CHAPTER II :
RESEARCH FRAMEWORK

2.1. Electric Vehicles: An Overview

According to Denton and Pells (2024), there are three types of electric vehicle. They are PEV, HEV and PHEV.

Pure electric vehicles (PEVs), also known as battery electric vehicles (BEVs) or simply electric vehicles (EVs), use a battery instead of a fuel tank and an electric motor instead of an internal combustion engine (ICE). These vehicles run solely on electricity and need to be plugged in for recharging. They produce no tailpipe emissions. Most modern EVs can travel between 100 to 300 miles on a single charge. Examples include the Nissan LEAF, Volkswagen ID.3/ID.4, Jaguar I-Pace, Audi Q4 e-tron, and Tesla Model 3.

Hybrid electric vehicles (HEVs) use both an internal combustion engine and one or more electric motors that draw power from batteries. This combination allows HEVs to offer the advantages of good fuel efficiency and lower tailpipe emissions, while still providing the power and driving range of conventional vehicles. Standard HEVs cannot be recharged from an external power source; instead, they recharge their batteries through regenerative braking and the internal combustion engine. Examples of popular HEVs include the Toyota Prius, Honda CR-V, and BMW 3 Series. These vehicles effectively blend traditional vehicle performance with enhanced fuel economy and environmental benefits.

Plug-in hybrid electric vehicles (PHEVs) feature a battery, an electric drive motor, and an internal combustion engine (ICE). These vehicles can operate using the ICE, the electric motor, or a combination of both. One of the key advantages of PHEVs is that they can be recharged from an external power source, allowing them to drive purely on electric power for 20 to 50 miles. When the battery is depleted, the vehicle seamlessly switches to hybrid mode, utilizing both the ICE and electric motor, thus eliminating any range anxiety. Notable examples of PHEVs include the Mitsubishi Outlander PHEV, BMW 330e, and Volkswagen Golf GTE.

Range-extended electric vehicles (E-REVs) are a specialized type of PHEV. They include an internal combustion engine and generator specifically designed to recharge the battery once it is depleted. This setup ensures that the vehicle can continue running on

electric power for longer distances. An early example of an E-REV was the BMW i3, though new models of this type are no longer available.

Table 2. List of Major Electric Vehicles that are available in Indonesia (by July 2024)

No	Brand	Brand Origin	Model	Type	Price Range OTR Jakarta
1	KIA	Korea	Kia EV 9	BEV	Rp 1.555.000,000 - Rp 1.985.000,000
			Kia EV 6	BEV	Rp 1.299.000.000 - Rp 1.699.000.000
2	Hyundai	Korea	Ioniq 5	BEV	Rp 782.000.000 - Rp 990.000.000
			Ioniq 6	BEV	Rp 1.220.000.000
			Kona EV	BEV	Rp 499.000.000
3	AION	China	Aion Y Plus	BEV	Rp 415.000.000
			Aion ES	BEV	Rp 386.000.000
			Hyptech HT	BEV	Rp 685.000.000
4	Citroen	France	Citroen E-C3	BEV	Rp 377.000.000 - Rp 382.000.000
5	DFSK	China	Seres E1	BEV	Rp 189.000.000 - Rp 219.000.000
6	Nissan	Japan	All New Serena e-Power C28	HEV	Rp 635.000.000 - Rp 639.500.000
			Kicks e-Power	HEV	Rp 519.000.000
			Leaf	BEV	Rp 738.000.000
7	Honda	Japan	CR-V e:HEV	HEV	Rp 814.400.000
			All New Accord RS e:HEV		Rp 959.900.000
8	Wuling	China	Air EV	BEV	Rp 209.000.000 - Rp 302.000.000
			Bingou EV	BEV	Rp 348.000.000 - Rp 408.000.000
			Cloud EV	BEV	Rp 438.000.000

No	Brand	Brand Origin	Model	Type	Price Range OTR Jakarta
9	Suzuki	Japan	All New Ertiga Hybrid	HEV	Rp 276.000.000 - Rp 301.800.000
			XL7 Beta/Alpha Hybrid	HEV	Rp 287.000.000 - Rp 310.000 000
			Grand Vitara Hybrid	HEV	362.000.000 - Rp 396.400.000
10	MG	China	MG4 EV	BEV	Rp 395.000.000
			MG ZS EV	BEV	Rp 413.000.000
			MG VS Hybrid	HEV	Rp 389.000.000
11	Neta	China	Neta V	BEV	Rp 317.000.000
			Neta V-II	BEV	Rp 299.000.000
			Neta X	BEV	Rp 428.000.000
12	Toyota	Japan	Yaris Cross HV	HEV	Rp 440.600.000 - Rp 453.950.000
			Kijang Innova Zenix HV	HEV	Rp 551.600.000 - Rp 620.750.000
			RAV4 GR-S PHEV	PHEV	Rp 1.150.000.000
			New Alphard 2.5 Hybrid	PHEV	Rp 1.710.800.000
13	BMW	German	i4 eDrive35	BEV	Rp 1.835.000.000
			iX1 eDrive20 M Sport	BEV	Rp 1.337.000.000
			iX xDrive40 Sport	BEV	Rp 2.483.000.000
			iX xDrive50 Sport	BEV	Rp 2.665.000.000
			i7 xDrive60	BEV	Rp 3.285.000.000 - Rp 3.330.000.000
14	Mercedes-Benz	German	EQA	BEV	Rp 1.540.000.000
			EQB	BEV	Rp 1.655.000.000
			EQE Saloon	BEV	Rp 2.300.000.000

No	Brand	Brand Origin	Model	Type	Price Range OTR Jakarta
			New EQE SUV	BEV	Rp 2.850.000.000
			EQS Saloon	BEV	Rp 2.984.000.000 - Rp 3.500.000.000
			EQS SUV	BEV	Rp 3.650.000.000

Source: Compile by authors

Table 2 shows a variety of electric vehicle (EV) options available in Indonesia as of July 2024, including both luxury brands like BMW and Mercedes-Benz, and more affordable options from Chinese brands such as DFSK and Neta. Established players like Toyota, Honda, Nissan, and Hyundai also offer a wide range of models. New entrants, such as Aion and MG from China, are actively entering the market. The majority of the listed vehicles are battery electric vehicles (BEVs), making up 61.4% of the total models, showing a growing shift towards fully electric cars. Hybrid electric vehicles (HEVs) make up 34.1%, while plug-in hybrids (PHEVs) account for just 4.5%, reflecting that hybrids remain a popular intermediate option for consumers.

The price range varies widely across different brands. The most affordable model is the DFSK Seres E1, priced at IDR 189 million, while the most expensive is the Mercedes EQS SUV, priced at IDR 3.65 billion. Luxury brands like BMW and Mercedes-Benz dominate the high-end market with models ranging from IDR 1.54 billion to IDR 3.65 billion. Korean brands, such as Hyundai and Kia, offer models between IDR 499 million and IDR 1.985 billion. Japanese brands, including Toyota, Honda, and Nissan, provide options from IDR 276 million to IDR 1.71 billion, while Chinese brands like Wuling and Neta focus on more affordable EVs, with prices between IDR 189 million and IDR 428 million.

2.2. Theoretical Review

Research theories operate within a hierarchical structure that encompasses three distinct levels of abstraction and practical application, each serving different purposes in academic inquiry (Creswell and Creswell, 2023:47). Understanding this hierarchy is crucial for positioning specific research within the broader landscape of theoretical frameworks and ensuring appropriate theoretical foundations for empirical studies.

At the highest level of abstraction, grand theories provide comprehensive frameworks that explain universal principles within specific disciplines. These theories are characterized by their broad, philosophical nature, serving as foundational perspectives rather than precise empirical tools (Sugiyono, 2013). In the context of this research, Customer Perceived Value (CPV) Theory, serves as the grand theory, offering a comprehensive framework for understanding how consumers evaluate products and services through systematic assessment of benefits and sacrifices.

The intermediate level comprises middle-range theories, which bridge the gap between abstract conceptualization and practical implementation (Sekaran and Bougie, 2016). These theories maintain sufficient breadth while focusing on specific phenomena, making them applicable across various contexts. In this study, the Unified Theory of Acceptance and Use of Technology (UTAUT) represents the middle-range theoretical framework, examining specific mechanisms such as facilitating conditions that discuss on infrastructure availability, and government incentives that influence technological adoption. This theoretical positioning allows for a more focused examination of consumer behavior in technological adoption scenarios while maintaining connections to broader value concepts.

At the most specific level, applied theories address concrete problems within particular contexts, often drawing upon insights from both grand and middle-range theories (Marcoulides, 1998). These theories are distinguished by their direct practical applicability and focus on measurable outcomes in real-world scenarios (Sugiyono, 2013). The current research operationalizes its theoretical framework at this level by examining specific hypotheses about electric vehicle (EV) purchase intentions in Indonesia. This practical application combines elements from both CPV theory and UTAUT to investigate how various factors, including marketing initiatives, facilitating conditions, perceived benefits, and potential risks, influence consumer decision-making in the EV market. Marketing efforts play a crucial role at this level, as they represent concrete actions that can be measured and evaluated in terms of their impact on consumer perceptions, attitudes, and purchase intentions. These marketing initiatives, alongside facilitating conditions, perceived benefits, and potential risks, form an integrated framework for understanding the factors that drive EV adoption in the Indonesian market context

2.2.1. Consumer Perceived Value

Customer Perceived Value (CPV) theory represents a fundamental framework in marketing that explains how customers evaluate products and services based on their perception of benefits received versus sacrifices made. Originally developed from Zeithaml's (1988) seminal work, the theory proposes that customers make purchase decisions by weighing what they get (benefits) against what they give up (sacrifices/risks), rather than simply considering objective product features or price alone. This evaluation process is inherently subjective and context-dependent, meaning different customers may perceive different value from the same offering depending on their individual circumstances, preferences, and the consumption situation. The theory has evolved from a simple benefits-versus-sacrifices calculation to recognize multiple dimensions of both positive and negative utilities, including functional, emotional, and social aspects on the benefits side, and monetary costs, time, effort, and various risks on the sacrifices side.

In its development, the theory explains the relationship between perceived benefits, perceived risks and perceived value as follows:

a. Perceived Benefits

Perceived benefits refer to the value that customers perceive in a product or service offered by a firm. This includes the overall evaluation of the benefits, both tangible and intangible, that the customer believes they will receive from using the product or service. Customers do not simply purchase products for their physical attributes but for the promise of what those products will deliver in terms of satisfaction, image, reputation, or functional superiority compared to alternatives (Hollensen, 2020:116).

Study by Hu et al. (2023) on consumers' value perception and intention to purchase electric vehicles define perceived benefits in the context of consumer value perception include financial benefit, environmental benefit, and psychological benefit. Financial benefit refers to the cost savings over the life cycle that consumers can achieve by adopting electric vehicles (EVs), such as lower operating costs compared to traditional gas-powered cars. Environmental benefit is related to the positive impact of EVs on the environment, including reducing oil dependence and exhaust emissions. Psychological benefit refers to the emotional satisfaction and comfort that consumers derive from adopting and using EVs. These perceived benefits play a significant role in forming consumers' value perceptions of EVs, ultimately influencing their willingness to purchase electric vehicles. Additionally, financial, environmental, and psychological benefits have

been shown to positively impact the perceived value of electric vehicles, with financial benefit having a particularly significant effect (Hu et al. 2023:8).

b. Perceived Sacrifices or Risks

On the other hand, perceived sacrifice or risk is the uncertainty that consumers face when making a purchase decision. This includes the perceived costs, both monetary and non-monetary, that customers believe they will incur in finding, acquiring, and using a product or service (Hollensen, 2020:112). Perceived risk can stem from various factors such as functional risk (product performance), physical risk (potential harm), financial risk (cost versus value), psychological and social risk (consumer ego), and time risk (wasted time in the decision-making process) (Schiffman and Wisenblit, 2019:135-136).

Table 3. The Elements of Perceived Risk*

Type of Perceived Risk	Definition	Example
Functional risk	Product will not perform as expected.	Can the e-book reader operate a whole day without having to be recharged? Will the electric engine perform as promised?
Physical risk	Product can harm self and others; risk to self and others.	Is organic unpasteurized milk safe to drink? (Many states do not permit unpasteurized milk, but many greenmarkets carry it because it is organic.) The electric car's breaks are excellent.
Financial risk	Product will not be worth its cost.	Will a new and cheaper model of an LED TV monitor become available six months from now? Will I save money on gas if I buy an electric car?
Psychological and social risk	Poor product choice will bruise the consumer's ego.	Will I be embarrassed when my friends see me with a mobile phone that is not a smartphone? If I buy an electric car, I will not be polluting the environment.
Time risk	Time spent in product search may be wasted if the product does not perform as expected.	Will I be forced to compare all the different carriers' calling plans again if I experience a lot of dropped calls with the one I selected? I will save time by not having to buy gas if I but the electric car.

*cite from Schiffman and Wisenblit, 2019:136

c. Perceived Value

Consumer perceived value refers to the overall assessment or evaluation that consumers make regarding the utility or benefits they receive from a product or service in relation to the resources, whether monetary, time, effort, or psychological, that they invest to obtain those benefits (Schiffman and Wisenblit, 2019:42). This evaluation can be influenced by various factors such as the quality of the product, the level of service provided, the brand image, and how the product/service meets their needs and expectations (Kotler and Armstrong, 2016:326). It is the customer's subjective assessment of whether the benefits outweigh the sacrifices made in obtaining the product or service. Essentially, it is the perception of the value received in relation to the cost paid (Hollensen, 2020).

Schiffman and Wisenblit explain that in the studies of consumer behavior, perceived value plays a significant role as it determines whether customers feel that the benefits they receive from a product or service are worth the resources they invest in obtaining it. This perceived value is the trade-off between the perceived benefits or quality of the product and the perceived sacrifice, both monetary and non-monetary, required to acquire it (Schiffman and Wisenblit, 2019:144). The perceived value of a product or service is crucial in shaping consumers' purchase intentions and behavior (Hu et al., 2023:2).

Recent meta-analyses by Blut et al., (2018) have validated that this comprehensive view of CPV, incorporating both multidimensional benefits and sacrifices along with overall value assessment, provides the strongest explanation for customer decision-making and behavioral outcomes like satisfaction and loyalty that pictured in the diagram below.

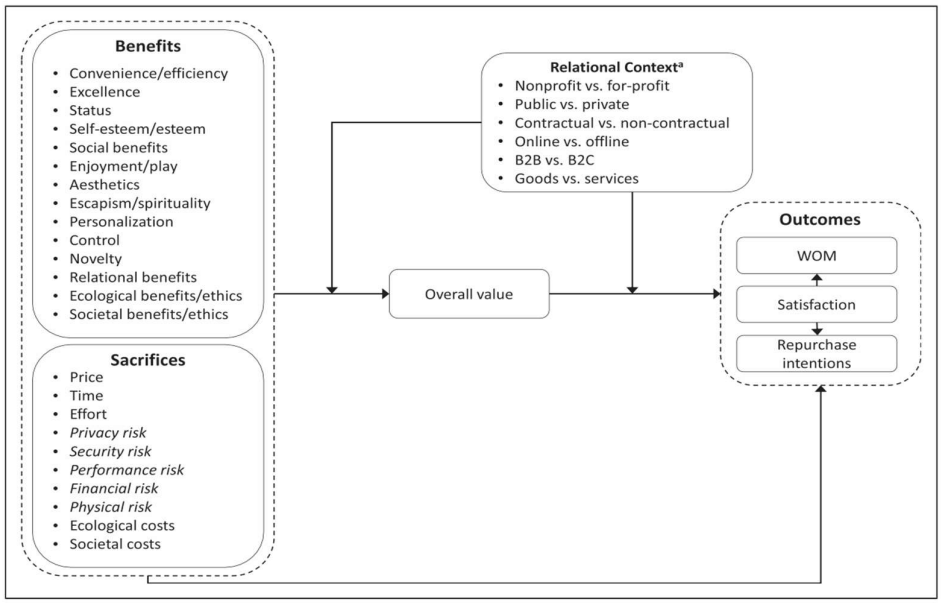

Figure 5. Conceptual Model of Customer Perceived Value by Blut et al. (2023)

The diagram in figure 5, illustrates the comprehensive framework of Customer Perceived Value (CPV) and its relationships with various components and outcomes. At its core, overall value is determined by two main categories: benefits and sacrifices. The benefits encompass 14 different dimensions, ranging from functional aspects like convenience and excellence to psychological elements such as self-esteem and social benefits, while sacrifices include both monetary (price) and non-monetary factors like time, effort, and various types of risks. The model shows how overall value is influenced

by six different relational contexts, including business settings (B2B vs. B2C), operational modes (online vs. offline), and organizational types (nonprofit vs. for-profit). This overall value assessment then leads to three key customer outcomes: satisfaction, word-of-mouth (WOM), and repurchase intentions, with satisfaction potentially influencing both WOM and repurchase intentions. Notably, the framework suggests that both benefits and sacrifices can directly affect repurchase intentions, indicating the complexity of customer decision-making processes in different contextual settings.

From the above explanation, perceived benefits represent the perceived value or benefits that customers expect to gain from a product or service, while perceived sacrifice or risk refers to the uncertainties and costs associated with the decision to acquire and use that product or service. These two factors play a crucial role in influencing consumer perceived value, consumer behavior, and purchase decisions in the market. The way customers evaluate this trade-off significantly influences key outcomes including satisfaction, word-of-mouth recommendations, and repurchase intentions, making it crucial for organizations to understand and manage customer value perceptions effectively.

2.2.2. Consumers Purchase Intention

Consumer purchase intention refers to the likelihood that an individual will engage in a specific action or behavior related to purchasing a product or service. It is a crucial aspect of consumer behavior as it reflects the individual's mindset towards making a purchase decision (Schiffman and Wisenblit, 2019:177). In consumer research, purchase intention is often used as a predictor of actual buying behavior (Cannon, Perreault, and McCarthy, 2024:134).

Consumers form their purchase intention based on various factors such as their attitudes towards the product or brand, their perceptions of value, their expectations, and external influences like social norms or marketing messages (Kotler and Armstrong, 2016:185).

The evaluation stage in the consumer decision-making process is where consumers rank brands and form their purchase intentions. However, several factors can influence this intention, including the attitudes of others and unexpected situational factors (Kotler and Armstrong, 2016:170).

In the context of Consumer Perceived Value Theory, purchase intention is significantly influenced by the perceived value that consumers associate with a product.

This perceived value encompasses the benefits that consumers expect to receive from the product relative to the costs they incur, including monetary, time, and effort costs. When consumers perceive that the benefits outweigh the costs, their intention to purchase increases (Blut et al. 2023).

Marketers play a significant role in influencing consumer purchase intention through understanding consumer behavior, identifying what evaluative processes consumers go through, and taking steps to shape the buyer's decision.

2.2.3. Facilitating Condition of The UTAUT Theory

The Unified Theory of Acceptance and Use of Technology (UTAUT), represents a significant advancement in understanding technology adoption patterns. Developed to provide a comprehensive framework, UTAUT model, as shown in Figure 6, integrates eight distinct technology acceptance theories into a unified model that explains up to 70% of variance in usage intention (Venkatesh et al., 2003). What sets UTAUT apart from its predecessors is its ability to simultaneously capture individual perceptions and organizational context through four key determinants: performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh et al., 2003).

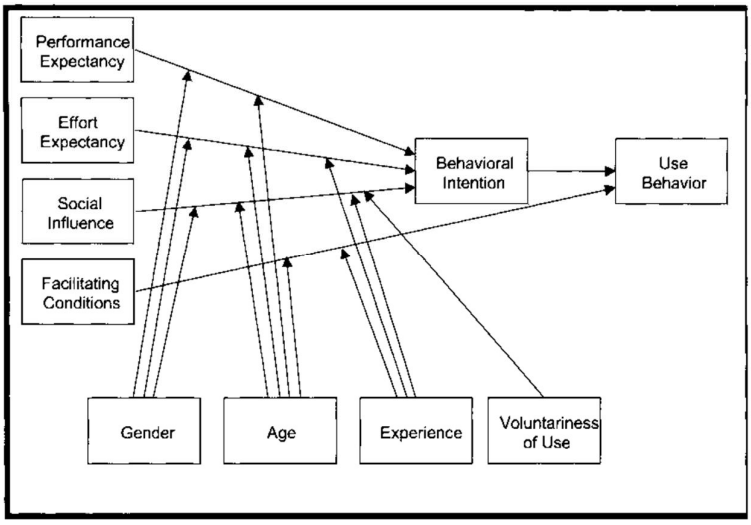

Figure 6. The UTAUT Model

Within the UTAUT framework, Facilitating Conditions emerges as a crucial construct, defined as "the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system" (Venkatesh et al., 2003). This construct's theoretical foundation draws from three distinct sources: perceived behavioral control from TPB/DTPB, facilitating conditions from MPCU, and

compatibility from IDT. What makes Facilitating Conditions particularly significant is its dual role as both a direct determinant of usage behavior and a moderating influence on user adoption patterns, with its effects becoming more pronounced among older workers and those with increasing technology experience (Venkatesh et al., 2003).

In the context of electric vehicle (EV) adoption, Facilitating Conditions encompasses several critical elements. These include the availability of charging infrastructure, government incentives and supportive policies, and access to technical assistance and information resources (S. Wang et al. 2018; Dutta and Hwang 2021). The importance of these supporting elements becomes evident in their role in reducing perceived barriers to EV usage, such as range anxiety (He et al., 2018). This practical dimension of Facilitating Conditions directly influences users' decision-making processes regarding technology adoption.

The selection of Facilitating Condition as a research variable holds particular significance for several compelling reasons. First, unlike other UTAUT constructs that primarily focus on individual perceptions, Facilitating Conditions uniquely captures the essential role of organizational and technical support infrastructure in technology adoption. Second, empirical evidence has consistently demonstrated its significant direct effect on usage behavior, with this effect strengthening as users gain experience with the technology (Venkatesh et al., 2003:466). Furthermore, the construct has exhibited robust measurement properties across various organizational contexts, maintaining consistent reliability and validity measures (Venkatesh et al., 2003:454). This becomes especially relevant in mandatory use settings, where organizational support and infrastructure play decisive roles in ensuring successful technology implementation (Venkatesh et al., 2003:468).

For researchers and practitioners in the EV adoption field, understanding Facilitating Conditions provides actionable insights. The construct helps identify and address practical barriers to adoption, enabling policymakers and manufacturers to develop more effective strategies for enhancing EV adoption rates. This understanding can guide the development of targeted interventions, from improving charging infrastructure to designing more effective incentive programs, ultimately contributing to broader sustainable transportation goals.

2.2.4. Marketing Efforts

Marketing effort refers to the resources, activities, and initiatives undertaken by a company to promote its products or services, attract customers, and drive sales. This includes expenses associated with sales efforts, market communications, customer service, and market management in order to implement a marketing strategy designed to achieve a certain level of market share (Hollensen, 2020:714). The goal is to create, communicate, and deliver value to customers while also achieving the organization's business objectives (Kotler et al., 2019). Essentially, marketing effort is the overall investment made by a company to reach its target audience, build brand awareness, and ultimately drive revenue and profits.

Marketing efforts in the context of electric vehicle (EV) sales can be operationally defined as the strategic activities and promotional actions implemented by dealerships and marketers to enhance consumer awareness, interest, and adoption of EVs. This includes using influencer marketing, mass media campaigns, and focused promotional events to draw attention to the technological, financial, and environmental advantages of electric vehicles. For example, a study analyzing mass media's role in EV promotion found that media campaigns often portray EVs as environmentally friendly, technologically advanced, and cost-effective, significantly influencing public perception and purchase decisions (Zewitra, Bakhti, and Nugraha, 2023). Additionally, influencer marketing has emerged as a powerful tool, with research indicating that consumers place higher trust in influencers' endorsements compared to celebrity endorsements, further amplifying the impact of marketing efforts (Pankaj and Yadav, 2023).

Marketing efforts are closely linked to the marketing mix because they involve implementing and optimizing these four elements to achieve marketing objectives. For example, a company's advertising campaign (promotion) is designed to communicate the unique value of its product (product) to target customers through various channels (place) at a price point that is competitive and attractive (price) (Cannon, Perreault, and McCarthy, 2024:406).

According to N. Wang, Tang, and Pan (2018), EV marketing strategies, including after-sales service, advertising, purchasing channels, and brand influence, play a key role in the effectiveness of marketing. To improve marketing outcomes, companies should focus on enhancing the quality of after-sales service and attractive advertising campaigns. Additionally, expanding purchasing channels will make the buying process easier, and

offering a wider variety of brands and EV models will give consumers more options to meet their needs.

With the above explanation, we can see that marketing efforts focus on leveraging the marketing tools to create a cohesive and effective strategy for reaching and engaging with customers, driving sales, and ultimately building a strong brand presence in the market.

2.3. Previous Research

To understand the factors influencing the purchase intention of electric vehicles (EVs) in Indonesia, we reviewed some previous studies. Table 4. below summarizes key research findings that have explored the different aspects of EV adoption, such as perceived benefits, perceived risks, perceived value, facilitating conditions, and marketing efforts. These studies provide a foundation for our investigation into the causal relationships between these factors and how they impact the decision to purchase EVs in Indonesia.

Table 4. List of Previous Research

Title, Authors	Method and Analysis	Conclusion / Findings
Consumer preferences for electric vehicles: a literature review. Fanchao Liao, Eric Molin & Bert van Wee. (2016) https://doi.org/10.1080/01441647.2016.1230794	Literature Review, analyzing findings from 687 articles across multiple databases, synthesizing empirical evidence about consumer preferences for electric vehicles while focusing on comparing different methodological approaches and identifying key variables that influence EV adoption.	- Research found that financial, technical, and infrastructure attributes of electric vehicles (EVs) significantly influence consumer preferences, with tax reductions proving most effective among policy incentives and charging infrastructure availability playing a crucial role in adoption. - While psychological factors showed consistent effects on EV preferences across studies, other individual characteristics like socio-economic variables produced mixed results, suggesting a need for more rigorous research on personal factors influencing EV adoption decisions.

Title, Authors	Method and Analysis	Conclusion / Findings
Factors Influencing Battery Electric Vehicle Adoption in Thailand—Expanding the Unified Theory of Acceptance and Use of Technology's Variables Phasiri Manutworakit, Kasem Choocharukul. (2022) https://doi.org/10.3390/su14148482	- The study used a quantitative survey methodology with a sample of car owners in Bangkok and surrounding provinces in Thailand. - A pilot study of 40 respondents was conducted to refine the survey questionnaire. - The main study was conducted online from October to December 2021, with 412 responses received and 403 usable responses after data screening. - The data was analyzed using partial least squares structural equation modeling (PLS-SEM) with the WarpPLS 7.0 software. - Reliability and validity of the measurement model were tested using Cronbach's alpha, composite reliability, convergent validity, and discriminant validity.	- The extended UTAUT2 model had good explanatory power for battery electric vehicle adoption in Thailand, with performance expectancy, effort expectancy, social influence, hedonic motivation, and environmental concern positively influencing purchase intention, while facilitating conditions, price value, and policy measures did not significantly influence purchase intention. - Purchase intention was a strong predictor of use behavior.
Predicting Purchase Intention of Electric Vehicles in Hong Kong Mark Ng, M. Law, Serene Zhang (2018) https://doi.org/10.1016/j.ausmj.2018.05.015	- Structural equation modeling was used to develop a model and test hypotheses - An empirical study was conducted, with survey data collected from 205 Hong Kong respondents Structural equation modeling (SEM)	- Perceived value, trust in EVs, responsive efficacy, and willingness to pay had significant and positive influence on purchase intention of electric vehicles.
The impact of facilitating conditions on electric vehicle adoption intention in China: An integrated unified theory of acceptance and use of technology model Dingni Wang, Mucahit Ozden, Y. P. Tsang. (2023) DOI: 10.1177/18479790231224715	- Collected 348 survey responses - Analyzed the data using structural equation modeling Structural equation modeling	- The study provides more robust evidence of the positive moderating effects of price value on electric vehicle (EV) adoption intention in China. - The study found positive moderating effects of facilitating conditions between perceived risk and EV adoption intention, which fills a gap in the research area. - Performance expectations, social influence, and price value positively influence EV adoption intention, while perceived risk has a negative impact. - Age and gender significantly moderate EV adoption intention.
Consumer Motivation by Using Unified Theory of Acceptance and Use of Technology towards Electric Vehicles Haider Ali Abbasi, Satirenjit Kaur Johl, Zullina Bt Hussain Shaari, Wajiha Moughal, Muhammad Mazhar, Muhammad Ali Musarat, Waqas Rafiq, Asaad Salam Farooqi and Alexey Borovkov. (2021) https://doi.org/10.3390/su132112177	- The study used a survey methodology, where a questionnaire was sent to 500 respondents, of which 199 were valid. - A pilot study was conducted on 50 respondents, and the questionnaire was modified and validated based on feedback. - The questionnaire was delivered online, targeting high-income respondents in Malaysia, as the price of electric vehicles is quite high. - Partial Least Squares-based Structural Equation Modeling (PLS-SEM) was used for confirmatory factor analysis.	- Factors related to consumer motivation, such as effort expectancy, social influence, technophilia, and perceived environmental knowledge, significantly influence purchase intention towards electric vehicles. - Performance expectancy was found to have an insignificant relationship with purchase intention. - The study expanded the UTAUT model by including perceived environmental knowledge and technophilia as additional factors influencing consumer motivation and purchase intention.

Title, Authors	Method and Analysis	Conclusion / Findings
Consumers' Intention to Purchase Electric Vehicles: Influences of User Attitude and Perception Z. A. Lashari, Joonho Ko, Jun-seok Jang Year: 2021 https://doi.org/10.3390/su13126778	- Questionnaire survey of 1500 potential consumers in major South Korean cities - Data analyzed using binary logistic regression and regression tree	- Environmental and economic perceptions about using EVs are the strongest predictors of intention to purchase EVs. - Technological concerns have a negative impact on EV purchase intentions.
The 4Ps of Marketing Mix and the Decision of Using Electrical Vehicles for Thai Consumer in Bangkok, Thailand. Sauwaluck Koojaroenprasit, Sumaree Pumpinyo. (2021) DOI: 10.5281/zenodo.5848595	Primary data collected through a questionnaire survey from 415 respondents—224 existing EV users and 191 intending users. The study used t-statistics to test differences between two groups regarding marketing mix (4Ps).	Results showed no significant difference between the two groups across the 4Ps of the marketing mix. Both groups emphasized high-quality products at a reasonable price. The study suggests the government should reduce EV import taxes to enhance adoption.
Perceived value and adoption intention for electric vehicles in Korea: Moderating effects of environmental traits and government supports. Moon-Koo Kim et al.(2018) https://doi.org/10.1016/j.energy.2018.06.064	Survey-based study with 285 drivers in Korea. Structural Equation Modeling (SEM) used to assess relationships. Environmental concern and government support were analyzed as moderators.	Identified perceived value as a significant predictor of EV adoption. Environmental traits and government support amplify the effect of perceived value. Charging risks and financial concerns were found to be key barriers to EV adoption.
Consumer purchase intention of electric vehicles in China: The roles of perception and personality. Xiuhong He, Wenjie Zhan, Yingying Hu. (2018) https://doi.org/10.1016/j.jclepro.2018.08.260	Survey conducted with 369 participants. The study used regression analysis to examine personality and perception effects on EV adoption intention.	Found that personal innovativeness and environmental concern influence purchase intention directly and through positive and negative perceptions. These findings highlight the importance of addressing both personality traits and perception in EV marketing.
Policy implications for promoting the adoption of electric vehicles: Do consumer's knowledge, perceived risk and financial incentive policy matter? Shanyong Wang et al. (2018) https://doi.org/10.1016/j.tra.2018.08.014	Used data from 320 participants to test an extended Technology Acceptance Model (TAM). Analyzed relationships among knowledge, perceived risk, and financial incentives with consumer intention.	Found that knowledge positively impacts consumer attitudes and intention, while perceived risk has a negative impact. Financial incentives did not show a significant effect on adoption intention, suggesting other psychological barriers are at play.

2.4. Conceptual Framework

The conceptual framework of this study is grounded in established theories in consumer behavior and technology acceptance research, including the Consumers

Perceived Value theory and the Unified Theory of Acceptance and Use of Technology (UTAUT).

As depicted in the model shown in Figure 7 below, the framework includes five key constructs: marketing effort, facilitating condition, perceived risk, perceived benefits, and EV perceived value, all of which ultimately influence EV purchase intention.

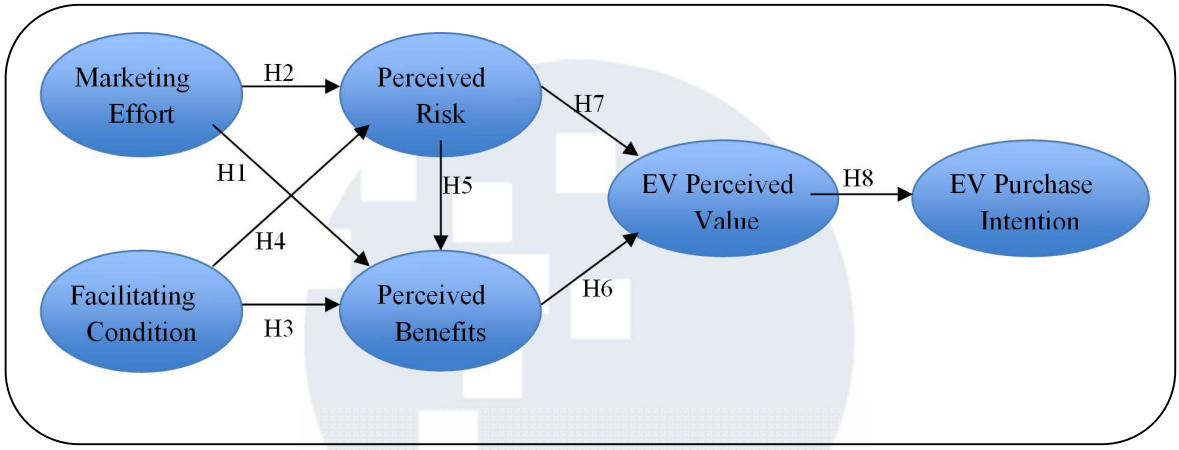

Figure 7: Research Conceptual Framework

Zeithaml's (1988) pioneering work on consumer perceived value, established the relationship between perceived benefits, perceived risks, and value perception. Building on this, Sweeney and Soutar (2001) further developed the framework by incorporating multiple dimensions of perceived value that influence purchase intentions (Blut et al., 2023).

The integration of marketing effort and facilitating condition constructs is derived from Venkatesh et al. (2003) Unified Theory of Acceptance and Use of Technology (UTAUT), which emphasizes the role of facilitating conditions in technology adoption. This was later reinforced by S. Wang et al. (2018) in their study, specifically focusing on electric vehicle adoption contexts.

The framework establishes relationships between marketing effort, facilitating condition, perceived benefits, and perceived risks, drawing from the work of Kim et al. (2018) who demonstrated the significant impact of marketing communications on consumer perceptions in sustainable technology adoption. Additionally, the connection between facilitation condition and perceived risks is supported by D. Wang, Ozden, and Tsang (2023), who found that government support and infrastructure development significantly reduce adoption barriers.

Marketing effort and facilitation condition are proposed to affect both perceived benefits and perceived risks of EVs. Effective marketing can highlight the advantages of EVs, thereby increasing perceived benefits, while also addressing concerns to reduce perceived risks. Facilitating condition such as government incentives and infrastructure development, enhances the perceived benefits and lowers perceived risks. These perceived benefits and risks then contribute to the overall perceived value of EVs, which directly influences the intention to purchase. This model helps identify the key drivers and barriers to EV adoption in Indonesia, providing valuable insights for policymakers and industry stakeholders.

By integrating those theories in the framework, the research can comprehensively examine the multifaceted nature of consumer decision-making in the context of EV adoption.

2.5. Hypothesis

Based on the above conceptual framework, the following hypotheses can be developed and explained as follows:

Marketing efforts by electric vehicle (EV) companies play a crucial role in informing and educating consumers about the various advantages of owning an EV (Garling and Thogersen, 2001). Through targeted marketing campaigns, companies can highlight the cost savings associated with lower fuel and maintenance costs, the positive environmental impact of reduced emissions, and the advanced technological features of EVs (Peters and Dütschke, 2014; Dillon et al., 2020). These marketing activities help to make them more attractive, beneficial and desirable. Based on that, we develop the hypothesis of:

H1: Marketing Effort has a positive effect on Perceived Benefits

Effective marketing efforts can also address and mitigate the perceived risks associated with EVs. By providing detailed information, addressing common concerns, and showcasing successful case studies, marketing campaigns can reduce worries about battery life, availability of charging infrastructure, and overall reliability (Bennett, Kottasz, and Shaw, 2016; Dillon et al., 2020). When consumers are well-informed and reassured through marketing efforts, their perceived risks decrease, leading to a more favorable view of EVs (Matthews et al., 2017). Thus, we proposed the hypothesis of:

H2: Marketing Effort has a negative effect on Perceived Risk

facilitating condition refers to external factors such as government incentives, availability of charging infrastructure, and supportive policies that can enhance the perceived benefits of EVs. When consumers see that there are adequate facilities and institutional support for EVs, they are more likely to perceive these vehicles as beneficial (Coffman et al., 2017). For instance, tax rebates, subsidies, and a robust network of charging stations can significantly increase the attractiveness of EVs by making them more convenient and cost-effective to own and operate (Jenn et al., 2020). Thus, we proposed the hypothesis of:

H3: Facilitating Condition has a positive effect on Perceived Benefits

Adequate facilitating condition can also reduce the perceived risks associated with EVs. When there is a well-developed infrastructure for charging, clear government policies, and financial incentives, consumers feel more confident about the reliability and convenience of using EVs (Han et al., 2017; Wang et al., 2018). These supportive measures can alleviate concerns about range anxiety, high upfront costs, and the availability of maintenance services, thereby decreasing the perceived risks (Lin, 2012; Pevec et al., 2020; Nazari et al., 2023). Thus, we developed the hypothesis of:

H4: Facilitating Condition has a negative effect on Perceived Risk

As the perceived risks associated with electric vehicles (EVs) increase, the perceived benefits of these vehicles decrease. Perceived risks can include concerns about battery life, availability of charging infrastructure, high initial purchase cost, and the potential for technical issues. When potential buyers are worried about these risks, they may overlook or undervalue the benefits of EVs, such as cost savings, environmental friendliness, and advanced technology. Addressing and mitigating perceived risks is crucial for enhancing the perceived benefits and, consequently, the overall value of EVs in the eyes of consumers (Liao et al., 2017; Wang et al. 2018; Dillon et al. 2020). Thus, we proposed the hypothesis of:

H5: Perceived Risk has a negative effect on Perceived Benefits

Perceived benefits are the positive aspects that consumers associate with owning an EV, such as cost savings, environmental benefits, and advanced technology. The more benefits consumers perceive, the higher the overall perceived value of the EV. When

consumers recognize significant advantages in terms of lower operational costs, positive environmental impact, and innovative features, they are more likely to view EVs as valuable and worthwhile investments (Hidrue et al., 2011; Han et al., 2017; Dillon et al., 2020). Thus, we proposed the hypothesis of:

H6: Perceived Benefits have a positive effect on EV Perceived Value

Perceived risk refers to the potential downsides or uncertainties that consumers associate with purchasing and using EVs. Higher perceived risks can lower the overall perceived value of EVs. If consumers are worried about potential issues such as limited driving range, high costs of battery replacement, or lack of charging stations, they are less likely to see EVs as valuable investments (Egbue and Long, 2012; Lim et al., 2015; Krishnamurthy, et al., 2022). Therefore, reducing perceived risks is crucial to enhancing the perceived value of EVs (Kim et al., 2018). Thus, we proposed the hypothesis of:

H7: Perceived Risk has a negative effect on EV Perceived Value

Perceived value is a critical determinant of purchase intention (Lashari et al., 2021). When consumers perceive high value in EVs, considering both the benefits and the reduced risks, they are more likely to have a strong intention to purchase one (Han et al., 2017; Huang and Qian, 2021). High perceived value indicates that consumers believe the benefits of owning an EV outweigh any potential drawbacks, leading to a higher likelihood of making a purchase (Kim et al., 2018). Thus, we proposed the hypothesis of:

H8: EV Perceived Value has a positive effect on EV Purchase Intention

These hypotheses provide a framework for investigating the causal relationships between marketing efforts, facilitating condition, perceived risks, perceived benefits, perceived value, and purchase intention in the context of electric vehicles in Indonesia. The findings from this research can offer valuable insights for policymakers and industry stakeholders to promote EV adoption and address the barriers to consumer acceptance.