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Factors influencing battery electric vehicle purchase behavior among adult consumers in Malaysia

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Abstract

This study examines the key factors influencing actual battery electric vehicle (BEV) purchase behavior among adult consumers in Malaysia. By integrating the theory of consumption value with the Technology Acceptance Model, this study aims to identify the most salient predictors of BEV adoption, thereby offering a more comprehensive understanding of consumers' motivations and barriers. A quantitative survey was conducted with 400 Malaysian BEV owners. The questionnaire was adapted from literature. Pearson's correlation and multiple regression analyses were conducted to determine the strength and significance of each predictor. Emotional value emerged as the strongest predictor of BEV purchase behavior, followed by perceived usefulness and conditional value. These findings underscore the importance of affective drivers, perceived practical benefits, and supporting contextual factors (e.g., incentives) in shaping adoption decisions. Although social and epistemic values showed positive correlations with BEV purchase behavior, they did not remain statistically significant in the regression model. By integrating the theory of consumption value and the Technology Acceptance Model, this study provides a holistic perspective on BEV purchase behavior in Malaysia, focusing on actual adoption. The results highlight the pivotal role of emotional resonance and practical incentives in accelerating sustainable automotive transition.

Keywords: Battery electric vehicles, Consumer behavior, Economic growth, Technology Acceptance Model, Theory of Consumption Value.

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1. Introduction

Transportation is integral to daily life, contributing to 24% of global carbon dioxide emissions and 25% of international fossil fuel consumption [1]. To mitigate these impacts, battery electric vehicles (BEVs) have been increasingly recognized as alternatives to conventional internal combustion engine (ICE) vehicles, with the potential to reduce environmental harm. However, the environmental benefits of BEVs depend heavily on the electricity sources used for charging. For instance, renewable energy sources, such as wind, solar, hydro, and geothermal, can significantly reduce associated carbon emissions [2].

In 2021, Malaysia committed to reducing carbon dioxide emissions and achieving carbon neutrality by 2050 under the 12th Malaysia Plan [3]. The Malaysian government promotes green technology to support this goal by offering tax exemptions for BEVs and solar panels. According to Lye [4] tax exemptions on road taxes, import duties, and excise duties for fully imported BEV models will be in place until December 31, 2025, with locally assembled models enjoying exemptions until December 31, 2027. These incentives are reflected in market trends, as BEV registrations have increased from 3,079 units (0.43%) in 2022 to 11,624 units (1.45%) in 2023 [5]. Research suggests that once consumer goods reach the 1% market share threshold, they begin to see widespread adoption [6]. Indeed, electric vehicles reached this threshold in 2016, with BEVs following suit in the subsequent year.

For Malaysia to achieve carbon neutrality by 2050, a broad consumer shift from internal combustion engines to battery electric vehicles is essential. Currently, over 17 million passenger vehicles are registered in Malaysia [7]. Transport Minister Anthony Loke acknowledged the challenge of transitioning Malaysians from internal combustion engine vehicles to battery electric vehicles, noting that such a shift requires a robust ecosystem, time, and sustained effort Lye [4]. Paradies et al. [8] found that habitual purchase behavior for ICE vehicles remains a major barrier to the adoption of BEVs. Therefore, firms must make significant innovative and strategic marketing efforts to influence consumer purchase decisions, providing clear information on the benefits of BEVs. High ownership costs compared with ICE vehicles further hinder this behavior [9].

Most previous studies on BEVs have focused on purchase intention [10-13] rather than focusing solely on actual purchase behavior, critics note that this emphasis on intention fails to address the behavioral gap [10]. Furthermore, many studies have employed the Technology Acceptance Model to explore purchase intentions for new energy or electric vehicles [14-17] without delving into BEV-specific purchase behavior, this study aims to address these gaps by integrating the theory of consumption value and the Technology Acceptance Model to examine BEV purchase behavior among adult consumers in Southeast Asia, with a focus on Malaysia.

Understanding how functional and conditional values such as ownership costs, operating costs, charging infrastructure, and fuel pricing influence consumer behavior is crucial [18]. Prior research Bhat et al. [15] suggests expanding the study of social values across different communities, while others call for examining how energy price fluctuations affect public emotional values [19]. Further exploration of epistemic value might include investigating BEV ecosystem factors, such as optimal driving modes and battery charge/discharge practices [13]. Additionally, examining gender differences in responses related to perceived usefulness and ease of use could yield valuable insights [20].

BEV adoption is essential to Malaysia's pursuit of carbon neutrality by 2050. Despite government incentives, such as tax exemptions and other support measures, BEV adoption rates remain low due to financial, infrastructural, and social barriers. By integrating the theory of consumption value with the Technology Acceptance Model, this study aims to provide a comprehensive perspective on BEV purchase behavior among Malaysian adult consumers, thereby contributing to a broader understanding of consumer motivations behind adopting BEVs as sustainability efforts become increasingly prioritized.

1.1. Theoretical Underpinning

The theoretical foundation of this study combines two established frameworks to explain consumer behavior toward adopting battery electric vehicles (BEVs): the theory of consumption value and the Technology Acceptance Model (TAM). Together, these models provide a comprehensive perspective on the multifaceted factors that influence consumer decisions, particularly in the context of green product adoption.

According to the Theory of Consumption Value, five distinct values, functional, conditional, social, emotional, and epistemic drive consumer choice behavior [21]. These multidimensional values explain how purchase behavior is influenced [22] predict market choices [18] and ultimately offer insights into consumer decision-making processes [23]. Importantly, the theory posits that the perceived value of products or services is determined by consumers and not solely by sellers. The interpretation of these values varies across contexts [24]; For example, in a service setting, functional value might refer to price and quality, while epistemic value pertains to the information provided by the service provider. The framework has been successfully extended to green product purchasing, emphasizing environmental awareness and how the value of green products influences consumer behavior [19, 25]. This has been widely validated, particularly in exploring how perceptions of green value affect choices in sectors such as cosmetics, food, clothing, and tourism [26-28]. This research focuses on understanding how these consumption values influence consumers' decisions to switch to green products such as BEVs.

Complementing this perspective, the Technology Acceptance Model (TAM) centers on two core beliefs: perceived usefulness and perceived ease of use [29]. These constructs are interrelated because ease of use can enhance the perceived usefulness of a technology. Originally developed from the Theory of Reasoned Action to study employee acceptance of computers [30, 31]. It has since been expanded to examine consumer decision-making and acceptance of new technologies, including automotive innovations such as BEVs, that aim for fuel efficiency, reduced emissions, and

alternative energy use [13, 32, 33]. TAM's adaptability is evident in its combination with other theories, such as the theory of planned behavior, to offer deeper insights into why certain consumers are more open to adopting new technologies [14].

TAM has been applied to various technologies, from computer systems and mobile payments to social media and autonomous vehicles, making it particularly suitable for exploring the barriers to acceptance of BEVs in Malaysia [34]. Since BEVs represent a relatively new technology with low adoption rates in Malaysia, TAM can identify potential hurdles related to perceived usefulness and ease of use that hinder consumer uptake.

By integrating the Theory of Consumption Value with TAM, this study aims to capture both the value-based and technology-related determinants of BEV purchase behavior. While the Theory of Consumption Value illuminates how various consumption values (functional, conditional, social, emotional, and epistemic) shape the decision to adopt BEVs, TAM provides insight into how perceptions of the usefulness and ease of use of BEVs as a new technology influence consumer acceptance. This combined approach offers a more comprehensive framework for understanding the motivations and barriers Malaysian consumers face when adopting BEVs, thereby contributing to strategies that could enhance BEV acceptance in the pursuit of sustainable transportation.

1.2. Functional Value and Battery Electric Vehicle Purchase Behaviour

Consumers are highly price-sensitive when selecting products, and price is identified as a critical factor shaping consumers' purchase behavior [35]. They seek the lowest possible price with maximum benefits while avoiding repeated purchases of high-value products [28]. However, these studies also acknowledge that consumers are willing to pay a premium if a product meets their expectations and maintains a certain level of quality. Since the selling price is a component of functional value, it plays a vital role in influencing consumer purchase behavior.

Alganad et al. [18] similarly, it was argued that price is a barrier for consumers considering BEVs, as their selling price is higher than that of conventional ICE vehicles. Despite the Malaysian government introducing incentives to make BEV prices more competitive, demand remains low. Conversely, when consumers recognize the cost-effectiveness and other functional benefits of BEVs, they positively influence their purchase behavior [22].

BEVs are durable consumer goods, meaning that consumers are less likely to replace them frequently, which makes it difficult to observe repurchase behavior in the short term [36]. For example, in Japan, the average vehicle replacement period is 7.5 years, and vehicles owned for more than 10 years comprise 25% or more of the active vehicle population. Because BEVs have only been actively promoted in recent years, studying repurchase behavior is challenging. Therefore, we hypothesize as follows:

H₁: Functional value has a significant positive impact on BEV purchase behaviour.

1.3. Conditional Value and Battery Electric Vehicle Purchase Behaviour

To promote BEV usage, the government has introduced various financial incentives, such as subsidies and preferential tax policies, to reduce the selling price [37]. Since the selling price is a barrier to widespread BEV adoption, providing financial incentives as a conditional value has shown a positive influence on BEV uptake. Conditional value is not limited to government incentives; discounts from sellers also stimulate BEV adoption and influence consumer buying behavior [11].

Conditional value extends beyond incentives and rebates. Alganad et al. [18] highlighted a market trend emphasizing environmentally friendly products that are less harmful to the ecosystem. This conditional value shifts consumers' choices to consider environmental consequences, thereby forming new purchasing behaviors. The authors find that pro-environmental behavior significantly affects consumer buying behavior by encouraging the selection of environmentally friendly products over conventional products.

Pontes et al. [38] further elaborated that conditional value factors include time, place, context, and personal situations. For instance, exposure to information on global warming and environmental threats can influence consumer decisions to choose green products. When environmental sustainability is highly valued, consumers opt to change their purchasing behavior, especially if green products are widely available and easily obtained. Their research also found a positive relationship between conditional value, environmental concerns, and purchase behavior. This aligns with Deo and Prasad [39] who suggests that consumer buying behavior largely depends on the current environmental situation; any alteration in the status quo can affect green product purchases. Therefore, we hypothesize as follows:

H₂: Conditional value has a significant positive impact on BEV purchase behaviour.

1.4. Social Value and Battery Electric Vehicle Purchase Behaviour

Social value is vital for influencing consumer choice when purchasing BEVs. Consumers buy BEVs to gain social benefits through an environmentally friendly self-identity [18]. This action is believed to improve peers' social status and foster a sense of connectedness [22].

Jabeen et al. [11] explained that social value influences consumer perceptions by considering the opinions and responses of those around them when purchasing a BEV. They agree with previous findings that social clusters affect buying behavior, as individuals seek to maintain social linkages. Economic gains may not be the only factor for an individual to display a positive impression; social status is also a key consideration when acquiring a BEV.

Consumers choose BEVs to express their environmental self-identity and to maintain an environmentally conscious image in society [40]. The stronger a consumer's environmental self-identity, the greater the influence of this self-image

on BEV adoption. Consequently, self-identification significantly influences BEV purchase decisions. Furthermore, Bănică et al. [41] argued that individuals driven by this self-identity tend to share their experiences, help other users, and contribute to the co-creation of green products to gain social acknowledgment. Such behavior is not carried out in isolation but involves interaction and appreciation at a social level. This interaction can motivate others in the same social circle to purchase and use similar products [42]. In conclusion, social value impacts consumers' beliefs, shaping their purchasing behavior for pro-environmental products. Therefore, we hypothesize as follows:

H₃: Social value has a significant positive impact on BEV purchase behaviour.

1.5. Emotional Value and Battery Electric Vehicle Purchase Behaviour

Emotional value is linked to the feelings and emotional states experienced when buying a product. Consumers feel ethically gratified when they purchase a BEV because the decision significantly contributes to ecological concerns [11]. This process psychologically affects consumers by fulfilling self-expression, providing warmth, and creating a connection to nature. Consumers assume a role in protecting the environment and contributing to sustainable development [18]. By driving a BEV, consumers can express their environmental concerns and derive satisfaction as part of a superior lifestyle.

Product design influences consumers' emotional states, either positively or negatively. Wang et al. [22] argued that emotional value plays a determining role in consumer purchasing decisions, often unconsciously. They contend that novel innovations influence consumer emotions, particularly in the context of BEVs, which are associated with safety, fun, and comfort, attributes that can positively encourage purchases.

Nekmahmud et al. [28] believe that trust in a brand also contributes to its emotional value. For example, environmentally conscious consumers find green purchasing to be pleasurable, reinforcing their belief that green consumption protects the environment. Consumers with a strong sense of environmental responsibility place high emotional value on the continued use of green products such as BEVs.

BEVs have replaced the complex engines of conventional ICE vehicles with simpler motors, making differentiation difficult. According to Kato [43] this situation is similar to other technology products, such as smartphones and personal computers, where high similarity challenges consumers in differentiating functionality and performance. However, some brands stand out by appealing to emotional value, especially durable goods such as BEVs. Factors, such as interior comfort, build quality, and self-driving technology, affect consumer perceptions. In marketing, consumer perception is often regarded as the only reality, and to gain high brand loyalty, many manufacturers shift their focus from functional to emotional value, underscoring its importance in purchase decisions.

The emotional bonds between consumers and brands influence their cognition, affect, and behavior [44]. Consumer purchase behavior is often studied through emotional responses and perceived pleasure when buying a product. Studies show that brand personality, aligned with self-concept, strongly affects brand loyalty. In conclusion, brand identification comprises the emotional aspects that influence BEV purchasing decisions. Therefore, we hypothesize as follows:

H₄: Emotional value has a significant positive impact on BEV purchase behaviour.

1.6. Epistemic Value and Battery Electric Vehicle Purchase Behaviour

According to Alganad et al. [18] many consumers who purchase new technologies, gadgets, and fashion products are influenced by their desire to own them without specific needs. The authors acknowledge that novelty seeking positively impacts consumer purchase behavior for green products. One key element of epistemic value is variety seeking: consumers purchase new products to satisfy their desires for change. Hence, variety seeking positively and directly affects purchase decisions for new products such as BEVs.

Previous studies on epistemic value have found that consumers' product knowledge and novelty seeking significantly influence their purchase decisions for new products. Owning new technologies such as BEV provides novelty and satisfies consumer curiosity. Nekmahmud et al. [28]. Mostaghel and Chirumalla [42] argued that more knowledgeable consumers with higher awareness tend to try different, new, and ethical products that are environmentally friendly. With convenient access to information, consumers can easily gather details on a product's manufacturing process and environmental impact and verify the authenticity of this information [38]. The authors further suggest a positive relationship between epistemic value and purchase behavior: as consumers gain more knowledge about BEVs, their perception that using these vehicles contributes to solving environmental issues strengthens.

Suhartanto et al. [25] found that consumers appreciate epistemic value when they experience it firsthand, such as through a BEV test drive. When consumers perceive driving a BEV as a new trend, it attracts their interest and encourages adoption. Consumers who perceive high epistemic value in BEVs tend to exhibit favorable behavior toward them. Therefore, we hypothesize as follows:

H₅: Epistemic value has a significant positive impact on BEV purchase behaviour.

1.7. Perceived Usefulness and Battery Electric Vehicle Purchase Behaviour

Perceived usefulness is a determinant of consumers' acceptance and usage of new technology, thus influencing purchase behavior [45]. Consumers believe that using new, user-friendly technologies is beneficial. When consumers perceive that BEVs offer advantages such as economic benefits from reducing or eliminating fossil fuel use, they are more likely to accept and adopt them [14].

Perceived usefulness also represents the advantages of adopting BEVs, including protecting the environment, reducing household transportation costs, improving travel efficiency, and enhancing quality of life. When BEVs are

proven useful, they create a positive impression and foster willingness to adopt. Consequently, when consumers perceive BEVs as useful, their likelihood of purchasing them increases [17, 46, 47].

To influence purchasing behavior, individuals must believe that new technology can enhance their performance [48]. When a product meets consumer expectations, it increases perceived usefulness and familiarity with its usage [49]. Otherwise, consumers may hesitate to adopt new technologies Swarna Swetha et al. [50]. Wang et al. [51] further examined the perceived usefulness of leading consumers to adopt new technology by studying their post-adoption behavior. Their study showed that consumers are more likely to continue using technology when they find a useful product. Therefore, we hypothesize as follows:

H₆: Perceived usefulness has a significant positive impact on BEV purchase behaviour.

1.8. Perceived Ease of Use and Battery Electric Vehicle Purchase Behaviour

Perceived ease of use refers to the simplicity and usability of new technologies such as BEVs. When a new technology is straightforward, uncomplicated, and unburdensome, consumers find it easier to accept and use [45]. If a BEV meets these criteria, it is deemed user-friendly and intuitive, thereby increasing its applicability and catalyzing consumer acceptance. Combining user-friendly features with comprehensive guidelines, alongside demonstrations of competence and goodwill by the manufacturer, promotes consumer trust in a product. Furthermore, perceived ease of use influences consumer behavior, both directly and indirectly, through perceived usefulness.

Ease of use is measured by how easily consumers can understand product usage. The easier it is to understand, the more quickly a product will be adopted, especially compared to products requiring new, complex skills [52]. New technologies, such as BEVs, that offer convenience [53], relative advantages, compatibility, and minimal complexity encourage adoption [54].

Zhang et al. [14] examined the perceived ease of use in purchasing BEVs, such as applying for a license plate, traveling, and operating the vehicle. For example, in some Chinese cities with strict traffic restrictions that limit license plate issuance for new vehicles, authorities allow BEV owners to skip the hassle of obtaining a license plate, thereby greatly improving their ease of travel. Consequently, when consumers perceive BEVs to be easy to use, they promote their adoption in daily activities. Therefore, we hypothesize as follows:

H₇: Perceived ease of use has a significant positive impact on BEV purchase behavior.

2. Methodology

2.1. Population and Sampling Size

The target respondents were BEV owners in Malaysia. As of June 30, 2024, the total number of BEV owners was approximately 23,000. This estimate is derived from the information provided by Khoo [5], who reports 11,624 units registered in 2023. Using data from the Government of Malaysia online portal, data and BEV registrations from January to December 2023 for brands such as BYD, Tesla, and Smart totaled 6,554 units. These three brands contributed almost 60% of the total registrations by 2023. Further, the data indicate that registrations for these three brands from January to June 2024 amounted to 7,734 units. Assuming that these registrations still represent 60% of the total BEV registrations during this period, the total number of BEVs registered from January to June 2024 was estimated to be approximately 12,000 units. Hence, the total number of BEVs registered from January 2023 to June 2024 is estimated to be approximately 23,000 units.

Using the sample size determination equation proposed by Yamane [55] and setting a margin of error of 5% with a confidence level of 95%, a common standard in research, the appropriate sample size was calculated.

A multi-stage sampling method was employed in this study. Because BEVs are relatively new to the Malaysian market, the first stage selected the entire country of Malaysia as the research location. Vehicle types in Malaysia are divided into two main categories: passenger and commercial vehicles. Cluster sampling was used to select only adult passenger vehicle consumers. In the following stage, purposive sampling was adopted to choose only adult BEV consumers, distinguishing them from owners of other types of electric vehicles available in the Malaysian market, such as hybrid and plug-in hybrid electric vehicles. In the final stage, simple random sampling was employed as the survey was distributed via the Internet through Google Forms. This approach was deemed most suitable during the early stages of BEV introduction in Malaysia because most BEV users are likely to engage with digital platforms and possess higher technological literacy.

2.2. Research Instrumentation

Quantitative data were collected using a self-administered questionnaire to obtain insights into the purchase behavior of BEV owners in Malaysia. A pre-screening question was placed at the beginning of the questionnaire to ensure that only BEV owners participated. Respondents who selected "Yes" to the question "Do you currently own a battery electric vehicle?" could proceed to the questionnaire. At the same time, those who answered "No" were immediately directed toward the end. The questionnaire consisted of 10 sections.

2.2.1. Respondent's Background

This section focuses on respondents' background information, including age, sex, ethnic group, religion, marital status, education, highest certificate level obtained, occupation category, activity status, monthly individual income, and monthly household income. Among these questions, only one related to age was open-ended. Furthermore, respondents were required to be at least 18 years old to participate; any respondent below 18 received an error message such as "Must

be a number greater than 17.” After data collection, respondents’ ages were grouped into the following categories: “≤ 20 years old,” 21–30 years old, “31–40 years old,” 41–50 years old, “51–60 years old,” and “61 years old.” The remaining questions in this section categorically collected background information, offering respondents a range of predefined answers that best described them.

2.2.2. Functional Value with Battery Electric Vehicle Purchase Behaviour

This section contained ten statements designed to measure the functional value related to BEV purchase behavior. One of these ten statements was negatively worded and reverse-coded before data analysis. Responses were recorded on a 5-point Likert scale ranging from “1” (strongly disagree) to “5” (strongly agree). These statements were developed by referring to previous research [18, 56].

2.2.3. Conditional Value with Battery Electric Vehicle Purchase Behaviour

This section presents ten positive statements designed to investigate the conditional factors influencing BEV purchase behavior. All statements are based on previous studies [18, 56].

2.2.4. Social Value with Battery Electric Vehicle Purchase Behaviour

This section features ten statements designed to explore the social value of BEV purchase behavior. These statements adopted instruments developed by Alganad et al. [18] and Liu et al. [40] using a 5-point Likert scale from “1” (strongly disagree) to “5” (strongly agree).

2.2.5. Emotional Value with Battery Electric Vehicle Purchase Behaviour

Emotional value was evaluated through ten positively constructed statements in this section. All statements were developed based on previous research [18, 27, 39].

2.2.6. Epistemic Value with Battery Electric Vehicle Purchase Behavior

This section contains ten statements designed to measure the epistemic value related to BEV purchase behavior. These statements were developed based on previous research on epistemic values [18, 28].

2.2.7. Perceived Usefulness with Battery Electric Vehicle Purchase Behavior

This section examines the perceived usefulness of BEVs on purchase behavior through ten positive statements. These statements were designed by adopting previous works [13, 49, 57, 58] and measured using a 5-point Likert scale from “1” (strongly disagree) to “5” (strongly agree).

2.2.8. Perceived Ease of Use with Battery Electric Vehicle Purchase Behavior

The ten statements in this section measured the perceived ease of use of BEVs on purchase behavior. One of these ten statements was negatively worded and reverse-coded before data analysis. All statements were developed based on previous studies [52, 57, 58].

2.2.9. Battery Electric Vehicle Purchase Behavior

The final section featured ten statements constructed to study the BEV purchase behavior of adult consumers in Malaysia. These statements were based on previous studies [18, 56, 59].

2.3. Reliability of Measurements

The reliability of the measurement instruments was assessed using Cronbach’s alpha coefficients during both the pre-test and main survey. The pre-test, which was conducted with 30 participants, ensured that the questionnaire items were clear and appropriately worded. After collecting responses from 400 participants, the internal consistency of each construct was reevaluated. According to He et al. [60] a Cronbach’s alpha value above 0.70 is considered acceptable for internal consistency.

The results showed that all constructs demonstrated high reliability in both the pre-test and the actual survey. In the actual test, functional value ($\alpha = .91$), conditional value ($\alpha = .94$), social value ($\alpha = .91$), emotional value ($\alpha = .92$), epistemic value ($\alpha = .90$), perceived usefulness ($\alpha = .88$), perceived ease of use ($\alpha = .90$), and battery electric vehicle purchase behavior ($\alpha = .92$) all exceeded the acceptable threshold. These results indicate that the measurement scales used in this study are highly reliable and suitable for assessing relationships between variables.

3. Results

3.1. Respondents' profile

The number of male respondents was four times that of female respondents. This finding aligns with that of Loengbudnark et al. [61] that differ from conventional ones. Because BEVs are considered a new technology, female consumers may be more hesitant to engage with them, leading to a gender imbalance among respondents.

The majority of BEV consumers were aged 31 to 50, accounting for 66% of the respondents. This age group is typically the main income generator; for example, assuming a university graduate is aged 24, individuals in their 30s and 40s may have around seven years of work experience, resulting in higher incomes than those below 30.

In contrast, fewer respondents were aged 51 years and above, despite the fact that this group generally had higher incomes. This lower representation may be due to bank loan restrictions. Banks often set a maximum loan tenure of 9 years for vehicle purchases. If older consumers cannot meet this requirement, they may need to purchase vehicles without a loan, which could discourage them from replacing their vehicles.

Income groups are categorized into three main tiers: B40, M40, and T20, representing the bottom 40%, middle 40%, and top 20% of income earners, respectively. These categories can be further defined: the first four income levels represent B40 (RM5,429 and below), M40 covers incomes between RM5,250 and RM11,819, and T20 comprises incomes of RM11,820 and above [62].

Reviewing household income, most respondents fell into the T20 category, constituting 69.25% of the sample. This aligns with the findings of Chapree [63] and Yusry [64] who suggests that BEVs in Malaysia are generally only affordable to high-income earners, given that selling prices start at RM100,000 and above. This information is presented in Table 1.

Table 1.
Distribution of respondents' particulars (N=400).

Item	Number of Respondent	Percentage (%)
Sex		
Male	322	80.50
Female	78	19.50
Age (years old)		
≤20	1	0.25
21 – 30	35	8.75
31 – 40	126	31.50
41 – 50	138	34.50
51 – 60	71	17.75
> 61	29	7.25
Ethnic Group		
Bumiputera	97	24.25
Chinese	286	71.50
Indian	16	4.00
Others	1	0.25
The Highest Certificate Obtained at School, College or University		
UPSR	0	0.00
LCE/SRP/PMR/PT3	0	0.00
MCE/SPM/SPM(V)	2	0.50
Certificate/HSC/STP/STPM	23	5.75
Diploma	59	14.75
Bachelor's Degree	224	56.00
Master or Ph.D.	92	23.00
Monthly Household Income		
< RM 2,560	2	0.50
RM 2,560 to RM 3,439	3	0.75
RM 3,440 to RM 4,309	2	0.50
RM 4,310 to RM 5,249	7	1.75
RM 5,250 to RM 6,339	6	1.50
RM 6,340 to RM 7,689	4	1.00
RM 7,690 to RM 9,449	60	15.00
RM 9,450 to RM 11,819	39	9.75
RM 11,820 to RM 15,869	29	7.25
≥ RM 15,870	248	62.00

3.2. Pearson Correlation

Pearson correlation analysis revealed significant positive relationships between all independent variables and battery electric vehicle (BEV) purchase behavior. Emotional value showed the strongest correlation with BEV purchase behavior

($r = .80, p < .001$), followed by perceived usefulness ($r = .76, p < .001$), and conditional value ($r = .69, p < .001$). Social value also demonstrated a strong positive correlation ($r = .61, p < .001$) with perceived ease of use ($r = .64, p < .001$). Epistemic value ($r = .53, p < .001$) and functional value ($r = .51, p < .001$) were moderately correlated with BEV purchase behavior. These results indicate that all seven independent variables are significantly and positively associated with BEV purchase behavior.

3.3. Hypothesis Testing

Multiple regression analysis was conducted to examine the dominant predictors of battery electric vehicle (BEV) purchase behavior. The overall model was significant, $F(7, 392) = 212.86, p < .001$, and explained 79% of the variance in BEV purchase behavior ($R^2 = .79$), indicating a strong model fit.

Among the predictors, emotional value was the strongest and most significant predictor of BEV purchase behavior ($\beta = 0.43, p < .001$), followed by perceived usefulness ($\beta = 0.26, p < .001$) and conditional value ($\beta = 0.22, p < .001$). Functional value ($\beta = 0.12, p < .001$) and perceived ease of use ($\beta = 0.10, p = .007$) also showed significant positive effects on BEV purchase behavior.

In contrast, social value ($\beta = -0.00, p = .953$) and epistemic value ($\beta = -0.05, p = .115$) did not significantly predict BEV purchase behavior. These findings suggest that emotional and practical considerations play a more critical role in influencing consumers' decisions to purchase BEVs than social and knowledge-driven factors.

4. Discussion

This study aimed to identify the factors influencing battery electric vehicle (BEV) purchase behavior among adult consumers in Malaysia by integrating the Theory of Consumption Value [21] and the Technology Acceptance Model [29]. The findings confirm that emotional value, perceived usefulness, and conditional value emerge as the three most prominent predictors of BEV purchase behavior, which is consistent with prior research highlighting the importance of affective and functional considerations in green product adoption [11, 18, 56]. Notably, emotional value registers as the strongest contributor ($\beta = 0.429, p < .001$), underscoring how intrinsic motivations, such as feeling ethically gratified by eco-friendly choices or experiencing the enjoyment of novel technology, significantly shape purchasing decisions [22, 44].

Beyond emotional value, perceived usefulness ($\beta = 0.257, p < .001$) also plays a vital role in shaping purchase decisions, aligning with the model's claim that consumers adopt new technologies primarily if they perceive a beneficial outcome in doing so [14, 29]. This includes the perceived performance benefits of BEVs, such as fuel savings and environmental impact reductions [17, 22]. Additionally, conditional value ($\beta = 0.219, p < .001$) encompassing incentives and broader contextual factors substantiates past findings that supportive policies, rebates, and green infrastructure significantly influence green technology adoption [18, 37].

By contrast, the regression model shows that social and epistemic values do not exert a statistically significant impact on actual BEV purchase behavior ($\beta = -0.003, p = .953$; $\beta = -0.054, p = .115$, respectively). Although these variables are positively correlated with BEV purchase behavior at the bivariate level, they do not retain predictive power once emotional, functional, and technological considerations are taken into account. This suggests that, while consumers may acknowledge social standing [11] or exhibit curiosity toward novel technology [28], their final purchase decision is more strongly driven by emotional appeal, perceived practicality, and conducive external conditions.

Demographically, this study's sample is largely composed of higher-income T20 consumers, in line with the prevailing view that BEVs currently priced at RM100,000 and above remain more accessible to affluent segments. [63, 64]. Respondents were predominantly male and fell within the 31–50 age range, echoing previous observations that middle-aged consumers with stable incomes are more inclined to adopt costly, innovative products [4, 61]. These findings collectively underscore the reality that broader BEV uptake in Malaysia demands further price reductions, infrastructural support, and appeal to emotional and functional drivers.

5. Implications

Given the significance of emotional value, policymakers, such as the Ministry of Transport Malaysia and the Ministry of Investment, Trade and Industry, should not only continue financial incentives (e.g., tax exemptions and rebates) but also design public awareness campaigns that highlight the eco-friendly and lifestyle-enhancing aspects of BEVs [3, 18]. For instance, emphasizing reduced carbon emissions, quieter rides, and innovative design features in promotional materials can tap into the emotional resonance consumers seek [44, 58].

Additionally, non-monetary incentives (e.g., priority parking and dedicated driving lanes) may enhance perceived usefulness and ease of use, reinforcing a positive emotional experience [45, 65]. Policymakers should also focus on expanding the charging infrastructure in both urban and suburban areas, demonstrating a commitment to building a supportive ecosystem for clean mobility [66, 67].

Automobile manufacturers and dealers should adopt marketing strategies to emphasize product attributes that increase emotional and functional appeal. For example, manufacturers could showcase improved technology features, stress lower long-term operating costs, and spotlight luxurious or cutting-edge vehicle designs [32, 49].

Since the current BEV market in Malaysia mostly comprises T20 consumers, collaboration with financial institutions to offer longer loan tenures or creative financing options may bridge the affordability gap for middle-income consumers (M40) [34, 68]. Furthermore, increasing the local assembly and leveraging economies of scale can gradually reduce manufacturing costs [56], expanding the addressable market beyond high-income tiers.

The government's goal of achieving carbon neutrality by 2050 requires a substantial transition away from ICE vehicles [3]. However, as multiple studies have noted, BEVs only reduce overall emissions if charged by renewable energy sources [2, 69]. Hence, integrating renewable energy policies, such as incentives for solar panel installation, will bolster the perception of BEVs as a comprehensive green solution rather than merely a shift in emission sources [48, 53]. Strengthening these environmental linkages can further increase both emotional and conditional value for prospective consumers.

6. Conclusion

By integrating the Theory of Consumption Value [21] with the Technology Acceptance Model [29], this study offers a holistic view of BEV purchase behavior in Malaysia. The strongest predictors, emotional value, perceived usefulness, and conditional value, indicate that, while financial incentives and functional benefits remain paramount, emotional resonance (e.g., enjoyment, environmental pride) is particularly influential in spurring BEV adoption [11, 22]. In contrast, social and epistemic values, although correlated, do not significantly influence final purchase decisions when other factors are considered.

However, this study has several limitations. First, the dominance of T20 respondents in the sample constrains the generalizability to lower-income segments (M40, B40), where financial barriers are more pronounced [62, 63]. Thus, future studies should explore diverse income brackets, particularly as BEV prices may decrease with increased local production after 2025 [4]. Second, the scope of this research is confined to Malaysia; expanding the investigation to other Southeast Asian countries (e.g., Thailand and Indonesia) could yield comparative insights that are beneficial to regional policymakers and industry players [28].

In conclusion, bolstering BEV adoption in Malaysia hinges on effective policy support, industry-driven marketing strategies that underscore emotional and functional values, and synergistic green-energy initiatives. Accelerating these efforts is crucial for meeting Malaysia's carbon neutrality goals by 2050 [3] and for fostering a sustainable automotive landscape in Southeast Asia.

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