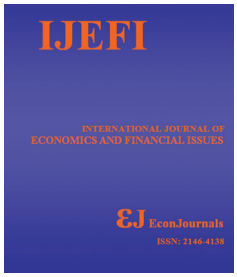

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Economics of Electric Vehicle Adoption: An Integrated Framework for Investigating the Antecedents of Perceived Value and Purchase Intent

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ABSTRACT

Due to political instabilities, limited non-renewable resources and international conflicts, the energy industry has been subject to high volatilities in the last few years. This had negative effects on many developing economies, namely those importing most of their energy needs from other countries (i.e., Morocco). More recently, the high increases in energy prices have renewed interests and discussions related to the adoption of electric vehicles. The current study aims to examine Moroccan consumers' perceptions and intentions to use electric cars (EV), an era marked by increasing cost of gasoline and other energy sources. Our study proposes an integrated model combining both contextual and technological factors that influence Moroccan consumer's Perceived value and purchasing intention of electric vehicles. Data was collected using a self-administered questionnaire from 203 Moroccan respondents and the findings were analyzed using the partial least squares (PLS) technique. Our findings convey that Environmental responsibility and Policy incentives positively influence EV perceived value, while Environmental responsibility, Policy incentives, and perceived value positively influenced purchasing intention.

Keywords: Electric Cars, Consumers' Perceptions, Consumers' Perceptions
JEL Classifications: Q01

1. INTRODUCTION

In recent year, air pollution has been considered a major concern in both developed and developing countries due to its impact on human health and the environment (Lebdaoui et al., 2021). In that same perspective, road transport accounted for high percentages of air pollution emissions. It is therefore essential to find new ways of getting around, to adopt new transport practices to overcome these environmental problems. Indeed, electric vehicles could help reduce pollution rates, particularly in urban areas (Fritzsche et al., 2011). However, even if we are currently seeing an increase in its sales, its use remains marginal, namely in developing countries (i.e. Morocco). This leads us to wonder about the key determining factors to its adoption. The decision to use these vehicles can be taken as a framework of analysis the socio-domestic activity and the driving experience which can be affected by the use of this type of vehicle.

In Morocco, even with all the potential and the steps taken to introduce electric vehicles in Morocco, it should be understood that for now, Morocco's electric and hybrid cars have very low market penetration there is a low demand for the green car as "Green cars represent a volume of 2,000 units per year or 1.21% of the total market. But the outlook for this segment is very promising (FNH, 2020).

With the limited numbers of studies on the subject and the unavailability of such studies in the country of Morocco this

study aims to understand the main factors that would influence the adoption of electric vehicles among Moroccan consumers, in order to achieve this goal this research use variables known among different past articles the variables involved are used and discussed by different articles but they were never put together in one research to the knowledge of the author. The current study aims to respond to the following research questions:

- RQ1. What are the key factors that influence Moroccan consumers' Perception toward Electric vehicles?
- RQ2. What are the key factors that influence Moroccan consumers' Purchasing intention of Electric vehicles?
- RQ3. Does Moroccans consumers' Perception toward Electric vehicles influence their Purchasing intention of Electric vehicles?

This research is twofold, First, it is the first of its kind to investigate the factors influencing Moroccan consumers intention to adopt Electric vehicle adoption. Secondly, it will be a guideline for electric vehicle companies planning to market these vehicles in Morocco and similar contexts. Secondly, it provides valuable insights on how Moroccan consumers perceive electric vehicles and the factors leading to consumer purchase intention, namely in a market where empirical research is relatively scarce.

The current paper is organized as follows: Section 2 covers the literature review and hypotheses.

Section 3 describes the methods used in the research. The results are presented in Section 4. Then the discussion is illustrated in section 5 and the conclusions in section 6. Finally, the limitations and future research are presented in section 7.

2. LITERATURE REVIEW AND HYPOTHESES

This section will be looking at different variables' effects on the perceived value of electric vehicles and the intention to adopt them in different countries to build our hypothesis, build our model and apply it to the case of Morocco.

Looking first at the consumer Environmental responsibility variable which represents the relationship between individual care for the environment it is discussed in different articles, (Chu et al., 2019) is looking at the Psychological and behavioral factors that lead to adopting electric vehicles showed that the Chinese are more concerned about environmental factors compared to Koreans. Chinese were earlier adopters than the Koreans and one of the factors is the environmental value of the Chinese. (White and Sintov, 2017) looks at the Environmentalist and social innovator symbolism effect on the adoption of electric vehicles which tries to look deeper into the factors of environmentalism and social innovator symbolism leading mechanics to EV adoption.

Environmentalist self-identity is the most influencing factor when it comes to EV adoption.

Axsen and Kurani (2013) used a survey based on 508 households from San Diego in California to try and understand the Electric vehicles customers wants where most customers showed interest in some electric vehicles cars dues to positive factors including vehicle images of intelligence, responsibility alongside the support of the environment and nation.

Kim et al., (2018) looks at the Moderating effects of environmental traits and government supports on Perceived value and adoption intention in Korea it has based its research on survey data collected from 285 EV drivers in Korea. Within this article, it was found, that environmental concern and financial incentives were positively influencing consumers' perceptions of EVs.

Wang et al., (2021) are discussing the effect of incentive policy, perceptions, and consumer social Attributes on the consumer purchase of BEV, some of the findings were that environmental concerns, and face consciousness were heterogenous on consumers' attitudes toward BEV adoption. from the variables discussed this research, therefore, build the following hypothesis:
H1: Consumer Environmental responsibility is positively influencing customer electric vehicle perceived value (H1a) and electric vehicle purchasing intention (H1b).

Moving down to the next variable which is the price of both electric vehicle and of maintenance and recharging relatively compared to fuel cars. (Axsen and Kurani, 2013) point out that higher vehicle purchase prices were concerns that negatively affected the decision to buy an electric car. Likewise (Cecere et al., 2018) show that lower price is the most important factor influencing the decision to adopt electric vehicles. (Coffman et al., 2016) also agrees with this point as it points out that the main factor found to be affecting is price which represents the main influence on the purchase of electric vehicles. On the same variable factor, looking at the prices of gas, we find out that (Javid and Nejat, 2017) explain that retail gas price was found to be positively correlated with the PEV adoption. (Barth et al., 2016) which is a study that tries to understand the electric vehicle market in Germany just like prior research purchasing costs were negatively related to EVs. (Li et al., 2017) a systematic overview of academic journals which includes about 40 papers also explains that purchasing cost was one of the main barriers that stopped individuals from adopting electric vehicles.

Based on the variables discussed the research therefore include the following hypothesis:
H2: electric vehicle lower prices are positively influencing customer electric vehicle perceived value (H2a) and electric vehicle purchasing intention (H2b).

The third contextual type of variable this literature review will be looking at is the policy incentive's effect on electric vehicle adoption which would include general financial incentives such as subsidies and lower taxation. First, (Huang and Ge, 2019) looks at factors influencing electric vehicle adoption intention it was shown that incentive policy had a very positive influence on the intention to acquire an Electric vehicle.

In fact Priessner et al. (2018) looks at the variables that would be a predictor for adoption in Austria based on a 2016 online survey

that collected data from a sample of 1000 individual in Austria. The two main findings are first that policy incentives are very effective as early adopters are much more likely to be living in areas where there is a wider range of policy incentives to encourage the EV adoption and second that the policies do not differentiate between adopter and non-adopters which meant that such policies would not be efficient in areas with low adoption as individual who are not that much interested in EV adoption saw traditional ICE vehicle as a much more interesting option that performs better, (Wang et al., 2021) is discussing the effect of incentive policy, perceptions, and consumer social Attributes on the consumer purchase of BEV within the findings it was found that financial incentive policies perceptions, information provision policies, and perceptions of convenience policies all were heterogenous on consumer's attitude toward BEV.

Coffman et al. (2016) shows that policy incentives were extremely successful at increasing EV adoption, for the effect of policies on the electric vehicle adoption in Sweden (Egnér and Trosvik, 2018) specializing in the case of Sweden where it bases its research on data collected between 2010 and 2016 based on municipality information when looking further at the understanding of the articles, it can be seen that they are looking at factors influencing consumers decision into electric vehicle adoption.

The findings involved the fact that policy incentives were extremely effective when it came to the adoption of electric vehicles, this incentive should be giving a lot of concentration to charging infrastructure which in their turn represents a problem when it comes to charging time and location but also the variability between the different charging born.

Higueras-Castillo et al. (2020) aims to determine the variables that predict the purchase of an electric vehicle and discuss the findings with consumer behavior experts and the automobile sector experts claims that incentives are one the most influencing factors leading to costumer's decision to adopt an electric vehicle.

From the variables discussed the following hypothesis is derived: *H3: policy incentives on electric vehicles are positively influencing customer electric vehicle perceived value (H3a) and electric vehicle purchasing intention (H3b).*

The next part is connected to the technological variable starting with the driving range capacity of electric vehicles which represents how much can the vehicle travels before discharging.

Axsen and Kurani, (2013) shows that some of the concerns regarding the electric vehicle were due to the limited driving range, (Cecere et al., 2018) found that the driving range comes as the second more important factor and the most important performance factor of the research influencing consumers' decision to buy an electric vehicle, (Li et al., 2017) is a systematic overview of academic journals and within it, it shows that driving range was one of the main barriers that stopped individuals from adopting electric vehicles, (Coffman et al., 2016) shows that driving range was once again found to be extremely influencing on buying electric vehicles, According to (Higueras-Castillo et al., 2020) driving range is also one of the most influencing factors leading to costumer's decision to adopt an electric vehicle.

Barth et al. (2016) explain that limited range was negatively related to EV. (Philipsen et al., 2018) points out that range plays an important role as range has been attributed great importance for the refilling decision, which as stated by this research comes from the anxiety of having to constantly refill the electric vehicle.

From the variables discussed the following hypothesis is derived: *H4: Higher Driving range is positively influencing customer electric vehicle perceived value (H4a) and electric vehicle purchasing intention (H4b).*

The next variable discussed would be charging time of the vehicle representing how much time it takes for the vehicle to get charged, (Haustein and Jensen, 2018) point out that charging infrastructures should be improved as BEV users already have prior experience and have some demands for charging time, (Egnér and Trosvik, 2018) point out that incentive should be giving a lot of concentration to charging infrastructure which in their turn represent a problem when it comes to charging time, (Bunce et al., 2014) point out that as a customer goes on and on into charging, their vehicle they are having a better perception of EV, likewise improving electric vehicle charging infrastructure will have a direct encouraging effect on EV adoption, (Egnér and Trosvik, 2018) also pointed out that unlike the case of charging station availability his finding were that consumers had extremely low tolerance toward waiting longer for charging time including waiting times due to occupied charging stations.

From the variables discussed the following hypothesis is derived: *H5: Lower Electric vehicle charging time availability is positively influencing customer electric vehicle perceived value (H5a) and electric vehicle purchasing intention (H5b).*

Finally, moving to the charging infrastructure availability variable both in quantity on how many charging stations are available but also how evenly spread, are they?

As stated by (Cecere et al., 2018) article through an analysis of the size of adoption of electric vehicles based in the regions of Ireland he found out that one of the main affecting factors is distance from charging points, (Javid and Nejat, 2017) also shows how charging station per capita is positively correlated with the PEV adoption, (Haustein and Jensen, 2018) points out that alongside improving charging infrastructures their number should be increased this would be very encouraging for BEV users, (Egnér and Trosvik, 2018) also claims that charging stations should heavily take into consideration the locations of charging stations but also the variability between the different charging born.

Philipsen et al., (2016) article which is a study targeting the analysis of evaluation criteria.

for fast-charging locations regarding both position and realization is pointed out within his article to the fact that is somewhat some

consent to accept going further for about few minutes or kilometers away, yet the locations still influence the individual perception on electric vehicle the locations should take into consideration movement patterns, occupation, the residential situation.

From the variables discussed the following hypothesis is derived: *H6: Higher electric vehicle charging station availability is positively influencing customer electric vehicle perceived value (H6a) and electric vehicle purchasing intention (H6b).*

Therefore, after defining the hypothesis, and when looking at (Wang et al., 2021) which point out that consumer perceptions of electric vehicles affect their adoption and purchase of electric vehicles, (Kim et al., 2018) check on the relationship between policy incentives, perceived value, and purchasing intention which shows that government policy incentives positively affect perceived value which in turn positively affects purchasing intentions.

Alongside the fact that the customer perceived value may be related to or even mediating the relationship between the dependent variable and independent variable of purchasing intention (Driouchi et al., 2011 , Farooq and Chetioui, 2012).

This allows to sum up the relationship between perceived value and adoption intention under the following hypothesis:
H7: customer perceived value of electric vehicles positively affects their electric vehicle purchasing attention.

Based on the hypotheses suggested above, the following conceptual model, in Fig. 1, can be suggested:

3. METHODS

3.1. Measurement

For the case of this research, a questionnaire was used the questionnaire scales and items were presented in French, as it is widely used among Moroccans (Benzakour, 2007). Demographic questions were introduced at the beginning of the questionnaire to allow us to get a demographic background of the respondent and discover how representative our sample is. Questions about respondents' age, gender, City of origin, education, income, and job were included for that purpose.

To measure the variables the constructs were measured by using five-point range scales in each item, divided into two categories depending on the question. Ranging from 1"Not important at all" to 5 "Very Important" or from 1 "Strongly disagree" to 5 "Strongly agree". All questions used for measurement can be looked down in Appendix A at the end of the research. The back-translation method was then used (Chetioui et. al., 2020) to translate the items from English to French.

3.2. Sample and Data Collection

For the practicality of this study and for time constraint reasons that this study has, this research used non-randomized sampling methods this would ensure that we get primary data as no similar prior research was made in Morocco based on the knowledge of the authors. The survey on which the study got its primary data was conducted in March 2022 to examine the hypothesis of the research, the survey was conducted using the snowball method alongside using convenient sampling methods to be able to target a wider set of population and decrease the sampling error while making sure that collection of response would be easy and achievable within the time constraint (Lebdaoui and Chetioui, 2021), the online survey includes Face-to-Face Surveys, email surveys in which the message to reach the respondent was built specifically for the respondent in order to maximize the response rate (Saunders et al., 2012).

The survey ensures that everyone only answers once the question were divided into sections based on the subject they relate to with clear instruction given to the respondent on each question alongside background knowledge on Electric vehicles and on the research to make it easier for the respondent to answer and ensure a better response. All responses were made with all respondents voluntarily deciding to take part in the survey. At the end of the survey collection data, 203 responses to the survey were collected, in which 55.2% (112) are male and 44.8% (91) are female. While the population was widely widespread on different professional status, income level, educational backgrounds the respondents were mostly young with an age below 25 years old representing 76.8% of the sample which in turn represents a limitation of the study. The population background information can be seen in Table 1.

Table 1: Respondents' profile

Measure	Item	N	Percentage
Gender	Male	112	55.2
	Female	91	44.8
Age	Under 25	156	76.8
	26–30	18	8.9
	31–40	7	3.4
	41–50	8	3.9
	more than51	14	6.9
City of origin	Casablanca	47	23.2
	Rabat	35	17.2
	Marrakech	6	3.0
	Meknes	18	8.9
	Fez	29	14.3
	Tangier	6	3.0
	Agadir	9	4.4
	Ifrane	16	7.9
	Other	37	18.1
Education	High school	24	11.8
	bac+2	40	19.7
	bac+3	39	19.2
	bac+5	68	33.5
	More	32	15.8
Job	Student	144	70.9
	Manager	6	3.0
	Employee	30	14.8
	Entrepreneur	14	6.9
	Unemployed	9	4.4
Income	Under 1000 MAD	73	36.3
	1001–2500 MAD	36	17.9
	2501–5000 MAD	20	10.0
	5001–10000 MAD	15	7.5
	10001–15000 MAD	24	11.9
	more than 15000 MAD	33	16.4

4. RESULTS

To achieve the goal of examining the causal relationships and estimating the conceptual model, structured equation modeling was used. SEM is an advanced statistical technique using a combination of statistical data and qualitative causal assumptions (Henseler et al., 2009). Due to the complexity of the conceptual model and the fact that it has not been tested this research decided to use Partial Least Squares (PLS) which would appear to be the most effective method to use for the model. Such method will allow us to assess indicator reliability, construct reliability, convergent validity, and discriminant validity to then get to subsequent subsection tests the structural model using Smart PLS 3.0 Software to apply the method.

4.1. Measurement model

As a first step of the Partial least square SEM analysis, we assessed the model validity. As indicated in Table 2, indicator reliability has been tested. Our results suggest that all items have loadings above 0.7 and as required by Chin (1998) convey that the loading of each indicator must be greater than all its cross-loadings. The Construct's reliability was assessed using Cronbach Alpha and composite reliability (CR). As it can be seen in Table 2, all constructs composite reliability are higher than 0.7 as required which confirms that the construct's reliability was achieved (Hair et al., 2010).

The accepted value of Cronbach's alpha is 0.7 (Chetioui and Lebdaoui, 2021); however, values above 0.6 are also accepted (Griethuijsen et al., 2015; Taber, 2018) which means that our Cronbach's alpha shown in Table 2 values would be satisfied for each variable as they are all above the accepted value. The third criterion used is the average variance extracted (AVE) which is as in Table 2 above 0.5 for all the constructs which mean that convergent validity was achieved for the case of this research (Hair et al., 2010).

As for the discriminant validity, the loading of each indicator must be greater than all cross-loadings Chin (1998) this condition being achieved can be concluded by looking at Table 3 while the root square of AVE for each latent variable must be greater than the correlation with any other latent variable. Fornell and Larcker (1981) which can be seen in Table 3 representing Fornell-Larcker Criterion table of our result which shows that our model ensures the satisfaction of the condition.

The next criterion used to assess the discriminant validity is the cross loadings (Lebdaoui and Chetioui. 2020). The loading of each indicator should be greater than all of its cross-loadings according to Chin (1998). As can be illustrated in Table 4, this was analyzed, and it was found that each construct has loadings with higher values than their cross loadings.

Table 2: Construct reliability

Construct	Loadings	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
Purchase intention				
PI1	0.867	0.895	0.927	0.760
PI2	0.844			
PI3	0.880			
PI4	0.895			
Perceived value				
PV1	0.713	0.893	0.918	0.653
PV2	0.802			
PV3	0.819			
PV4	0.788			
PV5	0.843			
PV6	0.874			
Environmental responsibility				
ER1	0.921	0.606	0.826	0.706
ER2	0.751			
Price				
PR1	0.773	0.655	0.815	0.689
PR5	0.883			
Policy incentives				
PO1	0.713	0.680	0.824	0.611
PO2	0.848			
PO3	0.778			
Driving range				
DR1	0.756	0.759	0.859	0.670
DR2	0.868			
DR3	0.827			
Charging time				
CT1	0.781	0.712	0.837	0.632
CT2	0.833			
CT3	0.770			
Charging stations availability				
CSA1	0.862	0.862	0.911	0.775
CSA2	0.927			
CSA3	0.849			

Table 3: Fornell Larcker table

	CS availability	Charging time	Driving range	Environmental responsibility	Perceived value	Policy incentives	Price	Purchasing intention
CS availability	**0.880**							
Charging time	0.677	**0.795**						
Driving range	0.526	0.579	**0.818**					
Environmental responsibility	0.070	0.141	0.222	**0.840**				
Perceived value	0.224	0.261	0.211	0.524	**0.808**			
Policy incentives	0.281	0.329	0.365	0.266	0.394	**0.782**		
Price	0.339	0.419	0.519	0.272	0.214	0.307	**0.830**	
Purchasing intention	–0.008	0.148	0.051	0.476	0.684	0.368	0.192	**0.872**

Table 4: Cross loadings

	CS availability	Charging time	Driving range	Environmental responsibility	Perceived value	Policy incentives	Price	Purchasing intention
CSA1	**0.862**	0.645	0.485	0.036	0.168	0.240	0.320	–0.034
CSA2	**0.927**	0.581	0.448	0.088	0.258	0.290	0.295	0.029
CSA3	**0.849**	0.589	0.488	0.046	0.115	0.177	0.288	–0.050
CT1	0.407	**0.781**	0.456	0.105	0.178	0.225	0.350	0.134
CT2	0.660	**0.833**	0.472	0.104	0.251	0.280	0.342	0.117
CT3	0.523	**0.770**	0.457	0.130	0.185	0.280	0.307	0.103
DR1	0.492	0.421	**0.756**	0.104	0.131	0.271	0.357	–0.023
DR2	0.464	0.530	**0.868**	0.185	0.194	0.327	0.545	0.090
DR3	0.364	0.460	**0.827**	0.235	0.182	0.293	0.345	0.030
ER1	0.053	0.137	0.167	**0.921**	0.528	0.258	0.241	0.484
ER2	0.074	0.092	0.230	**0.751**	0.315	0.178	0.221	0.280
PI1	–0.065	0.092	0.068	0.396	0.589	0.316	0.192	**0.867**
PI2	–0.029	0.087	-0.054	0.389	0.547	0.292	0.144	**0.844**
PI3	0.017	0.181	0.116	0.431	0.635	0.337	0.167	**0.880**
PI4	0.045	0.151	0.040	0.441	0.613	0.336	0.167	**0.895**
PO1	0.355	0.299	0.425	0.166	0.321	**0.713**	0.349	0.213
PO2	0.110	0.252	0.210	0.241	0.317	**0.848**	0.183	0.356
PO3	0.224	0.228	0.247	0.211	0.288	**0.778**	0.207	0.281
PR1	0.244	0.308	0.376	0.222	0.134	0.168	**0.773**	0.150
PR5	0.312	0.381	0.477	0.232	0.212	0.322	**0.883**	0.168
PV1	0.263	0.194	0.157	0.335	**0.713**	0.279	0.174	0.467
PV2	0.111	0.144	0.126	0.410	**0.802**	0.308	0.161	0.584
PV3	0.231	0.250	0.241	0.446	**0.819**	0.332	0.235	0.489
PV4	0.209	0.228	0.185	0.453	**0.788**	0.312	0.147	0.477
PV5	0.134	0.208	0.144	0.413	**0.843**	0.329	0.147	0.608
PV6	0.162	0.241	0.178	0.473	**0.874**	0.346	0.177	0.665

Table 5. HTMT table

	CS availability	Charging time	Driving range	Environmental responsibility	Perceived value	Policy incentives	Price	Purchasing intention
CS availability								
Charging time	0.858							
Driving range	0.669	0.777						
Environmental responsibility	0.101	0.210	0.330					
Perceived value	0.238	0.322	0.253	0.674				
Policy incentives	0.366	0.476	0.520	0.397	0.508			
Price	0.485	0.658	0.769	0.468	0.297	0.494		
Purchasing intention	0.063	0.184	0.095	0.612	0.759	0.464	0.271	

The Hetrotrait-Monotrait ratio (HTMT) in Table 5 shows that all values are lower than the threshold of 0.9, therefore, satisfying the requirements to accept it (Saunders et al., 2012). We, therefore, confirm the discriminant validity of our conceptual model by satisfying all the following Fornel and Larcker, cross-loadings, and HTMT as done above.

All the measures above meet the discriminant validity of the constructs, the assessment of the construct reliability, convergent validity, and indicator reliability would allow us to be able to test the conceptual model.

4.2. Structural Model

After approving the validity of the proposed conceptual model, the next step is to test the structural model. Chin (1998) suggests that the key criterion to assess the structural model is the coefficient of determination (R-square) on which its value being above 0.67 is considered high, its values ranging from 0.33 to 0.67

are considered moderate, while its values being between 0.19 and 0.33 is considered weak finally any values <0.19 is deemed unacceptable according to him, in our case, our R square as shown in Table 6 would be considered moderate for both perceived value and purchasing intention as they are between 0.33 and 0.67.

In the case of our first dependent variable perceived value R square present in Table 6 shows that 36.6% of the variation in Attitude can be explained by the factors proposed in our conceptual model.

For the dependent variable of Perceived value and based on findings on Table 7 H1a Environment Responsibility (β = 0.461; P < 0.01; supported) and H3a Policy incentives (β = 0.245; P < 0.01 supported) are significant because P is below 0.05 while H2a Price (β = –0.022; P > 0.1; not- supported), H4a Driving range (β = –0.083; P > 0.1; not- supported) H5a Charging time (β = 0.102; P > 0.1; not-supported) and H6a Availability of charging stations (β = 0.104; P > 0.1; not-supported) are statistically Non-significant because P is above 0.05, H1a and H3a are supported to explain Perceived value but H2a, H4a, H5a and H6a are not supported to explain the Perceived value.

In the case of our second dependent variable purchasing intention R square present in Table 6 shows that 55.2% of the variation in Attitude can be explained by the factors proposed in our conceptual model.

For the dependent variable of Purchasing intention and based on findings on Table 7 H2b Environment Responsibility (β = 0.461; P < 0.01; supported) H3b Policy incentives (β = 0.245; P < 0.01; supported) and H7 Perceived value (β = 0.582; P < 0.01; not-supported) are significant as P is below 0.05 while H2b Price (β = 0.087; P > 0.1; supported), H4b Driving range (β = –0.165; P > 0.05; not-supported) and H5b Charging time (β = 0.140; P > 0.1; not-supported) and H6a Availability of charging stations (β = 0.104; P > 0.1; not-supported) are not significant because P is above 0.05, H1b, H3b and H7 are supported to explain the Purchasing intention but H2b, H4b, H5b and H6b are not supported to explain the Purchasing intention, To sum up, 5 of our totals of 13 hypotheses are supported while 8 of them are not.

Table 6: Coefficients of determination

Constructs	R Square	CHIN 1998
Perceived value	0.366	Moderate
Purchasing intention	0.552	Moderate

5. DISCUSSION

5.1. Theoretical Implication

This research involves many theoretical implications which the following is stated.

From among the supported Hypothesis on perceived value both H1a Environment Responsibility and H3a Policy incentives have a positive coefficient correlation β and a P below 0.01 and therefore have a strong positive influence on Perceived value which goes along with previous findings (Wang et al., 2021; Kim et al., 2018; Axsen and Kurani, 2013) both were approximating to 0 which show that they were impressively influencing of perceived value.

For the case of the supported hypothesis into explaining Purchasing intention our past hypotheses H1b Environment Responsibility and H3b Policy incentives were also positively influencing the purchasing intention as coefficient correlation β was positive for both the influence was not as strong as it was for the case of perceived value P was higher than 0.01 yet lower than 0.05 yet it was strongly positive which does once again go along with prior findings (Wang et al., 2021; Chu et al., 2019; White and Sintov; Coffman et al., 2016; Higueras-Castillo et al., 2020).

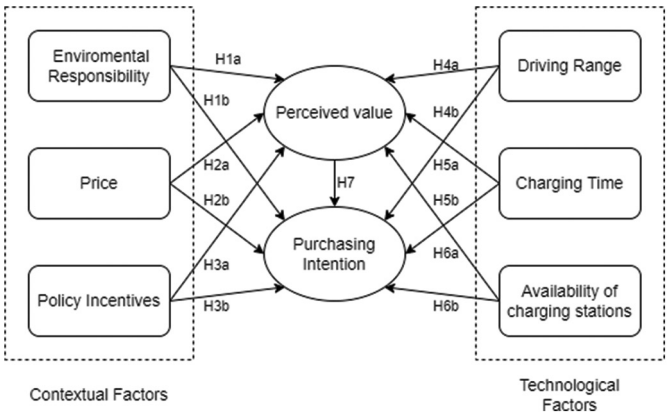
The H7 Perceived value also has a positive coefficient β and is therefore positively correlated with Purchasing intention not only that P is below 0.01 and approximating 0 making it have a very positive influence on purchasing intention which in turn goes along with prior findings (Wang et al.; Kim et al., 2018) more than any other of our variable have on purchasing intention, such factors become obvious when Environment responsibility and policy incentives both positively influence both Perceived value and purchasing intention.

Looking at our hypotheses that are not supported based on price, driving range, and charging time which their *P* is above 0.05 for both their influence on both perceived value and purchasing intention variable making H2a, H2b, H4a, H4b, H5a,H5b,H6a

Table 7: Path coefficient

Original sample (O)	Beta	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P-values
CS availability –> perceived value	0.104	0.078	1.343	0.180
CS availability –> purchasing intention	–0.166	0.086	1.931	0.054
Charging time –> perceived value	0.102	0.079	1.298	0.195
Charging time –> purchasing intention	0.140	0.100	1.403	0.161
Driving range –> perceived value	–0.083	0.082	1.011	0.312
Driving range –> purchasing intention	–0.165	0.090	1.842	0.066
Environmental responsibility –> perceived value	0.461	0.065	7.084	0.000
Environmental responsibility –> purchasing intention	0.139	0.058	2.401	0.017
Perceived value –> purchasing intention	0.582	0.061	9.494	0.000
Policy incentives –> perceived value	0.245	0.070	3.527	0.000
Policy incentives –> purchasing intention	0.153	0.068	2.247	0.025
Price –> perceived value	–0.022	0.064	0.349	0.727
Price –> purchasing intention	0.087	0.064	1.375	0.170

Figure 1: Conceptual model



and H6b not supported interestingly this goes against previous findings in other countries (Axsen and Kurani, 2013; Cecere et al., 2018; Javid and Nejat, 2017; Barth et al., 2016; Li et al., 2017; Coffman et al., 2016; Higueras-Castillo et al., 2020; Barth et al., 2016; Haustein and Jensen, 2018; Egnér and Trosvik, 2018; Bunce et al., 2014; Philipsen et al., 2016.)

We talk especially about price and driving range which were considered in other research findings as the most influencing factors of perceived value and intention in their countries. (Cecere et al., 2018; Higueras-Castillo et al., 2020; Coffman et al., 2016; Li et al., 2017).

5.2. Practical Implications

Several practical implications can be driven by this study involving the fact that first individuals with higher perceived value of electric vehicles have much higher purchasing intentions the perceived value of electric vehicles among Moroccan consumers is directly related to their intention to purchase an electric vehicle, The perceived value and the purchasing intention of the customer to acquire Electric vehicles are directly related as the better perception the consumer has of Electric vehicles the more intention, he has to purchase an electric vehicle.

The Perceived value that Moroccans have toward electric vehicle is directly influenced by their care about the environment and how much they assume that electric vehicle protects the environment from pollution environmental responsibility of the individual is the most influencing factor on Moroccan perception of electric vehicle.

Environment responsibility of the consumer has an even higher influence on their purchasing intention consumers who care a lot about the environment and perceive the electric vehicle as protecting it are much more likely to plan on buying one to protect the environment.

The other principal factor is government policy including mainly financial policies supporting the adoption of electric vehicles for our case its effect on perceived value is very noticeable which means that Moroccan consumers that have a great perception about electric vehicles do care about the government showing support to individuals who want to purchase Electric vehicles.

This does go against findings of prices, driving range, or other variables which mean that the individual care more about the government showing support to the individual rather than the actual effect but also the feeling that electric vehicle adopter gets some special treatment that would encourage him to do so.

Purchasing intention for this case is also supported to a large extent by the policies much more than perceived value which shows that Moroccan consumer that intends to buy electric vehicles are greatly encouraged to purchase electric vehicle if the government decision shows support toward the consumer.

Driving range, charging time, availability of charging stations and price seems to not be of that much importance for individuals who value electric vehicles in Morocco and more the less for those who intend to buy one, This would mean that individuals who care and have a good perception about electric vehicles or even better plans to buy one are eager and caring about them to the point where their price, how much driving distance can they retain or even how much time does it take for them to charge become less important or are at least not very different in that sense than does who care less about electric vehicles or do not plan to purchase one.

6. CONCLUSION

The contribution that this research has is to look at factors that affect Moroccan consumers' perceived value of electric vehicles but also, their purchasing intention, the research is looking at what factors influence consumers with higher perception and purchasing intention of electric vehicles.

The model developed in this research used both contextual and technological factors to build hypotheses on which our research would build an understanding of what Moroccans want to purchase electric vehicles.

Data collected were Primary sources where Online Surveys were used alongside a non-randomized method on which 203 responses were collected, the study uses the Structural Equational model (SEM) alongside Partial Least Squares (PLS) using the smart PLS software to transfer the data.

All data have been tested to ensure that it is valid before moving to analyzing them and making sure that the discriminant validity of the constructs, The assessment of the construct reliability, convergent validity, and indicator reliability are being met for our data to be valid, findings point out that environmental attitude and environmental responsibility alongside the Policy incentives made by the government are the main influencing factors that affect Moroccan consumers' traits of higher perceived value and purchasing intention of electric vehicles.

Perceived value in its turn positively influences purchasing intention as respondents with higher Perception of electric vehicles had higher purchasing intention, Availability of charging stations on the other side is negatively influencing the purchasing intention but did not seem to have any significant effect on their perceived value.

Finally, all other variables including driving range, charging time and Price seems to not have any significant effect on consumers perceived value and purchasing intention of electric vehicles, In general, Moroccans that plan to purchase an electric vehicle and are therefore having a good perception of electric vehicles have great care toward the Environment And care about the environment government showing support toward them which are therefore the main factor that should be taken into consideration when trying to promote electric vehicles on the kingdom.

7. LIMITATIONS AND FUTURE RESEARCH

Several limitations stand in the way of this research among which the following must be stated first the sample used was not fully representative of the Moroccan population as the individuals surveyed are not 100% aligned with Morocco's demographics and in fact when looking at the demographic of our sample it can be concluded that it is not very representative of the Moroccan population, the sample is also not big enough to be very representative due to population error, another limitation is that we do not fully understand the reason of the respondent's decision their deeper motives both conscious and subconscious for decisions are unknown and as such many respondents' answers are inexplicable, for example the study shows that consumers care for government support of their adoption but the reason of why they care is unknown, market penetration of electric vehicles in Morocco is still very limited and Moroccans typically have no experience with electric vehicles, the fact that they do not know what is and is not a constraint or a quality of electric vehicles means that respondents' answers would be built on their opinions rather than experience. As for future research to be made, there should be more complex and randomized data that would spread survey using quota sampling method but also would be taking into consideration a larger sample than the one in our research so that findings would be more comprehensive and accurate, Future qualitative researches are also very important to deeply understand consumer behavior toward electric vehicles but also, their unexplained motives and reasons why do they perceive those key factor as most influencing which would allow us to introduce electric vehicles to Morocco, and finally a research that would target individuals with prior experience with electric vehicles would also be useful to understand what a more knowledgeable consumer factor of influence on perceived value and purchasing intention are.

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APPENDIX A

Constructs	Items	Measurement items	References
Perceived value	PV1	Buying an electric vehicle is worth it	Bunce et al., 2014; Kim et al., 2018; Philipsen et al., 2016; Wang et al., 2021
	PV2	Electric vehicles are more interesting than fuel-powered ones	
	PV3	Using electric vehicles is more rational	
	PV4	Using electric vehicles is wise	
	PV5	For me, buying an electric vehicle is extremely pleasant	
	PV6	For me, buying an electric vehicle is extremely favorable	
Purchase intention	PI1	I plan to buy an electric car for personal use	Huang and Ge, 2019; Kim et al., 2018;Priessner et al., 2018; Wang et al., 2021
	PI2	I am ready to buy an electric car for personal use in the near future	
	PI3	I recommend electric cars to my friends and acquaintances	
	PI4	Electric cars are an important option if I'm considering buying a new car	
Environment Responsibility	ER1	Buying an electric vehicle helps protect the environment from pollution	Chu et al., 2019; White and Sintov, 2017; Axsen and Kurani, 2013; Kim et al., 2018 ; Wang et al., 2021
	ER2	The energy source to charge the electric vehicle is cleaner	
Price	PR1	The price of the electric car must be affordable	Axsen and Kurani, 2013; Cecere et al., 2018; Coffman et al., 2016; Barth et al., 2016 ; Javid and Nejat, 2017 ; Li et al., 2017
	PR2	Maintenance costs must be affordable	
Policy incentives	PO1	The government needs to reduce taxes and other bureaucratic costs on electric vehicles	Huang and Ge, 2019; Priessner et al., 2018; Wang et al., 2021; Coffman et al., 2016; Egnér and Trosvik, 2018 ; Higueras-Castillo et al., 2020
	PO2	The government must support you financially in the purchase of the electric car	
	PO3	The government needs to reduce electricity costs for charging electric vehicles compared to the average cost of electricity	
Driving range	DR1	The electric car must be able to travel long distances before discharging	Axsen and Kurani, 2013; Barth et al., 2016; Cecere et al., 2018; Coffman et al., 2016; Higueras-Castillo et al., 2020; Li et al., 2017 ; Philipsen et al., 2018
	DR2	The electric car's battery must be able to store a decent amount of electricity before it discharges	
	DR3	You must be able to travel between any place in Morocco without going through the anxiety of the discharge of your electric car	
Charging time	CT1	The electric car must recharge in a fairly short time	Haustein and Jensen, 2018; Egnér and Trosvik, 2018; Egnér and Trosvik, 2018
	CT2	Charging stations across the country need to be efficient and allow for faster charging time	
	CT3	Charging time should go hand in hand with your daily tasks in the sense that you can easily perform your daily activities and find that your car reaches the load needed to drive it again	
Charging station availability	CSA1	There must be a sufficient number of charging stations for electric cars to easily find places to charge the car	Cecere et al., 2018; Egnér and Trosvik, 2018; Haustein and Jensen, 2018; Javid and Nejat, 2017; Philipsen et al., 2016
	CSA2	Charging stations for electric vehicles must be scattered across the country to be able to charge your vehicle anywhere in Morocco	
	CSA3	Charging stations for electric cars must be around different gas stations on the roads to be able to charge your vehicle on the go	