"Impact of consumption values on consumers' intention to adopt battery electric cars in Pakistan's emerging EV market"

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Majors: MKT

S.No: 16

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FINAL PROJECT/THESIS APPROVAL SHEET

Viva-Voce Examination

Viva Date___/___/___

Topic of Research: Impact of consumption values on consumers' intention to adopt battery electric cars in Pakistan's emerging EV market

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Acknowledgement

I am profoundly grateful to Allah Almighty for providing me with the strength, knowledge, and determination needed to complete this thesis. Without His blessings, this accomplishment would not have been possible.

My heartfelt thanks go to my parents for their unwavering support and faith in me. Their love, sacrifices and encouragement have been my constant source of inspiration throughout my life. I would also like to take this opportunity to thank my sister Iqra for her never ending support and love.

I extend my sincere appreciation to my supervisor, Dr. Muhammad Usman, for his invaluable guidance support and encouragement throughout this thesis. His insights and expertise have been instrumental in shaping this research. I truly appreciate his patience and understanding.

I also wish to express my gratitude to my friends for their steadfast support. They have been there through all the highs and lows and their friendship along with our shared moments of joy and challenges have made this journey truly unforgettable. I could not have asked Almighty for better people.

Abstract

The widespread adoption of battery electric cars offers a sustainable remedy for addressing environmental and energy challenges, contributing to the fulfillment of carbon neutrality goals. Promoting the rapid advancement in the adoption of electric vehicles is a crucial strategy to improve the energy landscape, encourage energy efficiency, reduce emissions and catalyze the growth of a sustainable economy. The primary objective of the study was to explore consumption values and their influence on battery electric car adoption intention of consumers in Pakistan. Purchase price, resale price, and performance value were the dimensions taken to measure of functional value. Fuel prices and government policies were the dimensions of conditional value. Social image and social responsibility were the dimensions of social value. Personal feeling was taken as the dimension of emotional value while variety seeking was the dimension of epistemic value. A total of 303 responses were collected online through social media and email across Islamabad. Structural Equation Modeling (SmartPLS-SEM) was employed to assess the hypotheses. The results indicate that social value, emotional value, and epistemic value significantly influence adoption intention. However, functional value and conditional value do not significantly influence adoption intention, as their relationships are not statistically supported.

Keywords: Adoption Intention, Battery Electric Car, Battery Electric Vehicle, Functional Value, Conditional Value, Social Value, Epistemic Value, Emotional Value

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Nomenclature

BEC	Battery Electric Car
BEV	Battery Electric Vehicle
CV	Consumption Values
EC	Electric Car
EV	Electric Vehicle
HEV	Hybrid Electric Vehicle
PHEV	Plugin Hybrid Electric Vehicle
TCV	Theory of Consumption Values

CHAPTER 1: INTRODUCTION

1.1 Background

The transportation sector, significantly accountable for global CO_2 emissions through fuel combustion, is recognized as a substantial contributor to worsening environmental concerns (Lee et al., 2021). Electric vehicles serve as a clean alternative by replacing fossil fuels, emitting zero emissions during operation. (Ivanova & Moreira, 2023).

According to the International Energy Agency, electric car sales continue to grow robustly as major markets advance and emerging economies accelerate their adoption. Electric vehicles are steadily progressing towards becoming mainstream in a growing number of countries. The widespread adoption of EVs offers a sustainable remedy for addressing environmental and energy challenges, contributing to the fulfillment of carbon neutrality goals outlined in the Paris Agreement and Green Deal (Ivanova & Moreira, 2023). Promoting the rapid advancement in the adoption of EVs is a crucial strategy to improve the energy landscape, encourage energy efficiency, reduce emissions, and catalyze the growth of a sustainable economy (Yu et al., 2016).

Vehicles can typically be divided into two categories: conventional and electric. Conventional vehicles, also known as internal combustion engine vehicles (ICEs), operate on gasoline or diesel and have been prevalent since the early 19th century. Electric vehicles (EVs) can be classified into various categories based on their energy sources and powertrains, such as hybrid electric vehicles (HEVs), battery electric vehicles (BEVs), fuel cell electric vehicles (FCEVs) and plug-in hybrid electric vehicles (PHEVs) (Veza et al., 2023; UnNoor et al., 2017), BEVs, also called "pure EVs," rely entirely on electricity stored in batteries and needs to be

charged at stations. They emit no greenhouse gases (GHGs) but their performance depends on battery capacity (Lyu et al., 2019).

While EV sales experienced impressive growth, the adoption of EVs remains constrained by an uneven market share across countries; notable examples include the rapid expansion in developed nations such as Norway, the Netherlands, Iceland, and Sweden (Lee et al., 2021). EVs have surfaced as a promising solution to the harmful effects linked with internal combustion engine vehicles (ICEs) in the transportation sector. Their growing popularity stems from several significant advantages they have over ICE vehicles. (Thorne & Hughes, 2019; Wang et al., 2019, Veza et al., 2023)

Despite rise in global EC sales, they are heavily limited to certain markets. In 2023, almost 60% of new electric car registrations took place in the China, 25% in Europe and 10% in the United States, and make up 95% of global EC sales. However, sales remain limited in other countries, including developed automotive markets like India and Japan. As a result, the global electric car stock is also becoming more concentrated in these key markets.

The International Energy Agency (IEA) reports a dramatic rise in global BEV sales, as shown in Figure 1. Nearly 10 million BEVs were sold in 2023. This surge, especially since 2021, reflects rapid progress fueled by advancements in technology, lower costs, improved charging infrastructure, and government support. The worldwide surge in BEV adoption paves the way for Pakistan to strengthen its electric vehicle sector.

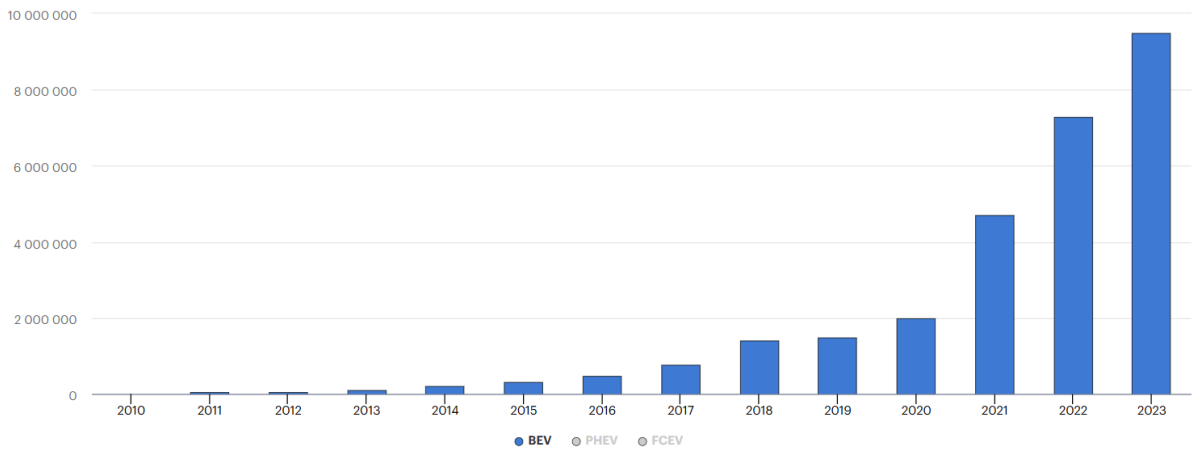

Figure 1: Battery Electric Vehicle Sales

According to the International Energy Agency (IEA), China's car market saw a shift in 2023, with electric vehicle (EV) sales surging 35% to reach 8.1 million registrations. This strong EV growth offset an 8% decline in sales of traditional gasoline-powered cars, resulting in a modest overall market increase of 5%. In recent years, numerous researchers have been examining the influence of various factors on the adoption of EVs. This issue has received particular attention in China and India, which are the biggest and most growing markets for EVs (Javanmardi et al., 2023).

The adoption of BEC is currently accelerating at an exponential rate, and if these trends continue, BECs are expected to dominate the global passenger car market in the foreseeable future, potentially within the next decade (Jung et al., 2023). Many developing countries are starting to transition to low-carbon EVs for transportation. In Thailand, SUVs and large models accounted for 60% of electric car sales, while in Indonesia, they made up 55%, and in Malaysia and Vietnam, they represented over 85% and over 95% of sales, respectively.

In the latest SDGs report, it is stressed that the Asia–Pacific (APAC) region is struggling to effectively address the surge in carbon emissions hindering progress towards UN Sustainable Development Goal 13; Climate Action (Ralison & Nawaz, 2023). As per the Global Climate Risk Index, Pakistan is placed 5th most susceptible country to climate change (UN Habitat Pakistan, 2023).

Hazy weather, characterized by reduced visibility due to the dispersion of tiny dust particles in the atmosphere, is a prevalent phenomenon. This atmospheric disturbance, exacerbated by the absorption of solar contaminants, commonly occurs in Pakistan during autumn and winter months. The persistent nature of this haziness has prompted significant research efforts to understand its causes and implications (Zamil et al., 2023).

The development of Pakistan is significantly shaped by its transportation sector, which not only constitutes 10% of the nation's GDP but also serves as a vital engine for job creation, contributing to 6% of employment opportunities in the country (Ralison & Nawaz, 2023). Most conveyance in Pakistan heavily depends on non-renewable energy resources, predominantly fossil fuels like gasoline and diesel. In response to the ongoing global challenge of climate change and the increasing adoption of EV policies at both global and regional levels, the Pakistani government has announced the National EV Policy (Dawn, 2020).

Pakistan's auto industry is experiencing a shift towards EV. While some domestic manufacturers already produce hybrid cars, wider adoption of EVs faces hurdles. These include limited charging infrastructure and the higher price of EVs compared to gasoline vehicles. Recognizing the need to lessen dependence on fossil fuels, the government is proposing solutions like installing charging stations at gas stations and offering financing options to incentivize EV use (Ali, 2024).

The Ministry of Climate Change (MoCC) policy document outlines the EV penetration targets for the medium and long term. Over the next five years, the government aims to introduce an electric fleet comprising over 100,000 sedan cars. Looking ahead to 2030, the policy targets electrifying 30% of all passenger vehicles (Raza, 2021).

While Pakistan faces challenges in developing its EV infrastructure and reducing EV prices, collaboration with global leaders, particularly from China, is seen as a valuable opportunity for technology transfer and industry advancement (Today, 2023). In light of this, it is vital to examine the public receptiveness to electric vehicles across different factors. While the introduction of EVs in Pakistan holds promise for enhancing air quality and reducing reliance on traditional fuels, several obstacles hinder their widespread adoption, contributing to their limited presence in the current landscape (Javid et al., 2022).

Electric cars are becoming more affordable, especially as competition increases in China. However, they are still more expensive than internal combustion engine (ICE) cars in other markets. For a swift transition to EVs, more budget-friendly models need to be introduced. Numerous multinational automakers, spanning South Korea, Japan, and China, have acknowledged the substantial potential within the Pakistani market for electric vehicles (EVs). Collaborative efforts between these international automotive giants and local enterprises are underway to bring EVs to Pakistan, underscoring a shared recognition of the burgeoning opportunities in the country's evolving automotive landscape (Shoukat, et al., 2022).

The introduction of ECs is a recent development in Pakistan, and predicting the consumer response is challenging, according to an official from a prominent automotive company. To gauge public interest, the company has launched EVs that are globally recognized electric cars, for sale

in Pakistan. Recognizing that purchasing an electric car signifies a significant behavioral shift for consumers, the company is cautious and plans to evaluate the adoption rate in Pakistan before considering more electric vehicle models (Hussain, 2023). In the realm of developing nations, Pakistan emerges as a compelling and promising market for EVs.

Currently, the EV value chain offers equal opportunities for both new and established market participants. Drawing parallels to the historical shift towards compressed natural gas (CNG) vehicles, past trends indicate a keen enthusiasm within the Pakistani market for what can be termed the 'Jones Effect'—a widespread and positive response to technological advancements after overcoming the initial adoption curve (Shoukat, et al., 2022). Audi made a groundbreaking entry into the Pakistani market in March 2020 with the launch of the first generation of its luxury electric SUV, the e-tron.

This marked the debut of electric cars in Pakistan, generating considerable excitement among consumers. Remarkably, the anticipation was so high that the initial 50 units of the Audi e-tron were sold out well before the official introduction of the vehicle in the country (Pakwheels, 2023).

Different models are presently available in Pakistan. Newly Launched Electric Cars include (Pakwheels, 2024).

Table 1: Newly launched BEV in Pakistan, Source: Pakwheels, 2024

Car Model	Price Range (PKR)	Launch Date
MG ZS EV	13 - 15 million	September 2023
GUGO GIGI	4.65 million	October 2023
MG 4	11 - 13 million	September 2023
MG ZS EV	13 - 15 million	September 2023
Seres 3	8.39 million	November 2023
MG MARVEL R	10 million	December 2023
MG 5 EV	13.5 million	December 2023
ORA 03*	9 million	February 2024
Hyundai Ioniq 6	23 million	March 2024
Hyundai Ioniq 6	22.5 million	March 2024

Pakistan introduced its first locally-produced electric car, NUR-E 75, in 2022. Developed collaboratively, the vehicle features a battery pack engineered at a local university. Bookings are set to open in late 2024. The initiative aims to contribute to environmental conservation and decrease foreign exchange spent on fuel imports (Tribune, 2022).

In Pakistan, EV drivers have access to a growing network of charging stations across various regions. Currently, there are a total of 8 charging stations distributed in key areas, with Islamabad leading the way with 3 stations, followed by Lahore with 2, and single stations in Karachi City, Hafizabad, and Sargodha (Electromaps, 2023).

Hence, the objective of this study is to investigate the inclinations of the public towards BECs adoption in a region undergoing early stages of EV integration, specifically in Islamabad, Pakistan. Islamabad, as the capital city of Pakistan, offers a favorable environment for the launch and promotion of battery electric cars. Its well-planned infrastructure, government support, and relatively affluent population make it an ideal location to introduce sustainable transportation options. As highlighted by (Pacific, 2019) Lahore and Islamabad are to be designated as EV model cities and different green vehicles are to be launched.

Therefore, this study aims to explore and understand the importance of CV on the BECs adoption intention of consumers in Pakistan. Using the TCV (Sheth et al., 1991); purchase price, resale price, and performance value are the dimensions taken to measure of functional value (Alganad et al., 2020; Han et al., 2017). Fuel prices and government policies are the dimensions of conditional value (Alganad et al., 2020). Social image and social responsibility (Han et al., 2017) are the dimensions of social value. Personal feeling is taken as the dimension of emotional value (Alganad et al., 2020) while variety seeking is the dimension of epistemic value (Alganad et al., 2020).

1.2 Research Gap

In many developing nations, there is a growing recognition of the value of green goods and EVs Conversely, in advanced countries, researchers are prioritizing environmental sustainability and advancing the adoption of EVs to mitigate carbon emanations and other injurious gases (Zamil et al., 2023).

The existing body of research on EVs adoption primarily centers on developed countries, particularly focusing on the USA, Germany, and the UK. Despite a growing interest in studying EV adoption in emerging markets, there remains a substantial gap in comprehending the dynamics

of EV adoption in emerging nations compared to their advanced equivalents (Tunçel, 2022; Qian & Yin, 2017; Han et al., 2017; Wen & Noor, 2015; Hu et al., 2023).

The existing literature predominantly covers research conducted in various developed and developing countries (Natalia et al., 2020), with a notable emphasis on HEVs including the research of (Zamil et al., 2023; Yousaf et al., 2020; Khan et al., 2022).

In general, the adoption intention and purchase intention of EVs have been researched in Pakistan. Some of the studies are limited to specific cities, (Javid et al., 2022; Zamil et al., 2023; Lee et al., 2021) or have been conducted from respondents all across Pakistan (Butt & Singh, 2023; Asghar et al., 2021; Bhutto et al., 2022) but are limited to HEVs or to all types of EVs

There is numerous literature on the BEV adoption in advanced and some emerging countries which will be discussed in detail in the next chapter. However, limited attention has been given to only BECs and, specifically, to the unique context of Islamabad, Pakistan.

This research utilizes the TCV to examine the intention of adopting BECs in Pakistan. Additionally, it incorporates novel dimensions proposed by (Alganad et al., 2020), which include integrating resale price into functional and considering fuel prices in conditional value assessments.

EV adoption faces challenges due to poor resale, as recent research indicates that EVs depreciate more rapidly than their gasoline counterparts. However, there's a shift in this trend. Declining resale pose another obstacle to persuading consumers to invest in EVs. Furthermore, the cost of purchasing a pre-owned EV is on a downward trajectory (Butts, 2024; Lee, 2024; Sloan, 2024). Therefore, in order to better understand the impact of resale on functional value and

ultimately on the BEC acceptance, this new dimension is also considered for the first time in the context of Pakistan.

This study addresses these gaps and thus seeks to contribute valuable insights to the understanding of consumer adoption intention towards BECs, particularly within the specific geographical context of Islamabad.

1.3 Research Questions

The research questions are intended to gather the required evidence for this study:

- **RQ1: Does functional value impact the adoption of battery electric cars in Pakistan's emerging EV market?**
- **RQ2: Does conditional value impact the adoption of battery electric cars Pakistan's emerging EV market?**
- **RQ3: Does emotional value impact the adoption of battery electric cars in Pakistan's emerging EV market?**
- **RQ4: Does epistemic value impact the adoption of battery electric cars in Pakistan's emerging EV market?**
- **RQ5: Does social value impact the adoption of battery electric cars in Pakistan's emerging EV market?**

1.4 Research objective

The research intends to comprehensively examine the factors persuading the adoption of BECs in Islamabad, Pakistan. The study intends to study the consumption values (CVs) hat effect the BECs adoption intention. Purchase price, resale price, and performance value are the dimensions taken to measure of functional value (Alganad et al., 2020; Han et al., 2017). Fuel prices and government policies are the dimensions of conditional value (Alganad et al., 2020). Social image and social responsibility (Han et al., 2017) are the dimensions of social value. Personal feeling is taken as the dimension of emotional value (Alganad et al., 2020) while variety seeking is the dimension of epistemic value (Alganad et al., 2020). This study investigates the relationship between the exogenous latent variables (conditional value, functional value, social value, epistemic value and emotional value) and the endogenous latent variable (adoption intention) of battery electric cars. This study is therefore conducted to investigate the objectives in light of aforementioned relationships:

- **To investigate the impact of functional value on the adoption of battery electric cars in the emerging EV market of Pakistan**
- **To identify the impact of conditional value on the adoption of battery electric cars in the emerging EV market of Pakistan**
- **To investigate the impact of emotional value on the adoption of battery electric cars in the emerging EV market of Pakistan**
- **To identify the impact of epistemic value on the adoption of battery electric cars in the emerging EV market of Pakistan**
- **To investigate the impact social value on the adoption of battery electric cars in the emerging EV market of Pakistan**

1.5 Significance of study

The significance of this study lies in its exploration of the buyers' adoption of BECs. Furthermore, the study addresses a critical research gap by shifting the focus to a developing nation, Pakistan, which is strategically collaborating with global leaders, to enhance its EV capabilities. The research not only contributes to the limited existing body of knowledge on BEC adoption but also pioneers the examination of CV within the specific socio-economic and geographical context of Islamabad, offering an understanding of the diverse characteristics influencing adoption. Policymakers and EV manufacturers can benefit from the study's findings to anticipate public intentions, foster sustainable practices, and contribute to the overall goal of mitigating environmental challenges and achieving carbon neutrality. This study will also contribute to the growing EV automotive sector of Pakistan.

1.6 Problem Statement

Despite the global recognition of the significance of green products and EV in reducing environmental pollution, the adoption of BECs in emerging EV markets, such as Pakistan, remains limited. Broad research has been conducted on EV adoption in developed countries, however, there is a significant gap in understanding the factors influencing consumer adoption intentions in developing nations. Existing studies in Pakistan have primarily focused on HEVs or have been limited to specific regions. There is a lack of comprehensive research specifically addressing the adoption of BECs within the unique socio-economic context of Islamabad, Pakistan.

This study is conducted to fill this research gap by utilizing TCV. It will explore the impact of CV on adoption intentions. Additionally, the study will incorporate novel dimensions such as resale price within functional value and fuel prices within conditional value assessments. Studying

these factors is crucial for policymakers and EV manufacturers to effectively promote BEC adoption and contribute to environmental sustainability in Pakistan's emerging market.

1.7 Structure of the Thesis

Chapter 1: Introduction

The introduction provides an overview of the research context, the significance of understanding these CV in promoting BEC adoption, and the structure of the subsequent chapters. Additionally, this chapter includes a background on the global electric vehicle market, highlighting trends, advancements, and adoption rates worldwide. This global perspective sets the stage for discussing the specific challenges and opportunities for BEC adoption in the Pakistani context.

Chapter 2: Literature Review

The literature review delves into existing studies on the adoption of battery electric cars, highlighting key frameworks and theories such as the TCV. It examines previous research on how functional values like purchase price, resale price, and performance value, along with conditional values such as fuel prices and government policies, influence consumer decisions. Additionally, the review covers the impact of social values, emotional responses, and the desire for variety on BEC adoption, providing a thorough background for the current study.

Chapter 3: Methodology

This chapter includes research design and methodology used to investigate the factors. Quantitative approach is used in this and data is collected with the help of surveys to collect data on consumer perceptions and intentions. The methodology section elaborates on how variables such as conditional, social, emotional, functional and epistemic values are operationalized and describes the statistical techniques employed to examine their relationship with adoption intention.

Chapter 4: Results

The findings chapter unveils insights from the data analysis, illustrating the impact consumption values on the adoption intention of BECs. The analysis underscores notable correlations between these consumption values and adoption intentions.

Chapter 5: Discussion

In the discussion chapter, the study's findings are examined within the context of Pakistan's automotive market, exploring the implications for policymakers, manufacturers, and marketers seeking to encourage the adoption of battery electric cars. The chapter assesses how the identified factors can inform strategies and policies. Furthermore, it reflects on the broader theoretical implications of applying the TCV in the Pakistani context and future research direction based on the limitations and discoveries.

CHAPTER 2: LITERATURE REVIEW

2.1 Electric Vehicle Adoption

Studies in China show that both financial and non-financial incentive policies significantly impact consumers' intentions to adopt EVs. Additionally, the personalities of consumers, specifically consumer innovativeness and environmental self-identity, significantly moderate adoption (Liao, 2021). The technical and financial attributes of EVs, including charging duration, operating and purchase costs, vehicle performance and driving range, significantly impact their utility. Additionally, the number of charging stations positively influences EV utility, highlighting the crucial role of developing charging infrastructure in promoting EV adoption (Liao et al., 2017). (Qian & Yin, 2017) suggests that EVs, with their eco-friendliness, long-term sustainability benefits, positive social perception, and government incentives, might resonate deeply with these cultural inclinations, paving the way for widespread acceptance and usage.

Battery electric vehicles (BEVs) are viewed as an advanced, dependable, and cost-efficient choice among electric vehicles. Globally, countries are actively promoting the uptake of BEVs (Wei et al., 2020). The widespread adoption of BEVs hinges significantly on supportive infrastructure, including maintenance facilities and charging stations, which are crucial for facilitating their use (Hoang et al., 2022). Regarding BEV adoption, individuals who exhibit greater openness to new technologies are more probable to transform their intentions into actual purchases. Consequently, BEV purchasers often belong to the category of innovators or early adopters who are less influenced by social norms.

In various studies, the higher purchase cost of BEVs compared to traditional fuel automobile with similar specifications is frequently identified as a barrier to adoption. However, the environmental advantages of BEVs have been emphasized in research and are recognized as key drivers influencing consumer adoption intentions. Government support, particularly financial subsidies, has a crucial role during the market promotion phase and significantly influences BEV adoption intentions (Li et al., 2017).

When assessing the resale of EVs in the United States, (Roberson et al., 2024) discovered that subsidies for new BEVs lowers resale prices in the secondary market, effectively acting as an indirect subsidy for used BEVs. While this makes used BEVs more economically accessible, it can also heighten resale anxiety among new BEV buyers. Despite this, acceptance of BEVs remain relatively modest in progressive industrialized countries. One potential yet underexplored obstacle is resale anxiety—a concern over the anticipated depreciation of BEVs due to expected advancements in battery technology. However, (Brückmann et al., 2021), in their study conducted in Switzerland, found contrasting results, indicating greater anticipated resale value for BEVs compared to conventional automotive.

(Corradi et al., 2023) indicated in the study of what drives EV sales, a recent shift among regime actors, highlighting both factors that support change and those that reinforce resistance. Resistance factors include uncertainty in demand and the absence of charging stations, which make EVs less practical for everyday use. The restricted range of BEVs is widely recognized as a significant barrier to adoption among their technical attributes (Skippon & Garwood, 2011). While some argue that this is an alleged barrier more than a real one (Rezvani et al., 2015), Danish drivers who trialed BEVs found that the limited range remains a genuine concern. Even after experiencing BEVs, drivers felt the range was insufficient for their needs. (Graham-Rowe et al., 2012) argues

consumers who drove EVs (BEVs and PHEVs) for trial expressed a range of sentiments when driving a car that is considered environmentally friendly.

(Bauer, 2018) study examines the effects of the extensive acceptance of BEVs on Norway's new car market and explores increased BEV possession in households about 15–20%.

(Beresteanu & Li, 2011; Gallagher & Muehlegger, 2011) concluded that petroleum expenses exert significant influence on the sales of green cars, indicating that a surge in fuel prices correlates increase in the purchase of green cars. (K. Paswan et al., 2014) further affirmed that rising fuel prices can induce changes in consumer behavior, leading to increased purchases of fuel-efficient vehicles such as hybrids.

In Malaysia, the pressing challenges associated with pollution have prompted concerted efforts from both automobile industries and government entities to actively promote the sales of EVs (Alganad et al., 2020). However, EV sales remain low. According to (Hamzah et al., 2021), Malaysian car buyers are known to prioritize vehicles that offer strong resale. They are highly sensitive to factors such as devaluation and resale price over the long term, which significantly influences their inclination towards BEVs and other EVs in Malaysia.

Indonesian EV market underscores the small rate of EVs and advocates for fast-tracking EV adoption through enhanced policies that align with the Indonesian administration's goal of reducing harmful emissions. The study identified pricing, infrastructure development, and perceived social desirability as pivotal aspects persuading the willingness to adopt EVs (Natalia et al., 2020).

As highlighted by (Durmuş Şenyapar & Akil, 2023), studies in Turkey evaluating consumer intentions to use EVs considered factors related to characteristics, environmental impact,

social-symbolic aspects. Contributing factors include the price of EVs, an insufficient number of charging stations, and the short lifespan of EVs (Durmuş Şenyapar & Akil, 2023).

Shifting to EVs in Pakistan represents an opportunity to tackle major issues like environmental pollution, economic prosperity and dependence on petroleum. However, research by (Asghar et al., 2021) reveals that the country faces various challenges across sectors in making this shift. Market prices, financial subsidies, technical hurdles, and societal barriers emerge were found to be as primary obstacles for EV integration.

In their study, (Javid et al., 2022) found that participants in Lahore, Pakistan, showed a positive attitude towards EVs, driven by their prosocial and pro-environmental tendencies. The research applied the NAM theory to explore commuters' agreement. The study identifies personal preferences, social and economic values, willingness to purchase, and willingness to use EVs as key determinants. Personal norms and preferences positively influence travelers' plans to buy and use EVs.

Research on Pakistan EV adoption intention conducted by (Lee et al., 2021) considered facilitating conditions, performance expectancy, environmental concerns, social influence and effort expectancy aid plans to buy and use EVs. Research affirmed that environmental concerns, effort expectancy and perceived ease of use, has positively influence. Social influence and facilitating conditions were found to have negligible impact in this study.

(Shakeel, 2022) employed the TPB model and incorporated variables such as monetary policies, subjective norms, consumer attitude, product perception, cognitive states, non-monetary incentive policies and perceived behavioral control. The study's conclusions highlighted that all factors had a positive impact.

2.2 Theory of Consumption Values (TCV)

Theory of Consumption Values (TCV) is one of the most widely used models to explain consumer choices. At its core, the TCV posits that an individual's final choice is influenced by five values as shown in (Figure 2); functional, emotional, social, epistemic and conditional values (Sheth et al., 1991). The theory delves into consumption values, elucidating the factors influencing consumer choices, including decisions to purchase or abstain from a particular product, opt for one product category over another, and select one brand over its counterparts. This framework is applicable across a spectrum of product types encompassing consumer nondurables, consumer durables, industrial goods, and services (Sheth et al., 1991).

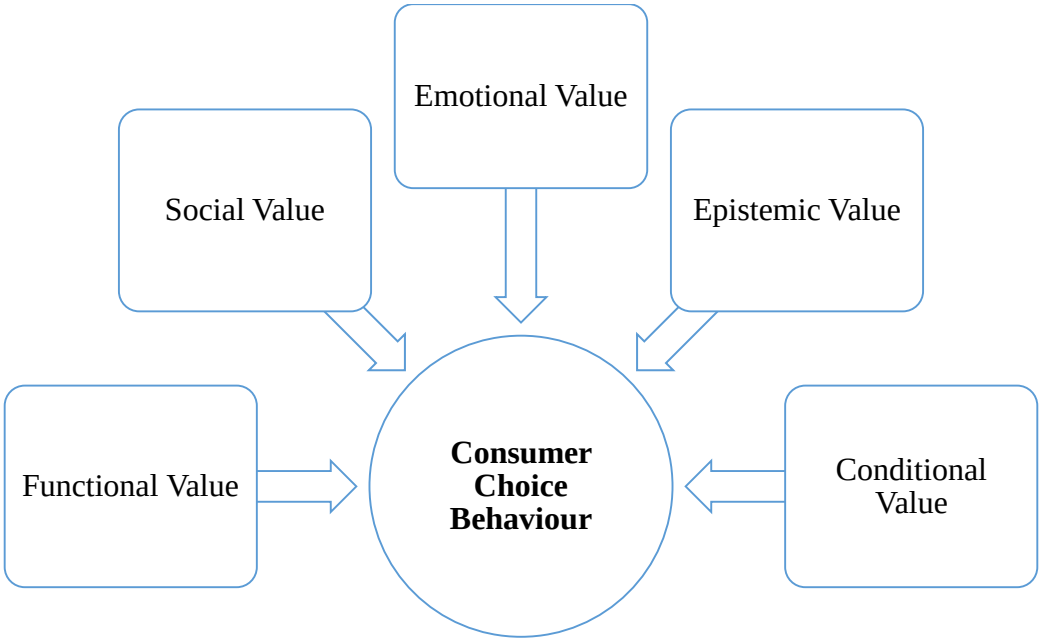

Figure 2: Theory of Consumption Values

This theoretical framework elucidates the underlying motivations driving consumer behavior, aiming to predict, describe, and explain choice behavior with a specific focus on

consumption values. (Sheth et al., 1991) undertook a comprehensive integration of various disciplines, including economics, marketing, consumer behavior, sociology, and psychology, in the development of this theory and its associated values. Consequently, the Theory of Consumption Values (TCV) offers a multidisciplinary perspective, making it particularly valuable for studies investigating consumer choice behavior.

In their exploration, (Sheth et al., 1991) sought to address pivotal questions such as why consumers opt to buy or abstain from purchasing (or using), why they prefer one type of product over another, and why they choose one brand over its alternatives. The values were defined by (Sheth et al., 1991) as:

Table 2: Consumption Values

Functional Value	Functional value pertains to the perceived utility derived from an alternative's ability to deliver functional, utilitarian, or physical performance.
Social Value	Social value relates to the perceived utility acquired from an alternative's association with specific social groups.
Emotional Value	Emotional value centers on the perceived utility gained from an alternative's capacity to evoke feelings or affective states.
Epistemic Value	Epistemic value is defined as the perceived utility derived from an alternative's ability to spark curiosity, offer novelty, and satisfy a desire for knowledge.
Conditional Value	Conditional value, the final component, is defined as the perceived utility acquired by an alternative due to the specific situation or circumstances facing the decision-maker.

2.3 Theory of Consumption Values (TCV) and Adoption of Electric Vehicles

TCV is frequently employed to describe factors influencing purchasers' decisions to either purchase or abstain from specific products. The literature indicates that numerous studies have explored consumer CV through the lens of the TCV, particularly in the acceptance of green goods (Ali et al., 2019). Notably, there has been research in the realm of EV acceptance in various countries, utilizing the TCV to understand consumers' perspectives and behaviors.

Study by (Wen & Noor, 2015) delves into the determinants shaping consumers' inclination to buy HEVs, emphasizing the significance of CV in the automotive domain. The results highlight functional followed by conditional value as the foremost predictors of consumers' intention to purchase HEVs, contrasting with emotional, symbolic and epistemic value, which do not demonstrate a significant correlation.

The study led by (Han et al., 2017) investigates the factors influencing of EVs adoption through TCV, categorizing perceptions into functional (monetary, convenience, performance) and non-functional (emotional, social, epistemic) values. Findings suggest a direct impact of perceived functional value on adoption, while non-functional value indirectly affects adoption through attitudes towards EVs. Notably, performance value emerges as pivotal. Non-functional values influence adoption through attitudes, with emotional and social factors playing significant roles.

Studies explore factors persuading HEVs sales in the context of environmental concerns (Zamil et al., 2023). The research employs the S-O-R model and the TCV. Findings reveal that functional and non-functional values of TCV positively influence consumer perceptions regarding the adoption of HEVs.

Biofuels emerge as a potential alternative, but their successful implementation faces challenges, particularly in gaining public acceptance (Zailani et al., 2019). Findings indicate that specific conditions, functional, epistemic and emotional values, significantly affect drivers' willingness to pay for biofuels, while social values do not.

The study concluded by (Hu et al., 2023) examined the role of perceived benefits and risks in determining perceived value. The research finds that financial, environmental, and psychological benefits positively correlate with perceived value, while physical safety and performance risks negatively impact it, with financial risk showing no significant effect. Moreover, perceived value positively influences purchase intentions, but this effect can be weakened by information overload.

Research addresses global sustainability challenges, with a focus on environmental issues like increasing pollution levels (Dilotsotlhe, 2022). Introducing green technology, particularly EVs, is seen as an innovative solution to combat environmental degradation. The study, conducted in Gauteng, South Africa, employs TCV to predict acquisition intents for PHEVs. Results indicate that social, functional, emotional, and conditional values positively influence customers' purchase intentions for PHEVs. Additionally, (Lin & Huang, 2012; Gonçalves et al., 2016) research shows CV play important role in determining green product acquisitions intent.

Based on the research conducted by (Mohammed Nasser Alganad et al., 2023) deliberated the roles of CV in the EV automotive manufacturing, introducing variety-seeking, resale price, and fuel prices as new dimensions to Sheth’s TCV within Malaysian society. The resulted concluded that conditional value had substantial influence on consumers’ attitudes toward green

cars, followed by epistemic, emotional and functional value. In contrast, social value did not significantly influence attitudes.

Numerous scholars in the field of consumer EVs adoption research have viewed the decision to adopt EVs as a rational one, examining various dimensions of consumer attitudes to predict intentions (Egbue & Long, 2012; Zhang et al., 2011; Carley et al., 2013; Krupa et al., 2014; Jensen et al., 2013; Moons & De Pelsmacker, 2012; Lieven et al., 2011). These dimensions encompass attitudes towards EVs, alternative fuel vehicles, automobiles in general, and driving. Specifically, consumer attitudes towards the technical features of EVs (speed, range) the initial price of EVs, ongoing operational expenses (such as charging and maintenance) compared to traditional ICE, and relevant policies aimed at mitigating initial price (such as tax incentives) are explored in these studies.

Therefore, the purpose of this study is to understand the importance of CV on the BECs adoption Pakistan. Independent latent variables include epistemic value, conditional value, functional value, emotional value and symbolic value while the dependent latent variable includes adoption intention of BECs. Multidimensional constructs comprise multiple interconnected dimensions or attributes that collectively represent a comprehensive depiction of a multifaceted phenomenon (Fernandez & Bonillo, 2007; Sweeney & Soutar, 2001; Sheth et al., 1991). Using CVs (Sheth et al., 1991); purchase price, resale price, and performance value are the dimensions taken to measure of functional value (Alganad et al., 2020; Han et al., 2017). Fuel prices and government policies are the dimensions of conditional value (Alganad et al., 2020). Social image and social responsibility (Han et al., 2017) are the dimensions of social value. Personal feeling is taken as the dimension of emotional value (Alganad et al., 2020) while variety seeking is the dimension of epistemic value (Alganad et al., 2020).

2.4 Hypothesis Development

The preceding literature has covered key concepts and relevant studies essential for developing the framework in the current study.

2.4.1 Functional Value

For BECs, functional value is particularly useful when consumers weigh considerations such as cost or price concerns associated with choosing green products. In essence, functional underscores the practical advantages and tangible benefits that consumers associate with green products, contributing to their overall perception of utility and desirability (Lin & Huang, 2012). While BEVs a means to decrease dependence on natural fuel resources reliance and lessen the impact on environment, their adoption can be slow due to the initial costs involved. (Ali et al., 2019).

For EVs, functional refer to the practicality, usefulness, or advantages derived from the performance by these vehicles. These values primarily arise from the physical features and characteristics of EVs (Schuitema et al., 2013). Functional value reflects product quality and affordability (Han et al., 2017; Sheth et al., 1991; Suki, 2017; Zailani et al., 2019). Similar to the purchase price, the resale value of a car is a significant component in the overall ownership costs (Palmer et al., 2018). However, there is limited literature introducing additional dimensions of functional values, such as resale price (Alganad et al., 2020).

2.4.1.1 Purchase price

Numerous previous studies illustrated a positive correlation between functional value and the adoption of environmentally friendly purchasing behavior (Wen & Noor, 2015; Lin & Huang, 2012; Zailani et al., 2019; Biswas & Roy, 2015; Suki & Suki, 2015; Han et al., 2017). The high cost of purchasing ECs remains a major barrier to increased sales (Gómez Vilchez et al., 2019). Furthermore, purchase price plays a crucial part in influencing the adoption of EVs, a finding extensively supported by prior research. Price emerges as a pivotal consideration for consumers when making purchasing decisions. It stands to reason that consumers are more inclined to opt for cleaner vehicles if their prices are competitive compared to conventional ones (Han et al., 2017). (Lane & Potter, 2007) also suggests that EVs purchase is significantly impacted by the purchase price

2.4.1.2 Resale price

As vehicles age, they undergo depreciation, with the most significant decline occurring in the initial years of their lifespan. The depreciation rates are influenced not only by factors such as fuel type and drivetrain but also by variables like brand image, mileage, and vehicle class. Determining the residual value of EVs remains a subject of controversy (Lebeau et al., 2013). Consumers assess the benefits and drawbacks of green and conventional cars using functional value, which encompasses factors like price and quality. While green cars may offer greater overall value, their substantial depreciation, over 70% of the purchase price, contrasts with the higher resale price of conventional cars (Alganad et al., 2020). Beyond automobiles, (Liao & Chu, 2013; Chu & Liao, 2010; suggested that higher resale of products could influence future consumer decisions by potentially offering greater returns from resale, thereby creating a perception of lower

initial costs. In the context of vehicles, a higher resale price indicates higher quality and value from the consumer's standpoint (Alganad et al., 2020).

2.4.1.3 Performance Value

(Finch, 2006) suggested that functional value plays a pivotal role purchase of BEVs. EVs serve as consumer transportation tools, with vehicle performance being a crucial factor in the purchasing decision (Kang and Park, 2011). Attributes like comfort, driving range, ease of use, reliability and charging time have a significant effect on purchase (Zhang et al., 2013). Users tend to prioritize "performance" at the time of making acquisition decisions, intending to adopt EVs if their performance aligns with their needs (Zamil et al., 2023). Therefore, bases on the above analysis, the hypothesis is proposed as:

H1: Functional value has a positive impact on adoption intention

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2.4.2 Conditional Value

Variations in circumstances significantly impact consumers' behaviors and their intentions to make purchases (Sheth et al., 1991). External factors such as economic conditions, environmental considerations, and market trends can influence consumer decision-making processes. Recognizing and understanding the vigorous nature of situational conditions is essential for businesses and marketers seeking to comprehend and predict consumer behaviors and preferences.

2.4.2.1 Fuel Prices

Fuel prices refer to the cost consumers pay for gasoline or diesel at the pump. Research by (Alganad et al., 2020) suggests that the current fuel prices make them a less viable choice. (K. Paswan et al., 2014) indicated that consumer behavior towards green cars could shift with changes in fuel prices. (Coffman et al., 2016) classified fuel prices as an external factor influencing EV adoption. Similarly, (Lim et al., 2019) posited that a rise in fuel prices would likely prompt most Malaysians to consider purchasing green cars. This association of fuel prices with green car adoption was presented as a new dimension of conditional value. (Diamond, 2009) similarly established fuel prices exerted the most substantial influence on the expansion of the car market. Additionally, (Lim et al., 2019) discovered that a majority of Malaysian consumers prefer EVs in response to higher fuel prices.

2.4.2.2 Government Policies

Research by (Lin & Hsu, 2013) identified external factors such as sales promotions and government policy impact influence consumer purchasing behavior towards ECs. (Hasudungan et al. 2024) suggested that infrastructure, subsidies, tax deductions, and age significantly impact sales. Higher EV subsidies encourage greater adoption, and respondents place substantial importance on the availability of EV infrastructure. Additionally, lower tax deductions correlate with increased EV adoption. (Xue et al., 2021) finds significant factors influencing the penetration globally. Tax incentives and the availability of charging infrastructure positively impact EV penetration rates. Therefore, bases on the above analysis, the hypothesis is proposed as:

H2: Conditional value has a positive impact on adoption intention

2.4.3 Social Value

EVs, which are more environmentally friendly than provide increased safety, enjoyment, conventional vehicles and driving comfort, thanks to advanced features found in HEVs (Brinkmann & Bhatiasevi, 2023). Social value, as indicated in past studies, encompasses various aspects such as social image, identification, social self-concept and the pursuit of social class association (Sheth et al., 1991). Social value plays a crucial role in how a product's image aligns with consumers' self-image, as individuals are motivated to communicate their social status and express their identity to others. Schuitema et al., 2013). For instance, individuals choosing electric vehicles may seek to convey specific aspects of their identity to society (Coad et al., 2009). As proposed by (Whitmarsh and O'Neill, 2010), adopting an EV can signify a pro-environmental identity, portraying individuals as eco-friendly and technology supporter. Additionally, (Schuitema et al., 2013) suggest that those who view themselves as seeking new information and influencing others could be considered car authorities. Thus, individuals perceiving themselves as both authorities in the automotive realm and environmentally conscious may find EVs particularly appealing. (Han et al., 2017).

2.4.3.1 Social image

Social values is crucial in consumers' purchasing decisions, as products often reflect and communicate the purchaser's self-image (Bhat et al., 2022). Research has underscored a range of factors, encompassing social image, environmental awareness, economic benefits, and acquisition costs, as pivotal drivers shaping consumers' intentions to purchase EVs. Consumers' perceived utility, social image, environmental apprehensions, economic advantages, and procurement expenses are critical determinants influencing their intention to buy an EV (Lashari et al., 2021).

2.4.3.2 Social Responsibility

The pressing environmental issue has garnered significant attention across society, emphasizing the collective responsibility of citizens to mitigate environment pollutants (Wang et al., 2016). EVs represent a technological advancement geared towards reducing carbon emissions, prompting consumers to embrace them to fulfill their societal duties and gain value from social responsibility. intention. Studies on innovation diffusion and green purchasing behavior highlight the significance of social values in consumer decision-making processes, attributing choices to personal norms and social norms like social preferences and responsibility (Ozaki & Sevastyanova, 2011; Eppstein et al., 2011). Social image and social responsibility positively impact consumers' attitudes, subsequently influencing EV acceptance (Han et al., 2017).

Despite perceiving EVs as environmentally friendly, concerns arise about negative environmental impacts like electricity production emissions and battery waste. Notwithstanding sustainability influencing consumer decisions, there are still uncertainties about the EVs sustainability compared to orthodox and alternative-fueled vehicles. Environmental advantages motivate consumers' decisions to buy EVs. Studies, however, suggest that buyers place lesser importance on environmental factors compared to cost and performance. Consumer acceptance of EVs is more likely when there is an expectation that EVs will reduce environmental risks. According to (Shetty, et al., 2020), environmental factors significantly influence consumer behaviors regarding EVs. Studies highlight the connection between environmental considerations and the purchase of ecologically safe products, emphasizing recycling. Environmentalists are more inclined to accept EVs than non-environmentalists. Positive impacts of environmental factors on EV choices are observed both before and after consumer experiences with the vehicles.

Environmental concern is a key influence leading to consumer objectives to purchase full EVs. Therefore, bases on the above analysis, the hypothesis is proposed as:

H3: Social value has a positive impact on adoption intention

2.4.4 Emotional value

Consumers often feel they embody environmentally friendly characteristics and actively contribute to environmental preservation. (Ali et al. 2019). Previous studies have demonstrated a strong positive correlation between emotional values related to green products and consumers' purchasing decisions (Zailani, et al., 2019; Amin & Tarun, 2020). In the context of sustainable consumption, consumer have apprehension regarding the societal and environmental impacts of green products. However, (Wang et al., 2004; Han et al., 2017) discovered that emotional values may not significantly influence purchase decisions or behavioral intentions among Chinese customers, potentially having limited impact on customer relationship management concerning environmental issues. Consumers who are environmentally conscious and place significant value on emotions may exhibit heightened enjoyment and experiential behavior when making green purchases. Emotional value considerably impacts intention to make green purchases (Amin & Tarun, 2020). EV offer heightened environmental friendliness compared to conventional vehicles, providing increased security, pleasure, and comfort while driving due to their advanced features. This leads consumers to develop emotional connections and derive value from adopting hybrid electric vehicles (Zamil et al., 2023). Literature indicated substantial positive correlation between emotional value and the purchase decisions of green goods (Gonçalves et al., 2016; Lin & Huang, 2012).

2.4.4.1 Personal Feeling

Emotional value, as described by (Sheth et al., 1991), includes the positive or negative feelings associated with a product acquisition. Positive emotions include loyalty, nostalgia, and enthusiasm. These can motivate consumers to purchase green products as they feel they are contributing to environmental security and sustainable change emotions (Suki and Suki, 2015). While some studies have suggested emotional value positively effects consumer choice in green products (Wen & Noor, 2015; Zailani et al., 2019, Awuni & Du, 2015)). Comfort and security levels in a car purchase may be associated with emotional value; high comfort in a green car could increase the likelihood of purchase (Alganad et al., 2020).

Consumers who place a strong emphasis on emotional values may increase their green products utility and identify as environmental advocates, driven by their strong emotional attachments.

H4: Emotional value has a positive impact on adoption intention

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2.4.5 Epistemic Value

Seeking novelty is important in prompting consumers to explore new products (Tse & Crotts, 2005). Green products may satisfy consumers' desires for knowledge by providing novelty and curiosity (Lin & Huang, 2012). Acknowledging human curiosity as a potent internal motivator for exploration (Tse & Crotts, 2005), researchers should further explore how curiosity and the quest for novelty impact the behavior of environmentally conscious consumers. Consumers cherishing epistemic benefits may prioritize spontaneous acquisitions without weighing other

consumer values. Similarly, many consumers seek novelty in technology, gadgets, and fashion items without a specific requirement (Alganad et al., 2020). Previous studies have highlighted diverse influences on consumer intentions and decision-making.

2.4.5.1 Variety seeking

The notion of variety-seeking remains underexplored (Wu et al., 2017). Variety-seeking is thus an overlooked aspect within consumption values theory, which previous studies have not addressed. (Alganad et al., 2020) study fill this gap by incorporating it as one of the dimensions of epistemic value. HEVs are a technological advancement that attracts consumer interest because of its potential for adoption and environmental conservation (Han et al., 2017). Prior studies suggest that epistemic value plays a significant role in shaping consumer attitudes towards embracing environmentally friendly purchases (Biswas & Roy, 2015; Lin & Huang, 2012). As the concept of green electric vehicles is emerging and not widely adopted in Pakistan yet, there is considerable potential for growth and development in this market. Therefore, BEV is associated with epistemic value, and it can be hypothesized:

H5: Epistemic Value has a positive impact on adoption intention

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2.4.6 Adoption Intention

Increasing apprehensions about the environmental effects of current road transportation systems, combined with concerns over peak oil risks, have driven the uptake of electric mobility solutions (Hirsch et al., 2005). The current shift towards more environmentally friendly transportation methods is predominantly propelled by governmental initiatives and policies.

Studies such as those by (Beresteanu & Li, 2011; Gallagher & Muehlegger, 2011) have shown that fuel prices and cost-related incentives significantly affect the acceptance intention of EVs. In the context of EV adoption, social influence can be a significant predictor, although its impact may vary across different studies and cultural contexts (Shakeel, 2022). Some studies, like those by (Brückmann et al., 2021), suggest higher expected resale values compared to conventional cars, which could positively influence adoption intentions. Research on HEVs adoption using the S-O-R model and TCV has shown that non-functional and functional values significantly influence consumer attitudes and intentions (Zamil et al., 2023).

(Ali et al., 2019) applied the TCV to investigate green IT adoption. Similarly, (Hedman & Gimpel, 2010) utilized the TCV to explore the underlying motivations for technology adoption. Literature suggest the adoption of EVs manifests in behavioral responses encompassing both purchase and usage (Rezvani et al., 2015). It encompasses intentions to adopt EVs, including usage intentions, consumer readiness, purchasing intentions, willingness to accept, willingness to pay, and other relevant proxy variables.

(Lin & Huang, 2012) used TCV to study HEVs adoption in Taiwan. They found that functional value, particularly fuel efficiency and operational cost savings, was a primary driver. Social and emotional values also contributed significantly, with consumers perceiving HEVs as a status symbol and experiencing positive emotions related to environmental conservation. (Alganad et al., 2023) explored the roles of CV in the adoption of green cars in Malaysia, incorporating new dimensions like resale price and variety-seeking into Sheth's TCV framework. The study suggested conditional value, followed by epistemic and emotional values, extensively impacted consumer attitudes toward green cars. This research highlighted how functional and social values also played important roles, albeit to a lesser extent, in influencing adoption intentions.

2.5 Research Model

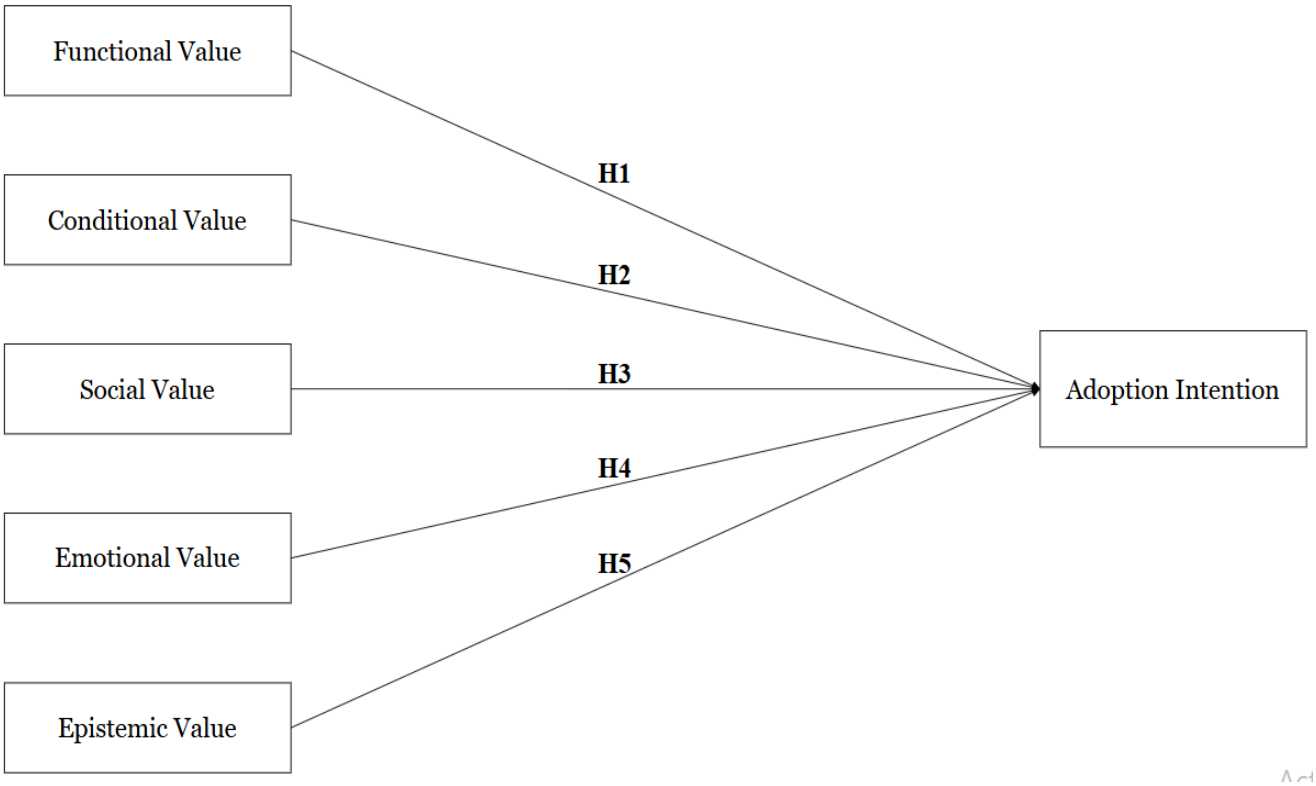

Figure 3: Research Model

Therefore, the following hypothesis are being tested in this research

H1: Functional value has a positive impact on adoption intention

H2: Conditional value has a positive impact on adoption intention

H3: Social value has a positive impact on adoption intention

H4: Emotional value has a positive impact on adoption intention

H5: Epistemic Value has a positive impact on adoption intention

CHAPTER 3: METHODOLOGY

3.1 Research Design

Serving as the comprehensive blueprint, research design, outlines the strategic framework and methodologies employed in a study (Iacobucciet al., 2014). It is the roadmap that guides the entire research process, providing a structured plan for proper measurement, analysis, and data collection. A well-crafted research design is crucial as it ensures that the study objectives are met efficiently and that the collected data is relevant and reliable.

By employing this quantitative technique, the research aims to clarify the phenomenon under investigation—consumer adoption intention toward BEV adoption. The numeric data obtained through the questionnaire responses is subjected to statistical analyses. This methodical approach increases the precision and reliability of the study. It provides a quantifiable basis for drawing meaningful conclusions about the factors influencing consumer attitudes and behaviors regarding BEV adoption.

3.2 Research Approach

This study focus on the impact of the TCV; conditional, functional, social, epistemic and emotional values, on the BEVs adoption in Pakistan's emerging EV market. A quantitative approach is implemented in this research. Quantitative research is a standard method of scientific investigation that involves collecting numerical data and analyzing it using mathematical or statistical techniques (Pandey et al., 2023). Data is collected in numeric format for analysis via statistical technique, which is efficient and effective. Quantitative approach allows to test theory via hypothesis development and establish correlation between variables (Choy, 2014).

3.3 Research Strategy

Different strategies are used for research including but not limited to questionnaire, experiments, case studies, action research, grounded theory and ethnography (Sekaran & Bougie, 2016). This research, however, adopts a one-time survey questionnaire which was circulated online for quantitative data collection.

3.4 Extent of Researcher Interference

The level of researcher interference determines whether a study is correlational or causal. A correlational study, unlike a causal one, is conducted with minimal or no interference in natural settings (Sekaran & Bougie, 2016). This research is a correlational study and is conducted in a natural environment without any external influences or changes to variables.

3.5 Study setting

The study is done in non-contrived setting as it is conducted in a natural environment (Sekaran & Bougie, 2016) as it is descriptive study done to find out the correlation between various variables.

3.6 Target Population

This study focuses on potential consumers of BECs in Islamabad, Pakistan. This group encompasses a diverse demographic, including individuals who are currently considering purchasing a vehicle and those who have already adopted BECs. The population includes a variety of socio-economic backgrounds, age groups and education level ensuring a comprehensive understanding of consumer values across different segments. The study aims to capture insights from a metropolitan area, Islamabad, that represents a mix of urban consumers with varying levels of exposure to electric vehicle technology and environmental awareness. This targeted approach

allows for a detailed analysis of the factors influencing BEC adoption intentions within this specific context.

3.7 Sample Size & Sampling Technique

This study includes a sample size of 303 participants. This number is selected based on guidelines from (Krejcie & Morgan, 1970), which recommend that a sample size of around 300 is sufficient for a population of several thousand to ensure reliable and statistically significant results. With a sample size of 303 participants, this study enables a comprehensive analysis of the factors influencing the adoption of BECs in Islamabad, Pakistan. This ample sample size also ensures sufficient statistical power to identify significant differences and relationships within the data.

Participants for the study are selected using a stratified random sampling technique. According to (Neuman, 2014), stratified random sampling enhances the precision and representativeness of the sample by ensuring that various subgroups within the population are adequately represented.

3.8 Unit of Analysis

The unit of analysis indicates whether data collection focuses on individuals, groups, dyads, or organizations (Sekaran & Bougie, 2016). For this study, the unit of analysis is the individual consumer. This is because the research question is specific to the individual consumer's intent. Therefore, it was deemed necessary to use the individual consumer as the unit of analysis. The study requires data regarding BEC adoption intentions in light of TCV and its specific dimensions. All these variables differ from individual to individual, hence the data was collected from individuals.

3.9 Time Horizon

Cross-sectional or longitudinal approach can be used to conduct research. A cross-sectional study collects data at a specific point in time, while a longitudinal study examines phenomena over multiple time points to assess changes in behavior (Sekaran & Bougie, 2016). Using a cross-sectional design, data was gathered through a online survey open from April 10, 2024, to May 10, 2024.

3.10 Construct Measurement

Using the TCV (Sheth et al., 1991); purchase price, resale price, and performance value are the dimensions taken to measure of functional value (Alganad et al., 2020; Han et al., 2017). Fuel prices and government policies are the dimensions of conditional value (Alganad et al., 2020). Social image and social responsibility (Han et al., 2017) are the dimensions of social value. Personal feeling is taken as the dimension of emotional value (Alganad et al., 2020) while variety seeking is the dimension of epistemic value (Alganad et al., 2020).

The study is among the few that discuss the dimensions for evaluating consumption value individually and consider several new dimensions. The questionnaire items are sourced from multiple references; as previous studies often do not encompass multiple items for a specific dimension. This study, however, includes multiple items for each dimension to provide a comprehensive measurement of the particular consumption value.

The initial nine items were used to assess functional value, focusing on purchase price, resale price, and performance. These dimensions were analyzed to understand their impact on BEC adoption intention. The subsequent six items measured conditional value, with fuel price and government policies as key dimensions influencing BEC adoption intention.

Next, an additional set of six items were used to assess social value, focusing on social image and social responsibility. Following this, four items were employed to measure emotional value, examining personal feelings. Lastly, four items were used to gauge epistemic value, with variety-seeking as a dimension influencing BEC adoption intention.

Table 3: Questionnaire Items

Variables	Dimension and sources	Adapted Items	Code
Functional Value	**Purchase Price** (Lin and Huang, 2012; Han et al., 2017)	The green product purchase price is reasonable.	**PP1**
		The green product offers value for money in terms of purchase price.	**PP2**
		For me, the decision of purchasing electric vehicles is attributed to the reasonable price.	**PP3**
	Resale Price (Tan et al., 2022)	When purchasing a car, I always consider the resale value.	**RP1**
		I purchase certain car brands because those brands are easier to resell to another consumer.	**RP2**
		When purchasing a car, I will consider how easy it is to resell it to another consumer.	**RP3**
	Performance Value (Han et al., 2017).	The electric car possess a consistent quality.	**PV1**
		The electric car in current market are well made.	**PV2**
		Electric cars available in current market have an acceptable standard of quality.	**PV3**
Conditional Value	**Fuel Prices** (Chen et al., 2023)	With gas prices remaining high and continuing to rise, driving a new energy vehicle will help me save on travel costs.	**FP1**
		Compared with traditional fuel vehicles, the daily use and maintenance cost of new energy vehicles is lower.	**FP2**
		With oil prices staying high and continuing to rise, I think switching from traditional fuel vehicles to new energy vehicles is a good choice	**FP3**

Variables	Dimension and sources	Adapted Items	Code
Social Value	**Government Policies** (Butt & Singh, 2023)	If the government provides income tax relaxation on the purchase, I will buy a electric vehicle.	**GP1**
		I believe government built charging infrastructure will support the use of EVs.	**GP2**
		If the government provides interest-free loans on EV purchases, I will consider buying it.	**GP3**
	Social Image (Han et al., 2017)	Driving electric vehicles would improve the way I am perceived.	**SI1**
		Driving electric vehicles would make a good impression on the other people	**SI2**
		Driving electric vehicles means I am sharing the common values of my social network	**SI3**
	Social Responsibility (Han et al., 2017)	Driving electric vehicles means I am making contributions to the reduction of harmful emissions.	**SR1**
		Driving electric vehicles means I am taking care of our common living environment.	**SR2**
		Driving electric vehicles means I am a responsible citizen.	**SR3**
Emotional Value	**Personal Feeling** (Lin and Huang, 2012; Han et al., 2017)	Buying electric vehicle instead of conventional cars would feel like making a good personal contribution to something better.	**PF1**
		Buying electric vehicle instead of conventional cars would feel like the morally right thing.	**PF2**
		I think it is important to restrict traveling by vehicles that use fossil fuels.	**PF3**
		For me, driving an electric vehicle will be enjoyable.	**PF4**
Epistemic Value	**Variety Seeking**	Driving electric vehicles characterizes me as a person who likes to try something different.	**VS1**
		Among my peers, I am usually the first one to explore new products.	**VS2**

Variables	Dimension and sources	Adapted Items	Code
	(Han et al., 2017; Anjam et al., 2020)	Driving electric vehicles characterizes me as a person who enjoys the benefits of innovation.	**VS3**
		Driving electric vehicles characterizes me as a person who would like to share technological knowledge	**VS4**
Adoption Intention (Han et al., 2017; Ali et al., 2019, Hu et al., 2017)		I will consider buying green IT products.	**AI1**
		I plan to adopt electric vehicle when adoption a vehicle in the in the near future.	**AI2**
		I plan to switch to other brands/versions of green IT products that are more energy efficient.	**AI3**
		If I need to buy a new car in the future, I am more likely to buy EV.	**AI4**

3.11 Data Analysis Technique

SmartPLS SEM software was utilized to analyze the intricate relationships in this study. PLS-SEM is chosen for its capability to manage complex models and accommodate potential deviations from normality in data distributions. (Hair et al., 2019). As this model includes multiple dimensions of each CV, SmartPLS was the appropriate tool to analyze the collected data to determine the results.

CHAPTER 4: RESULTS

4.1 Demographic Description

The second portion of the questionnaire is to analyze the demographic profile of respondents. The total number of respondents were 303. The demographic portion of the questionnaire includes the gender, education level, age, vehicle ownership, type of vehicle owned, years of driving experience and daily travel demand. These demographics questions were collected to understand the segment the respondents.

Table 4: Summary of Respondents Demographics

Category	Sub-category	Frequency (N)	Percent (%)
Gender	Male	198	65.3
	Female	105	34.7
	Total	303	100.0
Age	Less than 18	26	8.6
	18-24	134	44.2
	25-34	92	30.4
	35-44	23	7.6
	45-54	14	4.6
	55-64	9	3

	Above 65	5	1.7
	Intermediate or below	8	2.6
Education	Undergraduate	134	44.2
	Graduate	87	28.7
	Post Graduate	74	24.4
Vehicle Ownership	Yes	174	57.4
	No	129	42.6
Type of Vehicle Owned	Regular gasoline/diesel	184	60.7
	Hybrid	16	5.3
	Plug-In Hybrid	3	1
	Battery Electric	1	0.3
	Not Applicable	99	32.7
Years of Driving Experience	0-5	189	62.4
	6-10	49	16.2
	11-15	39	12.9
	15+	26	8.6

Daily Travel Demand	0-20km	160	52.8
	21-40km	94	31
	41-60km	30	9.9
	60km-over	19	6.3

The gender distribution in the survey shows that out of the total number of respondents, 198 (65.3%) were male while 105 (34.7%) were found to be female. In terms of age. majority of the respondents were aged between 18-24 (44.2%), following ages between 25-34 (30.4%).

Moreover, education level of 134 respondents was found to be undergraduates which accounted for 44.2% out of the total 303 responses. This is followed by 28.7% (87 respondents) with a graduate degree and 24.4% (74 respondents) with a postgraduate degree. A small segment, 2.6% (8 respondents), has education at the intermediate level or below.

Regarding vehicle ownership, 57.4% of respondents (174 individuals) own a vehicle, while 42.6% (129 individuals) do not. Among those who own vehicles, the vast majority, 60.7% (184 individuals), own regular gasoline or diesel vehicles. Hybrid vehicles are owned by 5.3% (16 individuals), plug-in hybrids by 1% (3 individuals), and battery electric vehicles by a very small fraction of 0.3% (1 individual). A notable portion, 32.7% (99 individuals), reported not applicable, likely reflecting the non-owners in the sample.

The years of driving experience among respondents indicate that a majority, 62.4% (189 individuals), have 0-5 years of driving experience, suggesting a relatively novice group of drivers. Those with 6-10 years of experience make up 16.2% (49 individuals), while 12.9% (39 individuals)

have 11-15 years of experience, and 8.6% (26 individuals) have over 15 years of driving experience.

Daily travel demand varies, with 52.8% of respondents (160 individuals) traveling 0-20 km daily. Another 31% (94 individuals) travel 21-40 km daily, while 9.9% (30 individuals) travel 41-60 km, and 6.3% (19 individuals) travel more than 60 km daily.

4.2 Measurement Model

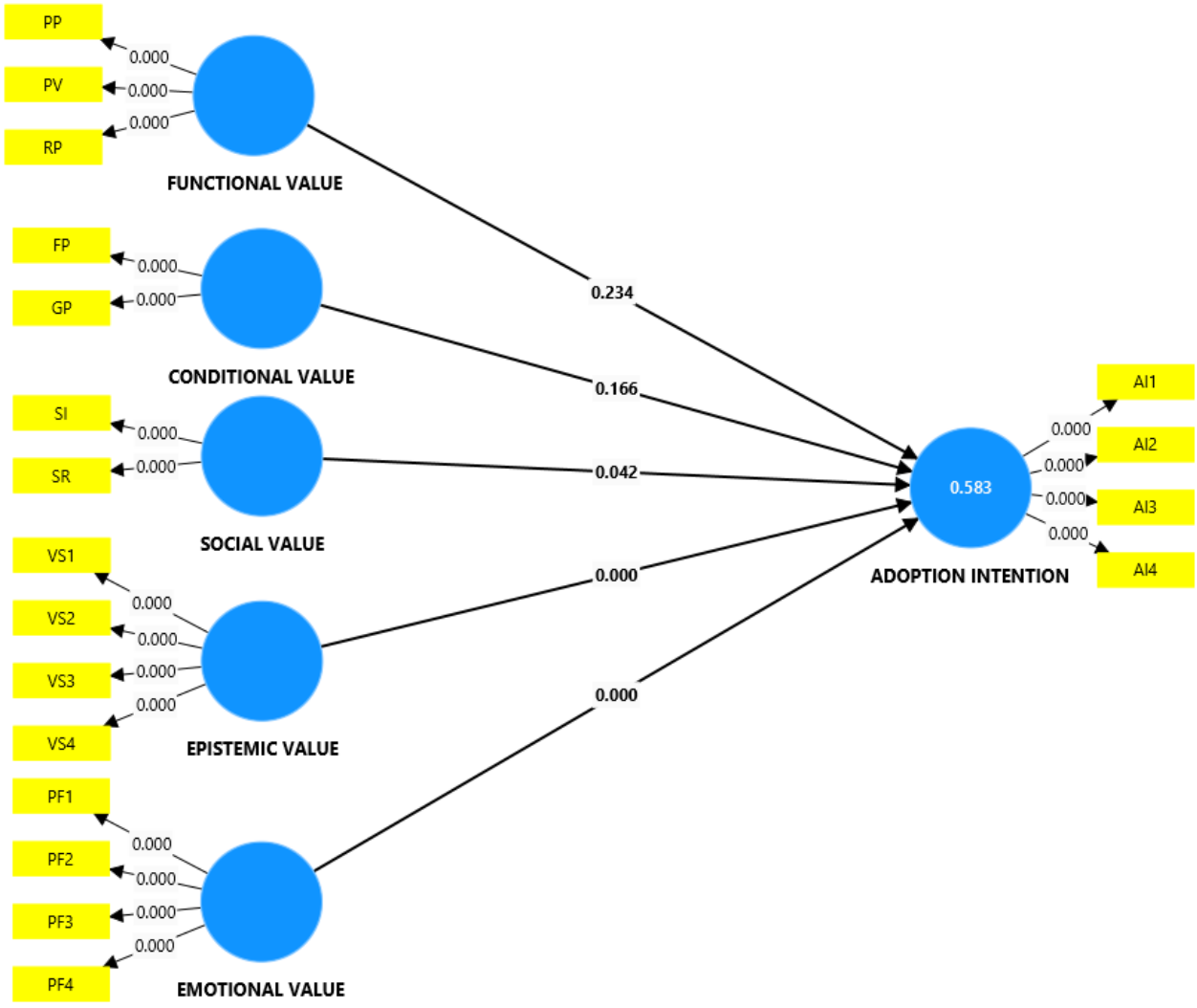

Figure 4: Measurement Model

The research model initially consisted of 33 reflective measurement indicators (Measurement Variables or items) across six variables (Latent Variables or constructs). These include five multidimensional independent variables (conditional value, functional value, social value, epistemic value and emotional value) and one dependent variable, which is users' adoption intention. Smart PLS was utilized for analysis due to its suitability for complex models. According to (Hair et al. 2017), data analysis in structural equation modeling involves two main steps. The first step examined the five CV with their multidimensional variables, operationalized using the Hierarchical Component Model. Recommended by (Hair et al. 2017), the HCM approach streamlines the framework and achieves greater theoretical simplicity. (Figure 6) displays the second step of the measurement model.

4.3 Measurement Model Assessment

4.3.1 Assessment of reliability

Table 5: Construct Reliability

	Number of items	Cronbach's alpha	Composite reliability (CR)	Average variance extracted (AVE)
Adoption Intention	4	0.901	0.902	0.772
Conditional Value	6	0.802	0.803	0.835
Emotional Value	4	0.818	0.82	0.647
Epistemic Value	4	0.859	0.868	0.705
Functional Value	9	0.612	0.672	0.569
Social Value	6	0.775	0.776	0.816

Cronbach's alpha

Cronbach's alpha was employed to assess the reliability of the scales used in this study. Cronbach's alpha values, alongside the number of items for each construct, indicate that the constructs of adoption intention (4 items, $\alpha = 0.901$), conditional value (6 items, $\alpha = 0.802$), emotional value (4 items, $\alpha = 0.818$), epistemic value (4 items, $\alpha = 0.859$), and social value (6 items, $\alpha = 0.775$) have good to excellent internal consistency, suggesting that the items comprising these constructs reliably measure their respective concepts. Acceptable alpha values generally fall within the range of 0.70 to 0.95 (Tavakol & Dennick, 2011).

The functional value construct, with 9 items and a Cronbach's alpha of 0.612, shows acceptable internal consistency but is on the lower end of the acceptable range. The reason for this low number can be explained by the fact that there are three distinct dimensions of functional value. Therefore, the Cronbach's alphas of functional value is on the lower end.

Composite reliability

The constructs exhibit varying levels of reliability based on composite reliability (CR) values. Adoption intention, with 4 items, shows excellent reliability (0.902), indicating strong internal consistency. Conditional value (6 items, 0.803) and emotional value (4 items, 0.820) both demonstrate good reliability, suggesting that their items reliably capture the respective constructs. Epistemic Value, with 4 items and a CR of 0.868, indicates very good reliability and strong internal consistency. Functional Value, measured with 9 items, has acceptable reliability (0.672), and is on the lower end. Social Value, with 6 items and a CR of 0.776, also demonstrates good reliability, indicating consistent internal consistency.

Average Variance Extracted (AVE)

The constructs, each measured with a varying number of items, demonstrate differing levels of reliability and validity as indicated by their AVE values. AVE indicates average variance shared between a construct and its indicators. (Hair et al., 2013). Adoption intention, emotional value, and epistemic value, each with 4 items, exhibit acceptable to good validity with AVE values of 0.772, 0.647, and 0.705, respectively. Conditional value (6 items) and social value (6 items) both demonstrate good validity with AVE values of 0.835 and 0.816, respectively. Functional value, measured with 9 items, shows acceptable validity with an AVE of 0.569.

These findings are consistent with the established criteria for evaluating measurement models as described in the literature that AVE > 0.5 as indicated by (Fornell & Larcker, 1981; Hair et al., 2010). Ensuring both reliability and validity is essential for the credibility of the findings, affirming that the constructs are measured accurately and that the results can be relied upon.

4.3.2 Assessment of Discriminant Validity

Table 6: Heterotrait-Monotrait (HTMT)

	Adoption Intention	Conditional Value	Emotional Value	Epistemic Value	Functional Value	Social Value
Adoption Intention						
Conditional Value	0.58					
Emotional Value	0.827	0.658				
Epistemic Value	0.754	0.581	0.81			
Functional Value	0.616	0.812	0.665	0.719		
Social Value	0.819	0.721	0.809	0.848	0.724	

Discriminant validity demonstrates the extent to which items differentiate between constructs or measure distinct concepts (Hair et al., 2022). (Henseler et al., 2015) recommended an HTMT threshold of 0.90 for path models containing constructs that are theoretically similar. Above 0.90 HTMT indicates a lack of discriminant validity. For path models with conceptually dissimilar constructs, a lower threshold of 0.85 should be considered. In light of above, all values are within the prescribed range.

4.3.3 Cross Loading

Table 7: Cross Loading

	Adoption Intention	Conditional Value	Emotional Value	Epistemic Value	Functional Value	Social Value
AI1	0.849					
AI2	0.857					
AI3	0.912					
AI4	0.896					
FP		0.917				
GP		0.91				
PF1			0.796			
PF2			0.844			
PF3			0.794			
PF4			0.783			
PP					0.595	
PV					0.882	
RP					0.759	
SI						0.898
SR						0.908
VS1				0.74		
VS2				0.886		
VS3				0.887		
VS4				0.837		

In the context of discriminant validity, the cross-loading analysis of all the dimensions of constructs confirms that each item primarily loads onto its intended construct with higher values, while exhibiting lower loading on other constructs. This suggests that the measurement model effectively captures the distinctiveness of each construct, aligning with the criteria for discriminant validity. The cross-loading analysis demonstrates strong discriminant validity, as each indicator loads more highly on its intended construct compared to others. Indicators for adoption intention (AI1 to AI4), conditional value (FP, GP), emotional value (PF1 to PF4), epistemic value (VS1 to VS4), functional value (PP, PV, RP), and social value (SI, SR) all show high loadings on their respective constructs, confirming their relevance and consistency. Despite one relatively lower loading (PP) for functional value, the overall results support the reliability and distinctiveness of the constructs, ensuring that each indicator accurately measures its designated construct.

4.3.4 Testing Multicollinearity

Table 8: Variance Inflation Factor (VIF)

	Adoption Intention
Adoption Intention	
Conditional Value	2.038
Emotional Value	3.353
Epistemic Value	2.269
Functional Value	1.941
Social Value	3.553

The Variance Inflation Factor (VIF) is commonly used to identify multicollinearity. A VIF value above 10 indicates substantial multicollinearity, values between 5 and 10 have moderate multicollinearity, and values below 5 indicate no significant collinearity. In light of above, all values are within the prescribed range.

4.4 Structural Model

4.4.1 Path Analysis

Table 9: Path Analysis

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	p values	f^2
Conditional Value -> Adoption Intention	0.062	0.057	0.063	0.97	0.166	
Emotional Value -> Adoption Intention	0.353	0.347	0.096	3.675	0	0.004
Epistemic Value -> Adoption Intention	0.26	0.262	0.072	3.623	0	0.089
Functional Value -> Adoption Intention	0.039	0.048	0.054	0.726	0.234	0.071
Social Value -> Adoption Intention	0.16	0.161	0.092	1.732	0.042	0.002

The path coefficient of 0.062 indicates a positive relationship between conditional value and adoption intention. However, the small coefficient, T statistic of 0.97, and p-value of 0.166 suggest a weak level of significance, indicating that conditional value does not significantly influence adoption intention in this context. The f^2 value of 0.004 further indicates a negligible effect, suggesting minimal contribution to explaining adoption intention variance.

Conversely, emotional value shows a strong positive relationship with adoption intention, with a path coefficient of 0.353. The high T statistic of 3.675 and very low p-value of 0 indicate a highly significant relationship, highlighting that emotional value significantly influences adoption intention. The f^2 value of 0.089 reflects a moderate effect, indicating substantial contribution to explaining adoption intention variance.

Similarly, epistemic value demonstrates a positive relationship with adoption intention (path coefficient of 0.26). The high T statistic of 3.623 and very low p-value of 0 indicate a statistically significant relationship, suggesting substantial influence on adoption intention. The f^2 value of 0.071 shows a moderate effect, indicating notable contribution to explaining adoption intention variance.

Functional value, with a path coefficient of 0.039, shows a positive relationship with adoption intention. However, the small coefficient, T statistic of 0.726, and p-value of 0.234 suggest a weak level of significance, indicating a lack of statistically significant influence on adoption intention. The f^2 value of 0.002 further indicates a negligible effect, suggesting minimal contribution to explaining adoption intention variance.

Social value indicates a positive relationship with adoption intention (path coefficient of 0.16). With a T statistic of 1.732 and p-value of 0.042, the relationship is moderately significant, albeit less so compared to emotional and epistemic values. The f^2 value of 0.017 shows a small but discernible effect, suggesting a modest contribution to explaining adoption intention variance.

4.4.2 Coefficient of Determination R^2

Table 10: Coefficient of Determination

	R^2	R^2 adjusted
ADOPTION INTENTION	0.583	0.576

R^2, or the coefficient of determination, is a statistical measure that indicates the proportion of the variance in the dependent variable that is predictable from the independent variables in a regression model. R^2 adjusted, which considers the number of predictors in the model, offers a more precise measure, especially when multiple predictors are involved (Hair et al., 2010).

R^2 values equal to or exceeding 0.75 are considered substantial, around 0.50 are deemed moderate, and approximately 0.25 are considered weak (Hair et al., 2014).

The R^2 value for adoption intention is 0.583, indicating that about 58.3% of the variance in adoption intention is explained by the model's independent variables. The adjusted R^2 is slightly lower at 0.576. This shows that the current model effectively explains a significant amount of the variation in adoption intention.

4.5 Hypothesis Testing

Table 11: Hypothesis Testing

Hypothesis	Relationship	Path Coefficient β	P values	Decision
H1	Functional Value -> Adoption Intention	0.039	0.234	**Not Supported**
H2	Conditional Value -> Adoption Intention	0.062	0.166	**Not Supported**
H3	Social Value -> Adoption Intention	0.16	0.042	**Supported**
H4	Emotional Value -> Adoption Intention	0.353	0.000	**Supported**
H5	Epistemic Value -> Adoption Intention	0.26	0.000	**Supported**

The hypothesis testing results in Table 11 indicate that social, epistemic and emotional value significantly influence adoption intention. Specifically, emotional value has the strongest impact ($\beta = 0.353$, $p < 0.01$), followed by epistemic value ($\beta = 0.26$; $p < 0.01$). Social Value also shows a significant positive effect ($\beta = 0.16$; $p < 0.03$). However, functional value ($\beta = 0.039$, $p > 0.1$) and conditional value ($\beta = 0.062$, $p > 0.1$) do not significantly influence Adoption Intention, as their relationships are not statistically supported. Therefore, the results signify the impact of epistemic, emotional, and social values in driving consumers' adoption intentions, while functional and conditional values appear to be less impactful in this context.

CHAPTER 5: DISCUSSION

The research intended to examine the CV that influence the BECs adoption intention of consumers in Pakistan. Purchase price, resale price, and performance value are the dimensions taken to measure of functional value (Alganad et al., 2020; Han et al., 2017). Fuel prices and government policies are the dimensions of conditional value (Alganad et al., 2020). Social image and social responsibility (Han et al., 2017) are the dimensions of social value. Personal feeling is taken as the dimension of emotional value (Alganad et al., 2020) while variety seeking is the dimension of epistemic value (Alganad et al., 2020).

5.1 Functional Value and Adoption Intention

Functional value encompasses attributes such as purchase price, resale price, and performance value, reflecting the practical and utilitarian benefits of BEVs. Despite prior research indicating that functional values, like cost-efficiency and performance, significantly influence green product adoption (Han et al., 2017; Biswas & Roy, 2015), this study did not illusrate a significant impact of functional value on BEV adoption intention. This result suggests that while functional considerations are essential, they might not be the primary drivers for consumers in your sample.

The high initial costs of BEVs may overshadow their long-term cost benefits (Gómez Vilchez et al., 2019). While BEVs are designed to be cost-effective over time, the upfront investment required can be a significant deterrent for many potential buyers. Furthermore, concerns about uncertain resale values could deter consumers from purchasing BEVs. As vehicles age, they undergo depreciation, and determining the residual value of electric vehicles remains

controversial (Lebeau et al., 2013). Finally, consumers might still be skeptical about the performance of BEVs compared to conventional vehicles. Attributes like reliability, comfort, ease of use, driving range, and charging time significantly impact the acceptance of EVs (Kang & Park, 2011; Zhang et al., 2013). Therefore, based on the current study's findings, functional value does not significantly impact the adoption of BECs in the emerging EV market of Pakistan.

5.2 Conditional Value and Adoption Intention

Conditional value, which includes external factors such as fuel prices and government policies, was hypothesized to influence BEV adoption. Despite literature supporting this hypothesis (Coffman et al., 2016; Lin & Hsu, 2013), this study found no significant effect. This might indicate that existing government policies and fuel price fluctuations may not be substantial enough to sway consumer decisions for widespread adoption of battery electric cars.

Insufficient incentives might be one reason for this finding. Government policies such as subsidies, tax incentives, and infrastructure development are crucial in promoting BEV adoption, but if these incentives are perceived as inadequate, their impact on consumer decisions could be limited. Moreover, a lack of awareness about these incentives among consumers could also contribute to the non-significant impact. Consumers might not be fully aware of or motivated by conditional factors like subsidies and tax incentives (Hasudungan et al., 2024). Therefore, based on the current study's findings, conditional value does not significantly impact adoption.

5.3 Social Value and Adoption Intention

This study supports this hypothesis, aligning with previous research indicating that social image and social responsibility significantly influence green product adoption (Whitmarsh & O'Neill, 2010; Schuitema et al., 2013). This result suggests that BEVs may be perceived as a status

symbol, appealing to consumers who value social recognition and environmental consciousness (Han et al., 2017). This result is contrary to the findings of (Alganad et al., 2023) which showed that the social value does not impact consumer's attitude towards green cars.

Peer influence and social norms likely play a crucial role in encouraging BEV adoption. Individuals opting for electric vehicles may seek to convey specific identity to society (Coad et al., 2009). Social image and social responsibility positively impact consumers' attitudes, subsequently influencing EV adoption intentions (Han et al., 2017). Therefore, BEVs may be attractive to those who wish to demonstrate their pro-environmental identity and be seen as eco-friendly and open to new technology. Therefore, based on the current study's findings, social value significantly impacts adoption.

5.4 Emotional Value and Adoption Intention

Emotional value, including the feelings of satisfaction and pride associated with environmentally friendly purchases, was found to positively impact BEV adoption. This aligns with previous findings that emotional connections can drive green product purchases (Zailani et al., 2019; Amin & Tarun, 2020). This result indicates that consumers who feel positive about contributing to environmental protection are more likely to adopt BEVs.

Consumers who place significant value on emotions may exhibit heightened enjoyment and experiential behavior when making green purchases. The emotional connection to the idea of sustainability and eco-friendliness enhances the appeal of BEVs. Positive impressions, such as nostalgia, faithfulness, and enthusiasm, can motivate consumers to purchase green products. (Suki & Suki, 2015). Therefore, based on the current study's findings, emotional value significantly impacts the adoption.

5.5 Epistemic Value and Adoption Intention

Epistemic value pertains to the novelty and curiosity satisfaction offered by BEVs. This study found that epistemic value significantly influences BEV adoption, which is consistent with earlier research suggesting that curiosity and the desire for new experiences can drive green product adoption (Lin & Huang, 2012; Tse & Crotts, 2005). This result implies that the innovative and novel nature of BEVs attracts consumers seeking new technological experiences.

Given the powerful role of human curiosity as an inner drive for exploration, researchers should further explore how these traits influence the behavior of environmentally conscious consumers (Tse & Crotts, 2005). Many consumers seek novelty in technology, gadgets, and fashion items without a specific requirement (Alganad et al., 2020). The desire for variety and new experiences can significantly impact consumer attitudes towards adopting green purchases (Biswas & Roy, 2015). Therefore, based on the current study's findings, epistemic value significantly impacts adoption.

5.6 Theoretical Implications

This study contributes significantly to the theoretical understanding of the acceptance of BECS by applying the TCV (Sheth et al., 1991) within the context of an emerging market, specifically Islamabad, Pakistan. One of the primary theoretical implications is the expansion of the TCV through the incorporation of novel dimensions such as resale price into the functional value and fuel prices into the conditional value. This adaptation enhances the theory’s applicability to emerging economies, providing a more comprehensive framework.

The study underscores the importance of contextual factors in consumer decision-making processes. By focusing on Islamabad, Pakistan, the research highlights how socio-economic,

cultural, and infrastructural variables influence the adoption of BECs. This suggests that the TCV must be contextually adapted to different geographical and economic settings to accurately capture consumer behavior. This multidimensional approach offers a nuanced understanding of how different values interact and affect consumer decisions, reinforcing the need for comprehensive models in consumer behavior research.

Furthermore, the study highlights that traditional barriers such as high initial costs, inadequate infrastructure, and limited knowledge about BECs can be mitigated by addressing specific consumption values. This finding suggests that tailored strategies focusing on these values can enhance the adoption rate of BECs in emerging markets, offering a pathway for theoretical models to incorporate market-specific factors and improve their predictive power.

5.7 Practical Implications

The identification of resale price as a significant component of functional value suggests that consumers are highly concerned about the long-term financial implications of their investment in BECs. This finding aligns with previous research indicating that the high initial cost and uncertain resale value of EVs are major barriers to adoption (Egbue & Long, 2012). To address these concerns, policymakers and automotive manufacturers can offer incentives such as guaranteed buy-back schemes or resale value assurances to mitigate the perceived financial risk. Such measures can enhance consumer confidence in the financial viability of BECs. Additionally, financial institutions could develop favorable financing options, such as low-interest loans or leasing programs, to make BECs more accessible to a broader range of consumers (Sierzchula et al., 2014).

The study highlights the importance of fuel prices within the conditional value dimension. This indicates that fluctuations in fuel prices can significantly influence consumers' decisions to

adopt BECs. Policymakers could leverage this by implementing policies that maintain higher fuel prices, making BECs a more attractive and cost-effective alternative in the long run. Furthermore, subsidies or tax incentives for BECs can help offset the initial high costs and make them more competitive against traditional fuel vehicles. Studies have shown that financial incentives, such as purchase subsidies and tax breaks, are effective in promoting EV adoption (Li et al., 2017).

The role of emotional and social values in influencing adoption intentions underscores the need for targeted marketing strategies that appeal to consumers' emotions and social identity. Marketing campaigns should emphasize the environmental benefits and the innovative, forward-thinking nature of BECs to resonate with consumers who value sustainability and social status. Collaborations with influencers and community leaders could also enhance the social appeal of BECs, fostering a positive perception and wider acceptance. Social influence has been found to significantly impact EV adoption, as individuals often look to peers and opinion leaders when making purchase decisions (Noppers et al., 2015).

Additionally, the significance of epistemic value, which relates to curiosity and the desire for knowledge, suggests that there is a need for more educational initiatives and informational campaigns. Providing consumers with comprehensive information about the benefits, technology, and usage of BECs can reduce uncertainty and increase adoption rates. Automotive companies and governments could organize workshops, test-drive events, and informational sessions to educate potential buyers. Research has shown that increasing consumer awareness and knowledge about EVs can positively influence their adoption (Rezvani et al., 2015).

The study’s context-specific findings indicate that infrastructure development is crucial for the widespread adoption of BECs. Investment in charging stations and maintenance facilities is necessary to support the growing number of BEC users. Policymakers should prioritize the

development of a robust infrastructure network to ensure the convenience and reliability of BECs, which will, in turn, boost consumer confidence and adoption rates. The availability of charging infrastructure has been identified as a critical factor influencing EV adoption (Gnann et al., 2018). Therefore, a coordinated effort to expand and enhance the charging network in Islamabad is essential to facilitate the transition to electric mobility.

The practical implications of this study suggest a multifaceted approach involving financial incentives, targeted marketing, educational initiatives, and infrastructure development to effectively promote the adoption of BECs in emerging market. These strategies, supported by empirical evidence from previous research, can address the various barriers to EV adoption and foster a sustainable transition to electric mobility.

5.8 Limitations of the Study

The sample size of the study, although adequate for the research design, may bound the generalizability of the findings to the broader population of Islamabad or other regions in Pakistan. The study's participants were selected from a specific geographic area, and their characteristics may not fully represent the diverse population of potential adopters.

Additionally, the study utilized a convenience sampling method, which may introduce sampling bias. Participants who volunteered to take part in the study might differ systematically from those who did not, potentially affecting the representativeness of the sample. For instance, individuals with a particular interest in or knowledge of electric vehicles may have been more inclined to participate, leading to overrepresentation of certain demographic groups or attitudes.

Furthermore, the study's data collection relied on self-reported responses from participants, potentially introducing social desirability bias It's important to note that participants may have

tailored their responses to meet perceived social expectations rather than accurately reflecting their true opinions or behaviors. This bias might have influenced the accuracy of the findings, particularly in light of the societal importance placed on environmental issues and green technologies.

The study was conducted in a specific socio-economic and geographical context, Islamabad, Pakistan, which may limit the generalizability of the results to other regions with different demographic, economic, and cultural characteristics. Therefore, caution should be exercised when applying the findings to other settings or populations.

While efforts were made to incorporate a comprehensive set of variables, other potential factors such as infrastructure development and marketing strategies, were not explicitly addressed in this study. Future research could explore these aspects to provide a more holistic understanding of BEC adoption dynamics.

5.9 Future Research Direction

Future research could explore the influence of additional variables. For instance, factors such as infrastructure development, marketing strategies, and cultural norms could be investigated. By examining these variables, researchers can gain deeper insights into the multifaceted nature of consumer decision-making.

Longitudinal studies could be conducted to track changes over time. Longitudinal research would allow researchers to observe how attitudes and behaviors evolve as technology advances, infrastructure improves, and policies change. By capturing data at multiple points in time, researchers can gain a more nuanced understanding of the dynamics shaping.

Furthermore, future research could explore the role of government policies and incentives. By examining the effectiveness of different policy measures, such as subsidies, tax incentives, and infrastructure investments, researchers can identify the most impactful strategies. Additionally, comparative studies across different regions and countries could provide valuable insights into the relative importance of policy interventions.

Moreover, qualitative research methods, such as in-depth interviews and focus groups, could complement the quantitative findings of this study. Qualitative approaches would allow researchers to explore the underlying motivations, attitudes, and perceptions. By capturing rich, detailed insights from consumers, policymakers, and industry stakeholders, qualitative research can provide a more holistic understanding.

Lastly, future research could investigate the environmental and economic impacts of widespread BEC adoption in Islamabad and Pakistan. Different geographical setting can further be studied.

5.10 Conclusion

This study has provided valuable insights into the factors influencing the adoption intentions BECs in Pakistan. The findings shed light on the complex interplay of consumer perceptions, preferences, and external factors shaping the decision to adopt BECs in an emerging EV market context.

Functional value, encompassing purchase price, resale price, and performance value, was found to have a non-significant impact on BEC adoption intentions. This suggests that while practical considerations are essential, they may not be the primary drivers. Conditional value, including factors such as fuel prices and government policies, also did not significantly influence

BEC adoption intentions, indicating that existing policy measures and price considerations may not be sufficiently compelling to sway consumer decisions.

On the other hand, social value, emotional value, and epistemic value were found to positively impact adoption. Consumers who value the social status, environmental responsibility, and novelty associated with BECs are more likely to express an intention to adopt these vehicles. This suggests that perceptions of social recognition, environmental consciousness, and technological innovation play significant roles in shaping consumer attitudes towards BECs.

The findings of this study have several practical implications for policymakers, industry stakeholders, and researchers. Policymakers can use the insights gained to design more effective policy interventions and incentives that address the social, emotional, and epistemic drivers of BEC adoption.

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APPENDIX- A

Questions	Strong Disagree	Disagree	Neutral	Agree	Strongly Agree
Battery Electric Cars available in Pakistan are reasonably priced.	1	2	3	4	5
In Pakistan, the cost of purchasing battery electric cars offers value for money.	1	2	3	4	5
For me, the decision of purchasing battery electric vehicles is attributed to the reasonable price.	1	2	3	4	5
When purchasing a car, I always consider the resale value.	1	2	3	4	5
I purchase certain car brands because those brands are easier to resell to another consumer.	1	2	3	4	5
When purchasing a battery electric car, I will consider how easy it is to resell it to another consumer	1	2	3	4	5
The battery electric car possess a consistent quality.	1	2	3	4	5
The battery electric car in current market are well made.	1	2	3	4	5
Battery electric cars available in Pakistan have an acceptable standard of quality.	1	2	3	4	5
With fuel prices remaining high and continuing to rise, driving a Battery Electric Vehicle will help me save on travel costs.	1	2	3	4	5
Compared with traditional cars, Battery Electric Cars are cheaper to operate because electricity is cheaper than gasoline.	1	2	3	4	5
With fuel prices remaining high and continuing to rise, driving a Battery Electric Vehicle is a good alternative.	1	2	3	4	5

Questions	Strong Disagree	Disagree	Neutral	Agree	Strongly Agree
If the government provides income tax relaxation on the purchase, I will buy a Battery Electric Vehicle.	1	2	3	4	5
I believe government built charging infrastructure will support the use of EVs.	1	2	3	4	5
If the government provides interest-free loans on EV purchases, I will consider buying it.	1	2	3	4	5
Driving electric vehicles would improve the way I am perceived.	1	2	3	4	5
Driving electric vehicles would make a good impression on the other people	1	2	3	4	5
Driving electric vehicles means I am sharing the common values of my social network	1	2	3	4	5
Driving electric vehicles means I am making contributions to the reduction of harmful emissions.	1	2	3	4	5
Driving electric vehicles means I am taking care of our common living environment.	1	2	3	4	5
Driving electric vehicles means I am a responsible citizen.	1	2	3	4	5
Buying EV instead of conventional cars would feel like making a good personal contribution to something better.	1	2	3	4	5
Buying EV instead of conventional cars would feel like the morally right thing.	1	2	3	4	5
I think it is important to restrict traveling by vehicles that use fossil fuels.	1	2	3	4	5
For me, driving an EV will be enjoyable.	1	2	3	4	5
Driving electric vehicles characterizes me as a person who likes to try something different.	1	2	3	4	5
Among my peers, I am usually the first one to explore new products	1	2	3	4	5

Questions	Strong Disagree	Disagree	Neutral	Agree	Strongly Agree
Driving electric vehicles characterizes me as a person who enjoys the benefits of innovation.	1	2	3	4	5
Driving electric vehicles characterizes me as a person who would like to share technological knowledge	1	2	3	4	5
I will consider buying a BEV.	1	2	3	4	5
I am planning to purchase BEVs in the near future.	1	2	3	4	5
I plan on switching from ICE to BEV.	1	2	3	4	5
If I need to buy a new car in the future, I am more likely to buy BEV.	1	2	3	4	5

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