
ASSESSING FACTORS DETERMINING PEOPLE'S DECISION TO ADOPT ELECTRIC MOTORCYCLES (EMs) THROUGH THE LENS OF THE TECHNOLOGY ACCEPTANCE MODEL (TAM)

Nicholas Wilson

Faculty of Social Sciences and Humanities, Department of Management,
Universitas Bunda Mulia
nicholaswilson8989@gmail.com (*corresponding author*)

Sentot Basuki Prayitno

Faculty of Business, Department of Management, Sampoerna University
sentot.prayitno@sampoernauniversity.ac.id

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Abstract: Over recent years, the Indonesian government has been consistently encouraging its citizens to transition from traditional, fuel-based vehicles to environmentally friendly electric-powered vehicles. Among these electric vehicles, Electric Motorcycles (EMs) have made their way into the Indonesian market. However, the adoption of EMs remains relatively low compared to conventional motorcycles due to various factors. This study aims to comprehensively analyze the determinants affecting individuals' decisions to adopt EMs, focusing on the Technology Acceptance Model (TAM) framework. Next, to collect data from respondents, a survey method employing questionnaires was utilized, employing a purposive sampling technique to ensure that all participants met the predetermined criteria. Specifically, respondents were individuals who had adopted EMs from various brands within the past year. A 5-point Likert scale was employed to gauge respondents' opinions and perceptions. Over approximately four months, from March 2023 to July 2023, questionnaires were distributed, resulting in the successful collection of 58 valid responses. Subsequently, Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed to analyze the gathered data. The findings of the analysis reveal that two key factors, namely, perceived ease of use and perceived usefulness, exert significant and positive influence on individuals' decisions to adopt electric motorcycles (EMs).

Keywords: Perceived Usefulness, Perceived Ease-of-Use, Purchase Decision, Electric Motorcycle (EMs)

Abstrak: Dalam kurun waktu beberapa tahun terakhir, pemerintah Indonesia secara aktif dan masif mendorong masyarakatnya untuk mulai beralih dari kendaraan BBM konvensional ke kendaraan listrik (*electric vehicle*) yang lebih ramah lingkungan. Adapun salah satu jenis kendaraan listrik (*electric vehicle*) yang dijual (dan tersedia) di Indonesia adalah motor listrik (*electric motorcycle*). Namun, terlepas dari berbagai usaha yang telah dilakukan oleh pemerintah, serta dikarenakan oleh satu dan lain hal, jumlah masyarakat yang telah membeli dan menggunakan motor listrik ini cenderung masih sangat sedikit dibandingkan dengan jumlah masyarakat yang membeli motor konvensional berbahan bakar minyak. Alhasil, berdasarkan pada fenomena ini, maka studi ini mencoba untuk menganalisis faktor-faktor yang cenderung mampu memengaruhi keputusan masyarakat di dalam mengadopsi motor listrik di Indonesia dari perspektif Technology Acceptance Model (TAM). Mengimplementasikan metode survei dengan kuesioner digunakan sebagai alat untuk mengumpulkan data dari para responden, metode sampling berupa *purposive sampling* diterapkan dengan tujuan untuk memastikan agar seluruh responden yang berpartisipasi telah memenuhi kriteria yang ditentukan dalam penelitian ini. Adapun kriteria responden yang ditetapkan adalah masyarakat Indonesia yang telah mengadopsi motor listrik (merek apa pun) dalam kurun waktu 1 tahun

terakhir. Berikutnya, sebanyak 58 data berhasil dikumpulkan dari para responden, dimana, seluruh data ini kemudian dianalisis dengan menggunakan metode PLS-SEM. Berdasarkan pada hasil analisis data yang telah dilakukan, peneliti menyimpulkan bahwa kedua faktor yang diuji, yaitu *perceived usefulness* dan *perceived ease of use*, secara signifikan memengaruhi keputusan seseorang di dalam mengadopsi motor listrik.

Kata Kunci: *Perceived Usefulness, Perceived Ease-of-Use, Purchase Decision, Motor Listrik*

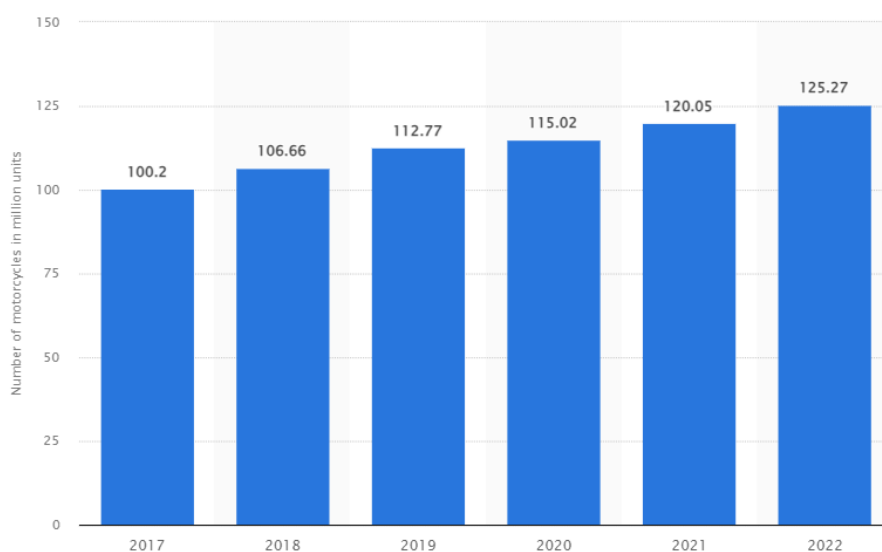
INTRODUCTION

Research Background

Over the past few years, the Indonesian government has actively initiated numerous campaigns to persuade and motivate a significant portion of the Indonesian population to shift from traditional, fuel-powered vehicles towards environmentally friendly electric vehicles (EVs). EVs, commonly known as Electric Vehicles, offer several advantages over their conventional counterparts. They are notably more ecologically friendly, producing fewer emissions compared to non-EV vehicles (Helmerts, 2022; Ngoc et al., 2023). Additionally, EV users can conveniently recharge their vehicles at home, eliminating the need for regular trips to gas stations, a common requirement for conventional vehicles (Jaiswal et al., 2022; Roberts, 2022; Schade et al., 2012). This push towards EV adoption has been propelled by the escalating pollution levels in many major Indonesian cities, including Jakarta. Furthermore, the ever-increasing annual vehicle purchases by Indonesians have amplified the importance of communicating these benefits nationwide to boost people's inclination towards purchasing electric vehicles, including Electric Motorcycles (EMs). However, in reality, the percentage of Indonesians who have acquired and used electric motorcycles remains considerably lower when juxtaposed with the number of individuals who have chosen conventional fuel-powered motorcycles. According to data published by Statista (2023), the total number of motorcycle users in Indonesia stood at 125.27 million, meaning that nearly half of Indonesia's population owned a motorcycle. In stark contrast, data from CNN Indonesia (2022) revealed that during the same period, only 21,668 people had purchased Electric Motorcycles (EMs). This translates to a mere 0.0172% of the total motorcycle users in Indonesia, indicating a significantly low willingness among the populace to embrace this type of vehicle. Given this context, it becomes essential to investigate the factors that influence and reinforce Indonesians' willingness and decision to purchase electric motorcycles (EMs) available in the country.

Figure 1

Number of Indonesians Who've Bought (and Owned) Motorcycles from 2017 to 2022



Source: Statista.com (2023)

Next, within the realm of marketing research, one theory that stands out as one of the most popular theories to predict one's willingness to use or adopt certain new technologies is the technology acceptance model (TAM). First developed by Davis (1989), this framework was crafted mainly to elucidate and forecast individuals' attitudes toward and adoption of emerging technologies. The technology Acceptance Model (TAM) serves as a valuable instrument, furnishing profound insights into the intricate determinants that govern users' willingness to accept and engage with technology, thus rendering it indispensable for contemporary businesses, researchers, and policymakers navigating the technology-driven landscape (Alnemer, 2022). TAM's fundamental premise is that the inclination of users to embrace a technology hinge predominantly on two pivotal factors: perceived ease of use (PEOU) and perceived usefulness (PU). Perceived ease of use pertains to the user's subjective assessment of the technology's user-friendliness and the ease of acquiring proficiency in its operation (Jokar et al., 2017). In contrast, perceived usefulness encompasses the user's belief in how the technology will augment their job performance or facilitate the accomplishment of specific objectives. These two facets are intricately intertwined, as users typically weigh the perceived advantages against the exertion required to harness the technology when arriving at adoption decisions (Kim & Woo, 2016).

While there have been abundances of studies utilizing the technology acceptance model (TAM) to study and predict one's willingness (and behavior) to adopt, use, or buy certain technology, however, studies which try to implement technology acceptance model (TAM) to predict one's behavior to purchase electric motorcycle (EM) was still in rarity. For example, prior studies by Putri et al. (2023) and Doanh et al. (2022) utilized TAM to predict people's willingness to accept, adopt, participate, engage, or use P2P lending platforms and livestream sales respectively, while similar studies performed by Natasia and Parastika (2021) had implemented TAM to determine factors affecting individuals' intention to adopt e-Learning technology. Meanwhile, another study by Ahmad et al. (2020) and Katebi et al. (2022) used the TAM framework to predict intention within the context of health and construction respectively. Moreover, several previous studies that had been performed to explain people's behavior to use or adopt electric vehicles (EVs) using the general framework of TAM tend to explain factors that could motivate people's intention to use electric vehicles (EVs) in general without attempting to specify which kind of electric vehicles (either electric motorcycles of electric cars) that people want to adopt or use (Jaiswal et al., 2021; Ngoc et al., 2023; Yankun, 2020; Zhang et al., 2022). In this case, electric motorcycles (EMs) were specifically chosen as the object of this study, because the number of motorcycles users in Indonesia tends to gradually increase on an annual basis. Therefore, to fill in the gaps presented by these previous studies, this research tries to adopt the framework of the technology acceptance model (TAM) to determine factors affecting people's behavior (or decision) to adopt electric motorcycle (EM) sold in Indonesia.

Purpose of this Research

This research attempts to utilize or adopt the basic framework of the technology acceptance model (TAM) to determine factors affecting people's decision to adopt electric motorcycles (EM) sold in Indonesia. Regarding this framework, 2 (two) main factors were identified, which are perceived usefulness and perceived ease of use.

LITERATURE REVIEW AND HYPOTHESES FORMULATION

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) serves as a comprehensive framework that aids researchers in comprehending and predicting how users embrace and incorporate new technology and information systems (Teo et al., 2009). This model posits that users' inclination to accept and utilize a technology primarily hinges on two pivotal factors: perceived ease of use and perceived usefulness (Rouidi et al., 2022). First of all, the concept of perceived ease of

use refers to the idea that elucidates how users perceive the simplicity of learning and employing the technology. In this case, when individuals perceive technology as user-friendly, intuitive, and requires minimal effort, they are more inclined to embrace it, and vice versa (Ge et al., 2023; Wilson et al., 2021). For instance, a clear user interface and straightforward instructions can augment the perception of ease of use, rendering the technology more appealing. Furthermore, another concept within the TAM framework, namely perceived usefulness, is related to users' beliefs regarding how the technology will aid them in attaining benefits and enhancing their achievement of objectives or tasks (Türker et al., 2022). When users perceive that the technology enhances their efficiency, productivity, or overall performance, they are more likely to accept and incorporate it into their daily routines, while on the contrary, when users or individuals felt that a new technology that they'll adopt or use won't significantly affect their performance, that such perception will eventually lower their willingness to buy, adopt or use such technology (Wang et al., 2023).

Decision to Adopt

The decision to adopt certain products or technology has been repeatedly studied by various scholars to be a fundamental element that plays a crucial role in both personal and business success (Putra et al., 2022; Wilson et al., 2019). Purchase decisions can be understood as a process by which individuals or organizations evaluate various options and ultimately select a product or service to acquire. This process involves a series of cognitive and emotional stages that have a significant impact on one's personal life or business endeavors (Arief et al., 2023; Wibisono & Keni, 2023). Meanwhile, within the world of business, the purchase decision is a critical factor that can determine whether or not companies or organizations can achieve success in the industry since this variable is linked directly with the level of sales that companies could generate regarding the product that they sold to consumers (Keni et al., 2023). In this case, when buyers or individuals buy their products, it will eventually increase the products' sales level, while on the contrary, when individuals decide against buying the companies' product, such decision will negatively affect the number of sales that companies can generate from the product (Gupta et al., 2022). Therefore, companies need to be able to develop various concrete strategies to increase people's intention and willingness to buy the products sold in the market. Furthermore, purchase decisions do not occur in isolation; they are an integral part of a broader decision-making process (Winata & Keni, 2023). Understanding how purchase decisions fit into this process, which starts with recognizing a need, evaluating options, making a choice, and assessing the purchase afterward, empowers individuals and businesses to tailor their strategies (Hanaysha, 2018). This alignment helps align products, services, and marketing efforts with the preferences and demands of their target audience, which would ultimately lead to better outcomes and accomplishments that companies wish to achieve (Novita & Rowena, 2019; Susilawaty & Wilson, 2021).

The Effect of Perceived Ease of Use and Perceived Usefulness on Decision to Adopt

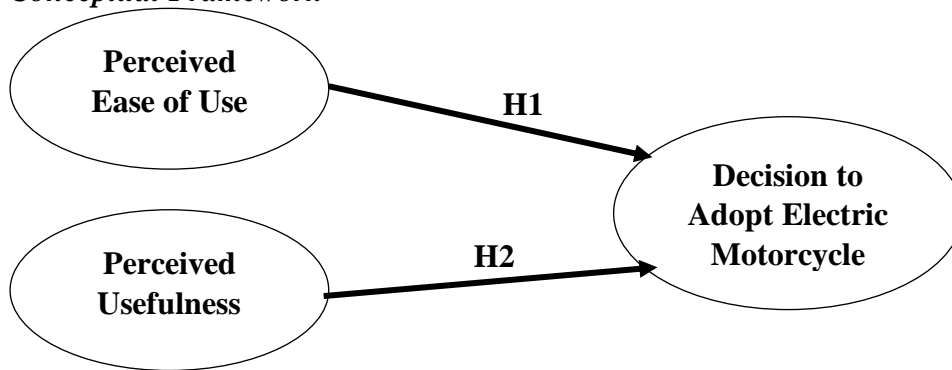
Previous studies by Rafique et al. (2020), Alyoussef (2022), and Scherer et al. (2019) underlined the significance of both perceived ease of use and perceived usefulness in affecting individuals' willingness or decision to use, buy, or adopt certain technology. Regarding these findings, the concept of perceived ease of use refers to how straightforward a product or technology is to operate. Consumers tend to favor items that exhibit simplicity, intuitiveness, and user-friendliness because they entail minimal effort to use. This, in turn, instills a sense of comfort and confidence in users when utilizing the product, ultimately influencing their purchasing behavior (Manis & Choi, 2019). In essence, products characterized by ease of use are more appealing to consumers, as they reduce the perceived risks and exertion associated with adoption. Conversely, perceived usefulness pertains to the value and benefits a product offers its users. Consumer purchasing decisions hinge on whether they believe a product can fulfill a particular need, resolve their issues, or enhance their quality of life in some way. When

a product is perceived as highly beneficial, consumers are more inclined to view it as a viable solution and are more likely to make a purchase (Oh & Yoon, 2014). This underpins the driving force behind consumer motivation to buy, as individuals generally seek products that offer tangible and distinct advantages (Kamal et al., 2020). Based on these arguments, the following hypotheses were posited:

H₁: Perceived Ease of Use positively affect people's Decision to Adopt Electric Motorcycle.

H₂: Perceived Usefulness positively affect people's Decision to Adopt Electric Motorcycle.

Figure 1
Conceptual Framework



Source: Wallace & Sheetz (2014); Ramkumar et al. (2019)

RESEARCH METHODOLOGY

This study centered around Indonesians who, within the preceding year, had bought electric motorcycles of any brand. To ensure that all respondents fulfilled these criteria, a purposive sampling method was utilized, in which, a screening question asking “Have you bought an electric motorcycle for the past 1 year” was added at the beginning of the questionnaire to enable researchers to properly screen out incompatible respondents. Next, data collection was accomplished through an online survey administered via Google Forms. A total of 58 data were then underwent a thorough review and were subsequently integrated into the study. Following this, the data collected from participants underwent analysis using the Partial Least Squares (PLS) method. Regarding this method, a two-step sequential analysis – consisting of both the outer model and the inner model assessment - needs to be performed one after another, not only to determine the validity and the reliability of the data but also to specify and assess the relationships between variables included in this study.

Moreover, the study incorporated an extensive set of 12 indicators, spanning three distinct factors. All of these Indicators (explaining perceived usefulness, perceived ease of use, and the decision to adopt) were adapted from Rodrigues et al. (2023), Hubert et al. (2019), Zhong et al. (2021), and Okpala et al. (2022). Before their inclusion in the questionnaires distributed to all participants, all of these indicators were translated into Indonesian and underwent appropriate adjustments in wording to align with the context and overarching theme of this research.

RESULTS AND DISCUSSIONS

Respondents' Profile, Outer Model and Inner Model Assessment

Before embarking on the data analysis with PLS to unveil intricate variable relationships, the researchers conducted an in-depth analysis of respondent characteristics. This step aimed to gain a comprehensive understanding of the overall profiles of the study participants. The analysis yielded intriguing insights: a majority of respondents were male (91,37%), a significant portion held a Bachelor's degree as their highest educational attainment (53,44%), and the majority resided in Jakarta (37,93%). This analysis of respondent characteristics was executed using SPSS 25 software. Subsequently, following the respondent characteristics

analysis, the study applied PLS-SEM to scrutinize the entire dataset comprehensively. Both measurement model assessment and structural model analysis played pivotal roles in comprehending the relationships postulated in this research. The measurement model analysis aimed to validate the data’s reliability and validity, while the structural model analysis sought to elucidate how one variable influenced others. The execution of the structural model analysis depended on prior confirmation of data validity and reliability. Tables 1, 2, 3, and 4 present the results of the measurement model analyses.

Table 1
Measurement Model Assessment (Factor Loading, AVE, CR, and Cronbach’s Alpha)

Variables	Indicators	Loading	AVE	Composite Reliability	Cronbach’s Alpha
Perceived Ease of Use	I personally think that it is easy to use electric motorcycle	0,705	0,670	0,890	0,835
	Compared to conventional motorcycle, I think it is more practical to use electric motorcycle	0,876			
	I encounter no trouble in learning how to charge my electric motorcycle when it is out of power	0,845			
	Little or no additional training is required to use electric motorcycle	0,838			
Perceived Usefulness	I think electric motorcycle can adapt to my different needs	0,914	0,767	0,929	0,898
	Many friends around me have used electric motorcycle	0,899			
	In my opinion, electric motorcycle is more efficient compared to the conventional ones	0,898			
	I think using electric motorcycle would make my life more convenient	0,786			
Decision to Adopt Electric Motorcycle	I have adopted electric motorcycle	0,763	0,775	0,932	0,901
	I often ride my electric motorcycle wherever I go	0,908			
	I have made decisions to adopt electric motorcycle based on its functions	0,908			
	The decision to adopt electric motorcycle was motivated by my feelings	0,933			

Source: Researcher (2023)

Table 2
Measurement Model Assessment (Discriminant Validity – HTMT)

Variable	Decision to Adopt Electric Motorcycle	Perceived Ease of Use	Perceived Usefulness
Decision to Adopt Electric Motorcycle			
Perceived Ease of Use	0.748		
Perceived Usefulness	0.622	0.649	

Source: Researcher (2023)

Tables 1 and 2 offer a comprehensive view of the data analysis results, focusing primarily on the outcomes of the measurement model assessment. The results emanating from these tables affirm the conformity of all data to all validity and reliability criteria. Specifically, each factor exhibited AVE (Average Variance Extracted) values and individual indicator loadings exceeding the respective thresholds of 0.50 and 0.70. Furthermore, the composite reliability and Cronbach’s alpha values for each factor surpassed the 0.70 benchmark. Additionally, table 2 presents the discriminant validity assessments from the perspective of HTMT (Heterotrait-

Monotrait) criteria, in which, the result of such assessment shows that the discriminant validity criteria from the perspective of HTMT had been satisfied since the HTMT value of all variables had been lesser than 0.85. To conclude, all of these results provide substantial evidence that both the reliability and validity criteria set within the framework of this research had been successfully met.

Next, after completing the assessment of the measurement model, the structural model assessment was performed aiming to uncover the connections and associations among the variables discussed in this study. The results of the structural model analysis were showcased in Tables 3 and 4.

Table 3
Structural Model Assessment (R-Squared)

Variable	R Square
Decision to Adopt Electric Motorcycle	0.487

Source: Researcher (2023)

Table 4
Structural Model Assessment (Path Coefficient)

Relationships	Original Sample (O)	t-Statistics	P-Values	Conclusion
Perceived Ease of Use → Decision to Adopt Electric Motorcycle	0.501	5.767	0.000	Significant
Perceived Usefulness → Decision to Adopt Electric Motorcycle	0.275	3.328	0.001	Significant

Source: Researcher (2023)

The *R*-squared assessment, displayed in Table 3, reveals that the endogenous variable, which is the Decision to Adopt Electric Motorcycle, yielded an *R*-squared value of 48,7%. This figure signifies that 48,7% of the variance in the Decision to Adopt Electric Motorcycle can be effectively accounted for by the exogenous variables considered in this study, namely perceived ease of use and perceived usefulness. The remaining 51,3% of the variance is attributed to factors beyond the scope of this study. Furthermore, upon scrutinizing the outcomes of the path coefficient analyses presented in Table 4, it becomes apparent that all relationships among the variables under examination in this study are not only statistically significant but also positive. These findings underscore the influence of both perceived ease of use and perceived usefulness, both of which exert positive and statistically significant impacts on people's Decision to Adopt Electric Motorcycle. Consequently, based on these compelling findings, it can confidently affirm that all hypotheses (H_1 and H_2) postulated in this study received robust empirical support and were all supported.

Discussions

The results obtained in this study confirm both hypotheses were statistically supported. That being said both factors within the framework of the technology acceptance model (TAM), which are perceived ease of use and perceived usefulness, positively and significantly affect one's decision to buy, adopt, or use new technology, which, in the case of this research, refers to electric motorcycle. Regarding these findings, the Technology Acceptance Model (TAM) serves as a fundamental framework for understanding the complex factors that influence people's choices to embrace and integrate new technology into their lives. In this specific investigation, we focused on the adoption of electric motorcycles as an innovative technological advancement. Within the TAM framework, one crucial factor, known as perceived ease of use, had a significant impact on individuals' decisions regarding the purchase, adoption, or use of electric motorcycles. This finding highlights the utmost importance of designing these vehicles to be user-friendly. When consumers perceive electric

motorcycles as easy to use and seamlessly integrated into their daily routines, they are more likely to embrace this innovative mode of transportation, which reshapes their buying habits and lifestyle preferences. Essentially, ease of use acts as the vital link that eases the transition from traditional gasoline-powered motorcycles to their electric counterparts. Similarly, the second factor within the TAM framework, perceived usefulness, emerged as another key factor in people's decision-making processes when considering electric motorcycles. The research results reveal that consumers are more open to this technology when they see it as a valuable tool that effectively meets their needs and enhances their overall quality of life. Perceived usefulness essentially drives the adoption process forward. When consumers recognize the tangible benefits and advantages that electric motorcycles offer, they are more likely to choose them over conventional alternatives. This emphasizes the importance of not only technological innovation but also effective communication and education about the benefits of electric motorcycles in influencing consumer decisions.

CONCLUSIONS AND SUGGESTIONS

Conclusions and Managerial Implications

Based on the results of the data analysis conducted in this research, it can be concluded that the perceptions of ease of use and usefulness significantly and positively impact the purchasing decisions of Indonesians regarding electric motorcycles. In light of these findings, it is recommended that companies involved in the production of such vehicles streamline the operation and maintenance processes of electric motorcycles to stimulate higher adoption rates. This could encompass implementing user-friendly interfaces, simplifying charging solutions, and providing clear and accessible user guides to enhance the perceived ease of use. Furthermore, companies are also encouraged to establish comprehensive user training and educational initiatives to educate potential buyers about the convenience and practical benefits of electric motorcycles can effectively address any reservations or misconceptions they may harbor. This educational effort could involve workshops, online resources, or collaborations with dealerships to offer hands-on experiences to the public regarding this kind of vehicle (electric motorcycles). Meanwhile, from the perspective of marketing and communication strategies, companies should actively highlight the real-world advantages of electric motorcycles, such as their cost-effectiveness, environmental friendliness, and reduced maintenance requirements. By accentuating the perceived usefulness of electric motorcycles, companies stand a greater chance of attracting more buyers, subsequently leading to an increase in the adoption of electric motorcycles in Indonesia.

Limitations and Suggestions for Future Research

Even though this research was carried out meticulously, however, it does come with certain limitations. To begin, the study exclusively focused on exploring the factors influencing people's Decision to Adopt Electric Motorcycles with the Technology Acceptance Model (TAM) serving as its theoretical foundation. Given the abundance of alternative theories and concepts available for comprehending and explaining human behavior, future researchers should expand the scope of this investigation by incorporating diverse theoretical perspectives to elucidate why individuals are willing to adopt electric motorcycles. Moreover, it is important to acknowledge that this study had a geographic constraint, concentrating solely on Indonesia. Given the potential disparities in demographics and culture between Indonesians and individuals from other regions or countries, it is recommended that future researchers consider replicating the framework or concepts established in this study by conducting analogous inquiries in various geographical contexts.

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