Factors of Electric Vehicle Adoption: A Comparative Analysis of Electric and Conventional Vehicle User in China Based on A Theory of Planned Behavior

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Abstract. With the rapid development of the global economy, the consumption of energy has increased significantly year by year, which has accordingly contributed to the ever-growing carbon emissions. Therefore, promoting electric vehicles is regarded as an important and promising way to reduce automobile exhaust. This study compares the demand preference, and behavioral preferences sociodemographic traits of users of conventional vehicles (CVs) and electric vehicles (EVs) based on the findings of an online survey conducted in China. In accordance with earlier studies, this report reveals that EV users are often men, have advanced degrees, high salaries, and frequently own several vehicles. Additionally, EV users perceive fewer practical barriers to EV use than CV users and have more positive attitudes and social norms than CV users. One of the elements from the Theory of Planned Behavior that is modeled in regression research is the possibility that CV and EV consumers will use or purchase an EV. This essay examines methods to increase EV adoption for both current users and non-users based on the findings.

Keywords: Electric Vehicle, Factors of Electric Vehicle Adoption, A Theory of Planned Behavior, Intention, Attitude, Norm, Behavior

1 Introduction

Rapid economic development has caused a considerable increase in the consumption of energy, which is responsible for the increasing carbon emissions. Thus, rather than reducing individual car use, many authorities believe that increasing the percentage of electric cars (EVs) in the overall fleet is a more practical method to achieve their environmental goals. Despite recent advancements in infrastructure and vehicle technology, the uptake of EVs is not happening as swiftly as one might anticipate. Developing methods to increase EV acceptance requires a deeper understanding of the variables that affect EV adoption by drivers of CV while also assuring that current EV users will choose an EV again.

Since EV users have different demographic features from non-users (e.g., more men and better incomes), they can be seen as a separate target market, according to

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prior research. Therefore, it is thought relevant to look at EV adoption determinants separately for present EV users and non-users. Financial obstacles are less of a factor for more affluent EV owners than they may be for non-users. EV users' intentions to use and purchase an EV will be influenced by their perceived functional barriers (PBC) with the EV, whereas non-users' intentions may be more influenced by the public perception of EVs and associated social norms. Such disparities in EV adoption variables suggest that when trying to enhance EV uptake, separate techniques should be employed to address both groups and that results from one group cannot be extended to other vehicle user groups. The polls looked at potential influencing factors as well as people's intentions to use and buy an EV. The Theory of Planned Behavior [1] is considered to make sure that the most important psychological elements are taken into account. This theory has the advantage of being flexible enough to consider additional elements like environmental norms and symbolic-affective reasons, which are seen to be important in the context of EV adoption as this research elaborates.

2 Literature Review

2.1 Socio-demographic profile of EV owners

According to the statement of China electric vehicle development 2020, it is suggested that currently the consumers of EVs are mainly from first- tier and second-tier cities in China, which are also license-restricted cities. Studies that compared EV owners with other car owner groups or the overall population of cities offer a very clear sociodemographic profile of EV owners. There is a significant difference in the consumption of new energy in cities with traffic restrictions and non-traffic restrictions. There are many middle-aged people aged 35 to 45 in cities where the traffic restrictions are imposed strictly and 38.7% of families have a monthly income of more than 20000 yuan ($2991). 60.3% of users in cities without traffic restrictions are under 35 years old, and the proportion of the low-income group is relatively high. Therefore, 84.3% of EV users are married, who are more likely to live in higher - income households, especially with children, and 69.8% of EV users are male, who have higher education degrees and a stable income. Additionally, 47.6% of EV users are interested in self-driving tours, and 39.0% of them enjoy exercising to keep fit. In terms of life attitude, 84,4% of EV users are more open-minded in accepting new things [2].

2.2 The elements of the Theory of Planned Behavior

The psychological components included in this study are provided by the Theory of Planned Behavior, an extension of the Theory of Reasoned Action - TRA [3] that may be used to explain the relationship between various variables and purchase intention. To explain the relationship between consumer behavior and their beliefs, attitudes, and social influence, the TRA and TPB models are frequently employed in marketing [4].

According to TPB, the primary factor in determining conduct is intention. Three elements—attitude, subjective norm, and perceived behavioral control—determine whether a behavior will be performed. In the TPB model, attitude refers to the assessment of the adoption behavior as either favorable or unfavorable. According to certain studies, behavioral intention's significant anterior variable is attitude. A person's sense of social pressure from other people or groups who are important to them and want or expect them to act in a certain way is referred to as a subjective norm. The final predictor of intention in the TPB model is perceived behavioral control, which evaluates how simple or complex a person considers it to be to carry out the behavior [5].

2.3 The elements of the Extended Theory of Planned Behavior to EV adoption

The TPB model has also been used by academics to investigate environmentally beneficial behavior. The TPB model, for instance, was used by Wang, S. et al. to forecast customer interest in hybrid electric car adoption [6]. Direct experience with battery electric vehicles (EVs) important when assessing vehicle features, attitude, and purchase intention, Schmalfuß, F. et al. found using the TPB model [7]. The TPB model is also used to describe young customers' desire to purchase green products [8]. Based on an expanded theory of planned behavior, the TPB model might potentially be used to compare users of conventional and electric cars.

In fact, various studies used the single TPB predictors or the TPB to research BEV adoption and conducted the relationship between them. In the context of figuring out the factors of electric vehicle adoption, functional, affective, and symbolic attitudes can be distinguished. It has been established that EVs are usually related with negative functional attitudes because of the high perceived purchase price [9], the restrictions on driving range, the length of time required for charging, and the perceived annoyance [10]. Additionally, it has been discovered that they are, in contrast, linked to positive affective attitudes: people value a quieter, higher acceleration driving experience. BEVs and their owners are commonly linked to positive symbolic implications like elevated social status [11], receptivity to novel concepts and technological advancements, or environmental and social ideals [12], in addition to these affective sentiments.

The ability to carry out the adoption behavior is one aspect of perceived behavioral control in the current setting, along with perceptions of technology, pricing, availability, or knowledge to use EVs. Such a behavioral purpose would be more likely to develop in customers' purchasing decisions if they had greater influence over these aspects [13]. Functional attitudes and perceived behavioral control share conceptual similarities with each other in this paper's discussion of perceived functional barriers.

In order to highlight aspects of the individual's living environment (such as a demanding or stressful lifestyle) that prevent the utilization of green transportation choices, Haustein and Hunecke incorporated the notion of perceived mobility demands to TPB [14]. The effect of subjective norm on EV adoption has been studied as it relates to symbolic elements like EV status in society. While a study indicated that

subjective peer norms had a little impact on EV usage intention, media had a larger impact, which is completely explained by the low contribution of EV among peers at the time of data collection [15].

In addition to the elements of the TPB, personal norm (PN) is also a factor that should be taken into consideration as a factor of EV adoption. The main variable in the Norm-Activation Model is called PN, and it is described as the moral obligation that a person has to act in accordance with their particular set of values [16]. In this study, PN is defined as a norm where a consumer chooses to purchase an EV based more on subjective norms or societal pressure than on his or her own moral principles or sense of personal responsibility. Environmental awareness is a key motivator for changing one's conduct from their current course to one that is more environmentally friendly [17]. It has an indirect impact on particular environmentally friendly behavior through some other variables [18]. Norms, beliefs, and attitudes can all affect a person's behavioral intention with regard to environmental care, claims Bamberg [19]. This suggests that concern for the environment is a prior aspect of the expanded TPB model's components and an indirect predictor of behavioral intention. Environmental rules are not very important, according to Lane & Potter [20]. Therefore, this paper does not address environmental concerns.

This study examines, considering nation-specific variables, the relationship between EV users and CV users' intention to use and purchase an EV under the terms of TPB. The outcomes should make it possible to draw precise inferences about how to boost EV adoption in both target groups.

3 Research Methodology

3.1 Sample and procedure

The two target demographics for this study are: (1) licensed drivers who only own internal combustion engine cars in their households (and no other types); and (2) drivers who own at least one electric car (referred to as "EV users" below). Between the end of March 2022 and the start of May 2022, data was gathered in China through online surveys. The links to Questionnaire Star's survey invites were sent anonymously in China. With 292 EV users and 137 CV users, the complete sample of users in China came to 429 people. Considering the huge number of Chinese car owners and the different geographical distribution, the online questionnaire is used to obtain data. Internet users voluntarily fill out the survey and complete the data collection online, which is not limited by weather and distance and only requires fewer human and material resources, reducing research costs. In addition to the special effects of the car itself will affect the consumer's choice behavior, the individual differences of consumers will also have an impact. Therefore, in addition to the selection task, questionnaire design also involves the age of residents, gender, education, household income, and other demographic information.

3.2 Measures

The questionnaire comprises questions to gauge demographics, mobility behavior, and EV attitudes and standards. The online survey can be finished in between five and fifteen minutes.

The TPB provides the foundation for the attitudinal variables used in this study (see Table 1). To distill the multitude of psychological factors down to their fundamental dimensions, factor analysis is used. Statistical Product Service Solutions (SPSS) uses it to conduct reliability analysis and factor analysis. I chose a 5-factor explanation, which accounts for 64.440%. The loading of the individual items on the five criteria is shown in Table 1. All the major components have loadings that are higher than 0.5, making it possible to clearly allocate a variable to one of them.

With Cronbach's alpha above 0.928, all factors have acceptable internal consistencies.

Table 1. Results of factor analysis on psychology items derived from TPB (Original)

	1 PERCEIVED FUNCTIONAL BARRIERS (PBC)	2 SUBJECTIVE NORM (SN)	3 ATTITUDE: SYMBOLIC	4 ATTITUDE: AFFECTIVE	5 PERSONAL NORM (PN)
ELECTRIC AUTOMOBILES ARE EXTREMELY IMPRACTICAL FOR USE IN DAILY LIFE DUE TO THE NECESSITY FOR CHARGING.	0.768	0.109	-0.002	0.180	0.067
IT IS DIFFICULT TO USE AN ELECTRIC AUTOMOBILE SINCE YOU HAVE TO MAKE SURE IT IS ALWAYS CHARGED.	0.670	0.391	0.112	0.006	0.061
USING AN ELECTRIC VEHICLE NECESSITATES METICULOUS ACTIVITY PLANNING.	0.626	-0.083	0.234	0.310	0.273
WHEN DRIVING AN ELECTRIC CAR, I USED TO WORRY ABOUT RUNNING OUT OF BATTERY ALL THE TIME.	0.680	0.299	0.363	0.062	0.030

DUE TO A SCARCITY OF CHARGING OUTLETS ALONG THE HIGHWAY, DRIVING AN ELECTRIC VEHICLE OVER EXTENDED DISTANCES IS CHALLENGING.	0.709	0.255	0.276	0.194	0.079
PEOPLE WHO ARE IMPORTANT TO ME ARE THINKING ABOUT GETTING AN ELECTRIC VEHICLE.	0.222	0.729	0.056	0.186	0.291
PEOPLE WHO ARE IMPORTANT TO ME DRIVE ELECTRIC VEHICLES.	0.234	0.508	0.363	0.308	0.192
PEOPLE WHO ARE IMPORTANT TO ME THINK THAT MY NEXT CAR SHOULD ME ELECTRIC CAR.	0.140	0.613	0.327	0.429	-0.138
PEOPLE WHO ARE IMPORTANT TO ME THINK THAT ELECTRIC CARS SHOULD PLAY AN IMPORTANT ROLE IN OUR TRANSPORT SYSTEM.	0.224	0.745	0.168	0.115	0.092
I'D BE PLEASED TO OWN AN ELECTRIC VEHICLE.	0.251	0.293	0.632	0.250	0.178
DRIVING AN ELECTRIC VEHICLE DEMONSTRATES MY CONCERN FOR THE ENVIRONMENT.	0.084	0.171	0.582	0.409	0.097

DRIVING AN ELECTRIC VEHICLE DEMONSTRATES MY RECEPTIVITY TO EMERGING TECHNOLOGIES.	0.233	0.205	0.679	0.245	0.028
DRIVING AN ELECTRIC AUTOMOBILE IS ENTERTAINING.	0.129	0.259	0.173	0.687	0.246
AN ELECTRIC CAR'S QUICK ACCELERATION IS A THRILLING SENSATION.	0.282	0.004	0.290	0.608	0.334
THE TECHNOLOGY BEHIND ELECTRIC CARS INTRIGUES ME.	0.171	0.154	0.306	0.502	0.328
IF I BUY A CAR, I FEEL ETHICALLY OBLIGATED TO PICK A CAR THAT PRODUCES THE FEWEST CARBON EMISSIONS AND AIR POLLUTION.	0.094	0.272	0.194	0.176	0.807
I FEEL COMPELLED TO CONSIDER HOW DRIVING WILL AFFECT THE ENVIRONMENT WHEN CHOOSING A CAR.	0.178	0.154	0.213	-0.017	0.791
CRONBACH'S ALPHA			**0.911**		

EVs are evaluated based on single attributes, such as purchase price, driving experience, after-sale service, chargers near people's homes or places of employment, environmental performance, maintenance costs, brand awareness, and public incentives (Cronbach's alpha = 0.989 for EV users and 0.998 for CV users) in addition to operationalization based on TPB constructions and its extensions. where 1 denotes the least significance and 5 the greatest. The importance of the eight attributes was rated by CV users while they were thinking about buying an EV. Next, EV buyers were questioned about how significant these factors were to them (retrospectively).

Additionally, the number of each sort of car owned by a person's household was questioned. Users of CV were questioned about whether they have driven an EV (either as a driver or a passenger) and how they would sum up the experience (negative or positive). Users of EVs were questioned about whether and how owning an EV

altered their pattern of mobility. And they were asked what their trip purpose was when they drived CV or EV.

Gender, age, education, employment status, household size, and income were sought as sociodemographic factors. The questionnaire included covered steps to increase the market share of electric vehicles as well as the present flaws with electric automobiles.

4 Discussion

4.1 Comparison of CV and EV users

Table 1. Socio-demographic profiles of CV and EV users in China (Original)

		CV users	*EV users*
Gender	Male	42.31%	61.05%
Age	<36	42.50%	45.50%
	36-45	40.56%	43.18%
	46-59	11.93%	8.85%
	>60	5%	2.48%
Income (10 K RMB)	<3	7.69%	4.49%
	3-10	36.35%	35.33%
	11-20	34.04%	40.07%
	>20	21.93%	20.12%
Employ-ment status	Employee	73.27%	71.67%
	Employer	17.13%	24.07%
	Student	3.85%	2.56%
	Retirement	1.93%	0.29%
	People, who are waiting for employment	0%	1.14%
	other	3.85%	0.29%
Education	University education	49.24%	61.92%
House-hold member (person)	1-2	3.85%	6.76%
	3	36.73%	43.97%
	4	27.31%	29.92%
	5	32.12%	19.36%

Table 2 demonstrates the sociodemographic differences between EV and CV users: Male respondents to the poll who reported having an EV in their home outnumbered female respondents, and women in China are more likely to be interested in EVs. Additionally, average household incomes and greater levels of education are characteristics of EV owners. And they are younger. In addition, EV households often lived with fewer household members; the household size and number of EV owners are smaller than the CV owners. In this survey, the population share of first-, second-, and new first-tier cities in China is only about 7.425%. Therefore, this research mainly depicts the portrait of consumers in third-, fourth-, and fifth-tier cities.

Table 2. EVs driving experience (Original)

CV USERS	YES(POSITIVE)	NO(NEGATIVE)
TRAVELLED IN AN EV BEFORE	76.93%	23.07%
EXPERIENCE DESCRIPTION	64.04%	35.96%
EV USERS		
CHANGED THEIR ACTIVITY PATTERNS	84.04%	15.96%
PLANNED LONGER TRIPS MORE CAREFULLY	55.57%	44.43%
MORE FREQUENTLY TO COMMUTE	53.64%	46.36%
MORE FOR LEISURELY OUTINGS (MEETING FRIENDS, SHOPPING, ETC.)	52.27%	47.73%
USED OTHER MODES LESS OFTEN	25.68%	74.32%

Users of CVs were also questioned about whether they had ever taken an EV. While 23.7 percent had never driven an electric vehicle before, 76.3 percent had done so either as a passenger, a driver, or both. The majority of participants (64.04%) who responded to the survey said they had a pleasant experience. We asked EV owners if their household's activity habits had changed since they installed an EV. 84.04 percent of EV users claimed to have altered their behavior, with 55.57% planning longer journeys more meticulously, 53.64% using EVs more frequently for commuting, and 52.27% using them more regularly for leisurely outings (meeting friends, shopping, etc.). Additionally, 25.68% used other modes less frequently.

Table 3. Trip purpose by car (Original)

	CV users	*EV users*
Daily commute	35%	52%
Leisure activities	25%	24%
Longer trips	30%	28%
Vacation/weekend trips	35%	56%
Business trips	25%	28%
Personal errands (e.g., appointment at doctor, bank)	40%	8%
Picking up children or others	25%	28%

Table 4 shows what trip purpose they preferred when users drove CV or EV. EV users are likely to take vacation/weekend trips and daily commute, CV users used to take CV to take leisure activities and private errands.

Table 4. Psychological characteristics of EV and CV users differ (Original)

	CV USERS	EV USERS
PERCEIVED FUNCTIONAL BARRIERS (PBC)	3.866	3.855
ATTITUDE: SYMBOLIC	3.861	3.851
ATTITUDE: AFFECTIVE	3.933	4.063
SUBJECTIVE NORM (SN)	3.823	3.833
PERSONAL NORM (PN)	3.130	3.943

It's impossible to ignore EV attitudes and conventions. According to the means in Table 5, individuals whose households only use CVs differ significantly from those who use EVs in terms of higher perceived functional barriers and lower personal norms and affective attitudes toward EVs. The means reveal that emotional attitudes and personal norms are where variations are most noticeable. Other than what is anticipated, the variations in subjective norms are quite minor but nonetheless present.

4.2 Factors of EV adoption

CV and EV users' intention to use/purchase an EV is analyzed by regression analyses.

Table 5. Analysis using linear regression to predict EV purchase and use intentions among CV and EV users (Original)

	CV USERS' INTENTION		EV USERS' INTENTION	
	Beta	P	Beta	P
PERCEIVED FUNCTIONAL BARRIERS (PBC)	-0.101	0.000	0.617	0.000
ATTITUDE: SYMBOLIC	0.902	0.000	0.037	0.000
ATTITUDE: AFFECTIVE	0.101	0.000	0.178	0.000
SUBJECTIVE NORM (SN)	-0.101	0.000	0.192	0.004
PERSONAL NORM (PN)	0.145	0.000	0.249	0.000
SATISFACTION WITH PRICE / PUBLIC INCENTIVES	-2.356	0.265	-0.008	0.000
SATISFACTION WITH MAINTENANCE/DAILY COSTS	0.345	0.289	0.027	0.496
SATISFACTION WITH IMPROVEMENT OF INFRASTRUCTURE	0.001	0.995	0.033	0.443
SATISFACTION WITH DRIVING FEELINGS	0.185	0.219	0.020	0.612

SATISFACTION WITH ENVIRONMENTAL PERFORMANCE	0.522	0.000	0.144	0.001
GENDER	-0.236	0.037	0.101	0.052
AGE	-0.033	0.691	0.191	0.000
INCOME (10 K RMB)	-0.047	0.382	0.066	0.195
EMPLOYMENT STATUS	0.169	0.010	-0.028	0.544
EDUCATION	-0.071	0.218	0.147	0.006
HOUSEHOLD MEMBER (PERSON)	-0.190	0.041	0.163	0.004

The factors influencing BEV users' and CV users' desire to buy or use a BEV were identified through separate linear regression analyses. Price, maintenance costs, and environmental performance were all taken into account. The following variables were also included: SN, PN, PBC, symbolic and emotional BEV attitudes, as well as BEV assessments that weren't better covered by the perceived functional barriers variable (PBC). The table shows that symbolic attitudes were the most important predictor for CV users, demonstrating that consumers are more likely to buy an EV if they associate BEV ownership with a favorable image and high status. Satisfaction with environmental performance was also significant, followed by satisfaction with maintenance or daily costs. In the case of BEV users, functional hurdles were by far the most important predictor of intention, indicating that consumers who experienced problems with charging and driving range are less likely to purchase a BEV again. It was also underlined the importance of affective and symbolic norms and attitudes. In the case of CV users, gender and employment status were two factors that now also had a significant impact, showing a greater BEV intention for household members and older adults.

5 Conclusion

This study's main objective was to evaluate the variables that influence EV adoption among EV users and CV users using an extended TPB in order to lay the groundwork for the creation of targeted interventions to promote EV adoption. It has been observed that BEV usage and purchase intent are connected to all TPB structures, as expected (attitude, subjective norm, and perceived behavioral control).

The most significant predictor for BEV purchase intention and current EV usage for EV users was price satisfaction or public incentives. Increased governmental incentives and price reductions are therefore of utmost importance for retaining current EV customers and attracting new ones. Views were more significant for the intention of CV users, particularly symbolic attitudes relating to EVs.

The results of this study show that EV and CV consumers are distinct target populations with unique demographics and EV usage attitudes. Different approaches are suggested for both groups in the future when attempting to expand EV adoption: for

EV users, efforts must be made to increase faith in the genuine improvements in public incentives. The activities that improve the perception of BEVs as "green" status symbols and reduce knowledge gaps about the driving range and related developments should be the major focus for CV users. It also seems crucial to increase the number of chargers along the highway network and offer straightforward and compatible payment solutions in China, especially when it's the only car in the household, to prevent current BEV users from switching back to a CV when their mobility needs are not satisfactorily met by a BEV.

Despite the fact that this study has some intriguing conclusions and ramifications, it is crucial to point out its shortcomings. First off, rather than focusing on actual adoption behavior, this study examined consumers' adoption intentions. Second, the majority of the study's participants are from China's third and fourth tiers. There can be variations among participants in trial cities. As a result, the author does anticipate that future research will be done using sample data from various places. The author hopes to create more thorough studies in the future that will better suit the Chinese cultural environment.

References

1. Ajzen, I. (1991). The theory of planned behavior. Organizational behavior and human decision processes, 50(2), 179-211.
2. "China New Energy Vehicle Industry White Paper 2020". Ariadne Consulting Series Research Report (No. 12, 2020). ed. Shanghai Iresearch Consulting Co. , 2020, 571-627.
3. Schiffman, L. G., Kanuk, L. L., & Wisenblit, J. (2010). Consumer behavior. Global edition. Pearson Higher Education, London, 12(2), 113-120.
4. Assael, H. (2004). Consumer Behavior. Edisi Bahasa Indonesia.
5. Haustein, S., & Jensen, A. F. (2018). Factors of electric vehicle adoption: A comparison of conventional and electric car users based on an extended theory of planned behavior. International Journal of Sustainable Transportation, 7(12), 1-46.
6. Wang, S., Fan, J., Yang, S., & Fu, Y. (2016). Predicting consumers' intention to adopt hybrid electric vehicles: using an extended version of the theory of planned behavior model. Transportation, 43(1), 123-144.
7. Schmalfuß, F., Mühl, K., & Krems, J. F. (2017). Direct experience with battery electric vehicles (BEVs) matters when evaluating attributes, attitudes and purchase intention, Transportation Research Part F: Traffic Psychology and Behaviour, (46A), 47-69.
8. Setyawan, A., Noermijati, N., Sunaryo, S., & Aisjah, S. (2018). Green product buying intentions among young consumers: Extending the application of theory of planned behavior. Problems and Perspectives in Management, 16(2), 145-154.
9. Rezvani, Z., Jansson, J., & Bodin, J. (2015). Advances in consumer electric vehicle adoption research: A review and research agenda. Transportation Research Part D: Transport and Environment, 34, 122-136.
10. Franke, T. & Krems, J. F. (2013). What drives range preferences in electric vehicle users? Transport Policy, 30(1), 56-62.
11. Skippon, S. M., Kinnear, N., Lloyd, L., & Stannard, J. (2016). How experience of use influences mass-market drivers' willingness to consider a battery electric vehicle: A randomised controlled trial. Transportation Research Part A: Policy and Practice, 92, 26-4

12. Graham-Rowe, E., Gardner, B., Abraham, C., Skippon, S., Dittmar, H., Hutchins, R., & Stannard, J. (2012). Mainstream consumers driving plug-in battery-electric and plug-in hybrid electric cars: A qualitative analysis of responses and evaluations. Transportation Research Part A: Policy and Practice, 46(1), 140-153.
13. Axsen, J., Kurani, K.S., (2013). Hybrid, plug-in hybrid, or electric-What do car buyers want? Energy Policy 61, 532–543.
14. Haustein, S., & Hunecke, M. (2007). Reduced use of environmentally friendly modes of transportation caused by perceived mobility necessities: An extension of the theory of planned behavior. Journal of Applied Social Psychology, 37(8), 1856-1883.
15. Moons, I., & De Pelsmacker, P. (2015). An extended decomposed theory of planned behaviour to predict the usage intention of the electric car: A multi-group comparison. Sustainability, 7(5), 6212-6245.
16. Schwartz, S. H. (1977). Normative influence on altruism. In L. Berkowitz (Ed.). Advances in Experimental Social Psychology (Vol. 10, pp. 221–279). New York: Academic.
17. Daziano, R. A., & Bolduc, D. (2013). Incorporating pro-environmental preferences towards green automobile technologies through a Bayesian hybrid choice model. Transportmetrica A: Transport Science, 9(1), 74-106.
18. Ajzen, I. e Fishbein, M. (1980). Understanding attitudes and predicting social behavior. Englewoord Cliffs.
19. Bamberg, S. (2003). How does environmental concern influence specific environmentally related behaviors? A new answer to an old question. Journal of environmental psychology, 23(1), 21-32.
20. Lane, B., & Potter, S. (2007). The adoption of cleaner vehicles in the UK: exploring the consumer attitude-action gap. Journal of Cleaner Production, 15(11), 1085-1092.