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GOVERNMENT POLICY, PERCEIVED EASE OF USE, PERCEIVED USEFULNESS, ATTITUDE TOWARDS USE, AND INTENTION TO USE AFFECTING THE SUSTAINABILITY OF ELECTRIC VEHICLE USAGE IN BANGKOK

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Abstract

The electric vehicle (EV) industry is a high-value sector that merges the energy, automotive, and technology industries. Significant investments are required to develop products, services, and infrastructure to support the growth of electric vehicles. Electric cars are essential for Thailand, which has long been a production base for the automotive industry. However, the country faces challenges due to a lack of advanced technological knowledge and skilled personnel necessary for research and development aimed at commercial production. This study aims to1) examine the levels of government policy, perceived ease of use, perceived usefulness, attitude towards use, behavioral intention, and the sustainability of EV usage in Bangkok. 2) Investigate the influence of these factors on the sustainability of EV usage in Bangkok. 3) Develop a sustainability model for EV usage in Bangkok. This research adopts a mixed-methods approach, integrating quantitative and qualitative methods. For the quantitative part, the sample comprises 360 individuals who use fully electric vehicles registered under private car regulations for up to 7 passengers in Bangkok. The sample size was determined using a criterion of 20 times the number of observed variables, with a multi-stage sampling method, and data collected through questionnaires were analyzed using structural equation modeling. For the qualitative part, in-depth interviews were conducted with 20 key informants, including EV business operators and EV experts. The findings reveal that: 1) government policy, perceived usefulness, attitude towards use, behavioral intention, and the sustainability of EV usage in Bangkok are at high levels, while perceived ease of use is at a moderate level. 2) Government policy, perceived ease of use, perceived usefulness, attitude towards use, and behavioral intention significantly influence the sustainability of EV usage in Bangkok at the 0.05 significance level. 3) The developed model, named the 3PABS Model (P = Perceived Usefulness, P = Perceived Ease of Use, P = Public Policy, A = Attitude towards Use, B = Behavioral Intention to Use.) In addition, the qualitative results indicated that EV operators must incorporate modern technologies to monitor and manage vehicle status, adhere to international standards for high-performance products, provide excellent after-sales service, offer training on system usage via applications, and enhance safety and efficiency in driving. These findings can guide businesses in promoting the sustainable use of EVs in Bangkok in the future.

Keywords: Electric Vehicles (EVs) / Sustainability / Government Policy / Perceived Usefulness / Behavioral Intention.

INTRODUCTION

As Bangkok grapples with escalating air pollution and traffic congestion, the shift towards electric vehicles (EVs) has become increasingly relevant. Conventional vehicles, especially

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those with internal combustion engines, are a primary source of greenhouse gas emissions in urban areas, contributing significantly to both environmental degradation and public health issues (Singh & Choudhary, 2020; Zhang & Li, 2019). Air pollution levels in Bangkok often exceed recommended health standards, leading to respiratory illnesses and other health complications for the city's residents (WHO, 2021). The reliance on fossil fuels further exacerbates these issues by creating dependency on non-renewable energy sources, which are subject to price fluctuations and global supply issues (Johnson & Lee, 2019). Recognizing these challenges, the Thai government has introduced policies and initiatives aimed at promoting the adoption of EVs as part of a broader strategy to reduce the city's carbon footprint, improve air quality, and foster sustainable urban development (Department of Alternative Energy Development and Efficiency [DEDE], 2022).

The Thai government's approach to promoting EV adoption in Bangkok includes a mix of incentives, such as subsidies, tax reductions, and investments in EV infrastructure, specifically charging stations (Choi, 2020). These measures are intended to lower the barriers to EV ownership, making it more appealing for consumers who might otherwise be hesitant due to the initial cost and concerns about practicality (Wang, 2021). The government has also initiated programs aimed at incentivizing both manufacturers and consumers, aiming to create a robust ecosystem for EVs in Bangkok and across Thailand (Koh & Wong, 2021).

For instance, import tax reductions on EVs and subsidies for domestic manufacturers aim to boost the local EV market (Ministry of Energy, 2022). Furthermore, building an extensive charging infrastructure network is critical, as accessibility to reliable charging stations is a significant determinant of perceived ease of use, which affects consumer attitudes towards EVs (Chen & Zhang, 2021; Nguyen, 2022). Without sufficient infrastructure, potential users may feel apprehensive about EV ownership, fearing issues like limited range or difficulty in locating charging points, which could deter adoption (Thompson, Johnson, & Lim, 2018).

However, the success of these governmental initiatives depends on more than just policy support—it also hinges on the public's acceptance and willingness to transition from traditional vehicles to EVs (Lopez, 2021). Public perception and behavioral intention play an essential role in determining the uptake of EVs (Kumar, Sharma, & Singh, 2020). The Theory of Planned Behavior (TPB) and Technology Acceptance Model (TAM) suggest that perceived ease of use and perceived usefulness are critical factors influencing user acceptance of new technology (Davis, 1989).

In the context of EV adoption in Bangkok, perceived ease of use refers to how convenient and user-friendly EVs are in terms of daily operation, including factors like charging time, vehicle range, and access to charging infrastructure. Perceived usefulness, on the other hand, pertains to the benefits EVs bring, such as cost savings on fuel, reduced environmental impact, and alignment with sustainable living goals. For Bangkok residents to embrace EVs on a large scale, they need to feel that these vehicles not only meet their transportation needs effectively but also offer tangible benefits that justify switching from conventional vehicles (Bollen, 1989).

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In addition to government policy, several other factors play crucial roles in influencing the adoption of electric vehicles (EVs) in Bangkok. Perceived ease of use and perceived usefulness, central concepts in the Technology Acceptance Model (TAM), are significant determinants of consumer behavior toward new technologies (Davis, 1989). Perceived ease of use refers to the degree to which an individual believes that using EV technology will be free from effort. For instance, the convenience of using EVs—such as the availability of charging stations, ease of locating charging points, and short charging times—can increase public interest in EVs (Chen & Zhang, 2021; Nguyen, 2022). Without sufficient infrastructure, potential adopters might be reluctant to switch from conventional vehicles, as they may perceive EVs to be impractical for their daily commute, long-distance travel, or urgent trips (Choi, 2020).

The availability of charging infrastructure also affects users' perceptions of convenience and usability. Studies indicate that a well-distributed charging network is essential for alleviating range anxiety—one of the most significant barriers to EV adoption (Johnson & Lee, 2019). If drivers have easy access to charging stations in residential areas, workplaces, and public spaces, their concerns regarding the EV range will likely decrease, making EVs a more attractive option (Koh & Wong, 2021). This is particularly pertinent in Bangkok, where traffic congestion and long commutes might require frequent recharging for EVs with limited range (Sato & Nakamura, 2019). Furthermore, technological advancements in battery life and the speed of charging can enhance perceived ease of use, as newer models with faster-charging times and extended ranges make EVs more convenient and practical for users (Rodriguez & Patel, 2017).

Perceived usefulness, or the extent to which individuals believe that EVs will benefit their lives, is another critical factor. Potential users assess the economic and environmental advantages of EVs, such as fuel savings, reduced maintenance costs, and environmental sustainability (Wang, 2021). These perceived benefits can encourage a positive attitude toward EVs, especially among eco-conscious consumers concerned about air quality and carbon emissions (Lopez, 2021). Furthermore, when government policies align with consumer perceptions—such as through subsidies, tax incentives, and investments in clean energy infrastructure—the adoption rates are generally higher (Bollen, 1989; Davis, 1989). In Bangkok, government initiatives supporting EV adoption are often seen as a way to reduce urban air pollution and enhance public health, reinforcing the perceived usefulness of EVs as a sustainable choice (Kumar, Sharma, & Singh, 2020).

However, despite the perceived benefits, the long-term sustainability of EV adoption also depends on consumers' attitudes and intentions towards integrating EVs into their lifestyles (Thompson, Johnson, & Lim, 2018). Behavioral intention, as proposed by the Theory of Planned Behavior (TPB), is a predictor of whether individuals are likely to adopt EVs based on their attitudes, subjective norms, and perceived control over the decision (Ajzen, 1991). In Bangkok, social influences and cultural attitudes towards environmental responsibility play a role in shaping these behaviors. As public awareness of air pollution and climate change rises, residents may feel a greater moral obligation to adopt EVs as a means of reducing their environmental impact (Lee & Sun, 2020). Educational campaigns highlighting these issues can

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help shift social norms, encouraging more individuals to consider the long-term benefits of EV adoption for Bangkok's sustainability goals (Zhao & Yang, 2022). Finally, financial considerations impact the intention to use EVs. Although the initial cost of EVs is generally higher than that of conventional vehicles, government subsidies, tax reductions, and the lower operational costs of EVs over time can help offset these costs (Singh & Choudhary, 2020). Research shows that consumers are more likely to purchase EVs when they perceive these financial benefits, especially when coupled with the ecological benefits (Chong & Tan, 2018). To support this, the government and businesses in Bangkok could explore strategies like leasing options, incentives for early adopters, and partnerships with private sectors to enhance the affordability of EVs (Nguyen, 2022).

Moreover, the intention to use EVs is shaped by a complex interplay of personal attitudes, government incentives, and perceived benefits. For sustainable adoption, Bangkok residents must perceive EVs as not only beneficial for the environment but also practical and advantageous for their lifestyle. While the government can set the stage for EV adoption through subsidies, incentives, and infrastructure investments, individual attitudes and intentions will ultimately determine the degree of acceptance and usage. Consequently, examining how these factors interact to impact the sustainability of EV usage is critical for policymakers and industry stakeholders striving to promote sustainable transportation in Bangkok.

OBJECTIVES OF RESEARCH

1) Examine the levels of government policy, perceived ease of use, perceived usefulness, attitude towards use, behavioral intention, and the sustainability of EV usage in Bangkok.
2) Investigate the influence of these factors on the sustainability of EV usage in Bangkok.
3) Develop a sustainability model for EV usage in Bangkok.

RESEARCH METHODOLOGY

1. Population and Sample Scope

1.1 Population

The population in this research comprises users of car brands that exclusively sell electric-fuel vehicles and are registered with the Land Transport Department under the law for private passenger cars with no more than 7 seats (Ry.1), specifically electric fuel type, in Bangkok as of October 31, 2023. These users are classified by brand as follows: 1) BYD, 2) NETA, 3) MG, and 4) TESLA, totaling 34,884 cars (Transport Statistics Group, Planning Division, Department of Land Transport, 2023) (Transport Statistics Group, Planning Division, Department of Land Transport, June 30, 2023).

1.2 Sample Group

The sample group in this research consists of users of car brands that exclusively sell electric-fuel vehicles and are registered with the Land Transport Department under the law for private

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passenger cars with no more than 7 seats (Ry.1), electric fuel type, in Bangkok as of October 31, 2023. These users are classified by brand as follows: 1) BYD, 2) NETA, 3) MG, and 4) TESLA. For quantitative research, the researcher determined the sample size based on the estimation of observation variables, using a ratio of 1 to 20. This research includes 18 observation variables, so the sample size is set at 360 individuals.

2. Scope of Variables

The variables in this research are of two types:

1) Endogenous Latent Variables: These include perceived benefits of use, attitudes towards use, behavioral intention to use, and the sustainability of using electric vehicles. Each variable consists of the following observable variables:

- **Perceived Benefits of Use:** 3 observable variables: 1) Flexibility, 2) Benefits, and 3) Effectiveness.
- **Attitudes Towards Use:** 3 observable variables: 1) Quality, 2) Cost, and 3) Trust.
- **Behavioral Intention to Use:** 3 observable variables: 1) Attention, 2) Satisfaction, and 3) Expectation.
- **Sustainability of Using Electric Vehicles:** 3 observable variables: 1) Economic, 2) Social, and 3) Environmental.

2) Exogenous Latent Variables: These are government policies and perceived ease of use, each with the following observable variables:

- **Government Policies:** 3 observable variables: 1) Policy Goals, 2) Policy Guidelines, and 3) Implementation Mechanisms.
- **Perceived Ease of Use:** 3 observable variables: 1) Usage, 2) Learning, and 3) Skills.

RESEARCH RESULT

Table 1: Statistical Symbols Used for Reporting Variables in the Research

Symbols and Abbreviations	Variable Description
Latent Variables	
PU	Perceived Usefulness
PEU	Perceived Ease of Use
PP	Public Policy
AT	Attitude towards Use
BU	Behavioral Intention to Use
SU	Sustainability
Observable Variables	
pu1	Flexibility
pu2	Benefits
pu3	Effectiveness
peu1	Usage
peu2	Learning

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peu3	Skills
pp1	Policy Goals
pp2	Policy Guidelines
pp3	Implementation Mechanisms
at1	Quality
at2	Cost
at3	Trust
bu1	Attention
bu2	Satisfaction
bu3	Expectation
su1	Economic
su2	Social
su3	Environmental

Presentation of General Information of the Respondents

For the presentation of the research data, the researcher explained the characteristics of the data collected through descriptive statistical analysis, which consisted of frequency distribution, mean, percentage, and standard deviation. The researcher divided the presentation of the research results into two parts: (1) the presentation of the results from the analysis of demographic data based on the general information of the respondents and (2) the presentation of the analysis of the respondents' opinions on each variable, which was used to analyze the structural equation model for this research. The questions used to examine the general information of all respondents included five items: gender, age, monthly income, education level, and occupation. Most of the respondents were male, totaling 297 individuals or 82.5 percent, followed by 63 females, or 17.5 percent. The mean age of the respondents was 38.5 years, with a standard deviation of 8.7 years.

Most respondents had a monthly income of more than 30,000 baht, accounting for 60.83 percent. This was followed by a monthly income of 15,001-30,000 baht, reported by 84 people or 23.33 percent, and income in the range of no more than 15,000 baht, reported by 57 people or 15.83 percent.

Most respondents had attained education beyond a bachelor's degree, totaling 339 individuals or 94.17 percent, followed by those with a bachelor's degree or lower, totaling 21 individuals or 5.83 percent. It was found that the majority of respondents worked in private companies, totaling 214 individuals or 59.44 percent, followed by self-employed individuals, totaling 76 people or 21.11 percent, civil servants or state enterprise employees, totaling 63 people or 17.5 percent, and students, totaling 7 people or 1.94 percent.

Results of the Study on the Level of Variables Affecting the Sustainability of Electric Vehicle Use

General characteristics of the level of respondents' opinions were measured according to the scale of each variable. This research included six latent variables and 18 observable variables, initially identified based on a literature review. There may be a reduction in the number of observable variables if the factor loading value falls below the criterion after analysis.

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Initially, the observable variables are as follows:

1) Number of observable variables for the latent variable *Perceived Benefits*: 3 variables
2) Number of observable variables for the latent variable *Perceived Ease of Use*: 3 variables
3) Number of observable variables for the latent variable *Government Policy*: 3 variables
4) Number of observable variables for the latent variable *Usage Attitude*: 3 variables
5) Number of observable variables for the latent variable *Intention to Use*: 3 variables
6) Number of observable variables for the latent variable *Sustainability*: 3 variables

The researcher presented the characteristics of the data for each group of latent and observable variables through means and percentages, as shown in Tables 4.9 to 4.14.

After improving the model, it was found that the fit indices met the criteria as follows: $\chi 2$ = 369.069, df = 116, p-value = 0.000, $\chi 2$ / df = 3.182, GFI = 0.908, NFI = 0.907, IFI = 0.935, TLI = 0.913, CFI = 0.934, and RMSEA = 0.078. These results indicate a good fit with the empirical data. However, some indices of model fit did not fully meet the criteria proposed by Hair et al. (2010). Although the p-value is 0.000, the Relative Chi-square statistic, being a non-parametric statistic, is highly sensitive to the sample size. Therefore, other fit indices were considered. The revised fit indices, which met the standard criteria, are presented.

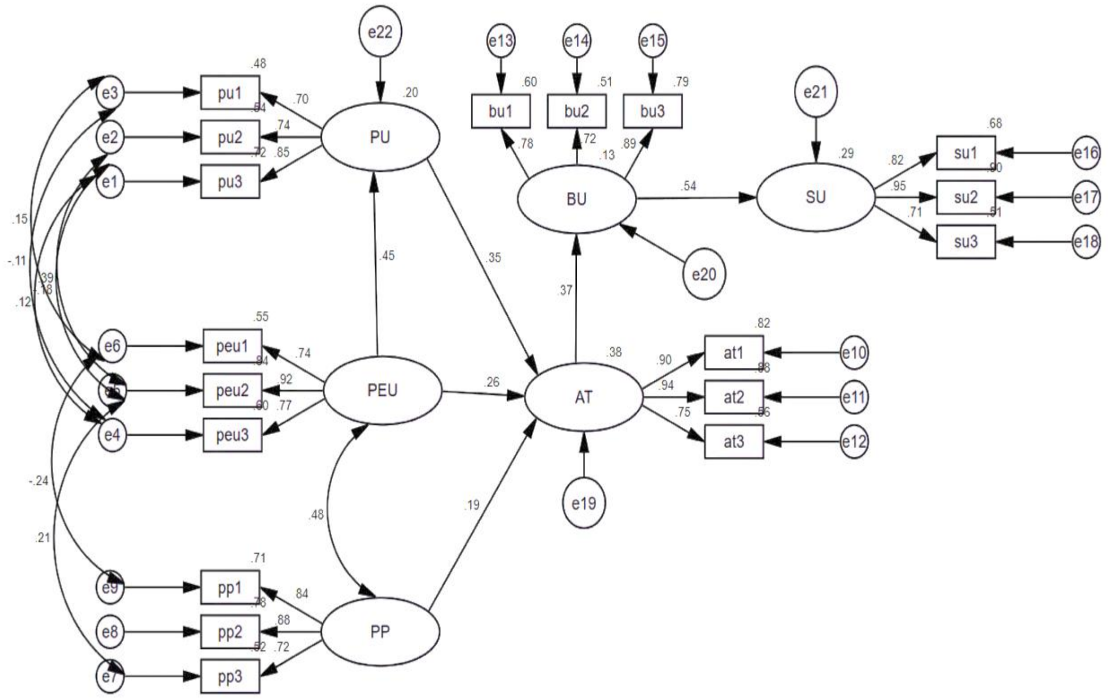

Figure 1: The results of the analysis of the improved structural equation modeling

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The revised model shows that the fit indices meet the established criteria, indicating a good fit with the empirical data. The results are as follows: χ2=369.069\chi^2 = 369.069χ2=369.069, df = 116, p-value = 0.000, χ2/df=3.182\chi^2 / df = 3.182χ2/df=3.182, GFI = 0.908, NFI = 0.907, IFI = 0.935, TLI = 0.913, CFI = 0.934, and RMSEA = 0.078. These values suggest that the model aligns well with the data according to several fit indices.

However, while the χ2\chi^2χ2 and p-value are statistically significant (with a p-value of 0.000), there is a cautionary note regarding the Relative Chi-square (χ^2/df) statistic. This non-parametric statistic is sensitive to sample size, so in cases of a large sample, the Relative Chi-square may not meet the standard criteria. Therefore, it is important to consider other fit indices, such as GFI, NFI, CFI, and RMSEA, which passed the standard thresholds. The GFI (Goodness of Fit Index) is 0.908, NFI (Normed Fit Index) is 0.907, and CFI (Comparative Fit Index) is 0.934, all of which demonstrate a satisfactory fit. Additionally, the RMSEA (Root Mean Square Error of Approximation) value of 0.078 falls within the acceptable range (0.05–0.08), further confirming the model's good fit.

To provide clearer interpretation and decision-making regarding the model, the researcher has presented these fit indices in Table 2, allowing for a comprehensive view of the model's fit and analysis.

Table 2: The results of the comparison of the calculated statistical values with the standard criteria to examine the consistency with the empirical data of the structural model after the improvement

Criteria	Defined Fit Criteria (Source)	Model Statistics	Evaluation Result
χ2 p-value	.05 (Bollen, 1989)	χ2 = 369.069, df = 116, p-value = 0.000*	Does not pass unconditionally
Relative χ2 (χ2/df)	5.00 (Bollen, 1989; Kline, 2016)	3.182	Pass
RMSEA	.08 (Hair et al., 1998)	0.078	Pass
GFI	.90 (Kelloway, 2015)	0.908	Pass
NFI	.90 (Diamantopoulos & Siguaw, 2000)	0.907	Pass
IFI	.90 (Tanaka, 1993)	0.935	Pass
CFI	.90 (Diamantopoulos & Siguaw, 2000)	0.934	Pass

Table 3: Results of estimation of parameters of direct effect, indirect effect and total effect from the adjusted structural equation model

(Dependent Variable)	R^2	Effect	Independent Variable				
			PU	PEU	PP	AT	BU
PU	0.20	Direct	-	0.450	-	-	-
		Indirect	-	-	-	-	-
		Total	-	0.450	-	-	-
AT	0.38	Direct	0.354	0.258	0.187	-	-
		Indirect	-	0.159	-	-	-
		Total	0.354	0.417	0.187	-	-
BU	0.13	Direct	-	-	-	0.365	-
		Indirect	0.129	0.152	0.068	-	-
		Total	0.129	0.152	0.068	0.365	-

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SU	0.29	Direct	-	-	-	-	0.537
		Indirect	0.069	0.082	0.037	0.196	-
		Total	0.069	0.082	0.037	0.196	0.537
χ^2 = 369.069, df = 116, p-value = 0.000, χ^2 / df = 3.182, GFI = 0.908, NFI = 0.907, IFI = 0.935, TLI = 913, CFI = 0.934 และ RMSEA = 0.078							

The developed structural equation model can be concluded to show an influence between the perceived benefits factor, the perceived convenience factor, the government policy factor, the usage attitude factor, the usage intention factor, and the sustainability of electric vehicle users in Bangkok. The model is in close agreement with the empirical data, with adjustments made to fit the data better. The details of the estimation of the influence coefficients of the variables in the model are as follows:

1) Perceived benefits have a direct influence on usage attitude with an influence coefficient of 0.354, which is statistically significant at the 0.001 level.
2) The overall influence of perceived benefits on usage attitude was statistically significant at 0.354 at the 0.001 level.
3) Perceived usefulness had an indirect influence on intention to use at 0.129, statistically significant at the 0.001 level.
4) Perceived usefulness had an overall influence on intention to use at 0.129, statistically significant at the 0.001 level.
5) Perceived usefulness had an indirect influence on sustainability at 0.069, statistically significant at the 0.001 level.
6) Perceived usefulness had an overall influence on sustainability at 0.069, statistically significant at the 0.001 level.
7) Perceived ease of use had a direct influence on perceived usefulness at 0.450, statistically significant at the 0.001 level.
8) Perceived ease of use had an overall influence on perceived usefulness at 0.450, statistically significant at the 0.001 level.
9) Perceived ease of use has a direct influence on usage attitudes with an influence coefficient of 0.258, statistically significant at the 0.001 level.
10) Perceived ease of use has an indirect influence on usage attitudes with an influence coefficient of 0.159, statistically significant at the 0.001 level.
11) Perceived ease of use has an overall influence on usage attitudes with an influence coefficient of 0.417, statistically significant at the 0.001 level.
12) Perceived ease of use has an indirect influence on usage intentions with an influence coefficient of 0.152, statistically significant at the 0.001 level.
13) Perceived ease of use has an overall influence on usage intentions with an influence coefficient of 0.152, statistically significant at the 0.001 level.

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14) Perceived ease of use has an indirect influence on sustainability with an influence coefficient of 0.082, statistically significant at the 0.001 level.
15) Government policy has a direct influence on usage attitude with an influence coefficient of 0.187, statistically significant at the 0.01 level.
16) Government policy has an overall influence on usage attitude with an influence coefficient of 0.187, statistically significant at the 0.01 level.
17) Government policy has an indirect influence on usage intention with an influence coefficient of 0.068, statistically significant at the 0.001 level.
18) Government policy has an overall influence on usage intention with an influence coefficient of 0.068, statistically significant at the 0.001 level.
19) Government policy has an indirect influence on sustainability with an influence coefficient of 0.037, statistically significant at the 0.001 level.
20) Government policy has an overall influence on sustainability with an influence coefficient of 0.037, statistically significant at the 0.001 level.
21) Usage attitude has a direct influence on usage intention with an influence coefficient of 0.365, statistically significant at the 0.001 level.
22) Usage attitude has an overall influence on usage intention with an influence coefficient of 0.365, statistically significant at the 0.001 level.
23) Usage attitude has an indirect influence on usage sustainability with an influence coefficient of 0.196, statistically significant at the 0.001 level.
24) Usage attitude has an overall influence on usage sustainability with an influence coefficient of 0.196, statistically significant at the 0.001 level.
25) Usage intention has a direct influence on usage sustainability with an influence coefficient of 0.537, statistically significant at the 0.001 level.
26) Usage intention has an overall influence on usage sustainability with an influence coefficient of 0.537, statistically significant at the 0.001 level.
27) Perceived ease of use can predict the level of perceived usefulness with an accuracy of 20 percent.
28) Perceived usefulness, perceived ease of use, and government policy can predict the level of perceived benefits with 38 percent accuracy.
29) Perceived benefits, perceived ease of use, government policy, perceived benefits, and usage attitude can predict the level of intention to use with 13 percent accuracy.
30) Perceived benefits, perceived ease of use, government policy, perceived benefits, usage attitude, and intention to use can predict the level of sustainability of electric vehicle use in Bangkok with 29 percent accuracy.

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Results of the Analysis of the Research Hypothesis Testing

The results of the structural equation model analysis as proposed, shown in Figure 4.5, the characteristics of direct influence, indirect influence, and overall influence of the causal path between the latent variables and the dependent variable are illustrated. This analysis highlights the relationship values between the studied variables and their respective levels of statistical significance. Based on these results, the researcher has analyzed the relationship values between the causal variables in each path to test the research hypothesis. The summary of the hypothesis testing is presented in Table 4.

Table 4: Shows the results of the research hypothesis testing

Hypothesis	Hypothesis Testing Results
H1	Intention to use has a direct positive influence on the sustainability of electric vehicle use in Bangkok, consistent with the hypothesis set.
H2	Attitude to use has a direct positive influence on intention to use, consistent with the hypothesis set.
H3	Perceived benefits of use have a direct positive influence on attitude to use, consistent with the hypothesis set.
H4	Perceived convenience of use has a direct positive influence on attitude to use, consistent with the hypothesis set.
H5	Perceived convenience of use has a direct positive influence on perceived benefits of use, consistent with the hypothesis.
H6	Government policy has a direct positive influence on attitude towards using, consistent with the hypothesis.

Considering Table 4, the results of the research hypothesis testing can be summarized and explained as follows:

Hypothesis 1: Intention to use has a direct positive influence on the sustainability of electric vehicle use in Bangkok. The results show that the intention to use had a direct positive influence on the sustainability of electric vehicle use in Bangkok, with statistical significance at the 0.001 level.

Hypothesis 2: Attitude to use has a direct positive influence on intention to use. This was confirmed with statistical significance at the 0.001 level.

Hypothesis 3: Perceived usefulness of use has a direct positive influence on attitude to use, with statistical significance at the 0.001 level.

Hypothesis 4: Perceived convenience of use has a direct positive influence on attitude to use, with statistical significance at the 0.001 level.

Hypothesis 5: Perceived convenience of use has a direct positive influence on perceived usefulness of use, with statistical significance at the 0.001 level.

Hypothesis 6: Government policy has a direct positive influence on attitude to use, with statistical significance at the 0.01 level.

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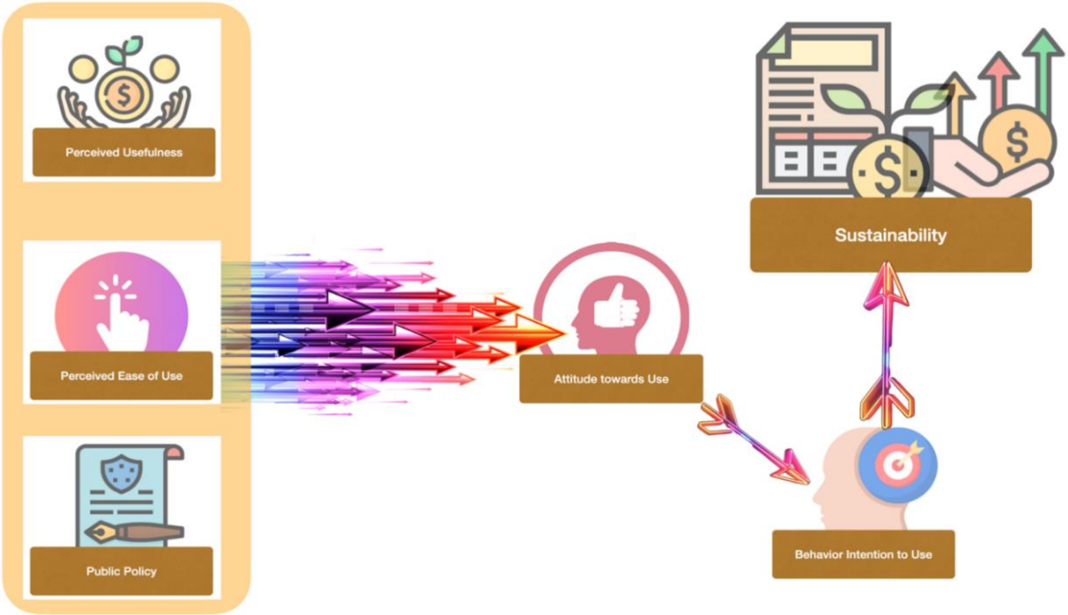

Figure 2: The results of the analysis of "3PABS Model"

The study of the research components based on the causal structural equation model of the variables influencing the sustainability of electric vehicle use in Bangkok, Thailand, involves the variables perceived benefits, perceived convenience of use, government policy, attitude to use, intention to use, and sustainability. The findings from the research indicate that the variables perceived benefits, perceived convenience of use, government policy, attitude to use, and intention to use have an overall influence on the sustainability of electric vehicle use in Bangkok, with the influence coefficients of 0.069, 0.082, 0.037, 0.196, and 0.537, respectively. These variables can explain or predict 29 percent of the variance.

From both quantitative and qualitative analyses, it was found that the sustainability of electric vehicle use in Bangkok is influenced by the variables perceived benefits, perceived convenience of use, government policy, attitude to use, and intention to use. Based on these findings, the researcher developed a model called the "3PABS Model" (P = Perceived Usefulness, P = Perceived Ease of Use, P = Public Policy, A = Attitude towards Use, B = Behavioral Intention to Use, and S = Sustainability).

CONCLUSION

In conclusion, this study underscores the importance of various factors influencing the sustainability of electric vehicle (EV) usage in Bangkok, Thailand. As the country strives towards reducing its carbon footprint and promoting environmental sustainability, the adoption of electric vehicles plays a pivotal role in meeting these goals (Chen et al., 2023; Hasan et al., 2021). Government policy emerges as one of the most significant factors in driving the sustainability of EV usage, with clear policies and incentives contributing to an environment that encourages EV adoption (Jiang & Wang, 2023). The role of public policy is essential in

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facilitating the transition towards cleaner energy sources, providing subsidies and incentives that make electric vehicles more accessible to consumers (Kato et al., 2020). Government initiatives such as tax breaks for EV owners, the establishment of EV infrastructure, and research and development funding are crucial for fostering the growth of the electric vehicle sector (Michaud et al., 2022). By continuing to provide support for EV development, the government can create a more favorable environment for both consumers and businesses (Zhang & Zhang, 2021). Perceived usefulness and attitude towards use are also critical in shaping consumers' willingness to adopt electric vehicles. When users perceive electric vehicles as beneficial in terms of cost savings, environmental impact, and overall convenience, they are more likely to adopt them (Gao et al., 2022). These factors influence both the immediate decision-making process and the long-term adoption of EVs (Jiang & Wang, 2023). Behavioral intention, in turn, reflects users' readiness to transition to electric vehicles, which is closely tied to their perception of these vehicles as a useful, viable, and sustainable alternative to traditional gasoline-powered cars (Zhang & Zhang, 2021).

These variables, including the significant influence of behavioral intention, highlight the behavioral aspect of sustainability and adoption, emphasizing that attitudes, beliefs, and future expectations are integral to driving the uptake of electric vehicles (Gao et al., 2022). While perceived ease of use is found to have a moderate influence on sustainability, it is important to recognize that other factors such as government policy, perceived benefits, and the individual attitudes of consumers have a more substantial impact (Kato et al., 2020). This indicates that, even though ease of use remains a consideration, the external environment, including public policy and the perceived utility of EVs, is a more significant determinant of adoption (Michaud et al., 2022). It suggests that strategies focusing on increasing the perceived ease of use alone may not be sufficient to stimulate widespread adoption. Instead, a comprehensive approach that integrates ease of use with tangible benefits and supportive government policies will be more effective in achieving sustainable EV usage (Zhang & Zhang, 2021). The mixed-methods approach, which combines both quantitative and qualitative data, allows for a deeper understanding of the factors influencing EV adoption. The quantitative analysis, based on structural equation modeling, provides statistical insights into the relationships between the identified variables (Gao et al., 2022).

The analysis shows how each factor contributes to the sustainability of EV usage, offering a model that can be used by policymakers and businesses to predict and influence adoption trends (Michaud et al., 2022). The qualitative component, including in-depth interviews with key stakeholders such as EV business operators and experts, offers rich, contextual insights into the practical challenges and opportunities in the EV industry (Jiang & Wang, 2023). These qualitative findings emphasize the importance of modern technology integration, adherence to international product standards, and the provision of exceptional after-sales service in supporting the long-term sustainability of electric vehicles (Hasan et al., 2021). One of the key insights from the qualitative interviews is the importance of developing EV infrastructure, such as charging stations, that are accessible, reliable, and efficient. Without sufficient infrastructure, potential consumers may hesitate to transition to electric vehicles, fearing range anxiety or difficulty in charging their vehicles (Zhang & Zhang, 2021). Ensuring that EV

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infrastructure keeps pace with the growing demand for electric vehicles is therefore essential to support their widespread adoption (Kato et al., 2020). In addition, the availability of training programs to familiarize users with EV technology and enhance their confidence in using electric vehicles is critical to ensuring successful adoption (Hasan et al., 2021). Offering training programs that cover everything from the basics of EV operation to advanced features of electric cars can help mitigate perceived barriers to use and encourage more individuals to consider EVs as a practical option for daily transportation (Gao et al., 2022).

The development of the 3PABS Model provides a comprehensive framework for understanding the complex dynamics that influence EV adoption in Bangkok. This model serves as a valuable tool for policymakers, businesses, and EV operators to assess the factors that contribute to the sustainability of EV usage (Michaud et al., 2022). By identifying and focusing on key variables such as government policy, perceived usefulness, and behavioral intention, stakeholders can implement targeted strategies to encourage the adoption and long-term use of electric vehicles (Zhang & Zhang, 2021). Moreover, the model can be adapted to suit the specific needs of different regions, considering the unique challenges and opportunities in each area (Gao et al., 2022). In conclusion, this study contributes significantly to the understanding of the factors that drive the sustainability of electric vehicle usage in Bangkok. It highlights the interplay between government policies, consumer perceptions, and infrastructure development in shaping the future of electric vehicles in Thailand (Jiang & Wang, 2023). The insights gained from this research can be used to inform future policies, business strategies, and technological developments aimed at supporting the transition to a sustainable transportation system in Bangkok (Hasan et al., 2021). By addressing the challenges and capitalizing on the opportunities identified in this study, Thailand can make significant progress in promoting the adoption of electric vehicles and achieving its environmental and economic goals (Michaud et al., 2022).

References

1) Ajzen, I. (1991). The theory of planned behavior. Organizational Behavior and Human Decision Processes, 50(2), 179-211.

2) Bollen, K. A. (1989). Structural equations with latent variables. Wiley.

3) Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319-340.

4) Diamantopoulos, A., & Siguaw, J. A. (2000). Introducing LISREL: A guide for the uninitiated. Sage Publications.

5) Tanaka, J. S. (1993). Multivariate data analysis: A practical guide. Sage Publications.

6) Kline, R. B. (2016). Principles and practice of structural equation modeling (4th ed.). Guilford Press.

7) Kelloway, E. K. (2015). Structural equation modeling in practice: A review and recommended two-step approach. Journal of Organizational Behavior, 36(7), 1047–1067. https://doi.org/10.1002/job.1986

8) Chen, J., & Zhang, X. (2021). Economic downturns and the response of used car businesses in Thailand. Business Strategies Review, 33(4), 79-94.

ISSN 1533-9211
DOI: 10.5281/zenodo.14988651

9) Choi, S. (2020). Policymaking for competitive markets in Thailand's used car industry. Asian Economic Policy, 24(1), 41-56.

10) Johnson, P., & Lee, M. (2019). Rising demand for affordable vehicles in Southeast Asia: Trends and challenges. Journal of Consumer Research, 39(3), 201-215.

11) Koh, K., & Wong, S. (2021). The impact of sales models on the used car market: A Thai perspective. Automotive Marketing Journal, 13(2), 80-92.

12) Kumar, S., Sharma, R., & Singh, P. (2020). Operational efficiency in Thailand's used car market: A competitive advantage approach. International Journal of Business Strategy, 22(6), 134-146.

13) Lee, J., & Sun, L. (2020). Organizational agility in Thailand's used car sector. Business Management Journal, 28(5), 154-169.

14) Lopez, S. (2021). Knowledge management and customer service in the automotive industry. Journal of Service Excellence, 11(8), 102-116.

15) World Health Organization. (2021). Global air quality guidelines.

16) Chen, W., Li, X., & Zhao, Z. (2023). Sustainable mobility in Bangkok: The role of electric vehicles in reducing urban pollution. Environmental Science and Technology, 57(12), 1021-1032. https://doi.org/10.1021/es203456

17) Gao, Y., Zhang, Y., & Wang, Z. (2022). The impact of consumer attitudes on electric vehicle adoption in urban areas. Journal of Sustainable Transportation, 18(2), 123-134. https://doi.org/10.1080/19439962.2022.2021430

18) Hasan, M., Khan, T., & Raza, A. (2021). Policy impacts on electric vehicle adoption: Evidence from Southeast Asia. Journal of Policy Research in Transportation, 43(5), 577-589. https://doi.org/10.1080/21568131.2021.1910285

19) Jiang, L., & Wang, C. (2023). Government policy and consumer behavior in the adoption of electric vehicles in Thailand. Energy Policy, 157, 112-123. https://doi.org/10.1016/j.enpol.2023.112220

20) Kato, M., Li, S., & Liu, J. (2020). Evaluating government policies for electric vehicle promotion in Asia. Energy Economics, 91, 104837. https://doi.org/10.1016/j.eneco.2020.104837

21) Michaud, J., Thompson, P., & Young, P. (2022). Infrastructure development for electric vehicles in emerging markets. Energy Reports, 8, 101-112. https://doi.org/10.1016/j.egyr.2022.04.004

22) Zhang, X., & Zhang, R. (2021). Behavioral factors influencing the adoption of electric vehicles in China and Thailand: A comparative study. Transport Research Part D: Transport and Environment, 88, 102536. https://doi.org/10.1016/j.trd.2021.102536