GIJEA
Greenation International Journal of Economics and Accounting
+62 81210467572 https://research.e-greenation.org/GIJEA greenation.info@gmail.com
GREENATION RESEARCH

DOI: https://doi.org/10.38035/gijea.v4i4.1339
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Received: 19 August 2026 | **Revised:** 30 August 2026 | **Accepted:** 24 September 2026

Unpacking Consumer Shift to Electric Motorcycles in Jabodetabek: An Extended Push-Pull-Mooring Framework

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Abstract: This study aims to determine the effect of push, pull, and mooring factors on the adoption intention of electric motorbikes in Jakarta. This study employed a quantitative approach using primary data collected through an online survey with a research instrument measured using a Likert scale. The sampling technique used was purposive sampling, involving 240 respondents who were individuals aged 17 years and above, owned a motorcycle, had either adopted or had the potential to switch to an electric motorcycle, and were domiciled in Jakarta. The results indicate that the push factor has a positive and significant effect on the adoption intention of electric motorbikes, with a path coefficient (β) of 0.215 and a t-value of 3.389. The pull factor also has a positive and significant effect on adoption intention, with a path coefficient (β) of 0.362 and a t-value of 4.533. Similarly, the mooring factor has a positive and significant effect on adoption intention, with a path coefficient (β) of 0.266 and a t-value of 4.171. The coefficients of determination (R^2) for the push, pull, and mooring factors are 0.059, 0.135, and 0.113, respectively. Furthermore, the mooring factor is able to moderate the relationship between the push factor and the intention to adopt electric motorbikes. However, the mooring factor is unable to moderate the relationship between the pull factor and the intention to adopt electric motorbikes in Jakarta.

Keyword: Electric Vehicle, Push Factor, Pull Factor, Mooring Factor, Adoption Intention.

INTRODUCTION

Indonesia has demonstrated a high capacity for adaptation in facing global technological transformations (Faturrochman and Yaasiin, 2024). With increasingly accessible internet and widespread use of smart devices, Indonesians have become more reliant on technology for daily activities, ranging from education and business to public services (Hou and Shiau, 2019). The growth of the digital economy serves as a key indicator of how technology has driven economic and social change in the country. Various technological innovations, such as fintech, e-commerce, app-based transportation, and industrial automation, have played a significant role in accelerating economic growth and

improving the quality of life (Wijayanti and Kusumawardhani, 2023). The government has also actively promoted digital transformation through strategic programs like the 100 Smart Cities Movement and the Sustainable Development Goals (SDGs) (Mashahadi, Mahmod, and Saidon, 2023).

The use of electric vehicles, particularly electric motorcycles, in Indonesia has shown a remarkably rapid increase. According to research conducted by Deloitte and Foundry, the number of electric motorcycle users grew 13-fold between 2020 and 2022. In 2020, only 1,947 electric motorcycles were in use, but this figure surged to 25,782 units by 2022. A similar trend was observed in electric cars, with their usage increasing more than 33-fold, from 229 units in 2020 to 7,679 units in 2022. To further drive this growth, the government has set ambitious targets for 2030, aiming for 13.5 million electric motorcycles and 2.2 million electric cars to be in use across the country. This policy forms part of the government's strategic efforts to reduce carbon emissions and promote the adoption of environmentally friendly technologies in the transportation sector.

Although the electric vehicle industry holds promising prospects in Indonesia, the transition from conventional motorcycles to electric motorcycles remains influenced by various technological, economic, and behavioral considerations. Several barriers, such as the availability of charging infrastructure, the relatively high initial purchase price of electric motorcycles, battery capacity, charging duration, and driving range, may affect consumers' willingness to adopt electric motorcycles. These conditions indicate that the decision to adopt an electric motorcycle is not determined solely by the advantages offered by the technology, but also by consumers' perceptions of their existing transportation options and the factors that may facilitate or hinder their transition.The Indonesian government has continued to accelerate the development of the battery-electric vehicle ecosystem as part of the broader transition toward more sustainable transportation. Presidential Regulation (Perpres) Number 79 of 2023 amended Perpres Number 55 of 2019 concerning the acceleration of the battery-electric vehicle program for road transportation. The regulation strengthens government support for the development of the electric vehicle ecosystem, including the role of central and local governments in accelerating its implementation. In addition, the government has established regulations concerning electric vehicle charging infrastructure through Minister of Energy and Mineral Resources Regulation Number 1 of 2023, indicating that charging infrastructure is considered an important component in developing the electric vehicle ecosystem. Government support is also reflected in policies addressing the affordability of electric motorcycles, including assistance for motorcycle conversion programs from internal combustion engines to battery-electric systems.

The development of electric motorcycles is particularly relevant in densely populated urban areas such as Jakarta. High levels of mobility, traffic congestion, fuel consumption, and environmental concerns create a context in which alternative transportation technologies may become increasingly relevant. Siskawati and Dirgahayani (2024) explain that electric motorcycles can serve as an alternative transportation option in major urban areas facing air pollution and traffic congestion. Electric motorcycles offer potential benefits associated with lower direct emissions during operation, energy efficiency, and reduced dependence on fossil fuels. Nevertheless, consumers' decisions to shift from conventional motorcycles to electric motorcycles involve an evaluation of both the problems associated with conventional motorcycles and the benefits offered by electric alternatives. To explain this transition, the Push-Pull-Mooring (PPM) framework provides a relevant theoretical perspective. Originally derived from migration theory, the PPM framework explains movement from an existing condition toward an alternative destination through three categories of factors: push, pull, and mooring. In consumer switching contexts, push factors refer to negative conditions associated with the existing option that encourage individuals to leave their current choice, whereas pull

factors represent positive attributes associated with the alternative option that attract individuals toward the new choice. Mooring factors represent personal, social, and contextual conditions that may either facilitate or inhibit the decision to switch. Bansal, Taylor, and St. James (2005) demonstrated the applicability of the PPM framework to consumer switching behavior and found that push, pull, and mooring variables can influence switching intentions directly, while mooring factors may also moderate the effects of push and pull factors.

In the context of electric motorcycle adoption, the distinction between push and pull factors is particularly important. The push factor should reflect consumers' perceptions of undesirable conditions associated with conventional motorcycles that create dissatisfaction or motivation to change. These conditions may include high fuel expenditure, concerns regarding exhaust emissions, environmental problems, maintenance considerations, or other inconveniences associated with continued reliance on conventional motorcycles. Thus, the psychological mechanism underlying the push factor is the perception that maintaining the current transportation choice has become less desirable, creating a motivation to seek an alternative. Recent research applying the PPM framework to electric vehicle switching similarly conceptualizes push factors as conditions that encourage consumers to leave conventional vehicles, rather than as direct advantages of electric vehicles.

In contrast, the pull factor represents the attractiveness of electric motorcycles as an alternative to conventional motorcycles. Consumers may perceive electric motorcycles as attractive because of their potential operating-cost savings, environmental benefits, technological features, ease of use, lower noise levels, and other perceived advantages. These attributes create a positive evaluation of the alternative and can increase consumers' intention to adopt electric motorcycles. In PPM theory, the psychological mechanism of the pull factor occurs when consumers perceive the destination or alternative choice as more attractive than the current option. Empirical research on electric vehicle switching has found that perceived benefits and convenience can function as pull factors that attract consumers toward electric vehicles.

The third component, the mooring factor, requires a different conceptualization from push and pull factors. Mooring factors represent conditions that can anchor individuals to their current choice or facilitate their transition to an alternative. In the context of electric motorcycle adoption, mooring factors may include perceived risk, switching costs, personal habits, social influence, financial considerations, technological familiarity, or other individual and contextual constraints. Therefore, mooring factors do not merely represent another source of motivation to adopt an electric motorcycle. Instead, they influence how consumers evaluate and respond to the motivations generated by push and pull factors. This distinction is important because a consumer may perceive conventional motorcycles negatively and simultaneously recognize the benefits of electric motorcycles, yet still postpone adoption because of perceived risks, habits, financial constraints, or concerns about adapting to a new technology. The role of mooring factors can therefore be examined in two ways. First, mooring factors may have a direct relationship with adoption intention because the presence or absence of constraints and facilitating conditions can influence consumers' willingness to make the transition. Second, mooring factors may condition the strength of the relationship between push or pull factors and adoption intention. When mooring conditions facilitate switching, the motivation generated by negative conditions associated with conventional motorcycles or the attractiveness of electric motorcycles may translate more strongly into adoption intention. Conversely, when mooring conditions create substantial resistance, the motivation generated by push and pull factors may not necessarily result in a stronger intention to adopt. This moderating logic is consistent with the PPM literature, which recognizes that mooring factors can influence the extent to which push and pull factors lead to switching intentions.

The relevance of this framework is also supported by recent research examining consumers' intention to shift from conventional vehicles to electric vehicles. Zhu et al. (2023), for example, applied the PPM framework to investigate consumers' intentions to switch to electric vehicles and found that push and pull factors can encourage switching, while mooring factors such as perceived risk and inertia can reduce switching intention and weaken the positive effects of push and pull factors. Similarly, recent research on electric vehicle switching has emphasized that consumers' transition decisions are influenced not only by the perceived advantages of electric vehicles but also by negative perceptions of conventional vehicles and individual barriers associated with switching. These findings provide a theoretical basis for applying the PPM framework to examine electric motorcycle adoption in the Jakarta context.

One study by Ha and Nguyen (2023) discusses that although the adoption of electric vehicles has become a key focus in efforts to reduce carbon emissions and enhance the sustainability of the transportation sector, research on the factors influencing electric vehicle adoption intentions in developing countries, particularly in Vietnam, remains relatively limited. The article highlights that most analyses of electric vehicle adoption have been conducted in developed countries such as Europe and North America, which have significantly different social, economic, and infrastructural contexts compared to developing nations. Findings from previous studies, such as those by Ha and Nguyen (2023), indicate that factors like ease of use, cost incentives, environmental awareness, and knowledge significantly influence the intention to adopt electric vehicles. However, these findings cannot be fully applied to the Vietnamese context, where motorcycle usage remains dominant and various challenges related to infrastructure and transportation policies persist. Therefore, important differences between this research and previous studies regarding the factors that attract and drive individuals to shift to alternative products must be carefully considered within Vietnam's local context.

The first study, conducted by Wang, Wang, and Yang (2020), states that push factors, including perceived environmental threats and perceived inconvenience, drive the shift from private cars to public transportation. Meanwhile, pull factors, such as green transportation policies, campaigns, and green transportation systems, attract individuals to switch to green transportation modes. This contrasts with the research by Bhattacharyya and Thakre (2020), which highlights the lack of alignment among stakeholders in India's electric vehicle ecosystem. Instead, there are fragmented efforts by various organizations. The electric vehicle ecosystem requires collaboration to boost electric vehicle adoption. Furthermore, the study emphasizes the need to address the disorganized charging infrastructure as a key issue preventing customers from adopting electric vehicles. Another study by Halawani and Rehimi (2021) indicates that individuals using public transportation abroad are more likely to shift to public transport whenever it is available in their home cities. Additional factors, such as gender and vehicle occupancy levels, also influence participants' intentions to transition from private vehicles to public transportation.

METHOD

Research Model

This study adopts a quantitative research approach based on the philosophy of positivism, which aims to examine phenomena by collecting and analyzing numerical data from a specific population or sample (Sekaran and Bougie, 2016). The study investigates the relationships between push, pull, and mooring factors and consumers' intention to adopt electric motorcycles. The unit of analysis is individual consumers who own motorcycles and have adopted or have the potential to switch to electric motorcycles. The research population consists of individuals residing in the Jabodetabek area, particularly Jakarta. A total of 240

respondents were selected using purposive sampling based on predetermined criteria, namely individuals aged 17 years or older, motorcycle owners, individuals who have adopted or have the potential to switch to electric motorcycles, and residents of the Jabodetabek area, particularly Jakarta. Data were collected through an online questionnaire distributed using Google Forms. The questionnaire was designed to measure respondents' perceptions of push, pull, and mooring factors, as well as their intention to adopt electric motorcycles, using a Likert scale. The quantitative approach enables the researcher to systematically measure each research variable and analyze the relationships among the constructs using statistical methods. Furthermore, statistical analysis is used to test the proposed hypotheses concerning the effects of push, pull, and mooring factors on electric motorcycle adoption intention, including the moderating role of the mooring factor in the relationships between push and pull factors and adoption intention. The findings are expected to provide empirical evidence regarding the factors influencing consumers' intention to adopt electric motorcycles in the Jabodetabek area, particularly Jakarta.

The results of the analysis regarding respondent demographics are as follows:

Table 1. Respondent Demographics

Gender			
		Frequency	**Percent**
Valid	Male	126	52.5
	Female	114	47.5
	Total	240	100.0
Age			
		Frequency	**Percent**
Valid	17 - 25 Tahun	55	22.9
	26 - 35 Tahun	90	37.5
	36 - 45 Tahun	54	22.5
	46 - 55 Tahun	28	11.7
	56 - 65 Tahun	7	2.9
	> 65 Tahun	6	2.5
	Total	240	100.0
Employment Status			
		Frequency	**Percent**
Valid	Student	47	19.6
	Private Sector Employee	89	37.1
	Entrepreneur	53	22.1
	Civil Servant	32	13.3
	Other	19	7.9
	Total	240	100.0
Domicile			
		Frequency	**Percent**
Valid	West Jakarta	31	12.9
	South Jakarta	26	10.8
	North Jakarta	25	10.4
	East Jakarta	28	11.7
	Central Jakarta	15	6.3
	Tangerang	20	8.3
	Bogor	42	17.5
	Depok	28	11.7
	Bekasi	24	10.0
	Other	1	0.4
	Total	240	100.0

An explanation regarding the indicators of the research variables is provided below:

Table 2. Indicator Variable

Indicator	Code
Relative Cost	PF1
Environmental Awareness	PF2
Effort Expectation	PUL1
Relative Benefit	PUL2
Government Regulation	PUL3
Performance Expectation	MF1
Facilitating Condition	MF2

The variable indicator table above shows that each variable is measured using several relevant indicators. The Push Factor variable is measured via relative cost (PF1) and environmental awareness (PF2), while the Pull Factor is measured via effort expectation (PUL1), relative benefit (PUL2), and government regulation (PUL3). Furthermore, the Mooring Factor is measured via performance expectation (MF1) and facilitating conditions (MF2). These indicators are used to measure respondents' perceptions regarding the factors influencing the intention to adopt electric motorcycles.

Referring to the background of the problem, the problem formulation, and the hypotheses proposed, the research model is as follows:

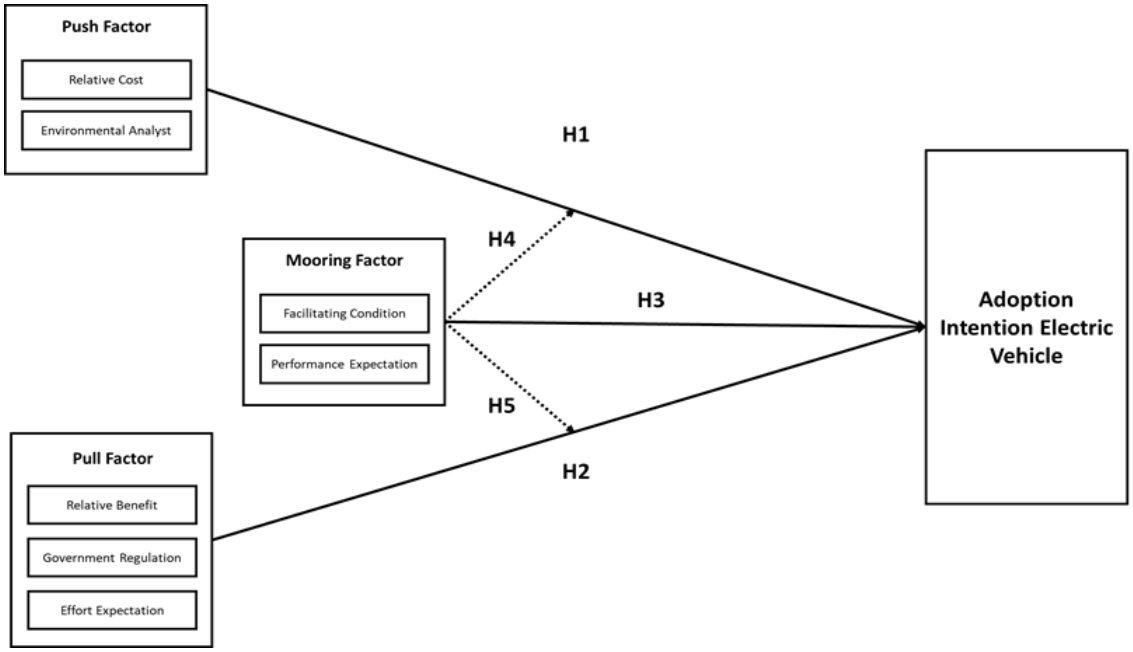


Figure 1. Research Model

Sampling Techniques

The method used is the Non-probability Sampling Method with Purposive Sampling. The sample population consists of individuals aged 17 years and older, motorcycle owners who already own or have the potential to switch to electric motorcycles and reside in Jakarta. In this study, the variables investigated are related to push, pull, mooring factors, and adoption intention regarding electric motorcycles. The sample size is approximately 200-400 respondents, depending on the available resources. The independent variables in this study are the push factors, which include relative cost and environmental awareness. The pull factors consist of relative benefit, government regulation, and effort expectation. The mooring factors include facilitating conditions and performance expectation. The dependent

variable is the decision to switch to electric motorcycles (intention to purchase, considering electric motorcycles as an alternative). These factors are adopted from studies conducted by (Ha and Nguyen, 2023), (Bhattacharyya and Thakre, 2020), and (Higueras-Castillo, Kalinic, and Marinkovic, 2020).

Data Analysis Techniques

The analysis method used in this study is the Structural Equation Model Partial Least Square (SEM-PLS), which aims to test the hypotheses proposed. To test the relationships between variables, the analysis is conducted using the SmartPLS 3.0 software. Several steps in the SEM-PLS analysis will be performed, including the testing of validity and reliability (Outer Model) by measuring Construct Reliability and Validity, followed by the structural model analysis (Inner Model) which includes the assessment of R-Square and the influence among the existing variables.

RESULT AND DISCUSSION

Outer Model Test

Convergent validity refers to the principle that indicators of a construct should have a high correlation with each other (Jogiyanto, 2011:70). The validity test for reflective indicators in the SmartPLS program is conducted by examining the loading factor values for each construct indicator. Generally, a loading factor value greater than 0.7 is recommended for confirmatory research and between 0.6–0.7 for exploratory research, with the average variance extracted (AVE) value ideally exceeding 0.5 (Ghozali & Latan, 2015:74). Convergent validity serves to evaluate the validity level of each latent variable by considering the AVE value, which is expected to exceed 0.5.

Tabel 3. Average Variance Extracted (AVE)

	Average Variance Extracted (AVE)
Adoption Intention	0.739
Mooring Factor	0.837
Pull Factor	0.779
Push Factor	0.850

Based on the test results, it was found that all latent variables had AVE values greater than 0.5. Therefore, these variables can be considered valid when assessed through the AVE value. After performing the convergent validity test, a discriminant validity test was conducted. Discriminant validity is a test that demonstrates whether a reflective indicator truly functions as an appropriate measure for its construct. Each indicator should have a stronger correlation with the construct it represents compared to other constructs. In the SmartPLS 3.0 application, discriminant validity is tested using the cross-loading values. For discriminant validity to be met, the loading value of the target construct must be higher than the loading values of other constructs.

Tabel 4. Discriminant Validity

	Adoption Intention	Mooring Factor	Pull Factor	Push Factor
AI1	0.844	0.701	0.758	0.726
AI2	0.863	0.758	0.798	0.775
AI3	0.859	0.769	0.803	0.776
AI4	0.857	0.777	0.776	0.745
AI5	0.876	0.811	0.806	0.814
MF1	0.805	0.913	0.808	0.812
MF2	0.821	0.917	0.810	0.785
PF1	0.836	0.791	0.810	0.924

	Adoption Intention	Mooring Factor	Pull Factor	Push Factor
PF2	0.811	0.819	0.871	0.919
PUL1	0.831	0.794	0.874	0.783
PUL2	0.791	0.753	0.867	0.815
PUL3	0.805	0.793	0.906	0.814

The cross-loading estimation results in the table above show that the loading values of each indicator item on its construct are higher compared to the cross-loading values on other constructs. This indicates that each construct or latent variable has met the adequate discriminant validity criteria. Thus, the indicators within each construct block are more strongly associated with their respective construct than with indicators in other construct blocks, signaling good discriminant validity. Next test conducted was the Composite Reliability test. The reliability of a construct using reflective indicators can be measured through two approaches: Cronbach's Alpha and Composite Reliability. Generally, a Composite Reliability value above 0.70 is recommended to indicate adequate reliability. Although Cronbach's Alpha is also used to assess reliability, this method tends to yield lower estimates, often referred to as an underestimate. Therefore, Composite Reliability is regarded as a more accurate method for evaluating construct reliability (Ghozali & Latan, 2015:75).

Tabel 5. Composite Reliability

	Cronbach's Alpha	Composite Reliability
Adoption Intention	0.912	0.913
Mooring Factor	0.805	0.805
Pull Factor	0.858	0.858
Push Factor	0.823	0.824

Based on the analysis results, the Composite Reliability (CR) values for all variables were very high, exceeding 0.90. This indicates that the reliability among all the latent variables is excellent.

Inner Model Test

In the analysis of the inner model, both the coefficient of determination and hypothesis testing were conducted. The structural model aims to predict the relationships between latent variables and assess the quality of the model in Partial Least Squares (PLS) through the R-square value or coefficient of determination. This coefficient illustrates the extent to which the endogenous variables can be explained by the existing exogenous variables. As a guideline, an R-square value of 0.67 is considered to indicate a strong model, a value of 0.33 reflects a moderate or adequate model, while a value of 0.19 suggests a weak model, which may require further development to enhance its predictive power.

Tabel 6. Coefficient of Determination

	R-square	R-Square Adjusted
Adoption Intention	0.886	0.882

The coefficient of determination (R^2) results indicate that the Adoption Intention variable has an R^2 value of 0.886 and an adjusted R^2 value of 0.882. These figures show that 88.6% of the variation in Adoption Intention can be explained by the independent variables included in the research model, while the remaining 11.4% is explained by factors outside the model. Meanwhile, the adjusted R^2 value of 0.882 indicates that, after adjusting for the number of variables and sample size, the model's explanatory power regarding Adoption Intention remains high at 88.2%. Thus, the research's structural model possesses strong explanatory power regarding the Adoption Intention for electric motorcycles. The path

diagram, which shows the output of the hypothesis testing obtained through PLS analysis, will be presented in the following figure:

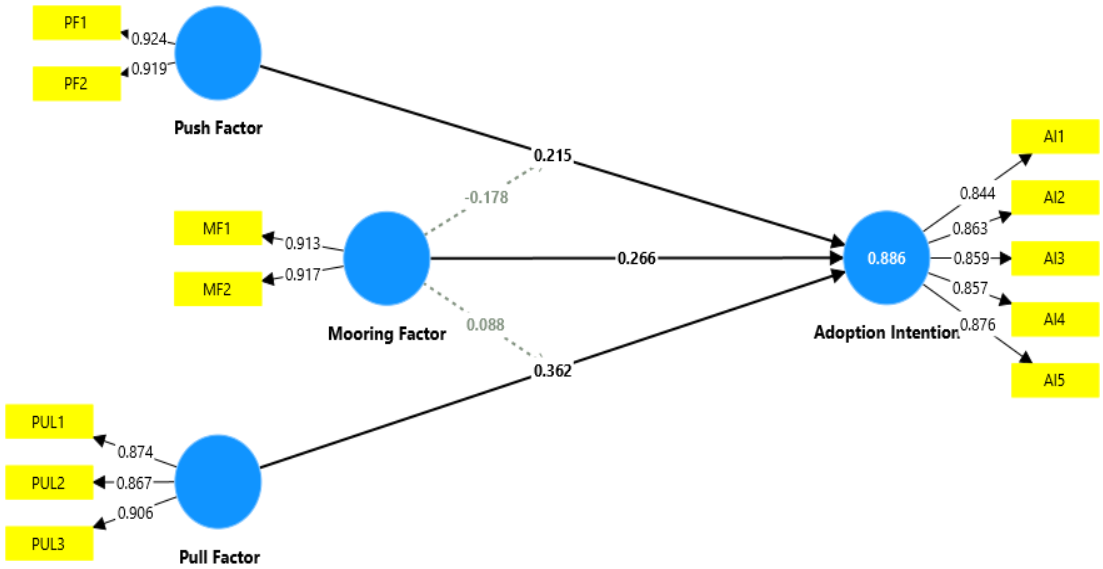


Figure 2. Path Diagram Output Results of Hypothesis Testing

Tabel 7. Hypothesis Testing

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Mooring Factor -> Adoption Intention	0.266	0.266	0.064	4,171	0.000
Pull Factor -> Adoption Intention	0.362	0.365	0.080	4,533	0.000
Push Factor -> Adoption Intention	0.215	0.214	0.063	3,389	0.000
Mooring Factor x Push Factor -> Adoption Intention	-0.178	-0.176	0.063	2,831	0.002
Mooring Factor x Pull Factor -> Adoption Intention	0.088	0.088	0.063	1,404	0.080

Based on the results of the Partial Least Squares (PLS) analysis, the push factor has a path coefficient of 0.215 with a p-value of 0.000 (< 0.05); thus, H1 is accepted. These results indicate that the push factor has a positive and significant effect on the intention to adopt electric motorcycles. Furthermore, the pull factor has a path coefficient of 0.362 with a p-value of 0.000 (< 0.05); thus, H2 is accepted. Consequently, the stronger the consumer's perception of the appeal of electric motorcycles, the higher the adoption intention. The mooring factor also exerts a positive and significant influence on adoption intention, with a path coefficient of 0.266 and a p-value of 0.000 (< 0.05); thus, H3 is accepted.Regarding the moderation effect analysis, the interaction between the push factor and the mooring factor yields a path coefficient of −0.178 with a p-value of 0.002 (< 0.05); thus, H4 is accepted. The negative coefficient indicates that the mooring factor weakens the positive influence of the push factor on adoption intention. Meanwhile, the interaction between the pull factor and the mooring factor yields a coefficient of 0.088 with a p-value of 0.080 (> 0.05); thus, H5 is rejected. This means that although the direction of the interaction relationship is positive, the moderating effect is not statistically significant.

Research results indicate that push factors have a positive and significant effect on adoption intention. These findings suggest that negative conditions associated with the use of conventional motorcycles can drive consumers to consider electric motorcycles as an alternative. From the Push-Pull-Mooring (PPM) perspective, push factors represent

dissatisfaction or conditions that compel individuals to move away from their current situation. In the context of the Jabodetabek area, perceptions regarding the costs of using conventional vehicles, fuel dependency, and environmental concerns can serve as drivers for consumers to consider switching to electric vehicles. Thus, the stronger the consumer's perception of the various unfavorable aspects of conventional motorcycles, the greater their inclination to adopt electric motorcycles.

Pull factors have a positive and significant influence on adoption intention. These results indicate that the inherent appeal of electric motorcycles is a key consideration in driving the intention to adopt them. In PPM theory, pull factors represent the positive characteristics of a new alternative that attract individuals to switch from their current situation. For consumers in the Jabodetabek area, factors such as relative benefits, expectations regarding technology usage, and government regulatory support can shape the perception of electric motorcycles as an attractive transportation alternative. These findings suggest that consumer decisions are driven not only by the desire to move away from conventional motorcycles but also by perceptions of the benefits and appeal offered by electric motorcycles.

The research results show that the mooring factor has a positive and significant effect on adoption intention. These findings indicate that conditions related to consumers' ability to use and adapt to electric vehicle technology may play a role in shaping adoption intentions. In the PPM framework, mooring factors are contextual factors that can influence movement decisions, both as obstacles and as conditions that facilitate movement. In this research, the mooring factor, which is represented through performance expectations and facilitating conditions, shows that when consumers have good expectations of the performance of electric motorbikes and feel that conditions are available that support their use, the intention to adopt these vehicles becomes higher.

Test results indicate that the mooring factor significantly moderates the relationship between the push factor and adoption intention, with a coefficient of −0.178. The negative direction suggests that the higher the mooring factor, the weaker the influence of the push factor on adoption intention. These findings can be explained by the nature of consumer switching decisions. When consumers experience dissatisfaction with conventional motorcycles, this can create an impetus to seek alternatives. However, this impetus does not necessarily result in a strong adoption intention if consumers face specific conditions that complicate the decision to switch. In the context of Jabodetabek, consumers may face a dilemma between the desire to abandon conventional vehicles and practical considerations regarding the use of electric motorcycles. For instance, even if consumers are burdened by fuel costs or concerned about environmental impacts, the decision to switch still requires weighing factors such as infrastructure readiness, technological proficiency, and the alignment of vehicle performance with daily mobility needs. Consequently, the mooring factor acts as a mechanism that limits the extent to which the pressure to abandon conventional vehicles translates into adoption intention. These results demonstrate that a "push" alone is not always sufficient to drive an adoption decision when other conditions influence the consumer switching process.

In contrast to the "push" relationship, research results indicate that the "mooring factor" does not moderate the influence of the "pull factor" on adoption intention, with an interaction coefficient of 0.088 and a p-value of 0.080 (greater than 0.05). Although the coefficient is positive, the relationship is not statistically significant. This suggests that the appeal of electric motorcycles to consumers is relatively independent of the level of the mooring factor within this research model. Consumers who view electric motorcycles as an alternative offering specific benefits and appeal may still harbor an intention to adopt them, regardless of variations in their mooring conditions. These findings can be understood through the

differing psychological mechanisms underlying push and pull factors. Push factors stem from dissatisfaction with current circumstances; consequently, a decision to switch requires weighing whether the consumer can overcome the obstacles involved in leaving that situation. Conversely, pull factors arise from a positive perception of a new alternative. Once consumers recognize the benefits, performance, or appeal of electric motorcycles as valuable, that attraction can directly shape the intention to adopt.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

This study demonstrates that the adoption intention of electric motorcycles in the Jabodetabek area is influenced by the interaction between push, pull, and mooring factors. The findings indicate that push, pull, and mooring factors each have a positive and significant effect on consumers' intention to adopt electric motorcycles. Among these factors, the pull factor represents the attractiveness of electric motorcycles as an alternative transportation option, while the push factor reflects conditions associated with conventional motorcycles that encourage consumers to consider switching. The mooring factor also contributes directly to adoption intention and plays a contextual role in the switching process. More specifically, the mooring factor significantly weakens the relationship between push factors and adoption intention, indicating that conditions associated with consumers' existing circumstances can reduce the extent to which dissatisfaction with conventional motorcycles translates into adoption intention. In contrast, the mooring factor does not significantly moderate the relationship between pull factors and adoption intention. This finding suggests that the attractiveness of electric motorcycles can influence adoption intention relatively independently of the mooring conditions examined in this study. Theoretically, these findings extend the application of the Push-Pull-Mooring framework to electric motorcycle adoption by demonstrating that mooring factors may operate differently depending on the source of consumers' motivation to adopt. From a managerial perspective, the findings indicate that increasing adoption requires not only strengthening the attractiveness of electric motorcycles but also reducing the conditions that make consumers hesitant to leave conventional motorcycles.

Limitations

This study has several limitations that should be considered when interpreting the findings. First, the use of purposive sampling limits the generalizability of the findings because the respondents were selected based on predetermined characteristics rather than through probability-based sampling. Second, the study focuses on consumers in the Jabodetabek area, particularly Jakarta, and therefore the findings may not fully represent consumer behavior in other regions of Indonesia with different transportation infrastructure, economic conditions, and levels of electric vehicle development. Third, the study examines consumers' adoption intention rather than their actual purchase or usage behavior. Consequently, the findings describe consumers' behavioral intentions and cannot be interpreted directly as evidence of actual adoption. Finally, the study identifies a significant moderating effect of the mooring factor on the relationship between push factors and adoption intention but not on the relationship between pull factors and adoption intention. This indicates that the role of mooring factors may depend on the type of motivation underlying consumers' adoption decisions, which warrants further investigation into the specific mechanisms underlying these relationships.

Recommendations

Based on the findings, several practical recommendations can be directed toward electric motorcycle manufacturers and local governments. For manufacturers, the positive influence of both push and pull factors indicates that marketing and product strategies should address both consumers' reasons for leaving conventional motorcycles and the benefits offered by electric alternatives. Manufacturers should consider developing more competitive battery and ownership pricing schemes, including battery leasing, trade-in programs, and flexible financing, to reduce the initial economic burden associated with electric motorcycle adoption. Manufacturers should also strengthen the battery-swapping ecosystem and expand partnerships with charging-service providers to improve access to energy infrastructure and reduce concerns regarding vehicle usability. Product communication should emphasize measurable benefits such as operating-cost efficiency, vehicle performance, battery reliability, and practical daily use rather than relying solely on environmental messaging.

For local governments, policy interventions should complement existing fiscal incentives with targeted and sustainable non-fiscal incentives. Local governments in the Jabodetabek area could consider providing clearly defined preferential access for electric motorcycles within applicable traffic-management policies, including long-term exemptions or dedicated treatment under odd-even traffic restrictions where legally and operationally feasible. In addition, governments could collaborate with electricity providers and charging network operators to introduce targeted electricity-rate incentives for electric motorcycle charging, particularly during the early stages of ecosystem development. The development of public charging and battery-swapping infrastructure at strategic mobility points, such as transportation hubs, public facilities, and high-traffic areas, should also be prioritized. These measures would address practical barriers to switching while simultaneously strengthening the attractiveness of electric motorcycles as an alternative to conventional motorcycles. For future research, the distinction between the moderating effects of mooring factors on push and pull relationships should be examined further by testing specific mooring dimensions, such as perceived risk, switching cost, habit, facilitating conditions, and technological confidence, to identify which conditions most strongly influence the transition toward electric motorcycles.

Author Contributions

All authors made significant contributions to this study. These contributions included research conceptualization, development of the theoretical framework, data collection, data analysis, interpretation of results, manuscript preparation, scholarly revision, and final approval of the manuscript for publication. All authors confirm that they have read and approved the final version of the article.

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