the consciousness that consumers must have regarding their capabilities about some specific topic before thinking on taking any action (Ajzen, 1991). This means that if Portuguese consumers see themselves as capable (eg: financially capable) of acquire an EV, their willingness to buy (attitude) is higher as well as their likeability of taking any action (purchase intention).

Face-consciousness presents a positive significant effect to attitude but not to purchase intention. These results aren't totally aligned to the literature once it was expected that face consciousness was significant for both. Literature suggests that owning an EV, that brings social status, is related to a promotion in consumers' self-image, so connecting it to a higher will of buying it (Jin et al., 2020).

6.3. EV ATTRIBUTES

Price and cost battery and brand awareness failed in explaining significantly both purchase intention and attitude. These results were not the expected ones. EV prices and its inherent maintenance costs, such as cost battery, are pointed by many studies as factors that influence consumers' decision on getting, or not, EVs (Hidrue, MK et al., 2011). However, parallel factors as consumers' culture and market maturity might be influencing these results meaning that, for now, price and cost battery factor is not significant because consumers value other factors most, but this might change over time. As for brand awareness results, also not expected, it seems that this factor does not have any relevance for respondents, which is against Hutter, K et al. (2013) findings and the results of this research qualitive interviews. There is very little research regarding the influence of this attribute on EV purchase intention. Brand awareness was included in the research model due to the results of a particular question made in the interviews: "What first comes to your mind when you think of EVs?". 90% of the interviewed mentioned a vehicle brand even if it was not the very first think that came to their mind.

Charging risk has a negative significant effect in attitude towards purchase intention. No study was found that indicated this construct as non-significant, which means consumers still look at charging infrastructures as barriers to adopt EVs (Yu. J et al., 2017). The higher the risk, the lower the perceived value and the lack of charging infrastructures as well as long charging times are still a reality in Portugal. These risks will impact the willingness to buy.

6.4. MEDIATION EFFECT – ATTITUDE

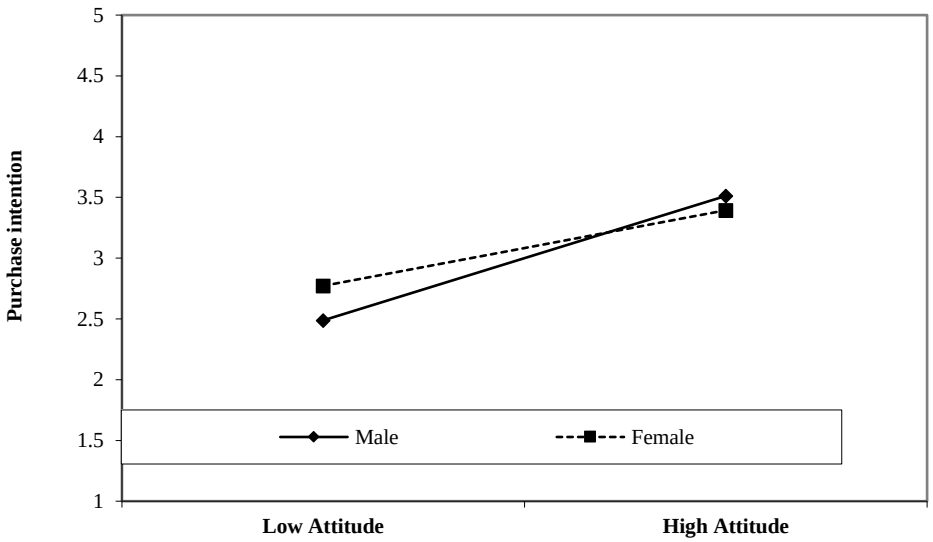
In this research, the structural equation model presents one single mediator, attitude, that is mediating relationship between all independent variables with purchase intention. The effect between attitude and purchase intention presents a solid positive effect result. According to background data, attitudes do have always the most significant influence on EV purchase intentions, and this is true for most studies regarding this topic (Huang et al., 2019). In other words, if consumers have a good attitude about EVs, the probability of their purchase intention will increase substantially.

Due to some factors that do not present significance with purchase intention in addition to the fact that most of the highly significant relations being with attitude, this last has a fundamental role when acting as indirect effect to clarify the nature of the relationship. Rather than a direct causal relationship between purchase intention and the dependent variables (Policies perceptions, social attributes, and EV attributes), dependent variables are influencing the mediator variable (attitude), which is influencing purchase intention.

6.5. MODERATION EFFECT - GENDER

This study successfully proves that gender moderates the effect of attitudes in purchase intention. Being this a binary moderator (male vs female), it was used a two-way slope, presented in fig.3, to represent how purchase intention of each gender varies in low attitude and high attitude scenarios.

Fig 3 – Interaction effect of gender



Literature suggests that men are more willing to acquire EVs (He et al., 2018) comparing to women, which is true if their levels of attitude are high. However, for lower levels in attitude, women's purchase intention is higher than men. Something that is also concludable is the fact that male line's slope is steeper than female's, meaning that for each unit in attitude increasing, purchase intention grown is higher for males.

Table 10- Path coefficients of direct effect and interaction effects

	β	S.E.	t-value	P values	LICI	ULCI
Gender → PI	0,083	0,090	0,929	0,353	-0,069	0,224
Gender x ATT → PI	-0,201	0,087	2,308	0,021	-0,349	-0,061
ATT → PI	0,512	0,071	7,217	0,000	0,396	0,630

7. CONCLUSION

The purpose of this research was to understand which effects Portuguese consumers value the most if they're considering acquiring an EV. The study concludes that, from the causal variables that were selected for the structure of this research model, just a few directly influenced purchase intention with strong significance. Charging risk, perceived behavior control and attitude were the only ones which seemed to have a significant direct effect in purchase intention, and two of them are also significant when connected to attitude.

In fact, 6 out of 9 causal variables (charging risk, face-consciousness, perceived behavior control, perceived green value, perceived information policy and perceived convenience policy), showed to be significant when connected to attitude, which has a very strong relation with purchase intention. Therefore, attitude towards EV, is playing a critical role as mediator between causal variables and the outcome – purchase intention. There is an indirect effect that specifies that these 6 causal variables influence purchase intention via consumers' attitudes.

Regarding the three policy perceptions approached in this study, only perceived convenience and perceived information policies were significant with attitude. Despite perceived financial policies failed in explaining attitude, literature background clearly defends this variable as significant. Therefore, this research suggests that Portuguese ecosystem participants and policymakers should first consider focusing on non-monetary policies despite not completely disregarding the adoption of monetary ones afterwards. In matter fact, we truly believe that all three polices are crucial factors to convince consumers in considering EV adoption, and therefore they should be reinforced.

As for electrical vehicle inherent factors, only charging risk appeared to be significant with both attitude and purchase intention. Despite current evolution in charging infrastructure development for EVs, this is still a work in progress in the Portuguese market. Consumers still worry about how and where they will charge their vehicles and how much time this will take. Therefore, governments should plan an efficient deployment and utilization of charging facilities aligned with Portuguese consumers' routines. As for the private players, investment in the optimization of charging technology and infrastructure should be a priority.

EV prices and its inherent maintenance costs, such as cost battery, are pointed out by many studies as factors that influence consumers' decision. This consideration checks with the results of qualitative research once most of the interviewed referred price as an influencing factor when considering getting an EV. However, results for the price and cost battery variable were not significant and this could be related to the fact of this influence being measured with one single variable that joined both factors (Price and Battery Cost). The fact of its result coming out as non-significant might be due to this merge once users, for instance, might consider price as main influent factor and battery costs not as much (or the opposite). Some other studies have split these two factors and got consistent significant values for both. Therefore, we consider that this aggregation of factors constitutes a limitation for this study and further research should treat these them separately.

Several research papers have proposed that consumer social attributes are essential for understanding consumers' adoption of EV. That's probably why this research had so consistent results for all variables included in this category. Perceived green value, perceived behavior and control and face-consciousness are all significant, one of them (PBC) being highly significant with both purchase

intention and attitude. The results of EV attributes and Policy perceptions categories are clearly overtaken by consumers social attributes, which means that decision makers and automotive industry should really focus on it. There are several measures that can be taken: green focused advertising emphasizing the green benefits of EVs compared to conventional vehicles (PGV); promote the idea of a narrowed relation between the sense of belonging to a certain group (eg: sustainable defenders, high / premium class) with brands and/or products (FC); promote campaigns to facilitate the purchase of EVs (PBC). The consistency of these results should encourage future researchers to explore other variables related to social attributes. Environment concern, social norms and environmental responsibility are some examples pointed out by the literature.

Another limitation to this research is the fact of sample data being exclusively collected from Portuguese consumers. Enlarging the scope to different countries and develop research with a wide and heterogenous sample would be interesting to understand if the different factors have the same influence in consumers with different culture backgrounds. It is a fact that several studies regarding EV purchase intentions already exist for the different markets, however each researcher adapts their own models, which turns their comparison into a challenge. Therefore, it would be interesting to have a single research model that would access, using the same attributes, the factors that influence the willingness to buy of an heterogeneous international group of consumers (eg: within an entire continent).

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