

Urban Value Based Adoption Model for Green Mobility: A Mixed-Methods Study of Electric Vehicle Purchase Decisions at Wuling Motors Pontianak

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Abstract

Electric vehicle adoption has become an important component of green mobility development to support sustainable transportation and carbon emission reduction. However, in urban cities such as Pontianak, electric vehicle purchase decisions are still influenced by various considerations, including perceived benefits, perceived sacrifices, perceived value, and the readiness of supporting ecosystems. This study aims to develop and examine the Urban Value-Based Adoption Model (Urban-VAM) in explaining electric vehicle purchase decisions for Wuling Motors in Pontianak City. This study employed a mixed-methods approach with a sequential explanatory design. Quantitative data were collected from 208 valid respondents and analyzed using Structural Equation Modeling-Partial Least Squares (SEM-PLS) through SmartPLS 4, while qualitative data were obtained through in-depth interviews with nine strategic informants. The results indicate that Perceived Benefits have a positive and significant effect on Perceived Value ($\beta = 0.508$; $p < 0.001$), and Perceived Value is the most dominant factor influencing Purchase Decision ($\beta = 0.613$; $p < 0.001$). Perceived Sacrifices also have a significant effect on Perceived Value, but the direction of the relationship is positive and contrary to the initial hypothesis ($\beta = 0.268$; $p = 0.001$). This finding indicates the existence of a high-involvement trade-off mechanism, in which consumers who actively consider purchasing electric vehicles demonstrate both awareness of potential risks and a stronger understanding of product value. Purchasing Power was not proven to moderate the relationship, but it has a direct influence on Perceived Value. This study concludes that electric vehicle purchase decisions are primarily shaped by consumers' perceived value, which emerges from the comprehensive evaluation of perceived benefits and perceived sacrifices.

Keywords: Electric Vehicle; Green Mobility; Perceived Value; Purchase Decision; Urban-VAM.

1. Introduction

The transition toward a low-emission transportation system has become a global strategic agenda in addressing the challenges of climate change, increasing carbon emissions, urban air pollution, and dependence on fossil fuels. The transportation sector contributes approximately one-quarter of global energy-related carbon dioxide emissions; therefore, accelerating the adoption of electric vehicles (EVs) has become one of the key solutions for achieving sustainable mobility (International Energy Agency, 2023). Globally, transportation electrification is recognized as an important instrument in the decarbonization process. The Global EV Outlook 2024 report indicates that global electric vehicle sales exceeded 14 million units in 2023 and continued to grow in supporting the achievement of the Net Zero Emissions by 2050 scenario (Agencia Internacional de la Energía, 2024). Furthermore, the IPCC, through the AR6 Synthesis Report, emphasizes that transportation electrification accompanied by the decarbonization of electricity systems can make a significant contribution to climate change mitigation (Calvin et al., 2023). This demonstrates that electric vehicles are not merely technological innovations but also represent a structural transformation toward a low-carbon transportation system.

In Indonesia, the development of electric vehicles has become part of the energy transition and green economy development agenda through the acceleration of the Battery-Based Electric Motor Vehicle (KBLBB) program. The government has strengthened the electric vehicle ecosystem through various policies, including Presidential Regulation Number 55 of

2019 concerning the acceleration of the KBLBB program, the provision of fiscal incentives for electric vehicles, and the development of the battery industry through nickel downstreaming based on Law Number 3 of 2020. In addition, the establishment of Public Electric Vehicle Charging Stations (SPKLU) continues to be expanded by PLN to improve infrastructure readiness. These policies indicate that electric vehicle development is not only aimed at reducing emissions but also at enhancing the competitiveness of clean technology-based automotive industries and supporting green economic growth (Kemenperin, 2023).

Although policy support and technological advancements continue to increase, the success of electric vehicle adoption still depends on market responses and consumer purchase decisions. The advancement of electric vehicle technology does not automatically lead to increased purchasing behavior because consumers continue to evaluate the balance between perceived benefits and perceived sacrifices. Consumers consider various benefits, including energy efficiency, lower operational costs, technological innovation, driving convenience, and environmental contributions. Conversely, consumers also consider sacrifices, such as high initial vehicle prices, limited charging infrastructure, concerns regarding driving range, technological risks, and uncertainty about resale value. Therefore, perceived value and perceived sacrifice are important factors in explaining electric vehicle purchase decisions (R. R. Kumar & Alok, 2020; Zhang et al., 2022; Zhao et al., 2024).

Most studies on electric vehicle adoption have focused on metropolitan areas, particularly those located on Java Island. Bryła et al. (2023) emphasize the importance of conducting research in emerging markets that remain underexplored, including regions of Indonesia outside Java. Pontianak City, as the capital of West Kalimantan Province, represents an emerging urban area with relatively stable economic growth. Based on data from the Central Statistics Agency (BPS) of Pontianak City, Pontianak's GDP per capita reached approximately IDR 70.89 million in 2023, representing the highest level within the province; however, it has not yet reached the economic characteristics of metropolitan cities (Darmawan, 2025). This condition indicates that electric vehicle purchase decisions in Pontianak are strongly influenced by consumers' evaluations of perceived benefits, costs, and risks.

From an infrastructure perspective, the development of Public Electric Vehicle Charging Stations (SPKLU) in West Kalimantan remains in an expansion phase. The limited availability of charging facilities has become one of the factors shaping consumers' perceived risks toward electric vehicles. Previous studies indicate that charging infrastructure availability plays an important role in influencing electric vehicle purchase intention and purchase decisions (Burra et al., 2024; N. Wang et al., 2017; Zhao et al., 2024). According to the PLN report in December 2022, the number of SPKLU facilities in West Kalimantan during the initial development phase reached only three units, which later increased to approximately 52 units based on the Pontianak Post report (2025). However, this number remains relatively limited compared with the geographical size of the region and the potential number of electric vehicle users.

At the national level, electric vehicle infrastructure readiness continues to face challenges. Data from the Ministry of Energy and Mineral Resources and PLN in 2023–2024 show that the number of electric cars in Indonesia ranged from approximately 70,000 to 80,000 units, with around 1,200–1,500 SPKLU facilities available. This condition indicates that infrastructure availability remains limited, with an estimated ratio of one SPKLU for every 50–60 electric vehicles. The gap between electric vehicle growth and infrastructure readiness presents a greater challenge, particularly in regions outside Java Island. In Pontianak City, electric vehicle adoption remains at an early stage. The low utilization of SPKLU indicates that electric vehicle users are still primarily dominated by early adopters and have not yet reached the stage of mass diffusion.

The socio-economic characteristics of urban communities, such as those in Pontianak, also influence electric vehicle purchase decisions. Consumers in these areas tend to be more

price- and risk-sensitive compared with consumers in larger metropolitan areas. They must evaluate long-term benefits, such as operational cost efficiency and environmental contributions, against the initial sacrifice of relatively higher vehicle prices. Previous studies demonstrate that green technology purchase decisions are strongly influenced by the relationship between perceived value and perceived sacrifice (R. R. Kumar & Alok, 2020; X. W. Wang et al., 2021).

In addition to consumer-related factors, the presence of electric vehicle manufacturers also plays an important role in the development of the national market. One company contributing to electric vehicle development in Indonesia is Wuling Motors through its electric vehicle products designed to meet urban mobility needs. However, the success of electric vehicle marketing does not solely depend on technological capabilities and policy support but also on consumer acceptance and actual purchase decisions.

Based on these conditions, a gap exists between progressive national policies and local market readiness in adopting electric vehicles. To date, limited management-based conceptual models have specifically explained electric vehicle purchase decisions within the context of emerging urban areas such as Pontianak. Therefore, this study develops the Urban Value-Based Adoption Model (Urban-VAM) to explain electric vehicle purchase decisions within the green mobility framework at Wuling Motors Pontianak Branch. This model integrates perceived value and perceived sacrifice as the primary factors influencing purchase decisions, with purchasing power as a moderating variable.

Based on the theoretical review and previous empirical studies, this study proposes the Urban Value-Based Adoption Model (Urban-VAM) framework, which integrates consumer value evaluation and contextual factors in explaining electric vehicle purchase decisions. The proposed conceptual model is presented in Figure 1.

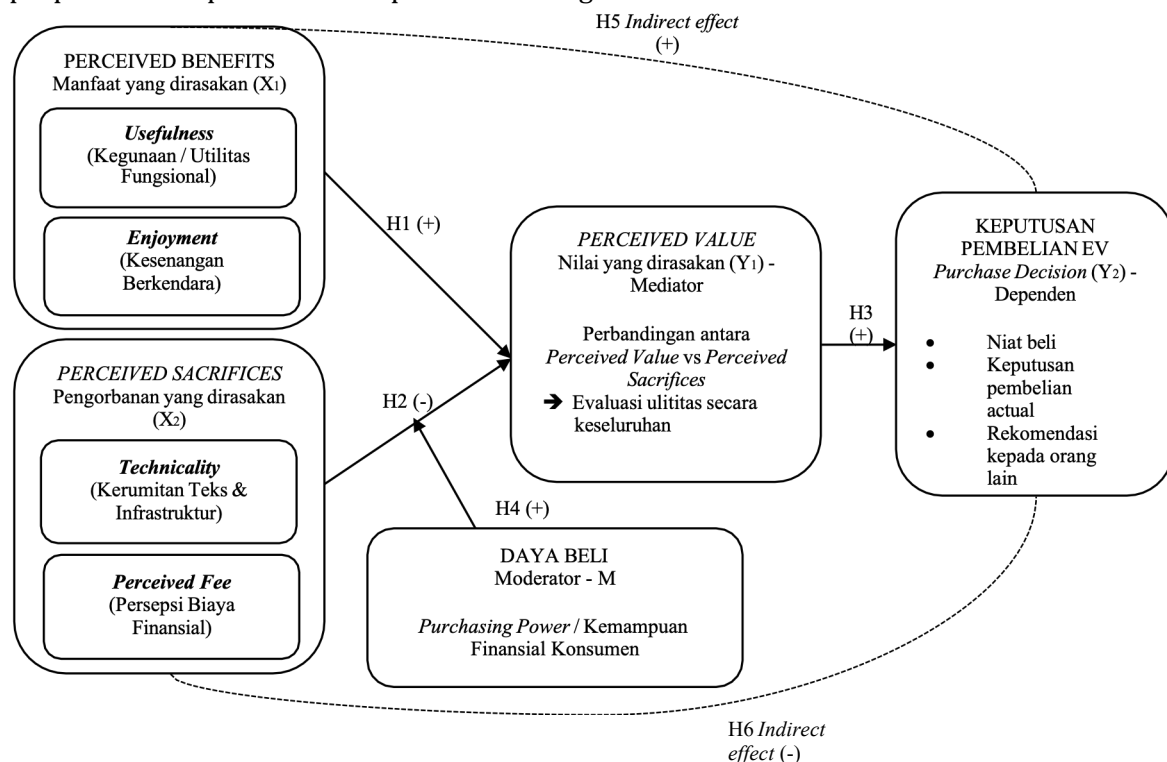


Figure 1. Conceptual Research Model of Urban Value-Based Adoption Model (Urban-VAM)

Source: Authors' data processing, 2026.

The figure illustrates the conceptual research framework that describes the relationships among variables or constructs examined in this study regarding electric vehicle

purchase decisions at Wuling Motors in Pontianak City. This model was developed based on the Value-Based Adoption Model (VAM) approach by incorporating Purchasing Power as a contextual factor and moderating variable within the context of electric vehicle adoption in an urban setting. The Value-Based Adoption Model (VAM) provides a relevant theoretical framework for explaining this process. The model explains that technology adoption is influenced by perceived benefits and perceived sacrifices, which subsequently form perceived value as the basis of behavioral decisions. Although widely applied in technology adoption studies, the application of VAM in the electric vehicle context still requires further examination, particularly within emerging urban settings in developing countries. Previous studies have predominantly focused on metropolitan areas or countries with more mature electric vehicle ecosystems.

These limitations are particularly relevant in the context of Pontianak City as an emerging urban setting in Indonesia. Urban settings outside metropolitan centers have distinct characteristics, particularly regarding infrastructure readiness, mobility patterns, and consumer purchasing capacity. The relatively limited adoption of electric vehicles in emerging urban contexts indicates a gap between the potential of electric vehicles as a green mobility solution and actual consumer purchase decisions. Therefore, further research is needed to explain how consumers in urban settings form value perceptions toward electric vehicles and what factors influence their purchase decisions.

Beyond contextual limitations, theoretical gaps remain in understanding the relationships among constructs within electric vehicle adoption models. The relationships between perceived benefits, perceived sacrifices, and perceived value require further investigation because electric vehicles, as high-involvement products, may generate different evaluation mechanisms. Perceived sacrifices, which are commonly viewed as barriers, cannot always be interpreted solely as negative factors because consumers may perceive certain sacrifices as investments to obtain long-term benefits. Furthermore, economic factors such as purchasing power may influence how consumers evaluate these sacrifices.

Based on these gaps, this study develops the Urban Value-Based Adoption Model (Urban-VAM) to explain electric vehicle purchase decisions within an emerging urban setting. The model maintains the theoretical foundation of VAM by positioning perceived value as a mediator between perceived benefits and perceived sacrifices toward purchase decisions, while incorporating purchasing power as a contextual factor that may moderate relationships among constructs. The development of Urban-VAM aims to provide a more comprehensive understanding of electric vehicle adoption within urban environments characterized by distinct infrastructure, social, and economic challenges.

This study also contributes methodologically through the application of a mixed-methods sequential explanatory approach. This approach enables the study not only to examine relationships among variables quantitatively through SEM-PLS analysis but also to explore the underlying mechanisms through the perspectives of consumers and stakeholders. Consequently, this research provides a more comprehensive explanation of how electric vehicle purchase decisions are formed.

Based on this background, this study aims to develop and examine the Urban Value-Based Adoption Model (Urban-VAM) in explaining electric vehicle purchase decisions among Wuling Motors consumers in Pontianak City. Specifically, this study aims to: (1) analyze the effect of Perceived Benefits on Perceived Value; (2) analyze the effect of Perceived Sacrifices on Perceived Value; (3) examine the effect of Perceived Value on Electric Vehicle Purchase Decision; (4) analyze the role of Purchasing Power as a moderating variable in the relationship between Perceived Sacrifices and Perceived Value; (5) examine the indirect effect of Perceived Benefits on Electric Vehicle Purchase Decision through Perceived Value; (6) examine the indirect effect of Perceived Sacrifices on Electric Vehicle Purchase Decision through Perceived Value; (7) explore the mechanisms underlying relationships among Urban-VAM constructs from the perspectives of consumers and stakeholders; and (8) identify contextual factors that

strengthen or weaken the role of Purchasing Power as a moderating variable in electric vehicle purchase decisions.

This study is expected to contribute theoretically to the development of sustainable transportation technology adoption research and provide practical implications for automotive industries, local governments, and relevant stakeholders in designing strategies to enhance electric vehicle adoption in urban settings.

2. Method

This study employed a mixed-methods approach with a sequential explanatory design to obtain a comprehensive understanding of electric vehicle purchase decisions within the framework of the Urban Value-Based Adoption Model (Urban-VAM). The research was conducted in two stages: a quantitative stage aimed at examining the relationships among research constructs and a qualitative stage used to explain and deepen the empirical findings obtained from the quantitative analysis.

In the quantitative stage, the study involved 208 respondents related to electric vehicle purchase decisions among Wuling Motors consumers in Pontianak City. Data were collected using a questionnaire instrument measuring the main constructs of the research model, namely Perceived Benefits, Perceived Sacrifices, Perceived Value, Purchasing Power, and Purchase Decision. Quantitative data were analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS) with the assistance of SmartPLS 4. The analysis involved evaluating the measurement model to assess construct validity and reliability, as well as evaluating the structural model to examine relationships among variables, mediation effects, and moderation effects.

The qualitative stage was conducted through in-depth interviews with strategic informants to obtain a deeper understanding of contextual factors influencing the relationships among constructs within Urban-VAM. Qualitative data were analyzed using thematic analysis to identify patterns, themes, and explanations that supported the interpretation of quantitative findings. The integration of quantitative and qualitative findings was conducted during the interpretation stage to provide a more comprehensive understanding of the mechanism underlying electric vehicle purchase decisions within an urban context.

3. Result and Discussion

This study employed a Mixed Methods approach with a Sequential Explanatory design (QUAN → qual) to examine and deepen the understanding of the Urban Value-Based Adoption Model (Urban-VAM) in explaining electric vehicle purchase decisions at Wuling Motors in Pontianak City. The quantitative phase was conducted through a survey involving 208 valid respondents. The qualitative phase was conducted through semi-structured in-depth interviews with five strategic informants representing three groups: (1) infrastructure and policy stakeholders from the PLN Regional Main Unit of West Kalimantan and the West Kalimantan Provincial Transportation Agency; (2) industry representatives from Wuling Motors Pontianak Branch and Wuling Motors Jakarta Branch Sales Consultant; and (3) electric vehicle users in metropolitan cities (Jakarta) as contextual comparison data. All interview transcripts were analyzed using Thematic Analysis following the six-phase approach proposed by Braun and Clarke (2006). The findings were subsequently triangulated with the quantitative results through the Joint Display procedure (Creswell & Plano Clark, 2018).

The respondent profile indicates that the majority of participants were female (54.3%), aged 21–30 years (85.6%), held a Bachelor's degree or Diploma IV qualification (44.7%), and had a monthly income below IDR 5,000,000 (69.2%). A total of 96.2% of respondents were categorized as considering purchasing a Wuling electric vehicle, while 3.8% had already purchased and used Wuling electric vehicles.

SEM-PLS analysis was conducted following the standard sequence of measurement model evaluation (outer model) prior to structural model evaluation (inner model), following the procedure recommended by Hair et al. (2022). All five constructs in this study, namely Perceived Benefits, Perceived Sacrifices, Perceived Value, Purchasing Power, and Purchase Decision, were specified as reflective constructs (Mode A), consistent with the original structure of the Value-Based Adoption Model (Kim et al., 2007) and supported by the literature review confirming strong covariance among indicators within each construct.

Figure 2 presents the estimation results of the research model using the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach through the PLS Algorithm. The model illustrates the structural relationships among constructs within the Urban Value-Based Adoption Model (Urban-VAM), including Perceived Benefits, Perceived Sacrifices, Perceived Value, Purchasing Power, and Purchase Decision, while also presenting the indicator outer loading values and the coefficient of determination (R^2) for endogenous constructs.

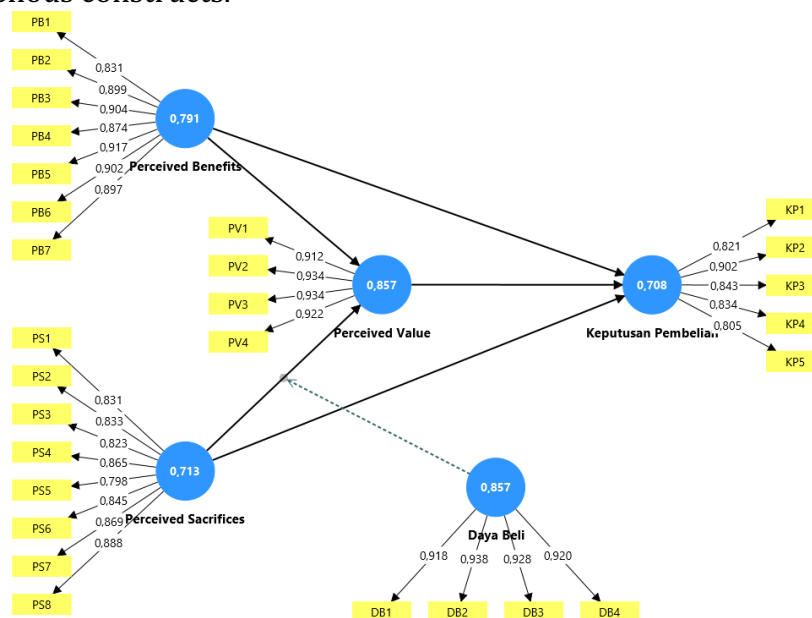


Figure 2. Measurement and Structural Model Assessment of Urban-VAM Using PLS-SEM

Source: Authors' data processing, 2026.

The results of the analysis using the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach indicate that the Urban Value-Based Adoption Model (Urban-VAM) has good explanatory capability in explaining electric vehicle purchase decisions at Wuling Motors in Pontianak City. Based on Figure 2, all indicators demonstrate outer loading values that meet the criteria for convergent validity, indicating that they are able to appropriately reflect their respective latent constructs.

In addition, the R^2 values demonstrate the model's ability to explain variations in the endogenous constructs, namely Perceived Value and Purchase Decision.

The coefficient of determination (R^2) indicates that Perceived Value is explained by 76.8% through Perceived Benefits, Perceived Sacrifices, and related factors. Meanwhile, Purchase Decision has an R^2 value of 56.7%, indicating that the model is capable of explaining more than half of the variation in electric vehicle purchase decisions.

Structurally, Perceived Benefits represents the construct with the strongest contribution in forming Perceived Value ($f^2 = 0.449$; large effect size) and influences purchase decisions both directly and indirectly through Perceived Value. This finding indicates that electric vehicle consumers in Pontianak tend to form their value perceptions based on the benefits obtained from electric vehicle usage.

Furthermore, the qualitative component was employed to deepen and contextualize the quantitative findings, particularly for results that were not fully consistent with the initial hypotheses (H2, H4, and H6), through triangulation of perspectives from industry stakeholders, infrastructure and policy stakeholders, and electric vehicle users. Hypothesis testing was conducted using the bootstrapping method within the PLS-SEM approach to determine the significance of relationships among constructs in the Urban-VAM model. The results of testing direct effects, indirect effects, and moderation effects are presented in Table 1:

Table 1. Summary of Hypothesis Testing Results

Hypothesis	Hypothesis Statement	β	T	p	Empirical Result	Decision
H1	<i>Perceived Benefits has a positive effect on Perceived Value</i>	0.508	5.050	0.000	Positive and significant	Accepted
H2	<i>Perceived Sacrifices has a negative effect on Perceived Value</i>	0.268	3.338	0.001	Positive and significant	Rejected (opposite direction)
H3	<i>Perceived Value has a positive effect on Purchase Decision</i>	0.613	6.095	0.000	Positive and significant	Accepted
H4	Purchasing Power moderates (weakens) the effect of Perceived Sacrifices on Perceived Value	-0.019	0.964	0.335	Not significant	Rejected
H5	<i>Perceived Benefits has a positive effect on Purchase Decision through Perceived Value</i>	0.311	4.206	0.000	Positive and significant (mediation effect)	Accepted
H6	<i>Perceived Sacrifices has a negative effect on Purchase Decision through Perceived Value</i>	0.164	2.670	0.008	Positive and significant (mediation effect)	Rejected (opposite direction)

Source: Authors' data processing, 2026.

Based on Table 1, Perceived Benefits had a positive and significant effect on Perceived Value, while Perceived Value had a positive and significant effect on Purchase Decision. Furthermore, the mediating effect of Perceived Value on the relationship between Perceived Benefits and Purchase Decision was also found to be significant. Conversely, the moderating effect of Purchasing Power on the relationship between Perceived Sacrifices and Perceived Value was not significant. The findings

related to Perceived Sacrifices showed a different pattern from the initial hypothesis, as it demonstrated a positive direction toward Perceived Value and Purchase Decision through Perceived Value.

Perceived Benefits as the Main Driver of Perceived Value Formation

The results showed that Perceived Benefits had a positive and significant effect on Perceived Value. This finding indicates that consumers of Wuling electric vehicles in Pontianak City primarily formed their value perceptions based on the benefits obtained from electric vehicle usage. The qualitative findings supported this result by demonstrating that operational cost efficiency was the main attraction of electric vehicles. Informants from both industry representatives and electric vehicle users consistently explained that energy cost savings and maintenance efficiency were the main reasons consumers considered electric vehicles. Electric vehicles have lower operational costs because they do not require components such as engine oil, spark plugs, and combustion systems. This finding confirms that the usefulness dimension of Perceived Benefits played an important role in forming consumer value perceptions.

Perceived Sacrifices as a Trade-Off Evaluation Rather Than Merely a Barrier

One of the important findings of this study was that Perceived Sacrifices had a positive effect on Perceived Value. This finding indicates that consumer-perceived sacrifices were not always interpreted as negative factors. The interview results showed that consumers who seriously considered electric vehicles had a high awareness of various risks, such as limited SPKLU availability, range anxiety, and battery safety concerns. However, after receiving information and mitigation strategies from industry stakeholders, consumers understood that these sacrifices could be accepted because they were considered proportional to the benefits obtained. Therefore, in the context of electric vehicles, consumers conducted a comprehensive trade-off evaluation. Sacrifices did not always reduce perceived value; instead, they became part of the value formation process when consumers understood the solutions to existing risks. 3.2 *Perceived Sacrifices sebagai Evaluasi Trade-Off, Bukan Hambatan Semata*

Perceived Value as the Main Mechanism of Purchase Decision

Perceived Value was proven to be an important mechanism in explaining electric vehicle purchase decisions. Consumers not only considered the benefits of electric vehicles but also evaluated the balance between benefits, costs, risks, and changes in usage patterns. From the Urban-VAM perspective, Perceived Value functioned as a mechanism connecting consumer evaluations of electric vehicle characteristics with actual purchase decisions. This finding reinforced that electric vehicle adoption decisions represented an overall value evaluation process.

Purchasing Power and the Limitation of Its Role as a Moderating Factor

The results showed that Purchasing Power did not moderate the relationship between Perceived Sacrifices and Perceived Value. The qualitative findings explained that higher financial capability did not automatically eliminate technical barriers associated with electric vehicles. Limitations related to charging infrastructure,

driving range, and ecosystem readiness remained factors influencing consumer perceptions. This means that barriers to electric vehicle adoption were not solely related to purchasing ability but also to the readiness of supporting environments. However, Purchasing Power still influenced general value perceptions because stronger economic capability provided greater confidence for consumers when considering electric vehicle ownership.

Infrastructure and Technical Barriers in the Context of Urban Adoption

Infrastructure readiness was an important factor in shaping consumer perceptions of electric vehicles. Although the number of SPKLU facilities continued to increase, the distribution of charging facilities remained a concern, particularly for intercity travel and areas outside urban centers. This condition indicated that barriers to electric vehicle adoption did not only originate from individual perceptions but also from the readiness of the electric mobility ecosystem. Therefore, infrastructure development was an important component in strengthening electric vehicle adoption within urban contexts.

Contribution of Urban-VAM in the Context of Developing Cities

The comparison between Pontianak and Jakarta demonstrated that electric vehicle adoption mechanisms could not be directly generalized from metropolitan cities to developing cities. Adoption drivers and barriers had different characteristics depending on local social, economic, policy, and infrastructure conditions. These findings strengthened the contribution of Urban-VAM by demonstrating that electric vehicle purchase decisions in urban contexts were influenced by the interaction between consumer value perceptions and contextual environmental factors. Therefore, this study contributed theoretically to understanding green mobility technology adoption in developing urban contexts.

4. Conclusion

This study aimed to develop and examine the Urban Value-Based Adoption Model (Urban-VAM) in explaining electric vehicle purchase decisions at Wuling Motors in Pontianak City through a mixed methods approach with a sequential explanatory design. The findings showed that electric vehicle purchase decisions were primarily shaped by the mechanism of consumer-perceived value (Perceived Value) through the evaluation of benefits and sacrifices associated with electric vehicle technology. The findings demonstrated that Perceived Benefits had a positive and significant effect on Perceived Value, confirming that functional benefits, operational cost efficiency, and usage value were key factors in shaping consumer perceptions of electric vehicles. Furthermore, Perceived Value was proven to be the dominant factor influencing purchase decisions, indicating that consumers not only considered product characteristics but also evaluated the balance between benefits and consequences before making decisions.

This study also found that Perceived Sacrifices had a significant effect on Perceived Value with a positive relationship direction that differed from the initial hypothesis. This finding indicated the existence of a high-involvement trade-off mechanism, where consumers with high interest in electric vehicles continued to consider existing risks and limitations but perceived these sacrifices as part of the

process of obtaining long-term benefits. Furthermore, Purchasing Power was not proven to moderate the relationship between Perceived Sacrifices and Perceived Value, indicating that electric vehicle adoption decisions were influenced not only by economic capability but also by the readiness of supporting ecosystems, such as infrastructure availability and usage conditions.

Theoretically, this study contributed to the development of green technology adoption models by extending the application of VAM through the Urban-VAM approach in developing urban contexts. Practically, the findings provided implications for automotive industries, local governments, and stakeholders to strengthen communication regarding electric vehicle benefits, improve infrastructure readiness, and develop a green mobility ecosystem that supports wider electric vehicle adoption.

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