Consumers' Adoption of Electric Vehicles for Sustainability: Exploring the Role of Personality Traits

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Abstract

This study investigates the influence of the Big Five personality traits which include extraversion, agreeableness, conscientiousness, neuroticism, and openness in molding the adoption intention of consumers regarding electric vehicles (EVs) in India. This study also looks at Behavioral Economics as an explanatory theory on the diffusion of electric vehicles in India.

The study comprised two stages. In the first stage, 150 users and non-users of electric vehicles were surveyed. Results pointed to a significant effect of all Big Five personality traits on adoption intention, with the exception of the trait of neuroticism. There was no significant difference in the adoption intention based on the differences in personality traits between men and women. In the second stage, the study used an expert-opinion based survey that was conceptualized based on the Diffusion of Innovation theory combined with the idea of memetics in new product diffusion. The results from the first stage of the research were bolstered by the fact that the second stage indicated that product attributes influencing diffusion would have a negative influence on adoption intentions of persons with high neuroticism. The study provides useful insights into consumer behavior based on personality for marketers of electric vehicles and policymakers interested in bringing about sustainable consumption practices.

Introduction

Globally, rapid economic growth, resource exploitation, and unsustainable consumption have had a huge negative influence on the environment (Liu et al., 2020). This has given rise to increased air and water pollution resulting in global warming (Sun et al., 2018). There is a global concern related to rising sea levels because of global warming, which has put a question mark on the survival of human beings on this planet earth (Perez-Castillo, Vera-Martinez, 2021). Globally, the transportation sector is a significant source of air pollution (US, EIA, 2017). Unless significant steps are taken to lower our dependence on non-renewable sources of energy, carbon dioxide emissions from this sector is expected to increase to 50% by 2030 (IEA, 2009). Road vehicles are the main contributors to greenhouse gas emissions accounting for approximately 75% of the worldwide carbon dioxide emissions and for three-quarters of the urban air pollution (IEA, 2020).

Electric vehicles form a category of green or sustainable products which help in solving the problem of air pollution by way of zero emission of greenhouse gases. They are fuel efficient, easy to use, and also reduce noise pollution (Beaume, Midler, 2009). Despite the fact that electric vehicles offer a lot of benefits to consumers as well as the environment, attempts to commercialize them have met with little success so far (Beaume, Midler, 2009).

From a practical perspective in the context of China, The International Energy Agency estimates that motor vehicles produced about 25% of China's overall carbon emissions in 2015 and that their contribution will increase to 45% in 2030. The Chinese government has recently implemented a number of incentive policy measures to support the EV industry, including consumer subsidies, numerous tax exemptions, exemptions from road tolls, the development of charging infrastructure, and funding for research and development (R&D) for EV manufacturers (Du, Ouyang, 2017). Sales of EVs in China, however, have not increased at the rate that was anticipated. For instance, according to the China Association of Vehicle Manufacturers, just 3.7% of all vehicles sold in that year were electric vehicles (EVs), which were sold for about 972,000 units in 2019. Subsequently, the Chinese government reduced the subsidies on EVs gradually, finally leading to their complete elimination in 2019 (Liao, 2022). India, for example, pledged in the Paris Agreement to reduce the level of its emissions by 33 to 35% from 2005 levels by 2030 (UN, 2018). The Indian government has developed a number of strategies and initiatives to promote the penetration of electric vehicles, including subsidising the original purchase price, rewarding electric vehicle owners, enhancing the necessary infrastructure, and establishing practical regulations (Bhat et al., 2022). Despite the fact that manufacturers and consumers are both given financial and non-financial incentives, the acceptability and adoption of electric vehicles remain quite low in India and as a result, the proportion of electric vehicles in all motor vehicles is quite low (Bhat et al., 2022).

It can be understood from the above country contexts that although the advantages of electric vehicles have widely been recognized, but the pertinent question is why consumers are reluctant to purchase them (Pickett-Baker, Ozaki, 2008). Is there a relationship between personality traits and adoption intention towards electric vehicles? This is the question that this study has attempted to answer through this research.

Society has been compelled to modify its traditional means of acquiring and using products to embrace sustainable consumption practices in an attempt to protect the environment (Jaiswal, Kant, 2018). The focus of government and policy makers across the globe has been to promote sustainable consumption practices to bring down global warming (Wu, Cheng, 2019). As a result, the concept of sustainable or green consumption has emerged as a novel means of consumption across the globe (Kumar et al., 2020) and it has gained popularity among policy makers and consumers (Sun et al., 2021). Research interest has grown substantially in this area with studies emerging from developed and emerging economies on a large scale (Nguyen et al., 2019).

Most studies have explored the role of different behavioural antecedents such as values, culture, attitude, motivations, etc. on consumer adoption of sustainable consumption practices (Nguyen et al., 2019; Zaremohzzabieh et al., 2020). Most studies have considered only pro-environmental consumers and their consumption behaviour (Nguyen et al., 2019). Such a view lacks universal appeal since consumers who are not pro-environmental in their consumption practices, also have to select between sustainable and non-sustainable products and few of them may adopt green products (Dalvi-Esfahani et al., 2020). Therefore, researchers should try to include all consumers and not focus on self-proclaimed green consumers to study consumption behaviour effectively (Nguyen et al., 2019).

Studies have also looked at the relationship between sustainable consumption behaviour from the perspective of consumer personality, but there is a clear lack of exploration between purchase behaviour towards sustainable products and consumer personality traits (Lu et al., 2015; Dalvi-Esfahani et al., 2020). Few researchers have found an association between agreeableness trait of consumer personality and sustainable consumption (Hirsh, 2010), and few studies reported this relationship to be significant (Kvasova, 2015). In fact, studies have argued that personality traits of consumers act as motivators for pro-environmental behaviours (Kvasova, 2015). The role of Big Five personality traits on pro-environmental purchase behaviour has also been explored in few

studies (Sun et al., 2018). For example, Duong (2021) found that the Big Five personality traits of extraversion, openness to experience, conscientiousness, and neuroticism were positively associated with green consumption. Personality traits are defined as "the heritable characteristic patterns of thoughts, feelings, as well as behavior" (Wang et al., 2021) and they are key motivators of purchase behaviour (Goldberg, 1990).

Parallely, there has been a growing interest in what is referred to as "Behavioral Economics" (Thaler, 2016). This field integrates insights from social sciences, mainly psychology, to enhance and strengthen standard "rationality-based" economic models. Thus, behavioral economics can study the drivers of values, "rational" as opposed to "irrational" choices, and so on that are antecedents to a society's environment-friendly outlook and related patterns of consumption.

Behavioral Economics is based on the idea that individuals are not endowed with boundless rationality and will power and that they are not typical "rational" decision makers as in the standard economic theory of maximization of utility. Along with that, they possess limited cognitive and computational capabilities. Thus, they resort to heuristics or rules of thumb in making decisions. Heuristics, although useful, can lead to systematic biases in decision-making leading to suboptimal behaviors (Soofi et al., 2020).

Behavioral Economics can be extended to the domain of diffusion of new products as well: low conformity with certain value systems, and types of thought processes influence the diffusion and adoption of a green consumer durable innovation, thereby fostering a pro-environmental culture in society. This article examines the diffusion of electric vehicles in India from this viewpoint.

The objective of the present study is to explore the influence of Big Five personality traits in consumers' intention to adopt electric vehicles and relate this to the literature in the Diffusion of Innovation (DoI) theory (Rogers, 2003). Research have shown that men and women have diverse perspectives on their intentions to adopt any new innovation (Ilie et al., 2005). Studies have found some fascinating distinctions between how men and women view information technology developments, for instance (Ilie et al., 2005). Similar variations are anticipated in their adoption of EVs. The study also attempts to find out if differences in gender effect the Big Five personality traits to influence adoption intention towards electric vehicles.

The study has implications to both theory and practice. Theoretically, this study has looked at consumer behaviour from the perspective of Big Five personality traits and has attempted to relate personality traits with behaviour towards electric vehicles,

which is a sustainable or green product. Practically, it can guide marketers of electric vehicles in framing effective marketing and communication strategies to target the appropriate personality trait of consumers. This will lead to better adoption intentions towards electric vehicles.

Literature Review

Researchers have shown a great interest in analysing and examining the behaviours of consumers purchasing sustainable goods. Jaiswal (2012) discusses green consumerism as a concept, which points to consumers who are willingly purchasing environment-friendly products/ sustainable goods. Personality factors contribute a great deal to the willingness of purchasing sustainable goods. Factors like health consciousness (Michaelidou, Hassan 2008), cultural or personal values, such as egoism and competence (De Pelsmacker et al., 2015), individualism and collectivism (Gregory et al., 2002), morals, moral attitude (Arvola et al. 2008), and ethical obligation (Shaw, Shui, 2002) are some of the major factors impacting the purchase of sustainable resources. When a person focuses on their moral attitude, they sense a feeling of doing the right thing which adds up to their ethical identity. Adding value to nature and surroundings gives a sense of ecological, political, and religious identity to an individual (Honkanen et al. 2006). This reward influences the choice of sustainable consumption practices for an individual. Consumer behaviour and personality characteristics play a major role in the intention to buy sustainable products and it further contributes to enhancing certain traits in an individual's personality (Kumar et al., 2020). Personality refers to a set of characteristics that distinguishes a person from others based on their thoughts, feelings, and actions (Kvasova, 2015). Personality refers to a person's individual characteristics that influence his or her decision-making and behaviour (Cawvey et al., 2017). Many theories have been established by psychologists and psychiatrists over the years in an attempt to define personality and determine its traits (Lu et al., 2015; Kvasova, 2015; Duong, 2021).

From the standpoint of Behavioral Economics, there are certain "biases" that are introduced in human behavior from the consideration of behavioral economics, such as: Present Bias, Status-Quo Bias, Framing Effect, Optimization and Overconfidence, Affect Heuristic, Herding Behavior and Social Influence, Nudging, and so on (Lehner et al., 2015; Soofi et al., 2020). The Diffusion of Innovations literature observes that many technological innovations are adopted slowly (Rogers, 2003). It is surmised that the tardiness in diffusion may originate from the Status Quo bias and the Social Influence Bias mentioned earlier (Mullainathan, 2007). Any endeavor to sway people's perception, decision, or conduct in

a foreseeable manner is called a nudge. This is feasible due to cognitive biases in personal and communal decision-making, creating hindrances for individuals to behave in a logical manner. Nudges work by making use of these biases as integral part of such attempts. A "nudge" can act as an influencer in human decision-making. Nudges target the more intuitive of the human thought process, as opposed to the more deliberate and conscious (Kahneman, 2011; Lehner et al., 2015). In the case of residential energy consumption, a green cause, nudge mechanisms were found to be effective. Some nudge mechanisms that were found to be effective were: simplification and framing of information, changes to the physical environment, changes to the default option, and use of descriptive social norms (Lehner et al., 2015). Carlsson and Johansson-Stenman (2012) conclude that Behavioral Economics has strong implications for environmental economics and related normative policy.

Many studies have analysed the role of Big-Five personality traits on green consumption behaviour, for example, Duong (2021) found that all the Big-Five personality traits played a positive role in shaping green consumption behaviour of consumers. Kvasova (2015) confirmed this finding by observing that green consumption behaviour is influenced by personality traits of individuals. The Big Five personality traits were first described by Goldberg (1990) and they influence the beliefs, attitudes, and motivations of individuals (Wang et al., 2021).

This study looks at the influence of Big Five personality traits of individuals on their intention to adopt electric vehicles. Parallelly, it also looks at the Behavioural Economics paradigm and attempts to understand findings in the light of Behavioural Economics. Electric vehicles run on power generated by batteries, unlike conventional vehicles which run on fuels and gases (Cowan, Hulten, 1996). The major contribution of electric vehicles is to the environment because with the use of electric vehicles there will be a decrease in greenhouse gas emissions, and emission of toxic fossil fuels via the tailpipe of the vehicle (Lieven, 2011). Electric vehicles do not produce carbon dioxide while driving which further contributes to a decrease in air pollution.

Proposed Theoretical Model and Hypotheses

Big Five Personality Traits and Intention to Adopt Electric Vehicles

The Big-Five personality traits, as per literature, include the traits of openness, agreeableness, conscientiousness, extraversion, and neuroticism (Duong, 2021).

Compassion, charity, social peace, and assimilating with others are all motivated by agreeableness (Dalvi-Esfahani et al., 2020). Individuals with a high level of agreeableness have attributes such as shar-

ing, comforting, and cooperating (Markowitz et al., 2012). Individuals that are highly agreeable are more likely to have empathy for others (Markowitz et al., 2012). They are considerate towards meeting the needs of others and they care for the environment too (Wang et al., 2021). These prosocial attributes of agreeable individuals motivate them to indulge in environmental friendly behaviors (Sun et al., 2018). Studies have shown that individuals who are agreeable behave in an environmental friendly manner, but the results have not always been consistent. Few studies have reported a negative and significant effect of agreeableness on pro-environmental behaviour (Kvasova, 2015; Markowitz et al., 2012), whereas few others have reported positive and significant effects (Sun et al., 2018). Hence, this study proposes the following hypothesis H1.

H1: *The personality trait of 'Agreeableness' has a significant impact on adoption intention towards electric vehicles.*

An individual's imagination and insight are described by the quality of openness (Sutin, 2017). Such individuals are very open and willing to learn new things and perceive the world from new perspectives (Kvasova, 2015). These individuals are willing to look at the world from a variety of perspectives (Sutin, 2017). Individuals with a high level of openness to the world love variety and diversity (Wang et al., 2021). They are on the lookout for unique encounters and intriguing adventures (Sutin, 2017). They have a creative way of thinking and expressing themselves (Kvasova, 2015). They're always interested in what's going on around them and are acutely aware of their surroundings (Wang et al., 2021). Individuals that score higher in this category are more likely to be able to adapt to and embrace change, as well as appreciate the world's creative technology (Duong, 2021). Studies have found that openness is a personality trait that is associated with many environmentally friendly behaviours (Sun, 2018; Milfont, Sibley, 2012). Therefore, it is expected that individuals exhibiting a high degree of this personality trait are more likely to adopt electric vehicles. Hence hypothesis H2 follows:

H2: *The personality trait of 'Openness' has a significant impact on adoption intention towards electric vehicles.*

Persons with a high level of extraversion are outgoing individuals who delight in the presence of others. These people are often referred to as 'people's people' (Wilt, Revelle, 2009). They are divided into four categories: sociable, chatty, aggressive, and exuberant (Wang et al., 2021). A person with a high level of extraversion is not scared to take chances (Kvasova, 2015). They exhibit environmentally friendly behaviours (Sun et al., 2018; Wang et al., 2021; Milfont, Sibley, 2012). Hence it is assumed that individuals who display higher degrees of extraversion will adopt electric vehicles.

H3: *The personality trait of 'Extraversion' has a significant impact on adoption intention towards electric vehicles*

People that have a high level of conscientiousness are thoughtful, goal-oriented, and patient (Roberts et al., 2009). They assess the situation and make plans based on how it impacts and influences others (Roberts et al., 2009). Individuals with high conscientiousness have attributes such as being well-organized, punctual, self-disciplined, adhering to norms, and being able to prioritise successfully (McCrae, Costa, 1985). Since they have stronger environmental interests, highly conscientious people are more likely to perceive major ecological challenges (Sun et al., 2018) and they are likely to align their actions towards pro-environmental behaviour (Kvasova, 2015). Earlier research has shown a strong correlation of conscientiousness with environmental friendly behaviour (Kvasova, 2015; Milfont, Sibley, 2012). However, there are also studies that have found a negative association between the two (Fraj, Martinez, 2006).

H4: *The personality trait of 'Conscientiousness' has a significant impact on adoption intention towards electric vehicles*

Neuroticism is a personality attribute that describes someone who is unhappy, moody, and emotionally unstable (Widiger, 2009). Changes in the environment cause them to feel uneasy and they find it difficult to make decisions (Akhtar, 2019). Apart from the negative characteristics of neuroticism, these people are naturally thoughtful and reflect on situations well (Widiger, 2009). Several studies have explored the influence of neuroticism on pro-environmental behaviour (Akhtar, 2019; Kvasova, 2015) and have found both significant (Akhtar, 2019) and insignificant (Milfont, Sibley, 2012) influences on environmentally friendly behaviour of individuals. Therefore, the hypothesis is as follows:

H5: *The personality trait of 'Neuroticism' has a significant impact on adoption intention towards electric vehicles*

Influence of Gender on Adoption of Electric Vehicles

Men and women, according to gender socialisation theory, go through different stages of socialisation and, as a result, interpret social expectations and values differently (Mostafa, 2007). According to previous research, female consumers pay more attention to environmental issues than male consumers, and as a result, female consumers have more favourable opinions about and stronger intent to purchase environmentally friendly products (Sreen et al., 2018). Therefore, this study examines the influence of gender differences on the Big Five personality traits on adoption of electric vehicles.

Based on literature review, five hypotheses have been formulated to find out the effect of Big Five personality traits on adoption intention towards electric vehicles. The theoretical model for the study has been depicted in Figure 1.

Material and Methods

The study was conducted in two stages. Stage 1 related to hypothesis testing and validating the conceptual model used for the study. In stage II, the results obtained from stage 1 were verified using Rogers' diffusion of innovation theory (Rogers, 2003).

Stage I: Hypothesis testing and model analysis

The aim of this study was to test the proposed hypotheses from H1 to H5. This was done through a structured questionnaire, which was pilot tested with 50 respondents, and corresponding corrections were made to the instrument as per the results obtained after the pilot study. The responses were collected using google forms from respondents from different parts of India. Sampling method was convenience sampling. A Google Form survey link was posted on social media accounts and respondents were approached using snowball sampling. The language of the questionnaire was English. The questionnaire had 3 parts. Part A collected demographic information of the respondents. Part B dealt with information on use or inclination to use electric vehicles as a sustainable means of transportation. Part C consisted of measurement items for the variables used in the study. The items were measured using a 5-point Likert scale (5= Strongly Disagree and 1= Strongly Agree). The questionnaire was distributed to 250 respondents, out which 150 valid responses were obtained. The data collected was analysed using WarpPLS 3.0. Age of respondents ranged from 20 to 50 plus with 30 percentage female and 70 percentage male respondents. It was observed that 48 percentage of respondents have used electric vehicles at least once in their lifetime.

To test the adoption intention of respondents towards electric vehicles based on the effect of Big Five traits of personality, all variables were measured using

Figure 1. **Theoretical Model**

Source: authors.
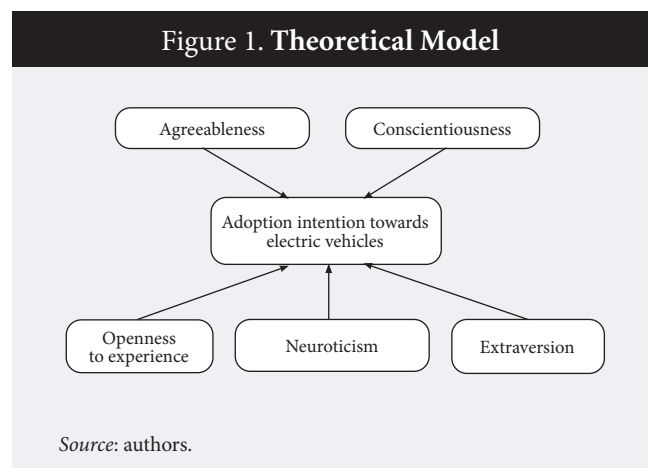
constructs already established in previous studies. The Big Five personality traits were measured using six items each for agreeableness, conscientiousness, extraversion, and openness. Items were customized to the study from Sun et al. (2018). Neuroticism was adopted from Kvasova (2015). Each observed variable was measured using the Five Point Likert scale.

Stage II: Validation of results from stage I using the Diffusion of Innovation Theory

Rogers (2003), as the preeminent researcher in the Diffusion of Innovation (DoI) theory had identified five distinct innovation attributes to explain the successful diffusion of an innovation as against a failure. These attributes are: Relative Advantage, Compatibility, Complexity, Trialability, and Observability. They are summarized in Table 1.

In the current research, we draw from the seminal work of Rogers (1962) and combine that with the idea of memetics in new product diffusion (Langley et al., 2005; Langley et al., 2009). Memes are "cultural equivalent of genes" (Dawkins, 1976). Memetics theorizes a mechanism for evolution of ideas and related behavior, and material artefacts associated with such behavior (Langley et al., 2005). Memetic theory proposes that for a behavior to be successfully diffused, a set of conditions need to be satisfied (Langley et al., 2005).

- Many copies of the behavior need to be available (fecundity)
- Reasonably accurate copies (fidelity)
- Long-lived copies (longevity)

We use the attributes enunciated by Rogers (2003) and attempt to link them with the memetic theory as applied in diffusion of new ideas as shown in Table 2.

Here in this research, we consider whether the innovation in question, namely EVs, would diffuse using a disaggregate (individual level) model. More specifically, we consider whether a person with certain personality traits as reflected through the big-five

Table 1. **Attributes of innovation**

Attribute of innovation	Definition
Relative Advantage	The extent to which the innovation is perceived as being superior to the current option.
Compatibility	The extent to which the innovation is perceived to be consistent with extant socio-cultural norms, perceived needs, and prevalent ideas
Complexity	The extent to which an innovation is difficult to understand and use
Trialabilty	The extent to which an innovation can be experienced on a trial/limited basis
Observability	The extent to which an innovation is "visible" to potential adopters
Source: authors.	

Table 2. **Memetic Theory and Diffusion of New Ideas**

Attribute per memetic theory	Attribute per Rogers (2003)
Fecundity (innovation gels with existing behavior, so more copies are possible)	Compatibility
Fidelity	Trialabilty and observability [more copies are possible]
Longevity	Relative advantage over existing alternatives gives an opportunity to the new product to be more stable.
Source: authors.	

Table 3. **Big-Five Personality Traits and Product Attributes**

Personality trait	Product attribute
Openness	Relative advantage
Conscientiousness	Compatibility
Extraversion	Complexity
Agreeableness	Trialabilty
Neuroticism	Observability

Note The influence of each personality trait / product attribute on the purchase decision is assessed on a scale: Very high/high/indifferent/low/very low.

Source: authors.

traits would be interested in adopting the product. Based on the above, a survey instrument was developed. The instrument intended to understand the probability that an individual with certain personality traits would adopt the new product with certain attributes. We broadly follow the framework of (Langley et al., 2005). However, we take the big-five personality traits, and combine that with the five product attributes of Rogers (2003). Thus, 5*5 =25 combinations became possible.

We chose 11 experts in the domain of Consumer Behavior/New Product Diffusion to answer the question: What is the influence of product attribute A on the probability that an individual with trait T will adopt the product? The domain experts were academicians, managers in electric vehicle outlets, and subject experts. Scores on a Likert-type scale [-2 through +2] were aggregated using arithmetic means. The resulting data looked somewhat like as in Table 3.

The findings of the two stages are shown below.

Stage I Results

Reliability and Validity of Variables

Reliability, in the absence of any other alterations, pertains to the degree to which a test, method, or instrument, like a survey, can produce consistent results across different situations (Paula & Helena, 2006). Reliability of constructs were evaluated using

Cronbach's alpha, which is the association or relationship between a group of items (Fornell, Larcker, 1981). Cronbach's alpha values for all personality construct indicators were found to be higher than the 0.70 minimum acceptable threshold (Fornell, Larcker, 1981). This indicated towards the reliability and consistency of the constructs used in the study. The Cronbach's alpha values for each construct is given in Table 4. All the scales were found to have values of Cronbach's alpha in the acceptable range, with the lowest being E (extraversion) at 0.677. Hence, the constructs used in the study were found to be reliable (Nunnally, 1994).

Confirmatory factor analysis to analyze the discriminant and convergent validity of variables was done. The degree to which numerous construct items that theoretically should be related to one another are actually related is known as convergent validity (Hair et al., 1998). Individual item loadings and the Average Variance Extracted (AVE) were utilised to assess the convergent validity. Standard benchmark values for factor loading and extracted average variance are 0.40 and 0.50, respectively (Hair et al., 1998). If the square roots of the average variance retrieved (diagonal elements) are higher than the correlations between each pair of latent components, discriminant validity has been demonstrated (Hair et al., 1998). Based on the factor loading values, items having factor loadings less than 0.5 were excluded from the list. The resulting number of items for each construct was three. The factor loadings of all three selected items for each construct along with validity findings are reported in Table 4.

Structural Model Analysis

To test the hypotheses used in the study, we used Structural Equation Modeling (SEM) which is based on Partial Least Squares (PLS). Two factors supported the decision to use PLS: First, PLS can more easily incorporate reflective and formative scales than covariance structure analysis (Chin, 1998). Second, PLS allows for a relatively small sample size and does not require any prior distributional assumptions (Chin, 1998). For the analysis of the measurement models and the structural model, WarpPLS 3.0 (Kock, 2011) was employed. Calculating the path loadings and R2 values is part of the structural model evaluation (Hair et al., 1998). The strength of the correlations between the independent and dependent variables are shown by the path loadings, and the predictive ability of the structural models is gauged by the R2 values (Hair et al., 1998). We computed path loadings and t-statistics for proposed relationships using a bootstrapping method.

Bootstrapping was done with a resample of 5000. The assessment of structural model involves checking the following as per Hair et al. (2014); collinearity, significance of path coefficients, value of R2 for model fit, effect size, and predictive relevance. VIF

Table 4. Construct loadings and validity checks

a) Factor loadings

Construct	Item	Loading
Agreeableness	AG1	0.661
	AG2	0.803
	AG3	0.768
Openness	O1	0.762
	O2	0.745
	O3	0.739
Neuroticism	N1	0.797
	N2	0.775
	N3	0.723
Extraversion	E1	0.834
	E2	0.865
	E3	0.796
Conscientiousness	C1	0.800
	C2	0.730
	C3	0.731

Source: authors.

b) Validity test results

Construct	CR	AVE	√AVE	Cronbach's α
Agreeableness	0.79	0.87	0.93	0.79
Openness	0.79	0.56	0.74	0.81
Neuroticism	0.81	0.58	0.76	0.73
Extraversion	0.87	0.692	0.83	0.67
Conscientiousness	0.79	0.56	0.74	0.82

Source: authors.

value for the model was below 5, hence collinearity was not an issue. The effect size of each predictor was interpreted using the rule given by Sullivan and Feinn (2012), where 0.02 indicates a very weak effect, 0.15 indicates a medium effect, and 0.35 indicates a strong effect. The predictive relevance of model was calculated using 'Stone-Geisser Q-squared coefficients' (Stone, 1974). The blindfolding procedure for the model indicated a cross validated redundancy index greater than zero, which indicated to the presence of predictive relevance. Figure 2 shows the estimated model using WarpPLS.

As illustrated in Table 5, H1 represents the path from agreeableness to adoption intention. The results show that this relationship is positive and significant (β=0.26, p < 0.05). H2 is the relationship between openness and adoption intention. This is significant and positive (β=0.22, p < 0.05). The relationship between extraversion and adoption intention was found to be significant and positive ((β=0.24, p < 0.05). Similarly the relationship between conscientiousness and adoption intention was also found to be significant and positive (β=0.24, p < 0.05). The relationship between neuroticism and adoption intention was found not to be significant (β=0.05, p = 0.29).

Table 5. **Result of hypothesis testing**		
Hypotheses	**Coefficient**	**Result**
H1: Agreeableness → Adoption intention	0.26 (p < 0.01)	Supported
H2: Openness → Adoption intention	0.22 (p <0 .01)	Supported
H3: Neuroticism → Adoption intention	0.05 (p=0.29)	Not supported
H4: Extraversion → Adoption intention	0.24 (p < 0.01)	Supported
H5: Conscientiousness → Adoption intention	0.24 (p < 0.01)	Supported
Source: authors.		

Figure 2. **Estimated Model**
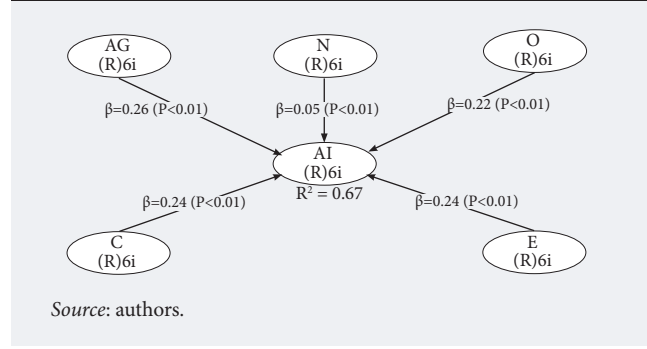

Source: authors.

Stage II Results

The five factors that influence diffusion of a new product (Rogers, 2003), namely, Relative Advantage, Complexity, Compatibility, Observability and Trialability, broadly are in consonance with the findings of the structural model. Table 6 displays the arithmetic means of the values obtained as an answer to the question of the influence of a new product attribute on the chance that an individual with a specific trait would adopt EV in India. Since a Likert-type scale was used, where +2 indicates very high probability, and -2 very low probability, the average scores would provide insight into how a product feature would affect a person's likelihood of adopting it based on his/her personality trait.

Table 6 shows that people with high openness are highly likely to adopt EVs as an innovation, whereas people with high neuroticism are generally disinclined to adopt EVs. Generally speaking, people with conscientiousness, agreeableness, and extraversion, are inclined to adopt EVs if the use of such EVs is not much complex.

Discussion

Environmentally conscious consumption is a major topic in today's marketing literature, particularly taking the context of Modern economies (Pham et al., 2021). With the growing number of environmental issues around the world, particularly in emerging Asian nations, sustainable consumption is now at the forefront of consumer behaviour research (Quoquab et al., 2019). The personality of consumers influence sustainable consumption practices (Duong, 2021). Purchase of electric vehicles is one of the sustainable consumption practices, which needs to be encouraged for solving environmental issues across the globe. This study has attempted to explore the effect of Big Five personality traits on the adoption intention towards electric vehicles by consumers.

This study has contributed to the pro-environmental literature from a theoretical standpoint. The study has contributed to consumer behaviour literature in terms of understanding the personality of consumers to motivate them to adopt sustainable consumption practices. The results from this study has helped to explain the effect of Big Five personality traits on shaping the adoption intention of consumers towards electric vehicles. This research found no discernible differences in the adoption intention between male and female consumers towards electric vehicles. The study has found that other than the personality trait of neuroticism, other traits such as agreeableness, extraversion, openness, and conscientiousness played a positive and significant role in the adoption intention of consumers towards electric vehicles.

Consumers belonging to the conscientiousness personality type have traits such as being careful, responsible, and persevering (Barrick, Mount, 1991). The findings of this study reaffirm this observation

Table 6. **Effect of factors influencing diffusion of a new product on the possibility of adoption of EV by individuals with different personality traits**					
Factors influencing diffusion	**Personality traits**				
	Openness	**Conscientiousness**	**Extraversion**	**Agreeableness**	**Neuroticism**
Relative advantage	+1.18	+0.73	+1.09	+0.91	−0.73
Compatibility	+0.91	+0.73	+0.45	+1.18	−0.36
Trialability	+1.45	+0.64	+1.18	+1.00	−0.36
Complexity	+0.09	−0.64	−0.22	−0.09	−1.27
Observability	+0.91	+0.64	+0.73	+0.91	−0.45
Source: authors.					

since conscientious consumers were found to show an inclination towards purchase of electric vehicles. This can be attributed to their personality trait of being responsible towards environment through adoption of sustainable consumption practices. Consumers who exhibited the trait of extraversion were found to be inclined to adopt electric vehicles. Since extravert consumers are sociable, expressive and love social recognition (McCrae, Costa, 1997), they are likely to adopt electric vehicles. Their pro-environmental consumption practice is an expression of their social nature. They also expect social recognition for their adoption of electric vehicles as a sustainable means of commute to safeguard the environment. Consumers with the personality trait of agreeableness have warmth, sympathy, and cooperativeness as their basic nature (Colquitt et al., 2009). The findings of this study reaffirm this observation since agreeable consumers were found to show an intention to adopt electric vehicles which reaffirms their attitude of cooperation and sympathy towards environmental protection. Consumers with the personality trait of openness showed a positive intention to adopt electric vehicles. This reaffirms the observation that individuals who are open to change and experience welcome adoption of pro-environmental consumption practices as a creative expression of their personality trait. The consumers with the personality trait of neuroticism were shown to have a negative adoption intention towards electric vehicles. As per previous studies, individuals with this personality trait are generally insecure and avoid situations where they have to take control (Colquitt et al., 2009). Adoption of electric vehicles as a means of commute demands that the individual has to take responsibility or control of his or her choice of commute and face criticism if any by family and friends. Neurotic individuals may find themselves nervous or anxious in such situations. Hence, they avoid being original and stick to the use of conventional products, which are socially prevalent.

Results of stage II showed that individuals with neurotic personalities will be influenced negatively by all the factors to adopt EVs. Another significant finding is that increase in complexity would negatively influence adoption intent in all personality traits, except those with Openness. This is in line with Rogers (2003). The study did not find any statistically significant influence of the influence of trait neuroticism on the intention to adopt EVs. This coupled with the negative influence of all product attributes influencing diffusion on individuals with neuroticism implies that there is a strong incentive to new product managers to consider this fact in their targeting exercise. There is also scope for research in understanding whether such people can change their attitude towards new product adoption as a result of social marketing. Findings from study showed that personality traits based on gender did not influence adoption intention towards EVs, which essentially means innovation diffusion characteristics are not gender dependent.

The findings can guide managers of firms manufacturing and selling electric vehicles in several ways. Managers have to consider the fact that each consumer has a different personality especially when it comes to purchase of sustainable or environmentally friendly products like electric vehicles. They should not try to market electric vehicles to all consumers in the same manner. Marketers can try to segment the market according to the Big Five personality trait of consumers and develop marketing campaigns with a focus on the type of consumer segment. This will result in better adoption practices.

Segmentation of consumers based on their personality traits will help marketers to satisfy consumer needs in a better way. Marketers of electric vehicles should create relevant advertising strategies to attract the right consumer segment according to their personality type. This can be achieved through the use of digital marketing techniques which helps in targeting the right consumers. Techniques such as location, usage, and demographics-based targeting have the capacity to reach pro-environmental consumers accurately. Marketers can design strategies to make consumers aware about the benefits of using environmentally friendly products not only for their individual benefit but for the collective benefit of humanity. Marketers should make consumers understand about the necessity of using pro-environmental products by motivating and incentivising them.

The observations from this study have implications for policy makers also. They should be aware of the personality traits of consumers to formulate appropriate environmental protection measures. In particular they can focus on proposing solutions that can bring about better adoption of sustainable consumption practices keeping in mind the personality traits of consumers. The policy measures should make consumers feel proud of their choice for adopting sustainable consumption practices and not make them anxious or stressed under pressure to adopt. From a social perspective, government organisations can launch awareness campaigns about the benefits of using sustainable means of transport to protect the environment. Government can motivate masses to adopt such transportation practices by motivating them through incentives like reduced tariffs at toll plaza, special lanes, social recognition, etc.

Openness as a big-five personality trait is particularly effective at eliminating the status-quo bias in Behavioural Economics; as mentioned they are more likely to "adapt to and embrace change and appreciate technology". This is reflected in the results: people with trait openness are predisposed to adoption of electric vehicles ($\beta = 0.22$, $p < 0.01$). Similarly, people with high level of consciousness being

thoughtful, and being able to "prioritize successfully" are expected to overcome Present Bias (non-linear and variable tendency of people to prefer a smaller payoff in a shorter time horizon over a larger pay-off in the distant future). This is, again, reflected in the results (β = 0.24, p< 0.01). In contrast, however, individuals with trait neuroticism are uneasy with changes in the environment, in this context adoption of a new technology. Thus, they are expected to exhibit Status Quo bias. This is reflected in the results (β = 0.05, p = 0.29): as a group neurotic people do not intend to adopt electric vehicles. However, as these people are "naturally thoughtful and reflect on situations well", the nudge can be used to guide them to make positive decisions on adoption of EVs. One such option to policy makers is to modify the choice architecture (the public and possibly the private) to strongly incentivize the purchase of EVs over internal combustion engine vehicles. This is being done through various policy initiatives such as National Electric Mobility Mission (NEMM) in India. However, an interesting question is whether purchase of EVs in India can be made the "default option" as a nudge? What could be the various potentially negative impacts of such a move be? Moreover, people with a high degree of extraversion can be influenced by the action of their peers, namely, purchase of EVs. Here the role of social influencers or mavens become important. Public authorities can take the help of social influencers, especially those perceived to be technology-friendly to pitch for EVs as the vehicle of choice.

Conclusion

This study looked at the role of the big five dimensions of personality on the adoption of EVs in India and attempted to link such behaviour with the paradigm of Behavioral Economics. This study was limited to the adoption of electric vehicles only. The study can be extended to include other sustainable consumption practices like adoption of green clothing, organic food, eco-friendly housing, etc. The study can be further extended to include post-purchase behaviour such as consumer satisfaction from the use of eco-friendly products and re-purchase intentions. Future studies can explore the link between personality traits and adoption intention using mediators and moderators in the conceptual model. The mediator or moderator variable could be a contextual construct that can interfere with adoption intention such as attitude, trust, risk aversion, etc. The sample size of the data can be increased by extending the study to a global platform and not limiting it to a particular region. Further research can also investigate the role of various choice architectures in changing people's adoption behaviour.

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