

## Environmental Concern and Purchase Intention of Electric Vehicles in the Eastern part of China

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### ABSTRACT

The main objective of this research was to examine the effects of environmental concern on the purchase intention of electric vehicles in the eastern part of China. The research adopted a qualitative approach to elicit data from a sample of 86 participants living in Beijing. Stratified random sampling was used as a sampling technique for these participants. The research findings indicate that environmental concern plays a significant influential role in the purchase decision of electric vehicles. The findings reflect that consumers who are environmentally concerned are more willing to purchase electrical vehicles as a means to protect their environment from air pollution. Several types of environmental concern or value orientations and their effects on the purchase decision of electric vehicles were also examined. Egoistic, social-altruistic and biospheric values were identified as the most influential value orientations in the purchase intention of electric vehicles. Apart from environmental concern and its value orientations, the study also found out that the purchase decision of electric vehicles is also affected by factors such as government incentives or subsidies on electric cars, reference group or peer group influence, driving range, possible top speed, cost of the vehicle itself, battery capacity, battery life, and charging time, appearance, charging stations, vehicle performance, maintenance costs and vehicle safety, lack of choice in vehicles, lack of electric vehicle infrastructure and potential increases in electric rates. It is therefore recommended that these factors are addressed in order to enhance the attractiveness of electric vehicles. More importantly, environmental concern has to be reinforced through campaigns which are focused on raising awareness on the issue of environmental sustainability.

**Keywords:** Environmental concern, value orientations, purchase intention, electric vehicles

### INTRODUCTION

Environmental concern has gained a wide space in both business and academia due to an increase in carbon dioxide emissions and air pollution [Sergio Silva Braga Junior et al, 45]. Over the past decades, China has experienced a severe increase in air pollution due to the growth and expansion of vehicle holdings among its citizens [Tianwen, 51]. Most vehicles that are owned by the citizens of China are using conventional diesel and petrol combustion engine, mainly responsible for excessive carbon dioxide emissions [Schulte et al, 42]. In the whole world, transportation industry is ranked second as the chief source of carbon dioxide emissions after electric power [IEA. World Energy Outlook, 27].

Data from China Association of Automobile Manufacturers entails that in Beijing, haze particles consist of 15.7% industry emissions, 16.3% dust, 16.7% coal and 22.2% vehicle emissions [Lou et al, 35]. Based on this statistics, transportation industry in China is indeed leading in terms of carbon dioxide emissions and air pollution. This is posing a serious threat to the general public health and the environment at large [Lou et al, 35]. For instance, it is now causing premature

deaths, low infant weight, and increased respiratory symptoms or bronchitis [Xu, Wang and Niu, 55].

According to Rezvani et al [41], the introduction of electric vehicles is one of the major developments that have been effected to address key environmental problems which are resulting from carbon monoxide emissions, and is being acknowledged as a leading resolution to the problem of depending on fossil fuels that have been increasing air pollution due to the amount of carbon dioxide emissions which are causing environmental issues [Rezvani et al, 41]. Echoing this view, Du and Ouyang [14] are of the notion that the establishment and development of New Energy Vehicles (NEV) in China plays a significant role in curbing the problem of carbon dioxide emissions, and they express that this development is considered as an ideal technological invention for solving problems related to air pollution.

According to Lou et al [35], the governments in the Capital Economic Circle, that is; Hebei, Beijing and Tianjin, are working hard to promote the use and adoption of NEV. For instance, through drafting and applying policies that encourage the adoption of NEVs, the government of China has created an environment that encourages the use of environment-friendly automobile, and as a result, NEVs such as electric vehicles have been developed in a large scale [Lou et al, 35]. In conjunction with this analysis, Du and Ouyang [14] noted that by the year 2015, China had climbed up to the top to become the leading Plug-in Electric Vehicle (PEV) market in the whole world. As such, the development and expansion of NEV in China cannot be underestimated. An increased concern on air pollution due to the alarming rate of carbon dioxide emissions has thus enhanced the necessity of the adoption of environment-friendly automobiles in China.

Green transportation has therefore evolved as an important field of research due to its significance in addressing environmental problems. Many researchers such as Rezvani et al, [41]; Lou et al, [35]; and Zhang et al, [57], have explored the area of green transportation, and some even linked it to consumer behaviour, for example Yusof et al, [56]. However, although such research has been done, little or no attention has been directed specifically towards determining the effects of environmental concern on the purchase intention of electric vehicles, particularly in the eastern part of China. This research was therefore seeking to fill this identified gap. Moreover, the study was seeking to establish a strong link between environmental concern and purchase intention of electric vehicles in general, and to also identify other factors apart from environmental concern, affecting the purchase intention of electric vehicles.

### **Environmental Concern and its effects on Purchase Intention**

Environmental concern refers to an attitude towards facts, or an assessment of one's own behaviour, or other people's behaviour with all the consequences for a given environment [Weigel, 52; Ajzen, 1; Sjoberg, 46; Takala, 50]. Environmental concern is also defined as the level to which people are informed and they are aware of environmental problems and commit themselves to solve them and or show willingness to overcome them [Dunlap and Jones, 16]. According to Lee [33], environmental concern refers to consumers' affective assessment, and is linked to purchase intention. Hence environmental concern plays a key influential role in determining consumers' purchase intention of environmental friendly products. This is echoed by Newton et al [38], as they reiterate that environmental concern is often conceptualised as a direct or immediate factor predicting the environmental purchase intentions and it plays a significant role in motivating consumers to purchase environmentally friendly products.

Several studies have reflected that many consumers would be interested in purchasing products which mainly protect their environment [Yusof et al, 56]. Echoing this analysis, Kim and Damhorst [31] reveal that consumers with responsible feeling for their environment will buy green products in order to protect their environment from air pollution. Fransson and Garling [20] articulates that environmental concern refers to a specific attitude that directly affect intentions, or more broadly to a general attitude. According to Helm et al [26], there are different types of environmental concern, also known as value orientations.

### **Value Orientations and their effects on Purchase Intention**

According to Stern [47], there are four different types of value orientations. The first value orientation reflects a specific way of thinking, namely; the New Environmental Paradigm (NEP) [Dunlap and Van Liere, 15]. On the second value orientation, Fransson and Garling [20] depict that environmental concern is associated with anthropocentric altruism. Anthropocentric altruism entails that people are motivated to care about their environment mainly because they are of the view that a polluted environment would pose a serious threat to their health [Fransson and Garling, 20]. Hence environmental concern plays a pivotal role in creating pro-environmental citizens. Based on the idea of anthropocentric altruism, concern is mainly centered on the well-being of the people themselves rather than the environment itself [Fransson and Garling, 20; Dunlap and Van Liere, 15; Black et al., 8]. On the third value orientation, Fransson and Garling [20] entails that environmental concern expresses self-interest. In support of this notion, Baldassare and Katz [5] articulates that an environmentally responsible behaviour is usually reinforced by perceived personal threats which are caused by environmental issues such as air pollution. The fourth value orientation entails that environmental concern is related to some deeper cause such as post-materialistic values and religious beliefs (Stern, 1996).

Based on social dilemma research, value orientations such as proselves or noncooperators and prosocials or cooperators are identified [Joireman et al., 29, Garling et al., 24]. This is echoed by De Groot and Steg [12]; they noted that people who possess proself value orientation tend to focus on achieving outcomes for themselves, whereas people with prosocial value orientation focus on achieving outcomes for other people. Studies on environmental significant behaviour reflects that individuals who seek to achieve collective or prosocials values possess stronger pro-environmental behaviour and are willing to obtain different types of environmental significant behaviour than individuals who possess proself values [De Groot and Steg, 12]. For Gardner and Stern [23], environmental concern encompasses ecocentric value orientation, which entails that people are concerned about the ecosystem for its own sake. In addition, De Groot and Steg [12] articulates that an ecocentric value or ethic entails that the ecosystem is made up of critical components that have an intrinsic value and they deserve moral consideration. In explaining environmental concern within the framework of environmental ethics, De Groot and Steg [12] presented what they call homocentric, or anthropocentric ethic, which entails that the social good should be maximized, while human evil on the other hand, minimized.

Based on the socio-cognitive theory of environmental concern, Schultz [43] expresses that people are motivated by different reasons for their concern for the environment, and these reasons include egoistic, social-altruistic and biospheric values. According to Helm et al [26], egoistic involves concern for oneself, one's health or life. Social-altruistic encompasses concern for others, future generations or country, and then biospheric value on the other hand includes concern for plants and animals, and nature in general (Helm et al, [26]. Hence environmental concern encompasses a lot of values that determine individual behaviours towards their environments.

In conjunction with the above analysis, De Groot and Steg [12] suggest that egoistic value orientation resides in people who specifically consider costs and benefits of environmental social behaviour for themselves. In this regard, when the perceived benefits surpass the perceived costs, people with egoistic value orientation will be characterized by an environmentally friendly intention and vice versa. The decision to behave pro-environmentally or not, for people possessing social-altruistic value orientation is based on the perceived benefits and costs for other people [De Groot and Steg, 12]. For people with biospheric value orientation, the decision to behave pro-environmentally or not is based on the perceived benefits or costs for the biosphere or ecosystem as a whole [De Groot and Steg, 12]. Since people are motivated by different reasons such as egoistic, social-altruistic and biospheric values, to be concerned about their environment [Schultz, 43], this study was focused on examining how environmental concern in its broad sense, affect the purchase decision of electric vehicles particularly in the eastern part of China.

### **Purchase Intention in relation to Environmental Concern**

According to Chan [10], purchase intention for environment friendly products can be understood as consumers' behaviour for any given kind of eco-friendly product to express and reflect their environmental concern. Intention is described by Ajzen [2] as an indicator of the extent to which people want to accept a certain behaviour, and the number of attempts they are making to implement a specific behaviour. According to Nik Abdul Rashid [39], purchase intention for environmental friendly products is also understood as the likelihood and preparedness to prefer to buy a product which is eco-friendly. Many scholars are sharing the same sentiment that consumers who are concerned about their environment are highly motivated to purchase environment friendly products (for example; Yusof et al, 56; Manaktola and Jauhari, 36; Ali et al., 3; Kim and Damhorst, 31, Straughan and Roberts, 49).

According to Newton et al [38], environmental concern is an immediate factor affecting environmental purchase intentions. This conceptualization assumes that consumers who are concerned about their environment attain an environmental purchase intention. Hence environmental concern enables environmentally concerned consumers to possess a pro-environmental behaviour when making their purchase decisions. Furthermore, Newton et al [38] are of the view that this conceptualization entails that consumers who become concerned about their environment will automatically know where to find products or services which are environmentally friendly. Although to some extent environmental concern may not directly affect environmental purchase intention, it can influence consumers to gain knowledge about the environmental outcomes related to their purchase decisions [Newton et al, 38].

### **THEORETICAL FRAMEWORK**

This research was guided by the Hines model which was coined by Hines et al. in 1987. The Hines model is based on the outcome of the meta-analysis of 128 studies which were reported since 1970. The model entails that intention is closely linked to the actual behaviour. This is strongly related to the theory of planned behaviour (TPB) [Fishbein and Ajzen, 19; Ajzen, 2] For instance in TPB, intention strength is regarded as the cause of behaviour. Thus, a positive or negative attitude behind the behaviour, perceived control over the behaviour and a subjective norm to implement the behaviour are causes of intention [Fransson and Garling, 20]. Many researchers in the field of consumer behaviour and environmental domain have acknowledged these conceptualizations to advance the idea that environmental concern directly affects environmental purchase intentions, for example Newton et al [38].

Relying on the meta-analysis work, Hines et al (1987) expresses that intention is closely related to knowledge, skill and personality [Fransson and Garling, 20]. According to Fransson and Garling [20], knowledge in this case is divided into two parts, that is; knowledge of the existence of the problem, related to environmental concern, and knowledge of the behavioural strategies, together with their effectiveness. According to the Hines model, skill refers to the capability to execute such knowledge towards notable problems [Fransson and Garling, 20]. Based on the model, an individual must also seek to do the right thing, and according to Fransson and Garling [20], this desire is believed to be fueled by attitude, personality responsibility and perceived locus of control. As contained in this model, a person who possess an internal locus of control, the necessary skill, a positive attitude towards the environment, personal responsibility and a responsible environmental behaviour, is likely to engage in a pro-environmental and responsible behaviour (Fransson and Garling, 1999). This research is thus acknowledging that a positive attitude, personal responsibility and an internal locus of control will motivate consumers to purchase environmental friendly products, such as electrical vehicles in this case, in order to protect their environment as part of showing concern. However, it is important to also acknowledge that there are other factors that may affect responsible or pro-environmental behaviours. This is also echoed and appreciated by Fransson and Garling [20], as they give examples of these situational factors, such as social pressure, economic constraints, and opportunities to make alternative behaviours.

## METHODOLOGY

A research methodology is a larger research design that is followed by a researcher when carrying out a research [Bailey, 4]. It can therefore be contextualized as the overall plan or guideline that directs the researcher from the first step up to the end. This research adopted a qualitative approach, and primary data was collected from eighty six participants living in Beijing. Stratified random sampling was used as a sampling technique for these participants. The main instruments used to collect data were interviews and questionnaires.

## FINDINGS AND DISCUSSIONS

### Demographic Data

Out of eighty six respondents who participated in this research, fifty one were males hence reflecting 59%, while thirty five were females, and thereby indicating 41%. The majority of these respondents were youth, falling between the age range of 18-24, and most of them were university students. Adult respondents were within the age range of 40-55, and most of them were owning cars, while some of them were working in the transport industry as taxi operators.

### Environmental Concern and its effects on Purchase Intention

Sixty seven respondents had an appreciation and understanding of environmental concern. They also expressed love and care for their environment. When asked to share their views about the meaning of environmental concern, one of the respondents indicated that *“environmental concern means taking great care of our environment so that it can be safe and protected from threats such as air pollution.”* In conjunction with this view, another respondent highlighted that *“environment concern refers to making great efforts towards ensuring the protection of our environment from any possible threat.”* Giving an example, the same participant pointed out that *“people who are concerned about their environment are responsible enough when it comes to their environment, and they will choose to consume environmentally friendly products as part of ensuring the sustainability of their environment.”* This is supported by Yusof et al [56] who earlier noted that many consumers would be willing to buy products which primarily protect their environment. Hence such consumers are said to be attaching and showing a good care to their environment and are very much concerned about its

sustainability.

Another respondent contextualized environmental concern as *“being responsible and taking great care of our environment in order to ensure its sustainability.”* The same respondent expressed that *“people who care about their environment will exhibit a pro-environmental behaviour, and as a matter of fact, because we are surrounded by and live in our environment, taking good care of our environment simply means taking great care of ourselves, especially our health.”* This was also acknowledged by eight respondents who suggested that every member of their society should be concerned about their environment, protect it and ensure its sustainability by developing a culture of pro-environmental behaviour. One of the concerned respondents expressed that *“it is high time that people should become responsible, for instance, members of our society can show concern about our environment through adopting new energy vehicles such as electric cars in order to avoid excessive carbon dioxide emissions.”* This was supported by another respondent who stated that every environmentally concerned societal member has a key role to play in ensuring environmental sustainability. This is echoed by Ellen et al [17] as they suggest that environmental concern and a belief that individuals can make a difference plays a significant role in fueling an environmentally conscious behaviour.

One of the respondents was highly concerned about the current environmental situation in his city, highlighting that *“it is disturbing to note that the air that we are currently breathing is highly polluted by carbon dioxide emissions, especially from vehicles since many people in this city are owning and driving cars that are powered by conventional diesel and petrol fuel combustion engines.”* He added that *“it is high time as people who are concerned about, and responsible for our environment to adopt new technological developments such as electrical vehicles so as to ensure our protection.”* This is a clear cut that people who are concerned about their environment are very much aware of the threats that come with environmental negligence, and they are willing to solve any problem that threatens their environment. This is supported by Dunlap and Jones [16] as they view environmental concern as the level to which people are well informed and aware of environmental problems affecting their environment and make efforts to solve them and or show willingness to contribute to their solution.

China is indeed suffering from environmental problems such as air pollution, especially in its highly populated eastern cities. This is backed by Lou et al [35], as they reiterate that the current environment of Beijing contains haze particles that consists of dust, industry emissions, coal, and vehicle emissions as the leading contributor to air pollution. When asked about the main sources of environmental pollution, thirty seven respondents shared the same sentiment that transportation industry in their city is contributing a lot to air pollution. One of them pointed out that *“it is much better nowadays because there are new energy vehicles that have been introduced, otherwise conventional diesel and petrol engine powered vehicles were highly polluting the air through excessive carbon dioxide emissions.”* The same respondent suggested that the government of China should come up with drastic measures that ensure the full adoption of new energy vehicles such as electric vehicles.

When asked if they are aware of any government initiatives towards reducing air pollution emanating from the transport industry, seven respondents appreciated the efforts that are being made by the government of China in protecting their environment. China is indeed working hard to ensure protection of its environment. This is backed by Fryxell and Lo [21]; they state that China has indeed committed itself in developing projects that are aimed at protecting its environment ever since the introduction of Environmental Protection Law in 1979. According to Ou, Lin, Wu, Zheng, Lyu, Przesmitzki, and He [40], the government of China

under the “Ten Cities, Thousand Vehicles” NEV Project, is offering subsidies for electrical vehicles and other environmental friendly automobiles purchases, hence making them attractive and affordable to buy.

In conjunction with the above analysis, three respondents mentioned that the government of the People’s Republic of China is working hard towards ensuring the full adoption of new energy vehicles in order to run away from the old model that contributes to air pollution. One of these respondents added that, *“for instance, our government is issuing incentives and subsidies for purchase of electrical vehicles. As a result, this makes such vehicles look attractive, and because of that, I was motivated to buy mine.”* This forms a clear cut that some consumers are motivated by attached benefits such as government subsidies and incentives, to purchase electrical vehicles, not necessarily because they are environmentally concerned. However environmental concern is having a strong influence on the purchase decision of electrical vehicles.

### **Value Orientations and their effects on Purchase Intention**

Fransson and Garling [20] propounded the view that some people care about their environment simply because they believe that a polluted environment would cause a serious threat to their health, and this type of concern is viewed as anthropocentric altruism. This is in relation with egoistic value identified and explained by Helm et al [26] as concern for one’s health or life. Accordingly, thirty eight respondents that were interviewed applauded the idea of full adoption of electrical vehicles, uttering that they were worried about their health because of the excessive carbon dioxide emissions that are increasing the rate of air pollution. One of these respondents indicated that *“it is the duty of every member of our society to show concern for our environment. After all, it belongs to us, and this means we have to keep it safe for our own health.”* Another respondent pointed out that *“I care about my environment simply because I am totally afraid of the consequences that may rise, such as air borne diseases that may affect us if we do not implement an environmentally sustainable behaviour.”*

In conjunction with the above analysis, another respondent indicated that *“I would therefore encourage all the citizens of China to adopt electrical vehicles as one of the major developments that can be adopted towards protecting our environment since transportation industry is leading in terms of air pollution. This will also contribute to the protection of our health from air borne diseases.”* In China, air pollution is indeed causing a serious threat to the health of the public. As mentioned earlier on, Xu et al [55] discovered that an increasing rate of air pollution in China had started causing premature deaths. Hence environmental concern has to be explored effectively in order to encourage the protection of the environment.

Based on the Value-Belief-Norm (VBN) theory which was formulated by Stern and Dietz [48], Helm et al [26] articulates that the attitudes that people possess about environmental issues are determined by; the value that they place on themselves, and that forms part of egoistic value as already discussed above; the value that they place on other people, and that is central to social-altruistic value; and or the value that they place on plants and animals, and that is under biospheric values. In accordance with this analysis, some respondents stated that people should also consider others and every living creature when it comes to environmental issues. In the context of transportation industry, one of the respondents expressed that, *“as a reflection that I care about my environment for everyone’s sake and for every living creature, I would prefer to drive an environment friendly automobile, such as an electric vehicle over a diesel or petrol combustion engine. Diesel or petrol combustion engine releases a lot of carbon dioxide which causes air pollution.”* Another responded emotionally expressed that *“our society could be a better place if every individual could show concern for our environment by executing a pro-*

*environmental behaviour.*" As noted earlier on, De Groot and Steg [12] unearthed what they call homocentric, or anthropocentric ethic, which implies that the social good should be maximized, while human evil minimized. One of the concerned respondents reiterated that every citizen of China should engage in an environmentally sustainable behaviour in order to protect the environment from global warming and climate change. The same respondent made emphasis on the adoption of electrical vehicles, stating that it is one of the major developments which are aimed at reducing carbon dioxide emissions. Hence he encouraged that it should be embraced.

### **Purchase Intention in relation to Environmental Concern**

All the respondents pointed out that they know an electric vehicle, stating that it is a vehicle that is powered by a battery which is rechargeable. This is supported by Lai, Liu, Sun, Zhang and Xu [32] as they describe a full electric vehicle as a vehicle that is an all-electric drivetrain powered by a battery that can be recharged from electricity supply. Schuitema et al [44] indicate that electrical vehicles are divided into hybrid electric vehicles and fully electric vehicles. According to Graham-Rowe et al [25], electric vehicles have been around for a very long time. The former generation of electric vehicles were classically small cars requiring a lot of hours to recharge, and with a limited range, for example 100km [Graham-Rowe et al, 25]. The current model of electric vehicles is however having an attractive appearance, it comes in different sizes and can now reach up to 250km in range [Graham-Rowe et al, 25].

Having been asked if they currently own or they have owned an electric vehicle before, sixty five respondents said no. Weiss et al [53] indicated that the sales of electric vehicles are still low, but by the year 2035 approximately 145 million full electric vehicles will have been produced worldwide. The sales volume of electrical vehicles in China is indeed growing to contribute towards the worldwide forecasted 145 million electric vehicles by the year 2035 statistics as stated by Weiss et al [53]. By the end of the year 2017, China sold 468 000 electrical vehicles [Zheng et al, 58]. Interesting to note is that the citizens of China have different motivations behind the purchase and adoption of electrical vehicles and they consider many factors during the purchase decision.

One of the respondents expressed that *"neither do I own or have ever owned an electric vehicle, I would love to purchase it simply because it does not emit carbon dioxide which is harmful to the environment."* This was echoed by another respondent who articulated that *"I would buy an electric vehicle simply because it does not contribute to environmental pollution."* Another respondent stated that *"when buying a car, I first of all think about its benefits and drawbacks to me, people around me and the environment at large."* One of the respondents who owns an electric vehicle indicated that *"I believe the adoption of electric vehicles should be embraced by every member of our society in order to protect our environment from air pollution, hence as an environmentally concerned individual, I bought my electric vehicle as part of contributing to environmental sustainability."* To be precise, many respondents were very much concerned about their environment and they acknowledged the adoption of electrical vehicles as the way forward in dealing with environmental pollution. This is in line with Delang and Cheng's [13] survey in Hong Kong which unearthed that people are motivated by the environmental benefits of electric vehicles but not necessarily social and or economic benefits. As such, when buying a vehicle, people who are concerned about their environment would think about factors such as carbon dioxide emissions and their effects the environment [Ziegler, 59; Nayum et al, 37].

However, when buying an electric vehicle, people also consider the cost of the vehicle itself [Liu and Santos, 34; Ziegler, 59; Carley et al, 9; Jensen et al, 28] In accordance with this analysis, twenty nine respondents were satisfied with the cost of an electrical vehicle in China, highlighting that it is affordable and attractive due to the intervention of their government with subsidies. It should be acknowledged that government incentives such as subsidies also play a key role in influencing the purchase decision [Gallagher and Muehlegger, 22; Berensteanuand and Li, 7]. One of the respondents expounded that *"we so much thank the government of China for promoting the sales of electrical vehicles through issuing subsidies to every electrical vehicle that is being purchased. This will in turn yield positive results in as far as promoting the adoption of electrical vehicles is concerned, hence adding value to environmental protection."* Another respondent said that *"I prefer to buy an electric vehicle simply because it is very cheap and affordable as compared to a diesel or petrol combustion engine."* Although environmental concern plays a pivotal role in influencing the purchase decision of electric vehicles, it should be acknowledged that there are other factors which are also influential.

Purchase intention of electric vehicles is also influenced by other factors such as battery capacity, battery life, battery stations and charging time [Liu and Santos, 34; Jensen et al, 28, Carley et al, 9]. In addition to that, consumers also consider other factors such as appearance, charging stations, driving range, possible top speed, vehicle performance, maintenance costs and vehicle safety [Carley et al, 9; Jensen et al, 2013; Zhang et al, 57]. One of the respondents said *"the disadvantage with electric vehicles is that they depend of batteries whose capacity, life and charging time may cause inconveniences. So I do not think I will ever buy an electric vehicle based on those factors."* In the same context, another respondent expressed concern on the maintenance costs and vehicle performance, indicating that *"electrical vehicles are associated with poor performance and high maintenance costs."* All the respondents were very much concerned about the driving range, possible top speed and charging time. One of the respondents was worried about the charging infrastructure, expressing that *"a lot should be done in as far as the charging infrastructure is concerned."* In line with these responses, EPRI [18] came across barriers such as lack of choice in vehicles, lack of electric vehicle infrastructure and potential increases in electric rates as affecting the purchase intention of electrical vehicles. A survey carried out by Tan et al (2014) found out that purchasing behaviours are affected by charge inconvenience, cost, psychological factors and short battery range.

A research on alternative fuel vehicles which was conducted by Zhang et al [57] indicates that opinions of peers also affect the purchase decision. Reference group and peer group have a significant influence on the behaviours of members of the group. According to William and Hickey [54], a reference group or peer group is any group that is used by members of the group as a standard when evaluating themselves and their own behaviours as a group. This was indeed discovered in this research as four respondents pointed out that the decision to purchase their electric vehicles were inspired by the fact that their friends were already owners of electric vehicles and they did not complain of any serious problem. One of these respondents said that *"I was encouraged to buy an electric vehicle by one of my friends who owns an electric vehicle, advising me that it is our duty to ensure maximum care for our environment."* Banerjee [6] pointed out that the main purpose of a peer group is to ensure that members of that group are guided by the common values and beliefs that govern the characteristics of their group life. As such, it was also discovered that a peer group can encourage its group members to adopt a pro-environmental behaviour.

### **CONTRIBUTION TO NEW KNOWLEDGE**

This research will contribute immensely to new knowledge in the sense that it establishes a

direct link between environmental concern and purchase intention of electric vehicles, particularly in the eastern part of China. Moreover, the study further explored several types of value orientations and reflects their effects on the purchase decision of electric vehicles. To be clear, such an approach has never been adopted before. Apart from environmental concern, this research also reflects that there are other factors affecting the purchase intention of electrical vehicles such as battery capacity, battery life, government incentives or subsidies on electric cars and reference group or peer group influence among others that have been discussed, within the eastern region of China. Based on this research, readers shall therefore be able to appreciate a wide range of factors affecting the purchase decision of electric vehicles within the above mentioned region, hence making it easy for future research.

### CONCLUSION

The core objective of this research was to examine the effects of environmental concern on the purchase intention of electric vehicles in the eastern part of China. Stratified random sampling was used as a sampling technique for a sample of 86 participants in Beijing. The research adopted a qualitative approach to elicit primary data from the respondents. Based on the research findings, environmental concern plays a key influential role in the purchase decision of electric vehicles. According to this study, consumers who are environmentally concerned exert pro-environmental behaviour and they are more willing to buy electrical vehicles as a way of protecting their environment from pollution. The study also looked at several types of environmental concern or value orientations as contextualized in literature review. This research also explored effects of value orientations on the purchase decision of electric vehicles in the eastern region of China. Some of the environmental values that were discussed include egoistic, social-altruistic and biospheric values. These value orientations were identified as the most influential value orientations in the purchase decisions of electric vehicles in China. However, apart from environmental concern and its value orientations, the study also unearthed that the purchase intention of electric vehicles is also affected by other factors such as battery capacity, battery life, government incentives or subsidies on electric cars, reference group or peer group influence, possible top speed, cost of the vehicle itself, driving range, battery stations and charging time. In addition, some of the factors which were identified include vehicle performance, maintenance costs, appearance, charging stations, lack of electric vehicle infrastructure and vehicle safety, lack of choice in vehicles, and potential increases in electric rates. As part of recommendation, the government of China should educate its citizens about the importance of keeping the environment safe from any possible threats such as air pollution. This can be done through campaigns which are focused on raising awareness about environmental sustainability. Moreover, it is also recommended that all the negative factors related to features of an electric vehicle that have been identified such as vehicle performance, maintenance costs and charging infrastructure, are addressed in order to enhance the attractiveness of an electric vehicle.

### Reference

- Ajzen, I., (1989) Attitude structure and behaviour. In Fransson, N., and Garling, T (1999) *Environmental Concern: Conceptual Definitions, Measurement Methods, and Research Findings*: Journal of Environmental Psychology, 19, 369-382.
- Ajzen, I., (1991). *The theory of planned behaviour*. *Organizational Behaviour and Human Decision Process*, 50, 179-211.
- Ali, A., Khan, A. A., and Ahmed, I., (2011). *Determinants of Pakistani consumers' green purchase behaviour: Some insights from a developing country*. *International Journal of Business and Social Science*, 2 (3) 217-226.
- Bailey, C. A (2007) *A Guide to Qualitative Field Research, 2<sup>nd</sup> Ed*, Thousand Oaks, California, Pine Forge Press/Sage.

- Baldassare, M., and Katz, C., (1992). *The personal threat of environmental problems as predictor of environmental practices*. Environment and Behaviour, 24, 602-616. In Fransson, N., and Garling, T (1999) Environmental Concern: Conceptual Definitions, Measurement Methods, and Research Findings: Journal of Environmental Psychology. 19, 369-382.
- Banerjee, S., (2016). *Moderating effect of peer group environment on consumer predisposition towards premium promotions: A study on young urban consumers in India*. IIMB Management Review, 28, 225-234.
- Berensteauand, A., and Li, S., (2011). *Gasoline price, government support and the demand for hybrid vehicles*. Int. Econ. Rev, 52, 161-182.
- Black, J. S., Stern, P. C., and Elworth, J. T., (1985). *Personal and contextual influences on household energy adaptations*. Journal of Applied Psychology, 70, 3-21. In Fransson, N., and Garling, T (1999) Environmental Concern: Conceptual Definitions, Measurement Methods, and Research Findings: Journal of Environmental Psychology. 19, 369-382.
- Carley, S., Krause, R. M., Lane, B. W., Graham, J. D., (2013). *Intent to purchase a plug-in electric vehicle: A survey of early impressions in large US cities*. Transp. Res, 18, 39-45.
- Chan, R. Y., (2001). *Determinants of Chinese consumers' green purchase behaviour*. Psychology and Marketing, 18 (4) 389-413.
- Chen, H. S., Chen C. Y., Chen, H.K., and Hsieh, T (2012) *A Study of Relationships among Green Consumption Attitude, Perceived Risk, Perceived Value toward Hydrogen-Electric Motorcycle Purchase Intention*. AASRI Procedia 2, 163-168.
- De Groot, I. M., and Steg, L., (2007). *Value Orientations and Environmental Beliefs in Five Countries: Validity of an Instrument to measure Egoistic, Altruistic and Biospheric Value Orientations*. SAGE Publications.
- Delang, C. O., and Cheng, W. T. (2013). *Hong Kong people's attitudes towards electric cars*. Int. J. Electr. Hybrid Veh, 5, 15-27.
- Du, J., and Ouyang, D., (2016). *Progress of Chinese electric vehicles industrialization in 2015: A review*. Applied Energy 188, 529-546.
- Dunlap, R. E., and Van Liere, K. D., (1978). *The 'new environmental paradigm.'* Journal of Environmental Education, 9, 10-19. In Fransson, N., and Garling, T (1999) Environmental Concern: Conceptual Definitions, Measurement Methods, and Research Findings: Journal of Environmental Psychology. 19, 369-382.
- Dunlap, R., and Jones, R., (2002) *Environmental concern: conceptual and measurement issues*. In Helm, S. V., Pollitt, A., Barnett, M. A., Curran, M. A., and Craig, Z. R., (2018) Differentiating environmental concern in the context of psychological adaptation to climate change. Global Environmental Change, 48, 158-167.
- Ellen, P. S., Wiener, J. L., and Cobb-Walgren, C., (1991). *The role perceived consumer effectiveness in motivating environmentally conscious behaviours*. J. Public Policy Mark, 10, 102-117.
- EPRI. (2010). *Characterizing Consumers' Interest in and Infrastructure Expectations for Electric Vehicles: Research Design and Survey Results; Report No. 1021285*; Electric Power Research Institute: Palo Alto, CA, USA.
- Fishbein, M., and Ajzen, I., (1975). *Belief, attitude, intention, and behaviour: An introduction to theory and research*. Reading MA: Addison-Wesley. In Fransson, N., and Garling, T., (1999) Environmental Concern: Conceptual Definitions, Measurement Methods, and Research Findings: Journal of Environmental Psychology. 19, 369-382.
- Fransson, N., and Garling, T., (1999) *Environmental Concern: Conceptual Definitions, Measurement Methods, and Research Findings*: Journal of Environmental Psychology. 19, 369-382.
- Fryxell, G. E., and Lo, C. W. H., (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, 45-69.
- Gallagher, K. S., and Muehlegger, E., (2011). *Giving green to get green? Incentives and consumer adoption of hybrid vehicle technology*. J. Environ. Econ. Manag, 61, 1-15. In Lai, I. K. W., Liu, Y., Sun, X., Zhang, H., and Xu W., (2015). Factors Influencing the Behavioural Intention towards Full Electric Vehicles: An Empirical Study in Macau. Sustainability, 7, 12564-12585.
- Gardner, G.T., and Stern, P. C., (1996) *Environmental problems and human behaviour*. Needham Heights, MA: Allyn and Bacon. In Fransson, N., and Garling, T (1999) Environmental Concern: Conceptual Definitions, Measurement Methods, and Research Findings: Journal of Environmental Psychology. 19, 369-382.

- Garling, T., Fujii, S., Garling, A., and Jakobsson, C., (2003). *Moderating effects of social value orientation on determinants of proenvironmental behaviour intention*. *Journal of Environmental Psychology*, 23, 1-9.
- Graham-Rowe, E., Gardner, B., Abraham, C., Skippon, S., Dittmar, H., Hutchins, R., and Stannard, J (2012). *Mainstream consumers driving plug-in battery-electric and plug-in hybrid electric cars: A qualitative analysis of responses and evaluations*. *Transp. Res.* 46, 140-153.
- Helm, S. V., Pollitt, A., Barnett, M. A., Curran, M. A., and Craig, Z. R., (2018) *Differentiating environmental concern in the context of psychological adaptation to climate change*. *Global Environmental Change*, 48, 158-167.
- IEA. World Energy Outlook (2006) *International Energy Agency*: Paris, France.
- Jensen, A. F., Cherchi, E., and Mabit, S.L., (2013). *On the stability of preferences and attitudes before and after experiencing an electric vehicle*. *Transp. Res. D*, 25, 24-32.
- Joireman, J. A., Lasane, T. P., Richards, D., and Solaimani, S., (2001). *Integrating social value orientation and the consideration of future consequences within the extended norm activation model of proenvironmental behaviour*. *British Journal of Social Psychology*, 40, 133-155.
- Joshi, Y., and Rahman, Z., (2012) *Factors Affecting Green Purchase Behaviour and Future Research Directions*. *International Strategic Management Review* 3, 128-143.
- Kim, H., and Damhorst, M. R., (1998). *Environmental concern and apparel consumption*. *Clothing and Textiles Research Journal*, 16 (3) 126-133.
- Lai, I. K. W., Liu, Y., Sun, X., Zhang, H., and Xu W., (2015). *Factors Influencing the Behavioural Intention towards Full Electric Vehicles: An Empirical Study in Macau*. *Sustainability*, 7, 12564-12585.
- Lee, K., (2008). *Opportunities for green marketing: Young consumers*. *Marketing Intelligence and Planning*, 26, 573-586.
- Liu, J., and Santos, G., (2015). *The plug-in hybrid electric vehicles potential for urban transport in China: The role of energy sources and utility factors*. *Int. J. Sustain. Transp*, 9, 145-157.
- Lou, Y., Wang, W., and Yang, X (2017) *Customers' attitude on new energy vehicles' policies and policy impact on customers' purchase intention*. *Energy Procedia* 105, 2187-2193.
- Manaktola, K., and Jauhari, V., (2007). *Exploring consumer attitude and behaviour towards green practices in the lodging industry in India*. *International Journal of Contemporary Hospitality Management*, 19 (5) 364-377.
- Nayum, A., Klockner, C. A., and Prugsamat, S., (2013) *Influences of car type class and carbon dioxide emission levels on purchases of new cars: A retrospective analysis of car purchases in Norway*. *Transp, Res*, 48, 96-108.
- Newton, J. D., Tsarenko, Y., Ferraro, C., and Sands, S., (2015). *Environmental concern and environmental purchase intentions: The mediating role of learning strategy*. *Journal of Business Research*, 68, 1974-1981.
- Nik Abdul Rashid, N. R., (2009). *Awareness of eco-label in Malaysia's green marketing initiative*. *International Journal of Business and Management*, 4 (8) 132-141.
- Ou, S., Lin, Z., Wu, Z., Zheng, J., Lyu, R., Przesmitzki, S., and He X., (2017). *A Study of China's Explosive Growth in the Plug-in Electric Vehicle Market*. Oak Ridge, US Department of Energy. TN 37831-6283.
- Rezvani, Z., Jansson, J., and Bodin, J., (2015). *Advances in consumer electric vehicle adoption research: A review and research agenda*. *Transport Research Part D*, 34, 122-136.
- Schulte, I., Hart, D., van der Vost, R (2004) *Issues affecting the acceptance of hydrogen fuel*. *Int. J. Hydrog. Energy*, 29, 677-685.
- Schultz, P., (2000). *New environmental theories: empathizing with nature: the effects of perspective taking on concern for environmental issues*. *J. Soc. Issues* 56, 391-406.
- Schuitema, G., Anable, J., Skippon, S., and Kinnear, N., (2013). *The role of instrumental, hedonic and symbolic attributes in the intention to adopt electric vehicles*. *Transp. Res.* 48, 39-49.
- Sergio Silva Braga Junior, Dirceu da Silva, Gabriel and Waleska Reali de Oliveira Braga (2015) *The Effects of Environmental Concern on Purchase of Green Products in Retail*: *Procedia – Social and Behavioural Sciences* 170, 99 – 108.
- Sjoberg, L., (1989) *Global change and human action: Psychological perspectives*. *International Social Science Journal*, 121, 414-432.

- Stern, P. C., (1992). *Psychological dimensions of global environmental change*. Annual Review of Psychology, 43, 269-302.
- Stern, P. C., and Dietz, T., (1994). *The value basis of environmental concern*. Journal of Social Issues, 50, 65-84. In Fransson, N., and Garling, T (1999) *Environmental Concern: Conceptual Definitions, Measurement Methods, and Research Findings*: Journal of Environmental Psychology. 19, 369-382.
- Straughan, R. D., and Roberts, J. A., 1999). *Environmental segmentation alternatives: a look at green consumer behaviour in the millennium*. Journal of Consumer Marketing, 16 (6), 558-578.
- Takala, M., (1991) *Environmental awareness and human activity*. International Journal of Psychology, 26, 585-597.
- Tianwen, L., (2010) *Electric Vehicle Industry Overview in China*. Battery World, 5(1), 8-9.
- Weigel, R. H., (1983) *Environmental attitudes and the prediction of behaviour*. In Fransson, N., and Garling, T (1999) *Environmental Concern: Conceptual Definitions, Measurement Methods, and Research Findings*: Journal of Environmental Psychology. 19, 369-382.
- Weiss, M., Patel, M. K., Junginger, M., Perujo, A., Bonnel, P., and van Grootveld, G (2012). *On the electrification of road transport – Learning rates and price forecasts for hybrid-electric and battery-electric vehicles*. Energy Policy, 48, 374-393.
- William, T., and Hickey, J., (2005). *Society in focus*. Rowman and Littlefield Publishers. In Banerjee, S., (2016). *Moderating effect of peer group environment on consumer predisposition towards premium promotions: A study on young urban consumers in India*. IIMB Management Review, 28, 225-234.
- Xu, X., Wang, L., and Niu, T., (2002). *Air pollution and its Health Effects in Beijing*. Wiley Online Library, Ecosystem Health / Volume 4, Issue 4.
- Yusof, J. M., Singh, G. K., and Razak, R. A., (2013). *Purchase Intention of Environment-Friendly Automobile*. Procedia. Social and Behavioural Sciences, 85, 400-410.
- Zhang, Q., Ou, X., Yan, X., and Zhang, X., (2017). *Electric Vehicle Market Penetration and Impacts on Energy Consumption and CO2 Emission in the Future: Beijing Case*. Energies, 10, 228; doi: 10.3390/en10020228.
- Zheng, X., Lin, H., Liu, Z., Li, D., Llopis-Albert, C., and Zeng, S., (2018). *Manufacturing Decisions and Government Subsidies for Electric Vehicles in China: A maximal Social Welfare Perspective*. Sustainability, 10, 672.
- Ziegler, A., (2012). *Individual characteristics and stated preferences for alternative energy sources and propulsion technologies in vehicles: A discrete choice analysis for Germany*. Transp. Res, 46, 1372-1385.