Author(s): Bhutto, Maqsood H.; Shaikh, Aijaz A.; Sharma, Ravishankar

Title: Factors Affecting the Consumers' Purchase Intention and Willingness-to-Pay More for Electric-Vehicle Technology

Year: 2021

Version: Accepted version (Final draft)

Please cite the original version:

Bhutto, M. H., Shaikh, A. A., & Sharma, R. (2021). Factors Affecting the Consumers' Purchase Intention and Willingness-to-Pay More for Electric-Vehicle Technology. In ICEB 2021 : Proceedings of the 21th International Conference on Electronic Business (Article 4). International Consortium for Electronic Business. Proceedings of the International Conference on Electronic Business. https://aisel.aisnet.org/iceb2021/4/

Factors Affecting the Consumers' Purchase Intention and Willingness-to-Pay More for Electric-Vehicle Technology
(Full Paper)

Maqsood H. Bhutto*, University of Jyväskylä, Finland, maqsood.h.bhutto@student.jyu.fi
Aijaz A. Shaikh, University of Jyväskylä, Finland, aijaz.a.shaikh@jyu.fi
Ravishankar Sharma, Zayed University, United Arab Emirates, ravishankar.sharma@zu.ac.ae

ABSTRACT
This study conducted an in-depth analysis of the factors affecting consumers' intention to purchase and willingness to pay more for an electric vehicle (EV) in the developing-country context, extending the theory of planned behavior with two new variables: environmental concern and willingness to pay (WTP) a premium. Survey data were collected from 358 responses and were analyzed using partial least squares structural equation modeling. Multi-group analysis was conducted, and the moderating role of gender was examined. The findings showed the significant effects of the theory-of-planned-behavior variables and environmental concern on EV technology purchase intention. The present study provides theoretical contributions and policy guidelines concerning high (vs. low)-sensitivity consumer attitudes toward EV technology that marketers and automobile manufacturers can make use of when designing and strategizing their pricing strategies.

Keywords: Electric vehicle technology, purchase intention, theory of planned behavior, willingness to pay more, automobile industry.
*Corresponding author

INTRODUCTION
The issue of greenhouse gas (GHG) emissions has become one of the most debated issues globally. The emergence of ecological problems has given rise to global warming, energy crises, climate change, ozone layer depletion, air pollution, and depletion of natural resources, all of which have a substantial impact not only on the ecosystem but also on consumer wellbeing (Shah, 2015). Global communities have been recognizing the impacts of these ecological problems on environmentally socially responsible activities, and this has led to the organization of international climate forums such as the Bonn Climatic Conference (2017), the Paris Agreement (2015), and the Copenhagen Conference (2009).

Carbon dioxide (CO_2) has been reported to be the most highly emitted GHG in the atmosphere. These emissions mainly come from the transport sector (World Health Organization [WHO], 2019). An increase in gross domestic product improves the per capita income in a country, which increases the rate of vehicle ownership (Jain, 2006). This ultimately generates more energy consumption and results in higher CO_2 emissions globally.

Hybrid and electric vehicles (EVs) can be considered technological solutions to the problem of GHG emission as they can reduce GHG emission (Bhutto *et al*., 2020) by replacing gasoline vehicles (Asamer *et al*., 2016). EVs, the context of this study, have electric batteries consisting of hundreds of lithium ion cells plugged in parallel series, and are charged with cables connecting the batteries to the optimal electric current and voltage. According to the International Energy Association (2018), adopting such innovative technology can be an effective strategy to minimize the GHGs emitted into the atmosphere by fossil fuel vehicles, which account for 21% of the total emissions from the transport sector worldwide.

In emerging and developing countries, the transport sector plays a key role in socioeconomic development but contributes to severe air pollution with motorization and urbanization. Despite these challenges and the proliferation of EVs and associated technologies, research considering and examining the consumer perspectives on the purchase and use of EVs is scarce. Moreover, much of the research that has been conducted on this topic has considered the Western regions, overlooking the non-Western or emerging/developing countries with high population densities and demands for transport means, including EVs, for the people's regular commute.

To fill the aforementioned research gap, this study was conducted in a non-Western country and investigated people's EV purchase intention. We provided a theoretical framework for our research and empirically tested the hypothesized relationships of certain factors with consumers' EV purchase intention and willingness to pay more for an EV. We also gathered insights from male and female consumers on the factors that most strongly affect their EV purchase intention and willingness to pay more for an EV. Venkatesh and Morris (2000) consider investigating gender difference in this regard important for two reasons. First, men's and women's decision-making processes are different. Second, as Zhou *et al*. (2014) reported,

information can easily be obtained from both men and women, and marketing managers can monitor different gender segments using different marketing strategies.

The following research questions were thus proposed: What factors influence EV purchase intention and willingness to pay more for an EV? Are there gender differences in terms of EV purchase intention and willingness to pay more for an EV? Do the explained variances in the theory constructs differ between males and females?

Pakistan, a non-Western country, was selected for this study for two reasons. First, it is fast becoming more urbanized and is undergoing rapid motorization. In the last decade, the automobile industry showed rapid growth (63% and 69%, respectively) from 2010 to 2018 in terms of production and sales (PAMA, 2018). Second, the WHO (2019) cited the cities of Lahore, Peshawar, and Rawalpindi in Pakistan as the most polluted cities globally, with their high air pollution levels giving rise to airborne disorders and untimely deaths.
EV technology covers a wide range of transport means, including cars, trucks, buses, and motorcycles, but only electric cars were included in this study.

For the remaining sections of this paper, section 2 presents and discusses the theoretical background of the research; section 3, the research model and hypotheses; section 4, the research method that was used; section 5, the study results; and section 6, the discussion and implications of the study findings, the study limitations, and the future research directions. Section 7 concludes the paper.

THEORETICAL BACKGROUND

Theory of Planned Behavior

Ajzens' theory of planned behavior was used to measure consumer behavior. According to this theory, the first predictor of purchase intention is attitude. Attitude refers to "a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object" (Fishbein & Ajzen, 1975, p. 211). However, attitude also shows consumers' likes and dislikes, which may indicate consumers' intention to purchase green products. Therefore, attitudes can be general or specific (Chen & Chai, 2010). A specific attitude reveals the stronger antecedent of a single behavior in a particular industry or object/product/service while a general attitude shows a common predisposition involving a significant behavior (Tan, 2011).

The second predictor of purchase intention according to Ajzens' theory of planned behavior is the subjective norm. The term refers to "the perceived social pressure to perform or not to perform the behavior" (Ajzen, 1985, 2002). Social norms are influenced by one's peers, family members, friends, or prominent members of the community, and exert pressure on people (Fishbein & Ajzen, 1975).

The third predictor of purchase intention according to Ajzens' theory of planned behavior is perceived behavioral control, which consists of two constructs: self-efficacy and controllability (Ajzen, 2002). Self-efficacy pertains to a person's ease or difficulty of carrying out a certain intention or behavior that he/she wants to carry out, also known as internal control according to Armitage and Conner (1999). Another construct of perceived behavioral control is controllability, which pertains to a person's belief that individuals have control over their own actions. The addition of perceived behavioral control extends the theory of reasoned action into the theory of planned behavior, whose predictive power has been significantly increased. Perceived behavioral control belongs to the "rational-choice model," which assumes that "people behave rationally and logically during the process of decision making" (Ajzen, 1991, p. 182). Several management scholars (e.g. Bhutto *et al*., 2020; Channa *et al*., 2020; Kumar *et al*., 2017) have frequently used the theory of planned behavior and have found that perceived behavioral control is its fundamental factor.

Environmental Concern

Environmental concern shows consumers' emotional responses to environmental issues, including compassion, dislike, and worry (Ramayah *et al*., 2012), and considerations to ensure environmental quality (Yeung, 2004). For instance, several studies have validated the environmental-concern impacts on the green product choice, including organic foods (Hoffmann & Schlicht, 2013) and renewable energy (Bang *et al*., 2000). People with more environmental concern are likely to have a positive attitude toward green products (Karatu & Mat, 2014).

In particular, reports show that consumers' interest in EVs has been stimulated by their environmental concern, and that consumers with higher environmental concern tend to be less price-sensitive toward EVs (Tanner & Wölfing Kast, 2003), showing a higher willingness to pay more for the environmental benefits of the product (Hansla *et al*., 2008). For example, consumers have shown a willingness to pay more for organic products (Loureiro & Hine, 2002).

Gender Differences

Gender differences have been widely considered in several studies in the marketing field (Mostafa, 2007), but few studies have been conducted on the effects of gender differences on EV purchase intention and willingness to pay more for an EV in a developing-country context.

RESEARCH MODEL AND HYPOTHESES

Figure 1 shows the research model in this study. The theory of planned behavior was used in the study, with a focus on a particular behavior of people: EV purchase. However, all the constructs of this theory individually or collectively lead to a consumer intention, which precedes an action. The following general rule was developed: the stronger the intention, the more likely the action corresponding to it will occur. Thus, the theory of planned behavior aims to show how people's acquired information and motivation affect their intention and behavior.

Impact of Attitude on Electric-Vehicle Purchase Intention

Attitudes consist of all the beliefs that influence an individual's behavioral intentions. They are a result of an internal assessment and association process and have a direct role in the development of positive or negative intentions (Ajzen, 2002). In researches on green consumer psychology, attitudes have always been stressed as important antecedents of behavioral intention and real behavior. Various researchers have validated the effect of attitude toward green products on the intention to purchase green products in developed countries (Qi & Ploeger, 2019; Tan *et al.*, 2019; Jaiswal & Kant, 2018). However, the existing literature clearly does not address the impact of consumer intention on consumer purchase behavior in the developing-country context. Thus, the hypothesis below was proposed.

H1: Attitude toward EVs is positively related to EV purchase intention.

Impact of Subjective Norms on Electric-Vehicle Purchase Intention

From the social-impact perspective, the individuals in a segment seem to be more closely connected to the other segment members than to non-segment members, and to be generally influenced by the opinions of the segment and by the normative pressure exerted by it (Ajzen, 1991, 2002). Thus, the segment's influence is viewed as the influence of subjective norms. Various studies have confirmed that subjective norms in the context of social pressure influence consumers to buy green products more than attitude does (Jayaraman *et al.*, 2015; Lai & Cheng, 2016; Lee, 2009). However, the existing literature does not describe the effects of subjective norms on EV purchase intention. Thus, the hypothesis below was proposed.

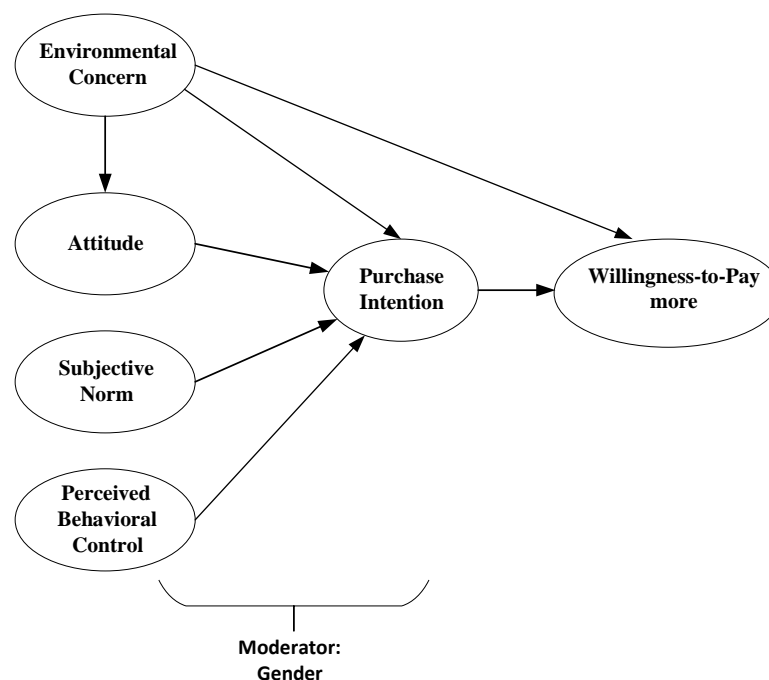H2: Subjective norms are positively related to EV purchase intention.

Figure 1: Research Model

Impact of Perceived Behavioral Control on Electric-Vehicle Purchase Intention

The study reported herein was among the few that had determined the impact of perceived behavioral control on purchase intention. Joergens (2006) argued that many consumers prefer to buy non-green products due to the high prices and unaffordability of eco-friendly products. Thus, the purchasing power control factor appeared to be the major consideration for deciding to purchase healthy food products or not to (Mai & Hoffmann, 2012). The government interventions in terms of policy and regulations support consumers' EV purchase behaviors and their willingness to pay more for an EV (Helveston *et al.*, 2015; Oreg & Katz-Gerro, 2006; Sang & Bhet, 2015). They are thus important predictors of green consumption behavior and have been confirmed to have a positive relationship with EV purchase intention (Egbue *et al.*, 2017).

Thus, the market for EVs is still an emerging market, and consumers' self-efficacy and control leading to willingness to buy at a premium is the most important factor that determines EV purchase intention. The pertinent studies clearly lack an explanation of the direct and indirect connections between perceived behavioral control and EV purchase intention to be able to accept or reject the hypotheses below.

H3: Perceived behavioral control is positively related to EV purchase intention.

Impact of Environmental Concern on Attitude toward Electric Vehicles, Electric-Vehicle Purchase Intention, and Willingness to Pay More for an Electric Vehicle
A significant driver of EV purchase intention is environmental concern. This is understandable because EVs have less detrimental effects on the environment than petrol or diesel engines do. Several leading carmakers have resolved to stop their production of non-electric cars in the coming decade. Moreover, Sinnappan and Rahman (2011) reported that consumers with stronger environmental concern are most inclined toward EV purchase. Generally, the literature (e.g., Bang *et al*., 2000) also indicates that consumers with a high level of environmental concern are less price-sensitive and are more willing to pay a premium for green products (Moser, 2015). Consumers may be concerned about the environment because they are aware that fossil fuel cars have significant negative effects on the environment. Accordingly, Junquera *et al*. (2016) looked into whether consumers could easily distinguish between the ecological factors of EVs and of gasoline cars and are thus willing to pay a premium for an EV. The hypotheses below were thus proposed.

H4: Environmental concern is positively related to attitude toward EVs.
H5: Environmental concern is positively related to EV purchase intention.
H6: Environmental concern is positively related to willingness to pay more for an EV.

Moderating Role of Gender
The role of gender differences seems important to understand because men and women behave differently from each other because of their different structural positions in the labor market and because of their different socialization processes in terms of how they think, behave, and act with regard to the caregiver role (Blocker & Eckberg, 1997).

The theory of gender socialization (Gilligan & Attanucci, 1988) refers to the socialization process where males and females learn different social values and perceive different expectations of them since their early childhood. For example, Gu and Feng (2020) reported the positive effects of heterogeneous groupings (including individuals and latent groups) on mobility tool purchase, particularly on the choice of EVs, which affects households' future technology adoption in relation to energy equipment preferences. However, the multi-country comparison of Belgium, Denmark, and Italy showed significant differences in the consumers' attitudes towards EVs and EV purchase intention (Barbarossa *et al*., 2015).

In the context of developing countries, the men from South Asian countries are nurtured to take care of their respective families as the sole breadwinners. They thus become competitive and more insensitive than the women who had grown up playing the role of a caregiver and thus had become more cooperative and compassionate. Past studies (e.g., Lee, 2009; Zelezny *et al*., 2000) have shown that females show greater concern than males regarding environmental issues, and thus have a more positive attitude toward products that aim to save nature and the environment.

Conversely, Huang and Ge (2019) performed multi-group analysis (MGA) of the gender demographics in China and found that males have more positive attitudes toward EVs and stronger EV purchase intentions than females. Very few studies have examined gender differences using MGA to assess consumer attitudes toward EVs and EV purchase intention. Hence, we came up with the hypotheses below.

H7: There is a more significantly positive relationship between attitude toward EVs and EV purchase intention among males than among females.
H8: There is a more significantly positive relationship between environmental concern and EV purchase intention among females than among males.

Environmental concern is a multi-dimensional variable demonstrating susceptibility to showing concern for environmental issues and thus to purchasing an environment-friendly product and to having the willingness to pay more for it (consumer price sensitivity) in terms of time and money (Dunlap & Jones, 2002). We thus formulated the hypothesis below.

H9: There is a more significant relationship between environmental concern and willingness to pay more for an EV among females than among males.

EMPIRICAL METHODOLOGY
Participants and Sampling Design
The target study population was estimated to be around 1.26 million automobile users in Pakistan from 2010 to 2018 (PAMA, 2018), who may have car awareness, including of the electric battery technology and EVs. The survey method was utilized, and online survey questionnaires were sent to about 1,000 automobile consumers for data collection, using a link shared

through Google Form (via e-mail), WhatsApp, and Facebook. The back-translated questionnaires were administered to the automobile users in their local languages (e.g., Sindhi and Urdu) so that responses would be received from them.

A hybrid convenience–snowballing sampling technique was employed to collect data from EV users, who were aware of battery and plug-in hybrid EVs. A total of 390 online questionnaires were retrieved, 32 of which were removed due to incomplete data. Thus, a final sample of 358 accomplished questionnaires was retained for analysis. Of the final usable sample, 51.1% were obtained from females, and 38.8% of the respondents had a monthly income of above Rs100,000. As regards age, 67.6% of the respondents were within the 25–35 age bracket, and 22.4% were within the middle age bracket (36 and above). As regards the respondents' education level and marriage status, 55.6% had a college degree and 61.5% were married. The respondents' detailed characteristics are shown in Table 1.

Measurement Instrument
The online survey form was divided into two parts: the respondents' demographic information and the questionnaire proper. A 5-point Likert scale was adopted for the respondents' response options, ranging from 1 (strongly disagree) to 5 (strongly agree) (Lin & Huang, 2012; Wang *et al*., 2014). The questionnaire items were obtained from previous studies but were modified to make them fit the research context. To confirm that all the questionnaire items could be clearly understood, a pilot study was conducted with a sample of 50 automobile owners who were students and staff of Sukkur IBA University belonging to different countries and regions of Pakistan and who were obtained via a hybrid convenience–snowballing sampling technique. One professor and two Ph.D. students who were well versed in research were involved in the pilot study.

Table 1: Demographic Statistics

Demographic Variables	Categories	Sample	Percent (%)
Gender	Male	175	48.9
	Female	183	51.1
Age (years)	≤ 25	58	16.2
	26–35	184	51.4
	36–45	107	29.9
	≥ 46	9	2.5
Education	Undergraduates	70	19.5
	Graduates	199	55.6
	Post-graduates	89	24.9
Marital status	Unmarried	138	38.5
	Married	220	61.5
Income (rupees)	30,000–60,000	125	34.9
	61,000–99,999	94	26.3
	≥ 100000	139	38.8

After the pilot study, the questionnaire with a total of 21 items was found fit for measuring all the constructs therein (refer to the Appendix). However, the constructs of the theory of planned behavior were measured by adopting 14 items from Ajzen (1985), and the Cronbach's alpha values for the theory-of-planned-behavior variables were 0.764 for attitude toward EVs, 0.802 for subjective norms, 0.895 for perceived behavioral control, and 0.860 for EV purchase intention. Environmental concern was measured by four items from Ramayah *et al*. (2012) and Kumar *et al*. (2017), and the Cronbach's alpha of environmental concern was 0.734. Finally, a scale of three items for measuring the willingness to pay more for an EV was adopted and modified as per the requirements of the study from Moser (2015), and the Cronbach's alpha for willingness to pay more for an EV was found to be 0.832.

Analytical Procedures
Previous studies (Byrne & Vijver, 2010; Channa *et al*., 2020; Henseler *et al*., 2009) have suggested that structural models can be analyzed by applying either a variance- or covariance-based approach. We employed the partial least squares structural equation modeling (PLS-SEM) technique for the following reasons: (a) as our study (please refer to the research model, Fig. 1) focused on prediction, we regarded PLS-SEM as appropriate for the study; (b) the preference for PLS-SEM over the traditional multivariate analysis approaches has been highly accepted, according to Haenlein and Kaplan (2004); (c) PLS-SEM's strength is that it can estimate the causal relationship between the latent constructs and their indicators as reflected in the measurement model (Henseler *et al*., 2009), and can simultaneously predict hypothesized relationships as reflected in structural models (Hair *et al*., 2016); (d) PLS-SEM has less strict multivariate analysis assumptions and is useful for prediction (Urbach & Ahlemann, 2010); and (e) for exogenous constructs, PLS-SEM helps maximize the explained variance (Hair *et al*., 2016).

RESULTS AND FINDINGS
To examine the hypothetical model in this study, we used PLS-SEM version 3.2.8 (Ringle *et al*., 2015). We conducted the two-step SEM process (measurement and structural model assessment) and then proceeded to conduct PLS Predict and MGA.

Measurement Model Assessment
Following the instructions of Hair *et al*. (2016) for the analysis of the measurement model, the individual item reliability, internal consistency reliability, content validity, convergent validity, and discriminant validity were determined.

Individual Item Reliability
The reliability of the individual items was analyzed by evaluating the factor loadings of all the individual items for each latent variable (Hair *et al*., 2016; Hulland, 1999). Accordingly, a factor loading below 0.5 is unacceptable. Following the recommendation of Hulland (1999), the items with minimum loadings of 0.5 were retained. The items' loadings are presented in Table 2.

Internal Consistency Reliability
To ensure internal reliability, the composite reliability (CR) value was used. CR estimates are much less biased than the Cronbach's alpha coefficient, and the reliability of a scale may be underestimated or overestimated by Cronbach's alpha (Hair *et al*., 2011). The CR values should be 0.70 or above (Hair *et al*., 2011). Table 2 presents the CR values for each latent variable, ranging from 0.817 to 0.918. As the CR values met the criteria recommended by Bagozzi and Yi (1988) and Hair *et al*. (2011), the measures were proven to have adequate internal consistency.

Convergent Validity
Convergent validity means that the test that evaluates certain constructs with average variance extracted (AVE) values actually tests such constructs (Fornell & Larcker, 1981). The AVE values should be 0.50 or above (Chin, 1998). Table 2 shows the AVE scores obtained in this study, ranging from 0.543 to 0.834, indicating that there was adequate convergent validity.

Table 2: Measurement Model

Constructs	Items	Loadings	Alpha	CR	AVE
Attitude	ATT1	0.903	0.764	0.895	0.809
	ATT2	0.896			
Purchase Intention	PI1	0.877	0.860	0.915	0.782
	PI2	0.907			
	PI3	0.869			
Environmental Concern	EC1	0.739	0.734	0.831	0.555
	EC2	0.626			
	EC3	0.762			
	EC4	0.837			
Perceived Behavioral Control	PBC1	0.779	0.895	0.918	0.615
	PBC2	0.764			
	PBC3	0.724			
	PBC4	0.804			
	PBC5	0.757			
	PBC6	0.805			
	PBC7	0.851			
Willingness-To-Pay more	WTP1	0.864	0.832	0.9	0.75
	WTP2	0.928			
	WTP3	0.803			
Subjective Norm	SN1	0.906	0.802	0.91	0.834
	SN2	0.921			

CR = composite reliability; AVE = average variance extracted

Discriminant Validity
Considering the recent criticism of the Fornell and Larcker (1981) criterion, we analyzed the discriminant validity through the heterotrait-monotrait (HTMT) method. HTMT follows the multi-trait multi-method matrix developed by Henseler *et al*. (2015) to ascertain discriminant validity. According to Kline (2011) and as also recommended by Henseler *et al*. (2015), if the HTMT

value is greater than 0.85, then there is a discriminant validity issue. Table 3 shows that the HTMT values for all the constructs in this study were lower than 0.85. Thus, there was no discriminant validity issue in this study.

Collinearity Statistics
The variance inflation factor values were obtained in this study. As they were all less than 5, the exogenous variables in this study had no multicollinearity problem.

Table 3: Discriminant Validity (HTMT Ratio)

Latent Constructs	Attitude	Purchase Intention	Environmental Concern	Perceived Behavioral Control	Willingness-To-Pay more	Subjective Norm
Attitude						
Purchase Intention	0.507					
Environmental Concern	0.274	0.601				
Perceived Behavioral Control	0.458	0.791	0.492			
Willingness-To-Pay more	0.305	0.673	0.515	0.568		
Subjective Norm	0.493	0.567	0.257	0.598	0.358	

Structural Model
After determining the significant results of the measurement model, we proceeded to analyze the structural model. The standard bootstrapping method was used to test the hypotheses, and the results are presented in Table 4.

Table 4: Assessment of Path Coefficients

Hypothesis	Relationships	Beta	T – Values	P – value	Hypothesis supported (Y/N)
H1	Attitude -> Purchase Intention	0.131	2.450	0.014	Yes
H2	Subjective Norm -> Purchase Intention	0.129	3.161	0.002	Yes
H3	Perceived Behavioral Control -> Purchase Intention	0.481	9.590	0.000	Yes
H4	Environmental Concern -> Attitude	0.189	3.860	0.000	Yes
H5	Environmental Concern -> Purchase Intention	0.249	5.958	0.000	Yes
H6	Purchase Intention -> Willingness-To-Pay more	0.364	8.445	0.002	Yes

R2 (Purchase Intention) = 0.569
R2 (Willingness-To-Pay more) = 0.386

The results of H1 (β = 0.132; t = 2.429; *p* = 0.015), which states that attitude toward EVs is a stronger predictor of EV purchase intention, were found to be statistically significant. Thus, H1 was accepted. The results of H2 (β = 0.129; t = 3.126; *p* = 0.002), which states that consumers' subjective norms are positively related to their EV purchase intention, were also found to be statistically significant. Thus, H2 was also accepted. The results of H3 (β = 0.480; t = 9.427; *p* = 0.000), which states that perceived behavioral control is positively related to EV purchase intention, were also found to be statistically significant. Thus, H3 was also accepted. The results of H4 (β = 0.188; t = 3.795; *p* = 0.000), which states that environmental concern is positively related to attitude toward EVs, were also found to be statistically significant. Thus, H4 was also accepted. The results of H5 (β = 0.250; t = 5.929; *p* = 0.000), which states that environmental concern is positively related to EV purchase intention, were also found to be statistically significant. Thus, H5 was also accepted. Finally, the results of H6 (β = 0.364; t = 5.218; *p* = 0.000), which states that EV purchase intention is positively related to willingness to pay more for an EV, were also found to be statistically significant. Thus, H6 was also accepted.

R² Assessment
R^2 reveals the proportional variance in the predictive dependent variable(s), which can be interpreted through their independent variables (Elliott & Woodward, 2007). Thus, the acceptable value of R^2 is 0.10, as suggested by Falk and Miller (1992),

whereas Hair *et al.* (2011) and Henseler *et al.* (2009) suggested that an R^2 value of 0.75 could explain accuracy substantially, 0.50 could explain it moderately, and 0.25 could explain it weakly. The R^2 values obtained for both EV purchase intention (0.569) and willingness to pay more for an EV (0.386) show that the research model had goodness of fit or good predictive accuracy (Hair *et al.*, 2016). This further suggests that all the predictable variables combined explain 57% of the variance in EV purchase intention and 39% of the variance in willingness to pay more for an EV.

Partial Least Squares Predict Assessment
PLS Predict assessment aims to analyze the predictive relevance in terms of the quality of the structural model used and the ability to create accurate predictions (Shmueli & Kopplus, 2011; Shmueli *et al.*, 2019). Predictive validity expresses the set of constructs' measures that can foresee the dependent variable (Straub *et al.*, 2004). The present study utilized cross-validation with holdout samples to measure the study model's predictive validity. For the PLS Predict algorithm, we followed the method suggested by Shmueli *et al.* (2016), using SmartPLS software version 3.2.8 (Ringle *et al.*, 2015). This procedure helped us find the prediction error summaries' statistics and the *k*-fold cross-validated prediction error. For example, these include the root mean square and the mean absolute error for the purpose of analyzing the PLS path model's predictive relevance for the constructs. The current study applied two new benchmarks based on the guidelines developed by the SmartPLS team to gauge the study model's predictive relevance.

First, we employed the Q^2 blindfolding procedure to analyze the predictive relevance of the study model. A cross-validated redundancy value Q^2 greater than 0 suggests that the model has predictive relevance (Chin, 1998). As Table 5 shows, the Q^2 value obtained for the model was 0.416 for EV purchase intention and 0.271 for willingness to pay more for an EV, which confirmed that the model had predictive relevance. All the obtained root mean square error (RMSE) and mean absolute error (MAE) values suggested that the values that were found were smaller than the RMSE value in the PLS model and the MAE values in the LM model. Similarly, the Q^2 values in the LM model were lesser than the Q^2 values in the PLS model. The results of the PLS Predict assessment thus strongly establish the study model's predictive relevance.

Table 5: Partial Least Squares Predict Assessment

Endogenous Latent Variable Prediction Summary									
	Q2								
Purchase Intention	0.416								
Willingness-To-Pay more	0.271								

Constructs Prediction Summary									
	PLS			LM			PLS - LM		
	RMSE	MAE	Q2	RMSE	MAE	Q2	RMSE	MAE	**Q2**
PI1	0.667	0.489	0.398	0.676	0.487	0.383	-0.009	0.002	0.015
PI2	0.604	0.443	0.392	0.622	0.454	0.354	-0.018	-0.011	0.038
PI3	0.682	0.51	0.472	0.692	0.519	0.457	-0.01	-0.009	0.015
WTP1	0.803	0.584	0.151	0.808	0.586	0.141	-0.005	-0.002	0.01
WTP2	0.773	0.572	0.245	0.796	0.59	0.199	-0.023	-0.018	0.046
WTP3	0.812	0.62	0.291	0.823	0.62	0.272	-0.011	0	0.019

Multi-Group Structural Equation Modeling Results
Using multi-group PLS-SEM analysis, we analyzed the gender differences (male vs. female) between the theory-of-planned-behavior and extended variables (i.e., attitude toward EVs, environmental concern) and the EV purchase intention and willingness to pay more for an EV. Table 6 shows the three hypotheses for the MGA SEM results.

For H7 (female β 0.004 < male β 0.261; *p* < 0.006), the positive relationship between attitude toward EVs and EV purchase intention was significantly stronger for the males than for the females. Unexpectedly, H8 (female β 0.003 < male β 0.142; *p* < 0.002) was supported, showing that the positive relationship between environmental concern and EV purchase intention was significantly stronger for the females than for the males. As for H9 (female β 0.350 > male β 0.175; *p* < 0.028), it was slightly supported, meaning that the positive relationship between environmental concern and willingness to pay more for an EV was significantly stronger for the females than for the males.

Table 6: Multi-Group Analysis Structural Equation Modeling Results

Paths	Hypothesized Relationships	β Path Coefficients		p-Value new (Male vs Female)
		Male	Female	
H7	Attitude -> Purchase Intention	0.261	0.004	0.006
H8	Attitude -> Willingness-To-Pay more	0.142	0.003	0.002

H9	Environmental Concern -> Purchase Intention	0.175	0.350	0.028

DISCUSSION AND FUTURE DIRECTIONS

This study examined how the transport sector influences the environment in terms of air quality and pollution (Oberhofer & Dieplinger, 2014), and whether that significantly affects consumer behavior. We tried to understand the antecedents of the theory of planned behavior and the impact of environmental concern on the consumers' EV purchase intention and willingness to pay more for an EV and their relative significance.

The relevant literature shows some gaps regarding the robustness of the theoretical framework and the results' generalizability, as discussed in the literature section. For instance, many of the previous studies had a theoretical framework that included only behavioral intentions or that did not include all the variables of the theory of planned behavior. Few studies have extended the theory of planned behavior by adding variables, and many studies involved only student participants. The present study offset some of these inadequacies by offering an extension of the theory of planned behavior with a sample of different respondents in the developing-country context (i.e., Pakistan). This pioneering empirical study was conducted using an extended theory-of-planned-behavior model (Ajzen, 1991) considering the original constructs' effects on EV purchase intention.

Theoretical Implications

This paper offers an alternative theoretical lens for understanding EV purchase intention and how it is influenced by all the theory-of-planned-behavior variables, environmental concern, and willingness to pay more for an EV in a developing-country context.

The results for H1 suggest that consumer attitude toward EVs is the strongest predictor of EV purchase intention. The findings regarding attitude toward EVs and how it affects EV purchase intention are in line with the theory of planned behavior, showing that consumer attitudes are significant predictors of behavioral intention. Furthermore, the results of the direct effect of attitude toward EVs on EV purchase intention are consistent with those of the previous studies in other contexts on consumer pro-environmental behavior, such as that by Ramayah *et al*. (2012), who stated that consumer attitude is an important predictor of the intention to purchase environment-friendly products. H2 was also supported by the study results, meaning that subjective norms, perceived as having a social influence on people's acts, were also found to have a significant positive effect on EV purchase intention.

In the context of the Pakistani consumers, H3 was supported by the study results, meaning that perceived behavioral control was found to have a significant positive effect on EV purchase intention. Perceived behavioral control concerns people's belief that they have the resources and opportunities needed to be able to carry out a particular action. It can be further divided into two different aspects: the degree to which one believes he or she possesses the "control factors" needed to carry out a certain behavior and the amount of confidence one has in performing a specific behavior (Kim & Han, 2010). This study showed that the more resources and confidence a consumer has in purchasing environment-friendly products, the higher his or her EV purchase intention will be.

The results for H4 and H5 clearly show that consumers' environmental concern has a significant positive effect on attitude toward EVs and EV purchase intention. This study thus revealed that consumers who care for the environment are likely to have a positive attitude toward EVs and to be willing to pay more for an EV.

In the opposite direction, H6 was supported by the study results. That is, environmental concern was shown to be significantly positively related to willingness to pay more for an EV, meaning that consumers are more willing to pay a premium for an EV if they are concerned about environmental sustainability and thus want to purchase environment-friendly products.

As for the effect of gender on EV purchase intention in the developing-country context, H7 and H8 were supported by the study results, meaning that attitude toward EVs more strongly affects EV purchase intention in males than in females, and that environmental concern more strongly affects EV purchase intention in females than in males. The results for H9 add to the existing knowledge that environmental concern has a stronger relationship with willingness to pay more for an EV in females than in males.

This study thus extended the role of environmental concern in EV purchase intention besides assessing the link between the theory-of-planned-behavior variables and EV purchase intention, and provided consumers' insights on the relationship between willingness to pay more for an EV and EV purchase intention in Pakistan.

Managerial Implications

First, EV producers are concerned with the price that can influence EV purchase intention. The results of this study suggest that price is a major consideration in buying EVs; that is, consumers are willing to pay more for green products (Bhutto &

Hussain, 2019). However, this study enables EV producers to adjust their pricing strategy by focusing on the marketing aspects that promote sustainability. When setting pricing strategies for EVs, EV producers should make sure that such vehicles are better than fossil fuel vehicles in terms of product design, quality, and functionality. The performance will make consumers willing to pay more for an EV.

Second, the findings of this study provide automobile manufacturers with consumers' insights regarding the sustainable consumption patterns of green automobiles. This will help automakers devise and implement a proactive strategy in the competitive market that promotes consumer-conscious subjective norms and the pursuit of environmental sustainability through green-product development (Bhutto & Hussain, 2019).

Third, the results of this study contribute to the achievement of the United Nations 2030 Sustainable Development Goals (SDGs), especially climatic industrial change, wellbeing and good health, innovative infrastructure, and affordable and clean energy. The manufacture of green automobile products may lead to a sophisticated manufacturing environment that will reduce GHG emissions and will thus have a less negative impact on ecological landscapes. The minimal CO_2 in the atmosphere will lead to healthier populations. Therefore, the development and adoption of green technology contribute to the attainment of a number of SDGs.

Fourth, this study offers scientific results on consumer EV acceptance to EV manufacturers. EVs help improve transportation sustainability, protect the environment, and reduce petroleum dependence.

Finally, the Pakistani government encourages the national and international automobile manufacturers to make major investments in electric automobile technology. The production of EVs will open up employment opportunities for domestic and international workers, especially those with automobile production experience.

Limitations and Directions for Future Research
The present study had various limitations, which could motivate other researchers to further expand their relevant studies. Among the major limitations were that the present study focused only on EV purchase intention and had a small sample size. Further studies on the relationships of new constructs with EV purchase intention with a large sample size may shed more light on the important factors affecting consumer EV purchase intention. This study also focused on automobile consumers; the future studies can consider the consumers of other products that contribute to environmental degradation and can investigate the roles played by attitudes, subjective norms, perceived behavioral control, environmental concern, and willingness to pay more for the product in shaping consumers' intention to purchase such products.

This study's sample consisted of various cities in Pakistan, both rural and urban centers. It would be interesting to determine if there is a difference between rural and urban consumers in terms of how the theory-of-planned-behavior variables affect EV purchase intention. An extended version of this study can be undertaken across Pakistan not only to verify this study's results but also to explore the variations across population groups (e.g., different age groups).

Lastly, the impacts of government incentives and reliability (in terms of EV range, facilities, and charging time) should be analyzed, with the aim of determining whether the effects of reliability (in terms of EV range, facilities, and charging time) on attitude toward EVs would be similar or different. This would further reveal the consumers' acceptance of EVs in terms of reliability in the developing-country context.

CONCLUDING REMARKS
The world is currently facing environmental issues such as air pollution from the transport sector especially in developing countries like Pakistan. The solutions direly needed for EV technology adoption were thus examined in this study, and policy recommendations were made accordingly. We argue that adopting EVs will solve the problem of air pollution caused by the transport sector, and will promote a clean environment, a more robust economy, and power self-sufficiency. Having reviewed the past relevant studies, we gathered that this study was among the few that had attempted to better understand EV purchase intention or EV technology acceptance by investigating its relationship with extended theory-of-planned-behavior variables, environmental concern, and consumers' willingness to pay more for an EV. Among the study's interesting results are that attitude toward EVs has the most significant influence on EV purchase intention and that environmental concern more strongly influences EV purchase intention and willingness to pay more for an EV in females than in males. How the variable of environmental concern affects consumers' willingness to pay more for an EV in the developing-country context is a new addition to the body of literature on EV purchase intention.

To conclude, as EVs emit a low level of carbon compounds, we may conjecture that the consumer reaction to their adoption in developing countries may allow such countries to leapfrog into environment-friendly and sustainable societies (Sharma et al., 2021). The wide use of EVs can abate health hazards and climate change due to their low GHG emissions, paving the way for a safe environment and healthy humans.

REFERENCES
Ajzen, I. (1985). From intentions to actions: A theory of planned behaviour. In *Action control* (pp. 11-39): Springer.

Ajzen, I. (1991). The theory of planned behaviour. *Organizational behaviour and human decision processes*, *50*(2), 179-211.

Ajzen, I. (2002). PERCEIVED BEHAVIORAL CONTROL, self-efficacy, locus of control, and the theory of planned behaviour 1. *Journal of applied social psychology, 32*(4), 665-683.

Armitage, C. J., & Conner, M. (1999). Distinguishing perceptions of control from self-efficacy: Predicting consumption of a low-fat diet using the theory of planned behaviour 1. *Journal of applied social psychology*, *29*(1), 72-90.

Asamer, J., Graser, A., Heilmann, B., & Ruthmair, M. (2016). Sensitivity analysis for energy demand estimation of electric vehicles. *Transportation Research Part D: Transport and Environment*, *46*, 182-199.

Bagozzi, R. P., & Yi, Y. (1988). On the evaluation of structural equation models. *Journal of the academy of marketing science*, *16*(1), 74-94.

Bang, H. K., Ellinger, A. E., Hadjimarcou, J., & Traichal, P. A. (2000). Consumer concern, knowledge, belief, and attitude toward renewable energy: An application of the reasoned action theory. *Psychology & Marketing*, *17*(6), 449-468.

Barbarossa, C., Beckmann, S. C., De Pelsmacker, P., Moons, I., & Gwozdz, W. (2015). A self-identity based model of electric car adoption intention: a cross-cultural comparative study. *Journal of Environmental Psychology*, *42*, 149-160.

Bhutto, M. H., Tariq, B., Azhar, S., Ahmed, K., Khuwaja, F. M., & Han, H. (2020). Predicting consumer purchase intention toward hybrid vehicles: testing the moderating role of price sensitivity. *European Business Review*.

Bhutto, M. H., & Hussain, S. An Exploratory Study of the Green Marketing Practices in the Retail Industry of Pakistan. In *The proceedings of 3rd Business Doctoral and Emerging Scholars Conference* (p. 96).

Blocker, T. J., & Eckberg, D. L. (1997). Gender and environmentalism: Results from the 1993 general social survey. *Social Science Quarterly*, 841-858.

Bonn Climate Conference (2017). Bonn Climate Change Conference. Retrieved from https://unfccc.int/process/conferences/past-conferences/bonn-climate-change-conference-may-2017/conference-overview/ (accessed 16 January 2019).

Business Insider (2018). Bill gates says there are 5 'grand challenges' to stopping an apocalyptic future of floods, hurricanes, and drought. Retrieved from www.businessinsider.sg/bill-gates-challenges-to-stopping-climate-change-2018-10/ (accessed 19 May 2020).

Byrne, B. M., & Van de Vijver, F. J. (2010). Testing for measurement and structural equivalence in large-scale cross-cultural studies: Addressing the issue of nonequivalence. *International Journal of Testing*, *10*(2), 107-132.

Channa, N. A., Bhutto, M. H., Bhutto, M., Bhutto, N. A., & Tariq, B. (2020). Capturing customer's store loyalty through relationship benefits: Moderating effect of retail innovation. *European Business Review*.

Chen, M., Wang, Y., Yin, S., Hu, W., & Han, F. (2019). Chinese consumer trust and preferences for organic labels from different regions. *British Food Journal*.

Chen, T. B., & Chai, L. T. (2010). Attitude towards the environment and green products: consumers' perspective. *Management science and engineering*, *4*(2), 27.

Cheng, T. M., & Wu, H. C. (2015). How do environmental knowledge, environmental sensitivity, and place attachment affect environmentally responsible behaviour? An integrated approach for sustainable island tourism. *Journal of Sustainable Tourism*, *23*(4), 557-576.

Chin, W. W. (1998). The partial least squares approach to structural equation modeling. *Modern methods for business research*, *295*(2), 295-336.

Copenhagen Conference (2009). Copenhagen climate change conference. Retrieved from https://unfccc.int/process-and-meetings/conferences/past-conferences/copenhagen-climatechange-conference-december-2009/copenhagen-climate-change-conference-december-2009/ (accessed 16 January 2020).

Dunlap, R. E., & Jones, R. E. (2002). Environmental concern: Conceptual and measurement issues. *Handbook of environmental sociology*, *3*(6), 482-524.

Egbue, O., Long, S., & Samaranayake, V. A. (2017). Mass deployment of sustainable transportation: evaluation of factors that influence electric vehicle adoption. *Clean Technologies and Environmental Policy*, *19*(7), 1927-1939.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behaviour: An introduction to theory and research*.

Flamm, B. (2009). The impacts of environmental knowledge and attitudes on vehicle ownership and use. *Transportation research part D: transport and environment*, *14*(4), 272-279.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*, *18*(1), 39-50.

Fryxell, G. E., & Lo, C. W. (2003). The influence of environmental knowledge and values on managerial behaviours on behalf of the environment: An empirical examination of managers in China. *Journal of business ethics*, *46*(1), 45-69.

Gilligan, C., & Attanucci, J. (1988). Two moral orientations: Gender differences and similarities. *Merrill-Palmer Quarterly (1982-)*, 223-237.

Gu, G., & Feng, T. (2020). Heterogeneous choice of home renewable energy equipment conditioning on the choice of electric vehicles. *Renewable Energy*, *154*, 394-403.

Haenlein, M., & Kaplan, A. M. (2004). A beginner's guide to partial least squares analysis. *Understanding statistics*, *3*(4), 283-297.

Hair Jr., J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2016). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage publications.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing theory and Practice*, *19*(2), 139-152.

Hamilton, K., & Akbar, S. (2010). *Assessing the environmental co-benefits of climate change actions*. World Bank.

Hamzah, M. I., & Tanwir, N. S. (2021). Do pro-environmental factors lead to purchase intention of hybrid vehicles? The moderating effects of environmental knowledge. *Journal of Cleaner Production*, *279*, 123643.

Hansla, A., Gamble, A., Juliusson, A., & Gärling, T. (2008). The relationships between awareness of consequences, environmental concern, and value orientations. *Journal of environmental psychology*, *28*(1), 1-9.

Helveston, J. P., Liu, Y., Feit, E. M., Fuchs, E., Klampfl, E., & Michalenvironmental knowledge, J. J. (2015). Will subsidies drive electric vehicle adoption? Measuring consumer preferences in the US and China. *Transportation Research Part A: Policy and Practice*, *73*, 96-112.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the academy of marketing science*, *43*(1), 115-135.

Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. In *New challenges to international marketing*. Emerald Group Publishing Limited.

Heo, J., & Muralidharan, S. (2019). What triggers young Millennials to purchase eco-friendly products?: the interrelationships among knowledge, perceived consumer effectiveness, and environmental concern. *Journal of Marketing Communications*, *25*(4), 421-437.

Higueras-Castillo, E., Kalinic, Z., Marinkovic, V., & Liébana-Cabanillas, F. J. (2020). A mixed analysis of perceptions of electric and hybrid vehicles. *Energy Policy*, *136*, 111076.

Hines, J. M., Hungerford, H. R., & Tomera, A. N. (1987). Analysis and synthesis of research on responsible environmental behaviour: A meta-analysis. *The Journal of environmental education*, *18*(2), 1-8.

Hoffmann, S., & Schlicht, J. (2013). The impact of different types of concernment on the consumption of organic food. *International Journal of Consumer Studies*, *37*(6), 625-633.

Huang, X., & Ge, J. (2019). Electric vehicle development in Beijing: An analysis of consumer purchase intention. *Journal of cleaner production*, *216*, 361-372.

Hulland, J. (1999). Use of partial least squares (PLS) in strategic management research: A review of four recent studies. *Strategic management journal*, *20*(2), 195-204.

International Energy Association. (2018). CO2 Emissions from Fuel Combustion 2018-Highlights. *International Energy Association, Paris*.

Jain, S. K., & Kaur, G. (2004). Green Marketing: An Indian Perspective. *Decision (0304-0941)*, *31*(2).

Jaiswal, D., & Kant, R. (2018). Green purchasing behaviour: A conceptual framework and empirical investigation of Indian consumers. *Journal of Retailing and Consumer Services, 41*, 60-69.

Jayaraman, K., Yun, W. W., Seo, Y. W., & Joo, H. Y. (2015). Customers' reflections on the intention to purchase hybrid cars: an empirical study from Malaysia. *Problems and Perspectives in Management*, *13*(2), 304-312.

Jin, Y., Andersson, H., & Zhang, S. (2016). Air pollution control policies in China: a retrospective and prospects. *International Journal of Environmental Research and Public Health*, *13*(12), 1219.

Joergens, C. (2006). Ethical fashion: myth or future trend?. *Journal of Fashion Marketing and Management: An International Journal*.

Junquera, B., Moreno, B., & Álvarez, R. (2016). Analyzing consumer attitudes towards electric vehicle purchasing intentions in Spain: Technological limitations and vehicle confidence. *Technological Forecasting and Social Change*, *109*, 6-14.

Karatu, V. M. H., & Mat, N. K. N. (2015). The mediating effects of green trust and perceived behavioural control on the direct determinants of intention to purchase green products in Nigeria. *Mediterranean Journal of Social Sciences*, *6*(4), 256.

Kim, Y., & Han, H. (2010). Intention to pay conventional-hotel prices at a green hotel–a modification of the theory of planned behaviour. *Journal of Sustainable Tourism*, *18*(8), 997-1014.

Kline, R. B. (2011). Principles and practice of structural equation modeling (3. Baskı). *New York, NY: Guilford*.

Kumar, B., Manrai, A. K., & Manrai, L. A. (2017). Purchasing behaviour for environmentally sustainable products: A conceptual framework and empirical study. *Journal of Retailing and Consumer Services*, *34*, 1-9.

Lai, C. K., & Cheng, E. W. (2016). Green purchase behaviour of undergraduate students in Hong Kong. *The Social Science Journal*, *53*(1), 67-76.

Laroche, M., Bergeron, J., & Barbaro-Forleo, G. (2001). Targeting consumers who are willing to pay more for environmentally friendly products. *Journal of consumer marketing*, *18*(6), 503-520.

Lee, K. (2009). Gender differences in Hong Kong adolescent consumers' green purchasing behaviour. *Journal of consumer marketing*.

Lin, P.-C., & Huang, Y.-H. (2012). The influence factors on choice behaviour regarding green products based on the theory of consumption values. *Journal of Cleaner Production, 22*(1), 11-18.

Liu, S., & Guo, L. (2018). Based on environmental education to study the correlation between environmental knowledge and environmental value. *EURASIA Journal of Mathematics, Science and Technology Education*, *14*(7), 3311-3319.

Loureiro, M. L., & Hine, S. E. (2002). Discovering niche markets: A comparison of consumer willingness to pay for local (Colorado grown), organic, and GMO-free products. *Journal of Agricultural and Applied Economics*, *34*(1379-2016-113432), 477-487.

Mai, R., & Hoffmann, S. (2012). Taste lovers versus nutrition fact seekers: how health consciousness and self-efficacy determine the way consumers choose food products. *Journal of Consumer Behaviour*, *11*(4), 316-328.

Milfont, T. L., & Gouveia, V. V. (2006). Time perspective and values: An exploratory study of their relations to environmental attitudes. *Journal of environmental psychology*, *26*(1), 72-82.

Moser, A. K. (2015). Thinking green, buying green? Drivers of pro-environmental purchasing behavior. Journal of consumer marketing.

Moses, M (2020). How does the electric engine work? Retrieved from https://www.edfenergy.com/for-home/energywise/how-do-electric-cars-work/ (accessed January 8, 2020).

Mostafa, M. M. (2007). Gender differences in Egyptian consumers' green purchase behaviour: the effects of environmental knowledge, concern and attitude. *International Journal of Consumer Studies, 31*(3), 220-229.

Ng, M., Law, M., & Zhang, S. (2018). Predicting purchase intention of electric vehicles in Hong Kong. *Australasian Marketing Journal (AMJ)*, *26*(3), 272-280.

Oberhofer, P., & Dieplinger, M. (2014). Sustainability in the transport and logistics sector: Lacking environmental measures. *Business Strategy and the Environment*, *23*(4), 236-253.

Oreg, S., & Katz-Gerro, T. (2006). Predicting proenvironmental behaviour cross-nationally: Values, the theory of planned behaviour, and value-belief-norm theory. *Environment and behaviour*, *38*(4), 462-483.

PAMA (2018). Pakistan automotive manufacturers association. Retrieved from www.pama.org.pk/home/ (accessed 16 January 2020).

Paris Agreement (2015). The Paris Agreement. Retrieved from https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement/ (accessed 16 January 2020).

Paul, J., Modi, A., & Patel, J. (2016). Predicting green product consumption using theory of planned behaviour and reasoned action. *Journal of retailing and consumer services*, *29*, 123-134.

Qi, X., & Ploeger, A. (2019). Explaining consumers' intentions towards purchasing green food in Qingdao, China: The amendment and extension of the theory of planned behaviour. *Appetite*, *133*, 414-422.

Ramanathan, V., & Feng, Y. (2009). Air pollution, greenhouse gases and climate change: Global and regional perspectives. *Atmospheric environment*, *43*(1), 37-50.

Ramayah, T., Lee, J. W. C., & Lim, S. (2012). Sustaining the environment through recycling: An empirical study. *Journal of environmental management*, *102*, 141-147.

Ringle, C. M., Wende, S., & Becker, J. M. (2015). SmartPLS 3. *Boenningstedt: SmartPLS GmbH*.

Sang, Y. N., & Bhet, H. A. (2015). Modelling electric vehicle usage intentions: an empirical study in Malaysia. *Journal of Cleaner Production*, *92*, 75-83.

Schahn, J., & Holzer, E. (1990). Studies of individual environmental concern: The role of knowledge, gender, and background variables. *Environment and behaviour*, *22*(6), 767-786.

Shah, K. U. (2015). Choice and control of international joint venture partners to improve corporate environmental performance. *Journal of cleaner production*, *89*, 32-40.

Sharma R, Shaikh AA, Bekoe S, Ramasubramanian G. (2021). Information, Communications and Media Technologies for Sustainability: Constructing Data-Driven Policy Narratives. *Sustainability*. 13(5):2903. https://doi.org/10.3390/su13052903

Shmueli, G., & Koppius, O. R. (2011). Predictive analytics in information systems research. *MIS quarterly*, 553-572.

Shmueli, G., Ray, S., Estrada, J. M. V., & Chatla, S. B. (2016). The elephant in the room: Predictive performance of PLS models. Journal of Business Research, 69(10), 4552-4564.

Shmueli, G., Sarstedt, M., Hair, J. F., Cheah, J. H., Ting, H., Vaithilingam, S., & Ringle, C. M. (2019). Predictive model assessment in PLS-SEM: guidelines for using PLSpredict. *European Journal of Marketing*.

Simsekoglu, Ö., & Nayum, A. (2019). Predictors of intention to buy a battery electric vehicle among conventional car drivers. *Transportation Research Part F: Traffic Psychology and Behaviour*, *60*, 1-10.

Sinnappan, P., & Rahman, A. A. (2011). Antecedents of green purchasing behaviour among Malaysian consumers. *International Business Management*, *5*(3), 129-139.

Straub, D., Boudreau, M. C., & Gefen, D. (2004). Validation guidelines for IS positivist research. *Communications of the Association for Information systems*, *13*(1), 24.

Tan, B.-C. (2011). The roles of knowledge, threat, and PCE on green purchase behaviour. *International Journal of Business and Management, 6*(12), 14.

Tanner, C., & Wölfing Kast, S. (2003). Promoting sustainable consumption: Determinants of green purchases by Swiss consumers. *Psychology & Marketing*, *20*(10), 883-902.

Taufique, K. M. R., & Vaithianathan, S. (2018). A fresh look at understanding Green consumer behaviour among young urban Indian consumers through the lens of Theory of Planned Behaviour. *Journal of cleaner production*, *183*, 46-55.

Urbach, N., & Ahlemann, F. (2010). Structural equation modeling in information systems research using partial least squares. *Journal of Information technology theory and application*, *11*(2), 5-40.

Venkatesh, V., & Morris, M. G. (2000). Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behaviour. *MIS quarterly*, 115-139.

Wang, P., Liu, Q., & Qi, Y. (2014). Factors influencing sustainable consumption behaviours: a survey of the rural residents in China. *Journal of Cleaner Production*, *63*, 152-165.

World Health Organization. (2019). World health statistics 2019: monitoring health for the SDGs, sustainable development goals.

Yeung, S. P. M. (2004). Teaching approaches in geography and students' environmental attitudes. *Environmentalist*, *24*(2), 101-117.

Zelezny, L. C., Chua, P. P., & Aldrich, C. (2000). New ways of thinking about environmentalism: Elaborating on gender differences in environmentalism. *Journal of Social issues*, *56*(3), 443-457.

Zhou, Z., Jin, X. L., & Fang, Y. (2014). Moderating role of gender in the relationships between perceived benefits and satisfaction in social virtual world continuance. *Decision Support Systems*, *65*, 69-79.

Appendix: Scale items

Attitude: Ajzen (1991)

1   It is environment-friendly to buy EV.
2   It is fuel-efficient to purchase EV.

Subjective Norm: Ajzen (1991)

3.   Most people who are important to me think I should use EV.
4.   Because I care about the people whom I value influence me to use EV.

Perceived Behavioral Control: Ajzen (1991)

5.   I can buy EV if I want.
6.   It would be easier for me to buy EV.
7.   I am confident to buy EV if it were entirely up to me.
8.   I am confident that I will be able to buy EV.
9.   It is mostly up to me to buy or not to buy EV.
10. I have personal control to feel over buying EV.
11. I have full control over buying EV.

Purchase Intention: Ajzen (1991)

12. I intend to purchase EV in the future.
13. I will try to consider buying EV.
14. I plan to switch my FFV with EV.

Willingness-to-Pay more: Moser (2015)

15. I accept to pay 10% more for EV.
16. I am willing to pay 10% more for EV.
17. I show my willingness to spend extra amount of Rs.300,000 for EV.

Environmental Concern: Ramayah et al. (2012) and Kumar et al. (2017)

18. I think environmental problems are becoming more and more serious in recent years.
19. Pakistan's environment is my major concern.
20. I am emotionally involved in environmental protection issues in Pakistan.
21. I often think about how the environmental quality in Pakistan can be improved.