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# The consumer purchase intention toward hybrid electric car: A utilitarian-hedonic attitude approach

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Environmental conditions are rapidly changing with every passing day worldwide. Degradation of ecological conditions hurts human health. Carbon emission severely destroys greenhouse gases, CO<sub>2</sub> is generated from different sectors, but the major portion of CO<sub>2</sub> is generated from the transport sector. This environmental deterioration stimulates academicians and practitioners to study ecological consumption behaviour. Protecting the environment by reducing carbon emissions is a shared responsibility. In the current era, the world is shifting from conventional vehicles to electric vehicles or hybrid vehicles to control carbon emissions. This study examines the factors in predicting consumers' purchase intention toward hybrid cars through the S-O-R model and theory of consumption values (functional and non-functional values). This will help academics and policymakers to expand the penetration of this new and favourable green technology in terms of protecting the environment. For our study, we collected data from the three big cities of Punjab, i.e., (Multan, Sahiwal, and Lahore). In this study, 500 questionnaires were distributed, from which 245 were returned. In the first step, we provide detailed information about demographic variables. The structural equation model (SEM) is used for evaluating the impact of identified constructs. The study results conclude that functional values (except conditional value) and non-functional values (except social value responsibility) positively influence the consumer's attitude toward the intention to adopt hybrid electric vehicles. The reasons behind the results and implications for the practitioners and policymakers are discussed. Furthermore, directions for future research have also been suggested.

## KEYWORDS

Pakistan, environmental conditions, hybrid electric vehicles, functional values, non-functional values, theory of consumption value

## 1 Introduction

Transportation is required for the expansion of all sectors of the economy since the movement of people and goods through roads (Li et al., 2019), air (Hussain, 2023) and sea (Dulebenets, 2018) is reliant on transportation (Wang H et al., 2018). Transportation is mainly driven by economic concerns (maximizing total turnaround profit) rather than environmental aspects (minimizing total transport CO<sub>2</sub> (tCO<sub>2</sub>) emission quantity) (Pasha et al., 2021). TCO<sub>2</sub> levels hit an all-time high of 8.25 (billion) metric tons in 2019, representing an 80 percent rise from 1990 to 2019. Even though the COVID-19 outbreak in 2020 lowered tCO<sub>2</sub> by 12%,

transport emissions are likely to rise in the coming years (Dai et al., 2023). As the human industry evolved (Zhang et al., 2021), humans were exposed to toxic elements *via* direct contact with pollution and indirect contact, such as food contamination, which constituted a significant threat (Izydorczyk et al., 2021). Coordination of the link between economic growth, energy conservation, and environmental preservation has become a significant concern for nations all over the globe in the development process (Liang et al., 2021).

Sustainability factors (e.g., emissions and social benefits) (Fathollahi-Fard et al., 2021) is a vital business goal for various stakeholders, including investors, customers, and governments (Puglieri et al., 2022). In Harvard Business Review, Lubin and Esty (2010) call sustainability an “emerging megatrend.” Attaining Sustainable Development Goals (SDGs) is critical for mitigating the adverse effects of climate change and achieving sustainable development. Among the 17 SDGs, 13 SDGs stress increasing urgent steps to fight climate-related changes. Chua et al. (2020) suggested that sustainable consumption is the best way to attain SDGs.

The main issue related to the transport sector is environmental degradation and the emission of greenhouse gases (Adnan et al., 2017a; Degirmenci and Breitner, 2017; Adom et al., 2018). Climate change is a global threat and hurts human health with every passing day. Environmental pollutants are increasing rapidly and capture the consideration of the international research community to explore the possible solutions for protecting the environment (Ahmed and Long, 2013; Mardani et al., 2019). In the last few years, research on climate change is becoming the most important topic. According to the World Health Organization, environmental change and air pollutants are the greatest threat to human health in the 21st century (Neira, 2016).

Due to environmental pollutants, climate change, and unstable fuel prices forced companies to replace conventional vehicles with electric and hybrid vehicles (Lajunen, 2014; Adnan et al., 2017b). The world is also found that environmental degradation is affecting their economy (Xu et al., 2012; Shirwani et al., 2019). Due to environmental degradation, most of the 11000000 countries from different nations initiated to take steps and make strategies to control the carbon emission with the adoption of electric vehicles (Adnan and Vasant, 2016; Adnan et al., 2017a; Naveed et al., 2019). In EVs (HEVs), new technology has been used, and the general public has insignificant information and experience about EVs; due to these factors, the adoption of EVs is comparatively unsatisfactory (Zhang et al., 2013). Many developing countries have learned about the importance of green products and Electric vehicles. Researchers in developed countries pay more attention to environmental sustainability and the adoption intentions of EVs in reducing carbon emissions and other harmful gases. There are many studies regarding EVs available in developed countries. However, there are only a few studies in developing countries (Adnan et al., 2017a; Alam et al., 2017; Degirmenci and Breitner, 2017; Y. Lee et al., 2016; Liu et al., 2017; Sang and Bekhet, 2015; Wolf et al., 2014). In electric vehicles, new technology is used, but this innovation is still in the early stage of development and needs an appropriate infrastructure. There are some issues related to electric vehicles, as their prices are higher than conventional vehicles, but their long-term cost is comparatively lower than conventional vehicles (Lajunen, 2014).

The Pakistani economy is growing positively and improving people's living standards along with unpleasant pollution, particularly a large haze area, becoming a severe threat to the public in the last few years. The continuous hazy weather is becoming a severe threat to

human health and threatening sustainable development (Lu et al., 2018; Zhao et al., 2018). Hazy weather is a phenomenon in the atmosphere triggered by the uniform scattering of various tiny particles of dust in the air. The dusting particles and the absorption of solar contaminations cause atmospheric disturbance and visibility reductions (B10 Km). In Pakistan, the continuous hazy weather has become a severe weather phenomenon that frequently happens in the autumn and winter. There is extensive research to determine the reasons behind the haze problem. The mainstream assessment is that vehicle exhaust, dust, biomass burning, inorganic aerosol, and coal combustion are primarily responsible for causing haze (Zhao et al., 2018). The government and the general public are more concerned and pay continuous attention to environmental and health problems related to haze pollution (Song et al., 2019). In Pakistan, the transport sector is one of the leading contributors to environmental degradation. Environmental contaminants are ten times more than the ideal level set by the World Health Organization (WHO), and the situation is further exaggerated with every passing day (Hamilton and Akbar, 2010). In Pakistan, many urban areas have been ranked as one of the most contaminated regions, and Karachi is at the top. Air pollution has reached an alarming situation, and many other causes of premature death, including malaria and AIDS (Lu et al., 2018). In Pakistan, with an increase in population, the demand for vehicles also increased, but there is a lack of policies to protect the environment from carbon emissions. Due to the poor oil and overlook the maintenance of engines, the transport sector emits more CO<sub>2</sub> and increases environmental pollutants (Rasool et al., 2019). Like other countries, Pakistan cares for the future technology and has a vision for reducing carbon emissions and protecting the environment (Naveed et al., 2019).

Behavioural theories are extensively used and accepted within the social science fields (Greve, 2001). Numerous social science theories capture the various determining factor of human behaviours, such as technology acceptance models (TAM), a theory of reasoned action (TRA), a theory of planned behaviour (TPB), and a theory of consumption values, have been widely used in the adoption of green vehicles (Adnan et al., 2017a; Adnan et al., 2017b; Chai Wen and Mohd Noor, 2015; Ru et al., 2018; Wang et al., 2016). All of these social science theories have facilitated research scholars and marketing practitioners to understand the decision-making procedure of consumers from different perspectives. From all of these theories, one of the fundamental assumptions is that individuals are more rational in their decision-making procedures; thus, utilitarian approaches can be used to predict individual behaviour (Ajzen, 1980; Ajzen and Fishbein, 1975; Ketabi et al., 2014; Moon et al., 2015). However, theories like TPB, TRA, and TAM are prone to several limitations, and these theories have been questioned and criticized by many research scholars for being too inadequate and ignoring the affective side of behavioural intentions (Conner and Armitage, 1998; Nejad et al., 2004; Gilal et al., 2019). It is worth noting that consumer consumption motivation is multi-dimensional, including utilitarian and hedonic attributes. Thus, to understand how consumers' decision-making process is affected by these factors, it is urgent and vital to consider these multi-faceted factors *via* the existing behavioural theoretical models to understand their latent relationships.

In line with the recommendations to cover both the utilitarian and hedonic side of attitude, the stimulus organism response (S-O-R) model proposed by (Mehrabian and Russell, 1974) allows researchers to inspect both the utilitarian and hedonic side of behavioural

intentions (Lee and Yun, 2015). Yet to date, no study has pampered the S-O-R model and bi-dimensional attitude approach to explaining consumers' behavioural intentions toward green vehicles (HEVs). Therefore, this study has three prime objectives, first of all, to empirically test and validate the modified S-O-R model with the support of the theory of consumption value to cover both the utilitarian and hedonic side of attitude, the second one is to examine consumer's perception of attributes of HEVs that influence their attitude and intentions toward the adoption intention, and the last one is to determine the consumer's perspective about the attributes of HEVs that are related to the bi-dimensions of attitudes.

This study contributes to the literature by testing and validating a new comprehensive research model that does not only elucidate the functional objects but also covers emotional and social psychological enthusiasms. This study also improves our understanding of HEVs related to behaviours to overcome the attitude-intentions contradiction by using the bi-dimensional attitude approach toward HEVs. In addition, this study also contributes to our knowledge and understanding of HEVs by empirically elucidating the comparative significance that consumers assign to different motives to adopt HEVs.

## 2 Theoretical underpinning and hypothesis development

### 2.1 Transport sector in Pakistan

In Pakistan, the transport sector is growing at a double-digit ratio for several reasons. Pakistan has the largest population of young people ever noticed in its history, according to a comprehensive National Human Development Report (NHDR). Pakistan is one of the youngest countries in the world and the second youngest country in South Asia. According to the report, 64% of the population in Pakistan is below the age of 30, and 29% is between the age of 15–29 years, and the annual growth rate of the population in Pakistan is 2.04% (Pakistan Population (2019)—Worldometers, 2019). Pakistan is going through a rapid expansion of highways and motorways. CPEC has invigorated the structure and rehabilitation of highways. Currently, the length of highways in Pakistan is 12,131 km, which goes on 15,201 km after the addition of 3,070 km in 2025 (National Highways Authority, 2018).

The number of cars per 1,000 people in Pakistan is 16, which is expected to extend almost twice by 2025 (Makhdoom, 2018). Currently, there are 19.09 million vehicles on the road, including bikes, cars, trucks, and buses. This number is estimated to reach 31.8 million by 2025, with 4.11 million cars from 2.99 million in Pakistan (Production & Sale of Vehicles, 2018). The expanding transport sector will badly damage many sectors' already compromised situation. The government should take steps or set some standards; otherwise, the transport sector's cost burdens Pakistan.

### 2.2 Impact of the energy and transport sector on the environment

The emission of Carbon dioxide gas increases day by day and damages the greenhouse very severely. With higher economic

growth, the standard of living in most countries is also raised, resulting in an increase in CO<sub>2</sub> emission and destroying natural resources. Emission of CO<sub>2</sub> increases as a result of different factors, such as social, economic and industrial factors (Adom et al., 2018; Mardani et al., 2019). There are so many reasons, such as the burning of oil, coal, gas, and petrol and also deforestation can increase the CO<sub>2</sub> emission in the environment (Sanglimsuwan, 2011). In world globalization, the main concern is linked with global warming due to the perspective of industrialization. The need is to control or minimize carbon practices to prevent worldwide warming.

The energy and transport sectors are the leading factors contributing to the country's deteriorating atmosphere. Fumes emissions from vehicles and emissions from power plants have exhausted the environment, and these harmful chemicals in the air cross the safe limits. In Pakistan, many urban areas have been ranked as one of the most contaminated regions of the world. Smog is one type of air pollution released due to the mixture of air contaminants, such as Sulphur Dioxide, Carbon and Nitrogen Oxide. At present, many cities in Pakistan have immersed in smog. Karachi and Lahore, the two biggest cities of Pakistan, have been ranked among the top 10 dirtiest cities in the world ("Two Pakistani cities among top 10 worst polluted cities of the World," 2018). As reported by the Environment Protection Agency (Pak-EPA), air pollutants exceeded the safe limits in Lahore. Environmental degradation has become so severe in Pakistan. In Pakistan, the energy and transport sector mainly damage the environment.

The environmental pollutants released from the energy and transport sector accounted for more than 310,000 deaths in Pakistan. Many more people are suffering from different disorders, such as respiratory disorders (Shaikh and Tunio, 2018). The need is to address the energy and transport sector with utmost priority at the government level in Pakistan.

### 2.3 The socio-economic cost of the transport sector in Pakistan

Pakistan has to bear a high economic cost due to its transport sector. This cost includes import bills of fuel and lubricants and the financial burden of Sulphur, Carbon and Nitrogen Oxide. Pakistan can import oil from different sources and pay hefty bills for imports. Pakistan's import bill for oil is nearly USD 13.3 billion. According to an estimate, the transport sector in Pakistan will grow continuously then the import bill of fuel will reach up to USD 30.7 billion in 2025 (Production & Sale of Vehicles, 2018).

Payments for fuel bills in Pakistan increased with every passing day. Not only petrol can import but also imports of other lubricants. Pakistan is already facing many crises, and when the import bill increases, it enhances challenges. Due to these circumstances, people are forced to pay a considerable fuel cost. Promoting hybrid electric vehicles will able to reduce the import bills of fuel. The fuel consumption in a hybrid electric vehicle is lower than a conventional vehicle, and its mileage is almost double that of conventional vehicles (Lane and Potter, 2007). Advanced technology in hybrid electric cars provides more comfort and security. The major portion of the oil is used in the transport sector; about 57% of the oil is used in the transport sector in Pakistan.

## 2.4 Theory of consumption value

The theory of consumption value focuses on consumer's attitudes toward consumption value that can explain "why consumers purchase or do not purchase (use or not use) a particular product, why to prefer to choose a product type over another type of product." (Sheth et al., 1991). Consumer behaviour should be different while purchasing different products and services. The critical factor affecting consumer intention toward purchase intention is perceived value (Zeithaml, 1988). The theory of consumption value proposes that consumers attach different values to different products and services based on their personal experience and knowledge, which will eventually impact purchase decisions (Ramkissoon et al., 2009). Consumers can make more informed purchase decisions based on multiple value dimensions such as quality, enjoyment, tradeoffs, social and value for money (Turel et al., 2010). Consumer value results when a consumer can experience and interact with a particular product or service. Researchers agree that there are two reasons for buying products and services: these are functional needs (performance, monetary and conditional values) and non-functional wants (emotional, social and epistemic values) (Turel et al., 2010; Kushwah et al., 2019).

## 2.5 S-O-R model

Limited theoretical frameworks have been employed in electric vehicles; theories that researchers have used to explain electric vehicles are behavioural attitude models, such as the theory of planned behaviour and the theory of reasoned action (Ru et al., 2018; Wang et al., 2016). Many studies used theories of planned behaviour and the theory of reasoned action. The main assumption of TPB and TRA is that consumers are rational in making decisions, so utilitarian approaches are used to predict the behaviours of consumers (Ajzen, 1980). (Conner and Armitage, 1998) Recommended addition of affective variables as a valuable extension of the models. With such a recommendation, the SO-R model is organism stimuli response model that helps researchers to examine both utilitarian and hedonic influences on behaviour (Mehrabian and Russell, 1974). No study, yet to date, has used the S-O-R model to explain consumer purchase behaviour (Lee and Yun, 2015).

There are elements in the S-O-R model: Stimuli, Organism, and Response. Stimuli are typically considered external forces on the behaviour of an individual. Organism normally refers to the internal states arising from external environmental stimuli. The outcome is either to show acceptance or avoidance behaviour (Chen et al., 2023; Lee and Yun, 2015; Wang J et al., 2018). In-fact the S-O-R model is a micro theory about different kinds of involvement from the consumer in the process of situation and decision interact. This model's main contribution is that it clarifies how the purchase decision may be affected by various types of associations (Slama and Tashchian, 1987).

In the S-O-R paradigm, three emotional states are represented by an organism pleasure, arousal, and dominance (Mehrabian and Russell, 1974). Other internal states of an organism are affected, value, consciousness, cognition, and emotion (Fiore and Kim, 2007; Lee et al., 2011). Researchers suggest two types of internal states that include utilitarian and hedonic attributes (Eroglu et al., 2001). Utilitarian and hedonic attributes have more explanatory power than previous internal states (Moon et al., 2017).

## 2.6 Purchase intention

Purchase intention can be explained as a personal assessment of consumers toward a particular product to respond to a specific action (Ajzen and Fishbein, 1975). Intention to adopt hybrid vehicles can be defined as the possibility of a consumer showing a particular purchase behaviour toward hybrid vehicles (Degirmenci and Breitner, 2017; He et al., 2018). Adopting a hybrid vehicle builds an environmental image because a person has an environment-friendly personality (Carley et al., 2013). The purchase intention of a hybrid vehicle is a consumer's intention to prefer those more environment-friendly vehicles (Albayrak et al., 2013). Adopting hybrid vehicles is a social, innovative, ethical and emotional action that can benefit consumers in terms of social and personal satisfaction (Sobhanifard and Allah, 2018). Many researchers have briefly studied the purchase intention of a hybrid vehicle (Rezvani et al., 2015; Junquera et al., 2016; Degirmenci and Breitner, 2017; Ng et al., 2018). By applying this concept in our study, we can say that purchase intention is the personal assessment of consumers willing to perform a particular purchase attitude toward hybrid vehicles.

## 2.7 Utilitarian and hedonic attitude approach

In general, attitude is defined as an enduring and long-lasting assessment of a place, person or an item (Solomon, 2014). Attitude is a multidimensional concept because of having multiple dimensions containing: affect, emotion, cognition, consciousness, and value (Fiore and Kim, 2007). From these five dimensions, we used two dimensions of attitude in our work: Utilitarian (cognitive) attitude and hedonic (affective) attitude, following the classification of attitude given by (Eroglu et al., 2001). Utilitarian attitude is the extent to which a consumer likes or dislikes a particular product based on its utility and functionality (Ahtola, 1991; Fiore and Kim, 2007; Celebi, 2015). Consumers have a greater desire to gain maximum benefit or output. A utilitarian attitude usually reduces involvement in environmental issues. Consumers with utilitarian attitudes are more concerned about economic benefits than environmental benefits and try to gain maximum utility from the product (Hong et al., 2018). Consumers seek practical benefits and long-term use of the product. Three central values affect utilitarian attitude: monetary value, performance value and conditional value (Han et al., 2017).

Hedonic attitude refers to the extent that deals with sensation, emotions, gratification, and experience, which consumers get by using a particular product (Ahtola, 1991; Fiore and Kim, 2007). A hedonic attitude is related to entertainment and fun. A hedonic attitude enhances and motivates consumers to engage themselves in environmental issues. Environmental involvement is defined as personal relevance and importance associated with protecting the environment and society (Hong et al., 2018; Lee, 2011; Schuhwerk et al., 2013). Hedonic attitudes are more personal and subjective than utilitarian attitudes because of resulting in fantasy, fun, emotional and adventure aspects of the shopping experience (Hirschman and Holbrook, 1982). Three elements are used which can affect hedonic attitude in this study. These are emotional, social, and epistemic (Han et al., 2017).

Various researchers have used attitudes in different contexts (Solomon, 2014). A significant and positive relationship is found between the consumer's attitude and their behaviour toward



purchase intention (Ajzen, 1980; Simester, 2016; Ali et al., 2022). Based on the above discussion about functional and non-functional values, we can hypothesise that:

H8: Utilitarian attitude positively affects consumers' intention toward adopting a hybrid electric vehicle.

H9: Hedonic attitude positively affects consumers' intention toward adopting a hybrid electric vehicle.

## 2.8 Functional value

### 2.8.1 Monetary value

From the consumer behaviour point of view, two perspectives are particularly relevant. The first aspect is an economic perspective, which is supposed to value as strongly related to the price consumers are willing to pay against what should be offered. The second aspect relates to the psychological perspective, which interprets value relative to the utilitarian and hedonic approach that influences the purchasing decision and brand selection process (Gallarzza et al., 2011). The price of a hybrid car is essential in shaping the acceptance or rejection attitude toward the hybrid electric vehicle (Lane and Potter, 2007). The prices of hybrid vehicles are considerably more than conventional vehicles (Coad et al., 2009). Extrinsic attributes such as prices are generally stated as one of the primary deciding factors in the purchase decision-making process, especially in the case of environment-friendly products or hybrid cars (Brouhle and Khanna, 2012; Kushwah et al., 2019).

With higher financial incentives, consumers show a positive attitude towards hybrid cars during decision-making. Hybrid cars are fuel-efficient, and the fuel budget of hybrid cars is lower than conventional cars in the long run and gives some extra monetary value (Lane and Potter, 2007). When consumers find that the value they get from hybrid electric vehicles meets their expectations, they show a more positive attitude toward hybrid cars and consider them in decision-making compared to conventional vehicles (Moons and de Pelsmacker, 2012). Based on the above discussion, we can hypothesise that:

H1: Monetary values positively affect consumers' attitudes toward the adoption of a hybrid electric vehicle.

### 2.8.2 Performance value

The functional values of hybrid vehicles represent the functionality, efficacy, and benefits attained from functions performed by hybrid cars. Functional values can be considered the key source for consumers' decision-making choices (Sheth et al., 1991). Performance value is measured on different attributes. These are maybe functional, utilitarian or physical attributes (Sheth et al., 1991; Talwar et al., 2020). Hybrid cars are one of the means of transport for consumers. The consideration of vehicle performance plays an imperative role in the purchase decision-making process for consumers (Kang and Park, 2011). Energy-sustainable innovations such as hybrid vehicles are most important when the environment changes dramatically, and climate change is becoming a severe issue.

An automatic gearbox in a hybrid vehicle can improve the car's performance and enhance the satisfaction level of consumers (Adamson, 2005). Safety features of hybrid cars, reliability, comfort level, top speed, the convenience of use and operability and practicality

of car can improve the functionality of hybrid cars and also capture the consumers' attention in the decision-making process (Zhang et al., 2013). Consumers are more concerned about the performance of the hybrid vehicle while making a purchase decision. If hybrid electric cars can meet their needs and perform effectively, then they show a positive attitude and agree to adopt hybrid electric cars (Han et al., 2017). So, green vehicles (HEVs) adoption is associated with performance value. It can be hypothesized that:

H2: Performance values positively affects consumer's attitude toward the adoption of hybrid electric vehicle.

### 2.8.3 Conditional value

Conditional value means the perceived net utility attained from an alternative obtained in a certain situation and conditions the decision-maker faces (Sheth et al., 1991). Different situations and circumstances, such as time and place, affect consumer's purchase behaviour based on the product features, prior knowledge, experience and other conditional dynamics (Gadenne et al., 2011; Talwar et al., 2020). Consumers' behaviours toward purchase intentions are affected by changes in situational conditions and circumstances (Saxena and Khandelwal, 2010). Now consumers are more willing and agree to pay more for green products to save the environment (Doszhanov and Ahmad, 2015). The proper infrastructure for hybrid electric vehicles and accessibility can attract consumers more positively. There is a lack of infrastructure for hybrid electric vehicles in Asian countries, especially Pakistan. Consumers can evaluate several functional or non-functional features when they are selecting a store to shop, such as; the distance of the store, the price range of the products available on store, quality, variety of products and most important parts availability of product and payment method (Sirgy et al., 2000). Consumers show a more positive attitude toward those products designed to make them easy or convenient for consumers (Lane and Potter, 2007). Previously it was found that conditional values positively influence consumers' behavioural intention (Lin et al., 2010; Lin and Huang, 2012). Therefore, based on the above discussion, we can hypothesise that:

H3: Conditional values positively affect consumers' attitudes toward adopting a hybrid electric vehicle.

## 2.9 Non-functional value

### 2.9.1 Emotional value

Emotional values are those consumers feel after evaluating the product or service (van Tonder et al., 2020; Van Tonder et al., 2023). The manufacturer needs to properly understand what consumers want from a green product and design it according to their needs and wants. Some consumers seek ecological performance, and others evaluate products based on personal benefits (Khan and Mohsin, 2017). Emotional and rational aspects associated with any product or service play a significant role in purchase behaviour (Khan and Mohsin, 2017). Hybrid electric vehicles are more environment-friendly than conventional vehicles and give more security, pleasure and comfort levels during driving because of multiple advanced features in hybrid cars. So, Consumers can get emotional values and attachments when they adopt a hybrid electric vehicle (Han et al., 2017). Those consumers who are more concerned about

environmental issues and protecting the environment have a positive attitude or willingness to reduce carbon emissions and prefer to drive hybrid cars (Torgler and García-Valiñas, 2007; Danish et al., 2019). Emotional values are positive, negative or mixed, which can vary from person to person. By adopting green products, consumers feel they have environment-friendly personalities and work to save the environment (Bei and Simpson, 1995). In previous studies, the emotional value was found to have a significant positive relationship between green products and purchase decisions (Gonçalves et al., 2016; Lin and Huang, 2012). Therefore we can hypothesise that:

**H4:** Emotional values positively affect consumers' attitudes toward adopting a hybrid electric vehicle.

## 2.9.2 Social value

Personal norms of an individual can encourage or motivate them to engage in environmentally friendly actions (Testa et al., 2016; Van Tonder et al., 2023). Factors associated with social values are identification, expression of personality, social class membership, social image and self-concept (Han et al., 2017). Consumers have been more concerned about environmental issues in the last few decades due to environmental degradation, increased carbon emissions, and other harmful gases (Wang et al., 2016; Wu et al., 2023). The adoption of hybrid vehicles shows investment behaviour. It is a decision style about innovation to adopt or reject. In this way, invest more money but save the environment from harmful elements in the long run (Testa et al., 2016; Huang et al., 2018). Social values of hybrid vehicles can be divided into two categories; Social responsibility (SOC R) value and Social identity value (SOC I) (Han et al., 2017).

## 2.9.3 Social value identity

The self-identity of consumers is related to the individual's specific roles, which can impact the attitude and consumption behaviours of consumers because consumers want to sustain constancy in behavioural attitude (Arnocky et al., 2007; Whitmarsh and O'Neill, 2010; Danish et al., 2019). The self-concept of an individual can contribute to a sense of identity. Then these self-identities help to create a relationship between personal values and an environment-friendly attitude (Steg et al., 2014). Individual behaviour which can contribute to environmental sustainability is a particular form of social identity which can provide a symbolic benefit to the individual when adopting a hybrid electric vehicle, like showing himself as an environment-friendly person who can ready to adopt new and green technology to protect the environment (Whitmarsh and O'Neill, 2010; Floress et al., 2022). The person who wants to gather information about new vehicles like hybrid electric vehicles and wants to impact others through the information has a personality like a car expert. When a person considers himself a car expert or environment-friendly, adopting a hybrid vehicle becomes more attractive to him and shows a more positive attitude toward adopting a hybrid electric vehicle (Schuitema et al., 2013; Floress et al., 2022). So, in the context of HEVs, in this study, we can hypothesise that:

**H5:** Social value identity positively affects consumers' attitudes toward adopting a hybrid electric vehicle.

## 2.9.4 Social value responsibility

Carbon emission damages health and the environment; the world is facing severe environmental issues. Environmental degradation has become a serious issue, and society is responsible for it. Everyone is responsible for protecting the environment (Danish et al., 2019; Wang et al., 2016). A hybrid electric vehicle is a technological innovation, and the purpose of hybrid electric vehicles is to control the carbon emission emitted from conventional vehicles. The need is to motivate and encourage consumers to adopt hybrid vehicles because their social responsibility is to protect the environment from carbon emissions and other harmful gases (Han et al., 2017). Those consumers who purchase green products can motivate and encourage others to use them because they have a social responsibility to protect the environment (Mohd Suki, 2015; Ali et al., 2019a; Ali et al., 2021). In previous studies, social values were found to affect green products and purchase intention positively (Biswas and Roy, 2015a; Gonçalves et al., 2016). Therefore, we can hypothesise that:

**H6:** H6: Social value responsibility positively affects consumers' attitudes toward adopting a hybrid electric vehicle.

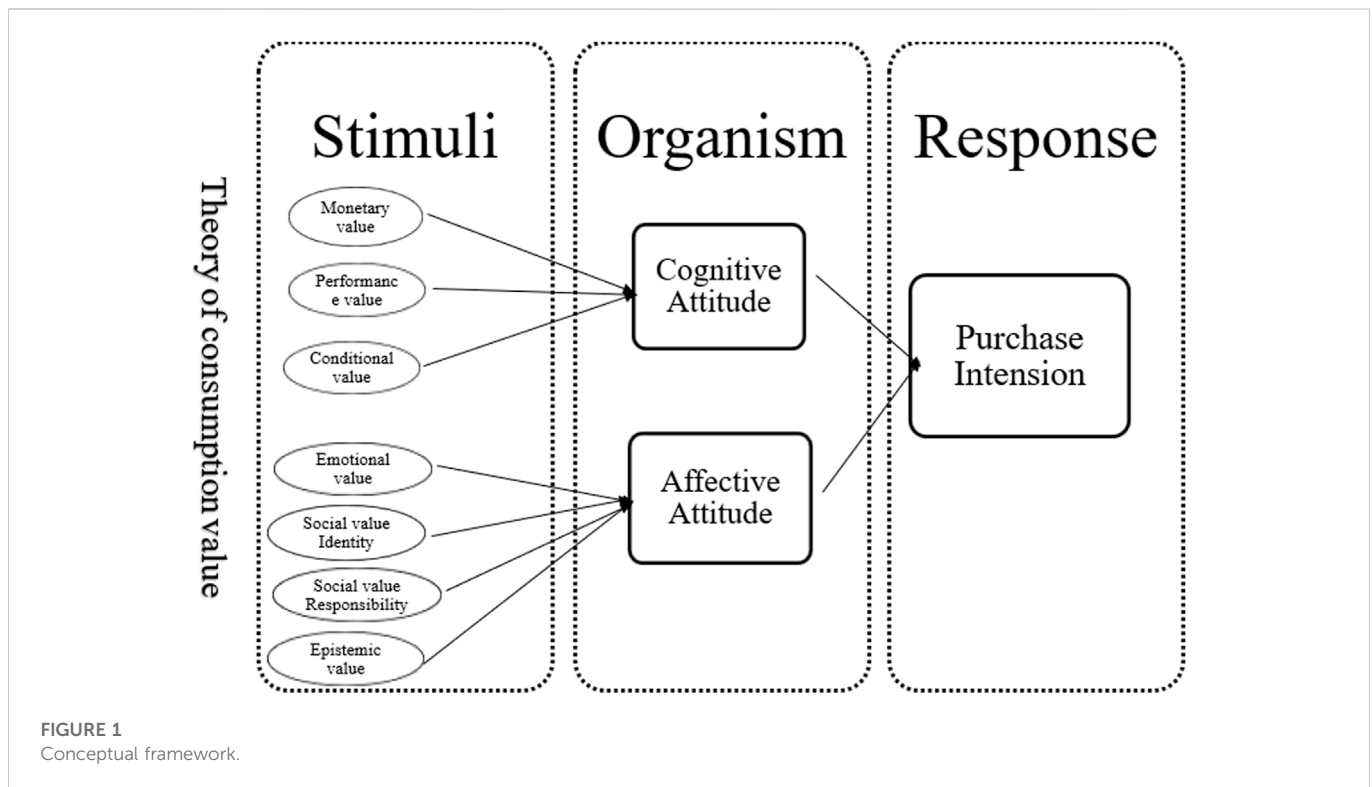
## 2.9.5 Epistemic value

Epistemic values relate to the curiosity, novelty, knowledge, and perceived utility consumers gain by adopting innovations (Sheth et al., 1991). Knowledge is one of the key characteristics influencing consumers while making purchase decisions (Laroche et al., 2001; Gonçalves et al., 2016; Chakraborty et al., 2022). When consumers face problems and get frustrated by older products, they explore alternatives to resolve the issues and then epistemic values occur (Lin and Huang, 2012; Solaiman and Halim, 2017). Novelty-seeking also improves problem-solving abilities. The main factor triggering the epistemic value for consumers is finding innovative products that offer more value and benefits (Teng, 2018). When new products and technology can enhance consumers' knowledge, they will be attracted to new products and show a more positive attitude (Turrentine and Kurani, 2007; Danish et al., 2019). A hybrid electric vehicle is a technological innovation that technically captures consumers' attention regarding adopting and protecting the environment (Han et al., 2017). Previous studies found that epistemic value significantly impacts consumer attitude toward adopting green purchases (Biswas and Roy, 2015b; Lin and Huang, 2012; Martins et al., 2015; Rahnama and Rajabpour, 2016). As green, a hybrid electric vehicle is an emerging concept and has not been adopted in Pakistan properly. Therefore, HEV is associated with epistemic value, and it can be hypothesized:

**H7:** Epistemic values positively affect consumers' attitudes toward adopting a hybrid electric vehicle.

## 2.10 Theoretical framework

This study aims to find consumers' intentions towards HEVs in Pakistan through the S-O-R model and theory of consumption values. The substance on which the whole research work is based is known as the theoretical framework. It is the logical association of different variables for a problem based on the theory or past literature. The theory involves functional and non-functional values. Further, based on the previous discussion regarding the definition and conceptualization, the below framework in Figure 1 presented for this study:



## 3 Research method

### 3.1 Research design, population, and sample

The research design is defined as the road map for the research (Iacobucci et al., 2014). Research design is most important because it provides proper measurement, analysis, and data collection guidance. This study will be conducted as correlational research because this study attempts to scrutinize consumer intention toward Electric vehicle adoption. A quantitative approach is used in this study to test the hypothesis. Using a quantitative technique, statistical tools and numeric data can be obtained through the questionnaire and focused on a group of people to clarify the phenomenon (Iacobucci et al., 2014).

Pakistan is a developing nation that is seeing a boom in urbanisation. People in Pakistan's rural areas are increasingly making their way to the country's growing number of urban centers. The data was collected from metropolitan regions, including Multan, Sahiwal, and Lahore. Multan, Sahiwal, and Lahore are the three major urban centres in Pakistan, and their metropolitan areas encompass nine other cities. Green customer citizenship behaviours concern "customers' voluntary, discretionary behavior that is not required, but is beneficial to the implementation of a firm's green (environmentally friendly) activities" (Deng and Yang, 2022). Citizens living in metropolitan cities were chosen because of the notable increase in green citizenship behaviour shown in urban cities (Ali et al., 2019a; Ali et al., 2019b; Ali et al., 2020). The data is obtained through a questionnaire.

A research population is a collection of people or objects focused on the study with similar characteristics. In this study, the research population will focus on all general automobile users from the metropolitan cities of Punjab. The sample used in this study is

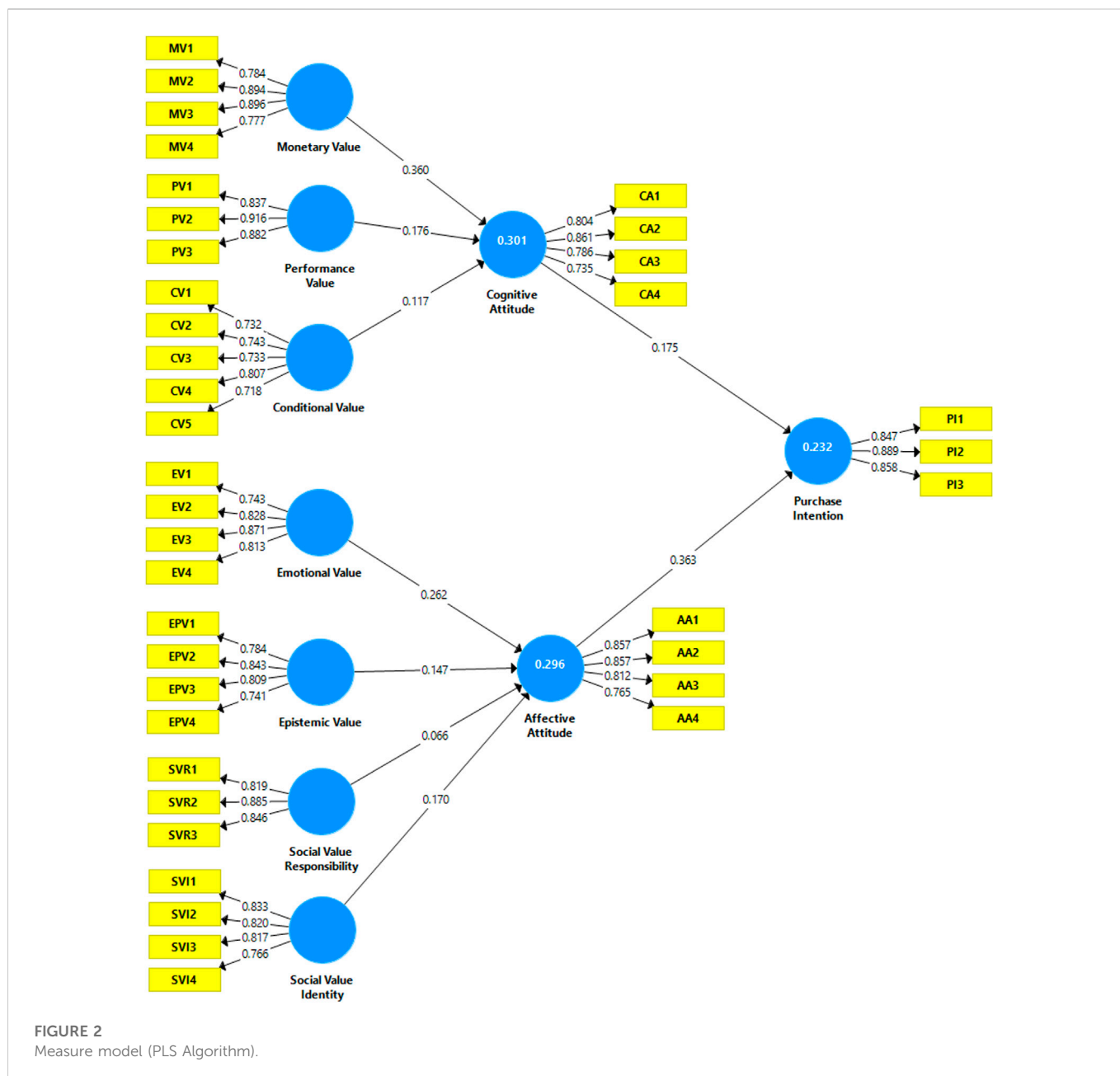
drawn from Lahore, Multan, and Sahiwal. The researcher wants to research the consumer's intentions toward adopting electric vehicles. The data is obtained through a questionnaire. Due to the limited time, the data will be collected from the big cities of Punjab. The unit of analysis in this study will be general automobile users.

### 3.2 Sample technique and sample size

Non-probability sampling technique was employed in this study because it is suitable when it is challenging to get a complete sampling frame. In this regard, non-probability sampling is appropriate and suitable for theoretical generalization (Calder et al., 1981). Prices of green products are a fundamental determining factor in the pro-environmental behaviour of consumers (Issock Issock et al., 2018). Electric vehicles (hybrid vehicles) are more expensive than conventional ones, which makes the price a hurdle in green buying behaviour. Therefore, the valuation of the income level of green product buyers becomes essential. So that people are chosen through judgmental sampling, representing the middle-class consumers in Pakistan with an income level above PRs 75,000. A rule of thumb for sample size determination was proposed by (Diamond, 2009), suggesting that a sample size of 50 is poor, 300 is good, 500 is very good, and 1,000 is taken into account excellent for statistical analysis. Therefore, a 500 sample size is ample in generating reliable and valid results for this study.

### 3.3 Measurements

A 7-point Likert scale will be adopted, ranging from strongly disagree = 1 to strongly agree = 7. All variables except attitudes will be



measured with a 7-point Likert scale. A 7-point semantic differential scale will measure attitudes. The questionnaire, pre-test and pilot test will be conducted to ensure its reliability and validity for this study.

### 4 Data analysis and results

Researchers understand their research statistics and relationship, which depend on univariate and bivariate analysis. Structural equation modelling is more beneficial for statistical analysis in terms of accuracy, efficiency, and convenience than other traditional statistical analysis methods (Henseler et al., 2014; Richter et al., 2016). The first generation of the method contains exploratory factors of analysis, factor analysis, cluster analysis, analysis of variance, multiple regression, logistic regression, and multidimensional scaling. These analyses are helpful when they are

confirmatory and test the assumption of existing theories and exploratory when searching for a suppressed variable with little previous information. In the first generation of the method, there is no clarification between exploratory and confirmatory. Hence, the second generation of the method is launched to resolve the issues of the first-generation method, and it is well-known as structural equation modelling (SEM).

Structural equation modelling is a multivariate analysis method that can help to analyse numerous variables simultaneously, and the applications of SEM in business research are gaining more attraction (Henseler et al., 2014). Structural equation modelling (SEM) has two well-known techniques; Covariance based SEM (CB-SBM) and Variance based SEM (VB-SBM) (Chin and Newsted, 1999). Selecting an appropriate statistical technique is most important for social science researchers because the inappropriate selection of statistical techniques can cause inaccurate conclusions (Ramayah



**TABLE 1 Demographic profile.**

| Variables           | Characteristics     | Frequency | Percentage |
|---------------------|---------------------|-----------|------------|
| Gender              | Male                | 211       | 91.74      |
|                     | Female              | 19        | 8.26       |
| Age (years)         | Less than 20        | 03        | 1.30       |
|                     | 21–30               | 113       | 49.13      |
|                     | 31–40               | 73        | 31.74      |
|                     | 41–50               | 34        | 14.78      |
|                     | 51 and above        | 07        | 3.05       |
| Marital status      | Single              | 91        | 39.57      |
|                     | Married             | 139       | 60.43      |
| Educational level   | Primary education   | 03        | 1.30       |
|                     | Secondary education | 31        | 13.48      |
|                     | Bachelor's          | 93        | 40.43      |
|                     | Master's degree     | 101       | 43.91      |
|                     | Doctoral degree     | 02        | 0.88       |
| Occupation          | Government sector   | 40        | 17.40      |
|                     | Private sector      | 106       | 46.09      |
|                     | Self-employed       | 68        | 29.56      |
|                     | Student             | 13        | 5.65       |
|                     | Retired             | 03        | 1.30       |
| Family income (PRs) | 75,000–100,000      | 65        | 28.26      |
|                     | 100,001–125,000     | 68        | 29.56      |
|                     | 125,001–150,000     | 56        | 24.35      |
|                     | 150,001-over        | 41        | 17.83      |
| Cars owned          | 1                   | 160       | 69.57      |
|                     | 2                   | 59        | 25.65      |
|                     | 3                   | 10        | 4.35       |
|                     | 4 or more           | 1         | 0.43       |
| Brand preference    | Toyota              | 61        | 26.53      |
|                     | Honda               | 72        | 31.30      |
|                     | Suzuki              | 75        | 32.60      |
|                     | Nissan              | 06        | 2.61       |
|                     | Others              | 16        | 6.96       |

et al., 2010). For this reason, data tend to have the problem of normality in social science studies, therefore partial least square (PLS), which is also well-known as VB-SBM and is normally used to address the problem and issues of normality and is preferred over the CB-SEM (Osborne, 2010). The partial least square SEM approach presents results in two segments: the first is the measurement model,

**TABLE 2 Measurement model results.**

| Constructs                  | Item                 | Loading | CR    | AVE   |
|-----------------------------|----------------------|---------|-------|-------|
| Monetary value              | MV1                  | 0.784   |       |       |
|                             | MV2                  | 0.894   |       |       |
|                             | MV3                  | 0.896   | 0.905 | 0.705 |
|                             | MV4                  | 0.777   |       |       |
| Performance value           | PV1                  | 0.837   |       |       |
|                             | PV2                  | 0.916   | 0.911 | 0.773 |
|                             | PV3                  | 0.882   |       |       |
| Conditional value           | CV1                  | 0.732   |       |       |
|                             | CV2                  | 0.743   |       |       |
|                             | CV3                  | 0.733   | 0.863 | 0.559 |
|                             | CV4                  | 0.807   |       |       |
|                             | CV5                  | 0.718   |       |       |
| Emotional value             | EV1                  | 0.743   |       |       |
|                             | EV2                  | 0.828   |       |       |
|                             | EV3                  | 0.871   | 0.887 | 0.664 |
|                             | EV4                  | 0.813   |       |       |
| Epistemic value             | EPV1                 | 0.784   |       |       |
|                             | EPV2                 | 0.843   |       |       |
|                             | EPV3                 | 0.809   | 0.873 | 0.633 |
|                             | EPV4                 | 0.741   |       |       |
| Social value responsibility | SVR1                 | 0.819   |       |       |
|                             | SVR2                 | 0.885   |       |       |
|                             | SVR3                 | 0.846   | 0.887 | 0.723 |
|                             | SVI1                 | 0.833   |       |       |
| Social value identity       | SVI2                 | 0.82    |       |       |
|                             | SVI3                 | 0.817   | 0.884 | 0.655 |
|                             | SVI4                 | 0.766   |       |       |
|                             | Utilitarian attitude | UA1     | 0.804 |       |
| UA2                         |                      | 0.861   |       |       |
| UA3                         |                      | 0.786   | 0.875 | 0.637 |
| UA4                         |                      | 0.735   |       |       |
| Hedonic attitude            | HA1                  | 0.857   |       |       |
|                             | HA2                  | 0.857   |       |       |
|                             | HA3                  | 0.812   | 0.894 | 0.679 |
|                             | HA4                  | 0.765   |       |       |
| Purchase intention of HEVs  | PI1                  | 0.847   |       |       |
|                             | PI2                  | 0.889   | 0.899 | 0.748 |
|                             | PI3                  | 0.858   |       |       |

TABLE 3 Discriminant validity Fornell-Larcker Criterion.

|     | AA    | CA    | CV    | EV    | EPV   | MV    | PV    | PI    | SVI   | SVR   |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| AA  | 0.824 |       |       |       |       |       |       |       |       |       |
| CA  | 0.551 | 0.798 |       |       |       |       |       |       |       |       |
| CV  | 0.496 | 0.394 | 0.747 |       |       |       |       |       |       |       |
| EV  | 0.486 | 0.427 | 0.663 | 0.815 |       |       |       |       |       |       |
| EPV | 0.437 | 0.448 | 0.466 | 0.553 | 0.795 |       |       |       |       |       |
| MV  | 0.386 | 0.501 | 0.475 | 0.417 | 0.448 | 0.840 |       |       |       |       |
| PV  | 0.430 | 0.423 | 0.602 | 0.535 | 0.480 | 0.489 | 0.879 |       |       |       |
| PI  | 0.459 | 0.375 | 0.471 | 0.510 | 0.525 | 0.300 | 0.358 | 0.865 |       |       |
| SVI | 0.477 | 0.443 | 0.559 | 0.668 | 0.660 | 0.335 | 0.593 | 0.585 | 0.809 |       |
| SVR | 0.347 | 0.398 | 0.518 | 0.448 | 0.498 | 0.383 | 0.395 | 0.418 | 0.532 | 0.850 |

and the second is the structural model (Henseler et al., 2009). This study tested the measurement model (validity and reliability of measures) and the structural model (testing the hypothesized connection among variables).

## 4.1 Demographic variables

The demographic section of the questionnaire includes gender, age, marital status, education level, occupation, family income, car owned and brand preferences. The demographic profile of the respondents is given in Table 1.

## 4.2 Measurement model

In this study's validity and reliability, tests are conducted for all the given constructs. All the items of model analyses were conducted in SPSS. The valuation of the measurement model is based on validity tests (discriminant validity and convergent validity) and reliability tests (internal consistency reliability and item reliability) (Hair et al., 2011). Convergent and discriminant validity is measured through average variance extracted (AVE), internal consistency reliability is measured through composite reliability, and item reliability is measured through outer loading. The composite reliability value for each paradigm exceeds the cut-off value of 0.7, and AVE surpasses the suggested value of 0.5, showing that measurements are reliable (Anderson and Gerbing, 1988). Loadings of all items are well above the threshold value of 0.5 (Henseler et al., 2014), and values are mentioned in the Table 2 and shown in Figure 2.

The study results indicate that all the values of AVE are between 0.566 and 0.723 (intentions to adopt hybrid electric vehicles), all the values of CR between 0.820 and 0.912, and all additional loadings are in-between values of 0.5 and 0.9. In this measurement model, all the values verified excessive validity and reliability. Therefore, based on the outcomes, it can be concluded that the measurement model has an adequate and acceptable level of convergent validity, discriminant validity, and reliability. All the values are given below in the table:

### 4.2.1 Assessment of discriminant validity

Discriminant validity helps to verify that each construct is different from the other. This study measures discriminant validity to examine individual intentions towards adopting hybrid electric vehicles through functional and non-functional values. The criterion of (Fornell and Larcker, 1981) is used for the appropriateness and adequacy of discriminant validity. The criterion (Fornell and Larcker, 1981) required that the square root of AVEs (diagonal values) should be higher than the latent constructs' correlations (off-diagonal values). The given results in Table 3 show that there is a discriminant validity between all constructs.

The other standard for discriminant validity is the Heterotrait-Monotrait (HTMT) Standard (Henseler et al., 2014). Based on this criterion, the constructs are distinct from each other when the HTMT value is less than 1, and in this study, the values of HTMT are found under threshold values. The values of HTMT are given below in Table 4:

## 4.3 Structural model

Assessment of measurement model based on t values, path coefficient ( $\beta$  values), effect size ( $f^2$ ), predictive relevance ( $Q^2$ ), and coefficient of determination ( $R^2$ ). Results of hypothesis testing show that from all of the nine hypotheses, seven hypotheses were accepted, and two (conditional value and social value responsibility) were rejected.

H1 proposed that monetary value positively affects consumers' attitudes toward adopting a hybrid vehicle, and the results show that monetary value has a significant positive influence on attitudes toward adopting the intention of hybrid electric vehicles ( $\beta = 0.360$ ,  $t = 5.095 > 1.64$ ,  $p < 0.05$ ). It reveals that financial benefits associated with HEVs strongly affect the decision. Previous studies also found that financial benefit is an important aspect when making a purchase decision, and consumers will intend to select those vehicles which provide more economic benefits in terms of the purchasing price, fuels cost, and maintenance cost (Ozaki and Sevastyanova, 2011; Ystmark et al., 2016).

H2 proposed that Performance value positively affects consumers' attitudes toward adopting a hybrid vehicle, which was supported by

TABLE 4 Discriminant Validity HTMT criterion.

|     | AA    | CA    | CV    | EV    | EPV   | MV    | PV    | PI    | SVI   | SVR |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----|
| AA  |       |       |       |       |       |       |       |       |       |     |
| CA  | 0.652 |       |       |       |       |       |       |       |       |     |
| CV  | 0.602 | 0.483 |       |       |       |       |       |       |       |     |
| EV  | 0.586 | 0.512 | 0.808 |       |       |       |       |       |       |     |
| EPV | 0.527 | 0.552 | 0.571 | 0.676 |       |       |       |       |       |     |
| MV  | 0.455 | 0.595 | 0.574 | 0.492 | 0.536 |       |       |       |       |     |
| PV  | 0.508 | 0.503 | 0.723 | 0.637 | 0.580 | 0.581 |       |       |       |     |
| PI  | 0.541 | 0.448 | 0.574 | 0.616 | 0.645 | 0.354 | 0.423 |       |       |     |
| SVI | 0.565 | 0.534 | 0.688 | 0.792 | 0.809 | 0.397 | 0.711 | 0.706 |       |     |
| SVR | 0.410 | 0.483 | 0.638 | 0.541 | 0.607 | 0.452 | 0.467 | 0.510 | 0.646 |     |

the data ( $\beta = 0.176$ ,  $t = 2.461 > 1.64$ ,  $p < 0.05$ ). Performance value significantly influences attitudes toward adoption intention, which means that when consumers are more satisfied with the performance of HEVs, they are more likely to adopt hybrid electric vehicles.

H3 proposed that Conditional value positively affects consumers' attitudes toward adopting a hybrid vehicle. But the results of the conditional value ( $\beta = 0.117$ ,  $t = 1.622 < 1.64$ ,  $p > 0.05$ ) reject the hypothesis and are found to be an insignificant impact on the adoption intentions of hybrid electric vehicles. Consumers are reluctant to adopt HEVs because several conditional values are not properly implemented, and sometimes overlook the conditional values intentionally or unintentionally. We found that conditional value does not positively trigger positive behaviour of consumers.

H4 proposed that Emotional value positively affect consumer's attitude toward the adoption of hybrid vehicles, and the findings of our study show that emotional value has a significant positive influence on attitude toward the adoption intention of hybrid electric vehicles ( $\beta = 0.262$ ,  $t = 3.507 > 1.64$ ,  $p < 0.05$ ).

H5 proposed that social value identity positively affects consumers' attitudes toward adopting a hybrid vehicle, which was supported by the data as, social value identity ( $\beta = 0.170$ ,  $t = 2.036 > 1.64$ ,  $p < 0.05$ ).

H6 proposed that social value responsibility positively affects consumers' attitudes toward adopting a hybrid vehicle. But the results of social value responsibility ( $\beta = 0.066$ ,  $t = 0.926 < 1.64$ ,  $p > 0.05$ ) are found to be an insignificant impact on the adoption intentions of hybrid electric vehicles. We found that social value responsibilities do not positively force them to show positive behaviour.

H7 proposed that epistemic value positively affects consumer's attitudes toward adopting a hybrid vehicle, and the results show that epistemic value has a significant positive influence on attitudes toward adopting the intention of hybrid electric vehicles ( $\beta = 0.147$ ,  $t = 1.912 > 1.64$ ,  $p < 0.05$ ).

H8 proposed that Utilitarian attitude positively affects consumers' intentions toward adopting a hybrid vehicle, and the findings of our study about utilitarian attitude ( $\beta = 0.175$ ,  $t = 2.612 > 1.64$ ,  $p < 0.05$ ) support the claim.

H9 proposed that a Hedonic attitude positively affects consumers' intentions toward adopting a hybrid vehicle. And this claim is

supported by the results ( $\beta = 0.363$ ,  $t = 6.172 > 1.64$ ,  $p < 0.05$ ), which positively impact adoption intentions of hybrid electric vehicles. The findings of attitudes (Utilitarian and Hedonic) indicate that attitude and intentions are positively associated with each other and support the previous results (Ajzen, 1980).

Furthermore, the proportion of variance, which is explained as ( $R^2$ ), can be considered another predictor of the reliability test (Kristal et al., 2010). According to the (Cohen, 1988; Chin and Newsted, 1999) value of  $R^2$  ranges between 0.26 and 0.67 is substantial, while from 0.13 to 0.33 is considered as moderate, and 0.02 to 0.19 is considered as the weak variance level. In this study, the value of  $R^2$  shows that the reliability results are adequate and acceptable. The  $R^2$  value for adoption intention is 0.232, which shows that the model has substantial explanatory power for adopting hybrid electric vehicles. However, it is not an appropriate and effective approach to support a model only based on the  $R^2$  value (Hair et al., 2017). Thus, the best way is to measure the predictive relevance of  $Q^2$  of the model. If the value of  $Q^2$  is higher than 0, then latent exogenous paradigms have great predictive relevance, and this is a rule-of-thumb concept (Akbar et al., 2019). Results show that the value of  $Q^2$  is 0.165 for adoption intentions which proposes that the model has great predictive relevance. The values of  $f^2$ , 0.02, 0.15 and 0.35 indicate small, medium and large effects, respectively (Cohen, 1988). Hence, the value of  $f^2$  postulates that effect size fluctuates from medium to large as given below in Table 5.

## 5 Discussion

Economic situations, unstable fuel prices, environmental deterioration and the destructive effects of conventional vehicles have made users sensible and conscious about their vehicle preferences and rapidly shift from conventional vehicles to green vehicles worldwide. To understand such a rapid shift, in this study, we focus on and try to identify the influential factors affecting consumers' intentions regarding green vehicles such as hybrid electric vehicles in Pakistan.

The results of this study show that constructs of functional values (Monetary and Performance value) excepting conditional values are strong and significant predictors for utilitarian attitude. While on the

TABLE 5 Structural Model Results (Hypothesis testing).

| H  | Relationship | Path coefficient | Std. coefficient | t -value | p-value | Supported | R <sup>2</sup> | Q <sup>2</sup> | f <sup>2</sup> |
|----|--------------|------------------|------------------|----------|---------|-----------|----------------|----------------|----------------|
| H1 | MV → CA      | 0.360            | 0.072            | 5.095    | 0.000   | Yes       | 0.301          | 0.171          | 0.131          |
| H2 | PV → CA      | 0.176            | 0.072            | 2.461    | 0.007   | Yes       |                |                | 0.026          |
| H3 | CV → CA      | 0.117            | 0.074            | 1.622    | 0.056   | No        |                |                | 0.012          |
| H4 | EV → AA      | 0.262            | 0.074            | 3.507    | 0.000   | Yes       | 0.296          | 0.191          | 0.051          |
| H5 | SVI → AA     | 0.170            | 0.084            | 2.036    | 0.021   | Yes       |                |                | 0.017          |
| H6 | SVR → AA     | 0.066            | 0.071            | 0.926    | 0.178   | No        |                |                | 0.004          |
| H7 | EPV → AA     | 0.147            | 0.078            | 1.912    | 0.029   | Yes       |                |                | 0.016          |
| H8 | CA → PI      | 0.175            | 0.066            | 2.612    | 0.004   | Yes       | 0.232          | 0.165          | 0.028          |
| H9 | AA → PI      | 0.363            | 0.059            | 6.172    | 0.000   | Yes       |                |                | 0.119          |

other hand, all the constructs of Non-functional values (Emotional values, epistemic values, Social value identity) except social value responsibility are strong and significant predictors of hedonic attitude. Both utilitarian and hedonic attitudes positively or significantly influence consumers' intentions to adopt HEVs.

Previously it was found that the monetary value (price, fuel efficiency) of eco-friendly products has an important factor in decision-making. The findings of this study were consistent with previous findings (Potoglou and Kanaroglou, 2007; Ozaki and Sevastyanova, 2011; Biswas and Roy, 2015a; Biswas and Roy, 2015b; Rahnama and Rajabpour, 2016). It reveals that consumers show a more positive and favourable attitude toward hybrid electric vehicles when they offer more financial benefits in terms of price, fuel efficiency, maintenance cost and running cost. Prices of green products have less impact on consumers' adoption intentions in developed countries. Likewise, in Malaysia and Taiwan, people focus on the functional values of the product rather than its price (Lin and Huang, 2012; Mohd Suki, 2015).

Economic conditions are excellent and stable in Malaysia and Taiwan, but in Pakistan, the economic condition is unstable due to inflation and political issues. In Pakistan, fuel prices are unstable and increasing dramatically due to economic instability. Increased fuel prices are one of the motives for shifting from conventional to hybrid electric vehicles. Government and marketers must focus on the prices of hybrid electric vehicles, which strongly influence purchase intention for green hybrid electric vehicles. Higher prices of hybrid electric vehicles would result in less adoption of HEVs.

When companies develop a new product for the first time, they must set a price. First of all, companies decide where they want to launch their products. When companies set their objectives and goals accurately or undoubtedly understood, it is easier to set prices. Different price ranges offer more choices to consumers and cover more markets. Mostly, the primary objectives or goals of any company are five: gaining maximum current profit, maximum market share, product quality leadership, survival, or maybe maximum market skimming. There are six steps considered in setting the price of a product, selecting the price objectives, estimating the cost, determining the demand for the product, analyzing competitor prices, selecting the pricing method and selecting the product's final price. Therefore, marketers set their prices of hybrid electric vehicles in developing countries like Pakistan according to the

economic condition of the country and according to the market response. Similarly, the need is to make people aware consumers of more financial benefits of adopting green vehicles.

Performance value was found to be a strong predictor in making a positive attitude toward the adoption intentions of hybrid electric vehicles. When the performance of HEVs, such as quality, ride comfort, handling, and maintenance, is easy and good, people show a more positive attitude toward adoption intentions. These findings are consistent with previous findings (Ozaki and Sevastyanova, 2011; Chai Wen and Mohd Noor, 2015; Gonçalves et al., 2016). The car's high performance can satisfy people and give them confidence that they are using a good car. Safety features can also improve the performance of cars. Consumers want they get maximum performance from the product. Still, when consumers are not satisfied with the product, a gap occurs between consumers' expectations and the product's actual performance, which ultimately leads to brand hate. Brand hate is more than just one emotion; it covers different layers of negative emotions. The level of hate starts and grows when companies cannot manage or resolve the problems which consumers face or not tries to improve their performance according to the consumer's expectations.

The success of any vehicle is based on its performance and ride comfort. Consumers cannot get their money's worth when the performance is not according to their expectations. Therefore, manufacturers pay more attention to improving the performance of HEVs in terms of ride comfort, reliability of cars and security perspective, especially in developing countries like Pakistan. Manufacturers and marketers must be aware that the performance of cars highly influences consumers' attitudes or intentions regarding whether to adopt hybrid electric vehicles. The performance of hybrid electric vehicles must be reliable, and there should be transparency in the information they provide. Marketers should be responsible for attracting consumers with appropriate values and features because the values of hybrid electric vehicles are considered important in influencing consumers' adoption intentions.

It was found that conditional values do not influence consumers' attitudes and intentions to adopt hybrid electric vehicles. The results of conditional values in this study are in line with previous studies that these values do not influence consumers' intentions to adopt green products (Biswas and Roy, 2015b; Mohd Suki, 2015; Mohd Suki and Mohd Suki, 2015; Rahnama and Rajabpour, 2016; Khan and Mohsin,



2017), but findings of this study have inconsistencies with previous findings which found that conditional value has a significant positive impact on green adoptions (Ali et al., 2019a; Biswas and Roy, 2015a; Gonçalves et al., 2016; Lin and Huang, 2012). The conditional value refers to those values achieved in different circumstances, situations, conditions, and states of affairs, such as place, time, money refunds, discounts, government subsidies and tax rebates in the decision-making process of green consumption (Chai Wen and Mohd Noor, 2015). This means conditional values associated with the product can lead to a consumer's positive or negative attitude toward adoption intentions.

There are some reasons behind the insignificant result of conditional value in Pakistan, such as high prices of HEVs, import duties, parts availability, delivery time and lack of companies' channels or outlets, especially for HEVs. The study's findings show that higher prices and availability of HEVs are the leading reasons behind Pakistan's low adoption rate of hybrid electric vehicles. Therefore, marketers should consider the most sensitive aspect and reduce those sensitivities through different ways, such as offering payback policies, discounts, and subsidies and improving the accessibility process for improving their conditional values of HEVs in Pakistan. Service backups and warranties are also playing an essential role in promoting HEVs. Easy access to the dealer satisfies customers in purchasing and repairing an automobile. The government should also promote HEVs by offering subsidies on import duties and registration fees to encourage such vehicles in Pakistan. When the government or manufacturers offer discounts, subsidies or promotion activities, the general public ultimately shows a more positive attitude toward adopting hybrid electric vehicles.

Feelings and emotions associated with a brand are essential to human existence and include both positive and negative states of mind. Emotional values may be gained by many emotions, such as a pleasant feeling by using the products, pleasure, joy, satisfaction, reliability from a security point of view, social acceptability, and excitement, which can lead to environmentally responsible consumption. The research results demonstrate that consumers' attitudes and intentions about purchasing hybrid electric cars are significantly influenced by consumers' perceptions of the emotional value associated with hybrid electric vehicles. The results are consistent with those of prior research, which found that emotional values had a significant and positive influence on behaviours related to environmentally friendly consumption (Ali et al., 2019a; Chai Wen and Mohd Noor, 2015; Danish et al., 2019; Gonçalves et al., 2016; Lin and Huang, 2012). However, the results go counter to earlier research, which shows that emotional values do not have a significant influence on the behaviours of environmentally conscious consumers. (Biswas and Roy, 2015a; Biswas and Roy, 2015b; Mohd Suki, 2015; Mohd Suki and Mohd Suki, 2015; Rahnama and Rajabpour, 2016; Khan and Mohsin, 2017; Solaiman and Halim, 2017). However, the results of this research show that emotional values influence consumers in Pakistan in their intentions about green automobiles such as hybrid electric vehicles. According to Ali et al. (2019a) and Khan and Mohsin (2017), the consumer's decision-making process in Pakistan is more emotional than rational. As a result, the outcomes of this research confirm our hypothesis regarding the importance of emotional values.

The study's findings imply that marketers should pay more attention to consumers' choice behaviour regarding HEVs and design their marketing campaigns or promotions in a manner that is more appropriate and effective to build solid emotional associations

between consumers and HEVs. Using emotional and environmental appeals in advertising has quickly become a popular strategy among marketers and practitioners. Emotional appeals play an essential role and highlight a person's positive attitude toward protecting the environment and participating in acts that are beneficial to the environment. Emotional appeals in advertising are recognised as a powerful marketing tool that may reach and target environmentally conscious customers and those who are not environmentally conscious. Transformational advertising appeals are another effective appeal to capture more consumers' intentions, and transformational ads can create more emotional feelings and beliefs about the product. Transformational advertising is a new marketing technique that can particularize non-product-related benefits. There are five steps or tips to make transformational ads more effective as the first one is the inspire change and growth. The second one is don't focus on selling, which means you must sell your product without technically selling techniques and encourage people to feel that they cannot live without whatever you offer. The third one is "Be Disruptive," like you are offering something different from your competitor. In the end, be a thought leader and listen carefully; you must first listen to what consumers want. With such emotional appeals, marketers should be able to get more attention and escalate their market share.

It was found that the epistemic value of hybrid electric cars has a substantial influence on customers' perceptions regarding their adoption intentions. Epistemic value is associated with curiosity or aspiration for knowledge and novelty in searching for a new or innovative product. The findings of the study are in line with previous findings that epistemic value positively affects consumer decision-making for eco-friendly products (Ali et al., 2019a; Biswas and Roy, 2015b; Biswas and Roy, 2015a; Lin and Huang, 2012; Mohd Suki, 2015; Mohd Suki and Mohd Suki, 2015; Rahnama and Rajabpour, 2016). The results of this research indicate that consumers intend to participate in environmentally friendly activities or adopt environmentally friendly practises when they have enough awareness about environmental concerns.

It was found that consumers are curious about eco-friendly products and try to gain something new with innovative features (Wang H et al., 2018). In one of the previous studies, epistemic value (novelty value) was found to be insignificant, especially in the purchase decision of hybrid electric vehicles (Chai Wen and Mohd Noor, 2015). Also, epistemic values' findings negatively impacted green buying behaviour (Gonçalves et al., 2016; Khan and Mohsin, 2017; Solaiman and Halim, 2017). Sometimes consumers develop a negative perception or opinion regarding green products as they feel that the information provided by the marketers is just an advertising approach and the product does not help preserve the environment. A misconception among consumers builds that the conventional alternative is superior and satisfies their needs more effectively. Therefore, marketers should develop their communication strategies to communicate the characteristics of products and concentrate on additional parameters such as the design and innovations connected with HEVs. Convey the positive impact HEVs have in terms of decreased fuel usage and discuss the positive impact they have had on both the environment and human health.

To influence the innovation rate of adoption, five characteristics are most important. The first is the relative advantage, in which the innovation appears superior to the existing one. Hybrid electric

vehicles are cleaner and more energy-efficient, which will accelerate their adoption rate. The second one is compatibility, which means that the compatibility of HEVs fits with the values and experiences of potential consumers. The third one is complexity, which means how complex is to handle this. Hybrid electric vehicles are not different or complex to drive, accelerating the adoption rate. The other one is divisibility; consumers can test drive the hybrid vehicle, which positively impacts the adoption rate of HEVs. The last one is communicability, in which innovation can be described or conveyed to others through proper channels. Epistemic values are concerned not only with the delivery of information but also with styles of appearance and presentation, and all aspects positively affect adoption intentions.

The findings of this study also show that social value identity (SOVI) has a significant positive impact on consumers' attitudes toward the adoption intentions of hybrid electric vehicles in Pakistan. Social value identity is a practical element for adopting green vehicles (HEVs). The finding of our study about self-identity is in line with previous results that self-identity positively influence consumers' attitude toward green adoption behaviour (Whitmarsh and O'Neill, 2010; Schuitema et al., 2013; Barbarossa et al., 2015; Barbarossa et al., 2017; Han et al., 2017; Carfora et al., 2019). Self-concept of individual identity can create a relationship between personal values and environment-friendly attitudes and encourage adopting environmentally friendly vehicles such as HEVs. When self-identity builds in, a person then considers himself as a person who is a car expert or environment-friendly; with such considerations, the adoption of HEVs becomes more attractive for him and shows a more positive attitude toward adoption intentions (Schuitema et al., 2013). Marketers and practitioners must implement various marketing tactics to educate people, help them build and improve a more positive version of their self-identity in relation to green cars, and raise their self-esteem (HEVs). When self-esteem is enhanced, they show a more positive attitude toward adopting HEVs.

In this study, social value responsibility (SOVR) was found to have an insignificant impact on consumers' attitudes toward adopting hybrid electric vehicles in Pakistan. One reason behind this negative relationship is that most people did not feel that adopting HEVs increases social sanction or makes a good impression on others. Our findings confirm that social value responsibilities do not positively influence consumer attitudes (Biswas and Roy, 2015b; Lin and Huang, 2012). But the findings of social value responsibility are contradicted by previous findings, which found that social value responsibility positively affects consumer attitudes (Han et al., 2017; Ali et al., 2019a). The reason behind the ignoring factor of social value responsibility is that most people accept it as accurate that working to protect the environment is the responsibility of big business and government (Laroche et al., 2001). Moreover, decisions are mainly driven by personal dynamics rather than social dynamics.

As a result, it is the responsibility of marketers to inform consumers about the many drawbacks associated with conventional automobiles. Organize events like seminars and promotional activities, with a primary emphasis on environmental and health problems. Promoting biospheric values to inspire customers to engage in environmentally responsible behaviour should fall within the purview of marketers. According to the biospheric value system, people should take responsibility for avoiding pollution, honouring the Earth, maintaining oneness with nature, and conserving the environment. Biospheric values can influence consumers' attitudes

and motivate them toward eco-friendly actions. It is also the responsibility of government authorities to do their part in promoting hybrid electric cars and to provide facts on fossil fuels. At present, everyone is responsible for supporting and adopting environmentally friendly automobiles owing to the unstable pricing of fuels, the rising use of private vehicles, and the most important factor in the destruction of the environment.

Furthermore, marketers should hire opinion leaders, including reputed community heads, celebrities and social evangelists, as their ambassadors and spokespersons to share product efficiency and environmental benefits to reinforce the consumer's intentions towards HVs further. Similarly, to create ease of use and confidence in purchasing green products, marketers should also use eco-labels or certifications stating the environmental impact of HVs. This will also help to enhance consumers' confidence in purchasing HVs.

The findings of this study show that utilitarian attitude has a significant positive impact on consumers' intentions toward adopting HEVs in Pakistan. The findings of this study about utilitarian attitude are in line with previous findings that utilitarian attitude positively influences consumers' intentions toward adoption decisions (Eroglu et al., 2001; Kumar et al., 2014; Lee et al., 2011; Moon et al., 2017; Moon et al., 2018; Nameghi and Shadi, 2013). From a new technology perspective, a utilitarian attitude refers to the consumers' perceptions of how they evaluate or feel about new technology based on their experiences. Positive associations of green vehicles with consumer attitudes will increase consumers' purchase intentions of green vehicles (HEVs). Previous findings indicate that adding a utilitarian attitude to the S-O-R model would better capture the consumer's psychological procedure, contributing to their behavioural approach (Eroglu et al., 2001). The study's findings propose that utilitarian attitude is a significant factor in predicting the adoption intentions of hybrid electric vehicles. Consumers are more involved in the utilitarian decision while purchasing a new vehicle. Therefore, manufacturers of HEVs can manufacture vehicles which are easy to operate and have user-friendly attributes. Marketers can focus more on the consumer's utilitarian side to promote hybrid electric vehicles. Most consumers avoid new technology due to the lack of knowledge and uncertainty of quality, so marketers should provide proper information about the functional values of cars. Marketers can attract many consumers, particularly to their HEVs, by including the functional values of HEVs in their marketing campaigns.

The study's findings show a significant positive connection between consumers' hedonic attitudes and purchase intentions toward hybrid electric vehicles in Pakistan. And findings of this study about hedonic attitude are correlated with previous reaches in which researchers found that hedonic attitude positively influences purchase decisions (Eroglu et al., 2001; Kumar et al., 2014; Moon et al., 2017; Moon et al., 2018; Schuitema et al., 2013). Hedonic attitude refers to the pleasure, arousal, fantasy or excitement of using new or innovative technology. However, the influence of a hedonic attitude is less prominent than utilitarian attitude marketers should not overlook the effect of a hedonic attitude on consumers' intentions. Some people buy a vehicle to extract fun, enjoyment and fantasy. Hence, marketers should also promote those attributes to affect consumers' hedonic states to capture the intentions of more consumers. Marketers should improve consumer satisfaction by providing them with complete and

authentic information verbally or in written form, conducting interviews with car experts, sharing publically, and arranging test drives.

Marketers must consider both utilitarian and hedonic attitudes in their marketing campaigns because head and heart loyalty further leads to hand loyalty. When the functional values of any product are met with desired expectations, customers show a more positive utilitarian attitude which further creates head loyalty, and customers can conclude that the chosen brand is more functional and better than the competitive brand. While on the other hand hedonic attitude is based on emotional commitment or attachment to brands which further leads to heart loyalty. Products having eco-friendly attributes offer more hedonic and heart attachment publically.

## 5.1 Theoretical implication

The main objective of this study is to find consumers' attitudes toward the adoption intention of hybrid electric vehicles in Pakistan through the theory of consumption value and the S-O-R model. This study has used functional and non-functional values to predict green vehicle (HEVs) adoption. The theory of planned behaviour, the theory of reasoned action, and the technology acceptance model are primarily used in previous studies regarding green vehicle adoption intentions. The theory of planned behaviour is the extended version of the theory of reasoned action, but both of these theories were criticized by many researchers. The key assumption of TPB and TRA is that consumers are rational in making a purchase decision, so utilitarian approaches are used to predict consumers' behavioural intentions (Ajzen, 1980). Different researchers suggest adding hedonic variables as a useful or valuable extension of the model (Conner and Armitage, 1998). With the recommendation of the addition of hedonic variables, the Stimulus organism response model is a model that enables researchers to examine both utilitarian and hedonic influences on consumer behaviours (Mehrabian and Russell, 1974). Only a few studies, yet to date, have used the S-O-R model to explain consumer behaviours toward adoption intention (Lee and Yun, 2015). Similarly, in previous studies, the S-O-R model was not used in sustainable transportation. Therefore, this study theoretically contributed by applying the S-O-R model with the support of the theory of consumption value in sustainable transportation (hybrid electric vehicles).

## 5.2 Practical implications

With the theoretical contribution, this study also provides practical implications for policymakers and practitioners to resolve the negative perceptions or other problems related to hybrid electric vehicles. First, this study addresses the negative impacts of conventional vehicle usage as it produces carbon emissions and other harmful gases. This study clearly defines that functional values (monetary value, and performance value) and non-functional values (emotional value, epistemic value, and social value identity) are important factors and positively affect consumers' attitudes toward the adoption intention of hybrid electric vehicles. Policymakers and practitioners can improve the attributes associated with HEVs so that consumers switch toward hybrid technology, which helps reduce carbon emissions.

Electric vehicle (hybrid electric vehicles) manufacturers have failed to convey the benefits of their products in their marketing and communication strategies, especially in Pakistan. This study helps to market managers and practitioners that how to capture the attention of consumers and which advertising appeal, either rational appeal (functional appeal, competitive advantage appeal, favourable price appeal, news appeal, product popularity appeal, high quality, and performance appeal) or emotional appeal (proud appeal, admiring appeal, guilty appeal, and disdainful appeal) is more appropriate and also helps to highlight the environmental conditions. From the consumer's viewpoint, this study identifies a significant level of functional or non-functional benefits and brand communication, which should supply more appropriate and sufficient detailed information about hybrid electric vehicles.

This study also provides a pathway for the government and manufacturers to promote these vehicles (HEVs) through different communication channels, like media, social media, advertisements, and also arrange seminars. Moreover, advertisements address the problems of conventional vehicles and use emotional appeals to motivate consumers toward adopting hybrid electric vehicles.

## 5.3 Limitations and future directions

This study provides theoretical and practical implications, but still, there are some limitations and recommendations for future studies. There are three main types of EVs (hybrid electric vehicles, partial hybrid electric vehicles, and fully electric vehicles). This study only concentrates on one type of EV, hybrid electric vehicles, and ignores the other two types of EVs. Future research can examine and study the other types of EVs. This study only focuses on the adoption intentions rather than the actual purchase behaviour of hybrid electric vehicles. Future studies can examine the customer's purchase behaviour and the re-purchase intentions of HEVs. This study is a context-specific study and is not able to apply this study to other countries.

In this study, the non-probability sampling technique (convenient sampling) was used. The data was collected only from the big cities of Punjab (Lahore, Sahiwal, and Multan), which is not capable of representing the entire population of Pakistan so that in future studies can target other provinces and metropolitan cities of Pakistan and also use probability sampling which may offer new visions and awareness.

In this study, the S-O-R model was used to support a theory of consumption value for adoption intentions of HEVs, but other theories can also be used with the S-O-R model. In future studies, the S-O-R model should also be used with other green products. People from all over the globe can now engage with one another more easily and effectively because of the proliferation of mobile technology, social media platforms, and the internet. Previous research has examined the influence of social media in a wide range of societal contexts, including green purchasing, ecologically friendly behaviours or recycling intention. However, there is a gap in the literature about an understanding of how social media influences the adoption intention of hybrid electric vehicles, particularly in the context of Pakistan, where there are 71 million people with access to the internet and 32 million of them use Facebook (Wang et al., 2020). So, in future studies, the moderating role of social media or social media influencers can also be studied. With the inclusion of such factors, the model's predictive power could be improved, or future research can also

examine whether these variables can impact the intentions to adopt hybrid electric vehicles.

## 6 Conclusion

The study's main purpose is to find customers' adoption intentions toward green vehicles, such as hybrid electric vehicles in Pakistan, through functional and non-functional values. In this study, we try to explore those factors which affect consumers' attitudes toward adopting hybrid electric vehicles in Pakistan. Also, we scrutinize how different elements such as monetary value, performance value, conditional value, emotional value, epistemic value, social value identity, and social value responsibility to, lead attitude (utilitarian and hedonic attitude) and consumers' intentions to adopt HEVs. The study's findings show that each element affects utilitarian or hedonic attitudes differently. These findings have similarities and contradictions with previous findings due to the specific categories in green vehicles and the cultural differences of the respondents. Based on the findings, some suggestions can be given to automobile companies, policymakers, and marketers.

This study clarified how consumers' perceptions of functional and non-functional values lead to consumers' attitudes and adoption intentions toward HEVs. Knowledge of the product can enhance the curiosity of consumers so that marketers and practitioners can create awareness about the benefits and proficiency of green vehicles (HEVs) with the environmental problems and energy issues created by conventional vehicles. This study raised a question about the lack of theoretical framework regarding hybrid electric vehicles in developing countries, especially Pakistan. The theoretical framework helps study and explore consumer behaviour associated with adopting hybrid electric vehicles. Therefore, in this study S-O-R model was operationalized with the support of the theory of consumption values to provide strong and resilient theoretical support. However, to operationalize the S-O-R model, a bi-dimensional attitude approach was used, representing both the utilitarian and hedonic attitudes of consumers toward adopting hybrid electric vehicles in Pakistan.

We have confidence and hope that the study's findings should be helpful for researchers, automobile manufacturers, and marketers, and they can utilize these findings for environmental sustainability. Marketers and policymakers can benefit from these findings by including effective functional or non-functional values in their marketing promotions. Moreover, manufacturers and marketers can ensure that HEVs and related services are accessible and available at all levels.

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## Data availability statement

The original contributions presented in the study are included in the article/Supplementary Material, further inquiries can be directed to the corresponding author.

## Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent from the participants was not required to participate in this study in accordance with the national legislation and the institutional requirements.

## Author contributions

All author contributes equally specifically ZA- Supervision, validation, and project administration, SA- Writing- original draft (Data analysis and interpretation), MA- Writing- critical review and editing, VZ-Writing- original draft (Methodology), FR- Data collection.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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