



Analysis of Mode Choice Between Private Two-Wheeled Vehicles and Commuter Line Trains on the Tangerang–Jakarta Route

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Abstract: This study is motivated by the increasing commuter mobility on the Tangerang–Jakarta corridor and the continuing competition between private motorcycles and the Commuter Line as daily transport modes. **Objective:** This study aims to analyze mode choice between private two-wheeled vehicles and the Commuter Line by comparing user perceptions and identifying service attributes that influence modal decisions. **Method:** This study employed a quantitative approach using a structured questionnaire distributed to 107 commuters. The data were analyzed using descriptive statistics, validity and reliability tests, the Mann–Whitney U test, and binary logistic regression. **Findings:** The results show significant differences in perceptions between motorcycle users and Commuter Line users across all service attributes, including security, safety, orderliness, smoothness, satisfaction, comfort, travel time, intermodal integration, and accessibility. However, the logistic regression results indicate that only travel security, safety, and orderliness significantly influence mode choice. **Implication:** These findings imply that modal shift policies should prioritize risk reduction, operational safety, and service orderliness to strengthen the attractiveness of rail-based public transport. **Originality:** The originality of this study lies in its direct comparison between motorcycle users and Commuter Line users on the Tangerang–Jakarta corridor by combining perception difference analysis and mode choice modeling.

Keywords: mode choice; commuter line; motorcycle; binary logistic regression; urban transportation.

INTRODUCTION

Commuting mobility in the Jakarta metropolitan area remains a central issue in urban transport planning because daily movements between suburban municipalities and the capital continue to shape travel demand, congestion, and transport service performance. The 2023 Jabodetabek commuter statistics published by Statistics Indonesia show that intercity mobility across Jakarta, Bogor, Depok, Tangerang, and Bekasi is still a defining feature of metropolitan daily life (Badan Pusat, 2024). This pattern is closely linked to the spatial restructuring of the metropolitan region, in which transport networks, residential expansion, and employment concentration have intensified corridor-based commuting flows, including movements from Tangerang to Jakarta (Tjahjono et al., 2020; Yudhistira

et al., 2019). In this setting, the demand for efficient public transport has grown, yet private two-wheeled vehicles remain deeply embedded in everyday mobility. In DKI Jakarta alone, the number of registered motorcycles reached 9,167,512 units in 2024, indicating the continued dominance of motorcycle-based travel in the region (Badan Pusat Statistik Provinsi, 2025). At the same time, rail-based mass transit has become increasingly important, with KAI Commuter reporting 374,488,422 passengers in 2024, or an average of 1,023,192 passengers per day (Indonesia, 2024). This dual condition suggests that the Tangerang–Jakarta corridor is characterized by a real competition between motorcycles and commuter rail, making it an important case for examining mode choice in support of sustainable urban transport policy (Aritenang, 2024; Hasibuan & Permana, 2022).

The first stream of literature has mainly examined public transport service quality and user perception. Studies of rail and urban transit repeatedly show that safety, comfort, information, reliability, and service responsiveness shape passengers' evaluations and satisfaction with public transport services (Priyanto et al., 2023; Tuan et al., 2022). In the Indonesian context, research on commuter line passengers has confirmed that perceived service quality remains a major determinant of users' assessment of rail-based transport, especially in relation to station facilities, travel security, and operational performance (Priyanto et al., 2023). Other studies have also shown that the quality of transit systems cannot be separated from inclusive service design, because user perceptions are influenced not only by technical performance but also by how safe and usable the system feels for different social groups, including women (Yossa et al., 2024). In Jakarta, transit-oriented station areas have likewise been discussed from the perspective of carrying capacity and spatial readiness, indicating that infrastructure quality around stations matters for the overall public transport experience (Hasibuan et al., 2021). However, this body of work is largely centered on transit users themselves, rather than on a direct comparison between public transport users and motorcycle users as competing mode groups.

A second stream of literature emphasizes accessibility, first-mile/last-mile conditions, and station-area integration. Research in Jakarta has shown that subjective and objective accessibility jointly shape commuting experiences and that mode users often evaluate accessibility differently depending on convenience, affordability, and perceived barriers in the travel chain (Ayuriany et al., 2023). More broadly, the first-mile/last-mile literature has established that inadequate access to transit, weak pedestrian environments, and poor intermodal continuity reduce the attractiveness of public transport and increase the burden

of using rail systems (Ha et al., 2023; Kåresdotter et al., 2022). Similar arguments are reinforced by more recent work showing that public transport accessibility indicators are strongly associated with actual mode choice behavior (Kühnel et al., 2025). In the Jakarta Metropolitan Area, station-level ridership studies further demonstrate that built-environment variables, surrounding land use, and riders' perceptions of station areas are closely related to commuter rail use (Putri & Lee, 2025; Widita et al., 2025). Research on Indonesian transit-oriented development has also highlighted that mobility culture and socio-cultural characteristics shape how station areas function and how transit is adopted in practice (Hasibuan & Permana, 2022). Even so, these studies predominantly explain station performance, accessibility conditions, or TOD outcomes, rather than directly testing how such service-related attributes distinguish the choice between motorcycle use and commuter rail use on a specific commuting corridor.

A third stream of literature focuses on mode choice modeling and traveler heterogeneity. Studies in Indonesia and other Asian metropolitan settings consistently find that travel time, cost, access distance, vehicle ownership, income, and trip purpose are important predictors of mode choice (Bastarianto et al., 2019; Le & Teng, 2023; Witchayaphong et al., 2020). A broader methodological review of developing cities reaches a similar conclusion by identifying socio-demographic factors, modal availability, and travel attributes as recurrent determinants of travel behavior (Mwale et al., 2022). Within Jakarta, evidence from non-work trips suggests that trip frequency, vehicle ownership, and socio-demographic characteristics still shape people's likelihood of using motorcycles rather than other modes (Benita, 2023). Research focused on women's travel-mode choices in Jakarta also indicates that dwelling type, travel distance, and socio-economic characteristics influence modal decisions in ways that are not uniform across user groups (Hermaputi & Hua, 2024). Additional Jakarta-based studies show that policy-related variables such as travel cost and route conditions can alter travel choices, as seen in congestion charging simulations and toll-road related behavioral models (Andani et al., 2021; Yugihartiman et al., 2023). Meanwhile, ride-hailing research in metropolitan Jakarta suggests that motorcycle-based mobility remains attractive because of flexibility, affordability, and accessibility, particularly for lower-income travelers (Aritenang, 2024). Taken together, the existing literature provides strong evidence on the determinants of travel behavior, but it still offers limited corridor-specific evidence that directly compares private motorcycle users and commuter rail users on the Tangerang–Jakarta route while

simultaneously examining both perception differences and the probability of choosing one mode over the other.

Based on those gaps, this study aims to analyze mode choice between private motorcycles and the Commuter Line on the Tangerang–Jakarta route. More specifically, the study seeks to identify the characteristics and preference tendencies of users of both modes, compare motorcycle users' and commuter rail users' perceptions of transport service attributes, and test whether those attributes significantly affect the probability of choosing one mode over the other. By doing so, the study is expected to contribute more focused empirical evidence to metropolitan commuting research, especially in explaining how service-related perceptions operate in a corridor where private motorcycles and commuter rail directly compete as daily travel options.

This study is built on the argument that mode choice on the Tangerang–Jakarta corridor is not determined solely by mobility need, but also by how travelers perceive the quality of transport services. In a context where motorcycles offer flexibility and door-to-door convenience, commuter rail must compete through attributes that reduce perceived travel risk and improve travel assurance. Prior research suggests that safety, service quality, and accessibility are among the most influential considerations in modal choice and modal shift (Ayuriany et al., 2023; Ibrahim et al., 2023; Priyanto et al., 2023). Accordingly, this study proposes two hypotheses: H1: there are significant differences in perceived transport service attributes between motorcycle users and commuter rail users; and H2: transport service attributes significantly influence the probability of choosing motorcycles or the Commuter Line on the Tangerang–Jakarta route.

RESEARCH METHOD

The unit of analysis in this study is the individual commuter traveler who performs regular trips on the Tangerang–Jakarta corridor and chooses either a private motorcycle or the Commuter Line as the main travel mode. Accordingly, the study focuses on travelers' mode choice behavior and their perceptions of transport service attributes. The dependent variable is mode choice, coded dichotomously as motorcycle users = 0 and Commuter Line users = 1. The independent variables consist of nine service-related attributes, namely travel security, safety, orderliness, trip smoothness, user satisfaction, comfort, travel time, intermodal integration, and accessibility. These variables were selected because they

represent key dimensions of transport service quality that are relevant to commuter decision-making in an urban corridor context.

This study employed a quantitative research design because the research sought to measure perceptions systematically, compare two user groups statistically, and examine the effect of service attributes on the probability of choosing a specific mode. A quantitative approach was considered appropriate because the study addresses observable relationships between variables that can be expressed numerically and tested through inferential statistics. In this regard, the study combined descriptive analysis, comparative analysis, and binary logistic regression. Descriptive analysis was used to portray the characteristics of respondents and the general tendency of their responses, comparative analysis was used to examine perception differences between motorcycle users and Commuter Line users, and binary logistic regression was used to estimate the effect of service attributes on mode choice.

The data used in this study were primarily primary data obtained from respondents through a structured questionnaire survey. The respondents were active commuters traveling on the Tangerang–Jakarta route. The survey was conducted in the area of Tangerang Station and its surrounding access points during the period of 10–21 February 2026, with data collection focused on weekdays in order to represent routine commuter travel patterns. The study population refers to users of both transport modes on the corridor, while the sample was determined through non-probability purposive sampling. This sampling technique was chosen because the research specifically targeted respondents who matched the characteristics of the study, namely travelers who actually used one of the two competing modes on the observed corridor. The final dataset consisted of 107 respondents.

Data were collected through a field questionnaire survey using a structured instrument. The questionnaire consisted of two main sections. The first section recorded respondents' socio-demographic characteristics, including gender, age, education level, occupation, and income level. The second section measured respondents' perceptions of the nine transport service attributes. The instrument used closed-ended statements arranged in a quantitative rating format so that respondents could provide comparable assessments across variables. The survey was administered directly to respondents in the field to ensure that the selected participants met the study criteria and to improve response completeness. This procedure was intended to obtain data that were relevant to the actual commuting experience of both motorcycle users and Commuter Line passengers.

The collected data were processed using SPSS. The analysis began with descriptive statistics to summarize respondents' characteristics and the distribution of responses across variables. Next, the questionnaire items were examined through validity and reliability testing to ensure that the instrument was adequate for analysis. After that, binary logistic regression was applied to assess whether the nine service attributes significantly affected the probability of choosing the Commuter Line over a private motorcycle. Since the study also aimed to compare perceptions between the two user groups, a normality test was first conducted. Because the data were not normally distributed, the analysis of perception differences was continued using the Mann–Whitney U test at a 10% significance level. Through these stages, the study was able to evaluate both the determinants of mode choice and the statistical differences in perceived transport service quality between the two groups of users.

RESULT

Respondent Characteristics and Mode Preference Patterns

This study involved 107 respondents who regularly travelled on the Tangerang–Jakarta corridor using either a private motorcycle or the Commuter Line. The respondent distribution shows that 43 respondents (40.2%) used motorcycles, while 64 respondents (59.8%) used the Commuter Line.

Table 1. Respondent Characteristics

Variable	Category	Frequency	Percentage (%)
Mode choice	Motorcycle	43	40.2
	Commuter Line	64	59.8
Gender	Male	51	47.7
	Female	56	52.3
Age	< 20 years	8	7.5
	20–29 years	70	65.4
	30–39 years	26	24.3
	40–49 years	3	2.8
Education	Junior high school/equivalent	5	4.7
	Senior high school/equivalent	26	24.3
	Diploma	2	1.9
	Bachelor's degree	74	69.2
Occupation	Student	18	16.8
	Civil servant	11	10.3
	Private employee	71	66.4

Variable	Category	Frequency	Percentage (%)
Income	Entrepreneur	7	6.5
	< IDR 3,000,000	14	13.1
	IDR 3,000,000–5,000,000	26	24.3
	IDR 5,000,000–7,000,000	41	38.3
	> IDR 7,000,000	26	24.3

The data show that the respondents were dominated by productive-age commuters, particularly those aged 20–29 years, bachelor’s degree holders, and private employees. This indicates that the Tangerang–Jakarta corridor is strongly associated with routine work-related mobility. The higher proportion of Commuter Line users also suggests that rail-based public transport already has an important role in the corridor, although motorcycle use remains substantial.

Instrument Quality and Perception Differences Between User Groups

Before conducting the main statistical analysis, the questionnaire instrument was tested for validity and reliability. The validity test using Pearson correlation showed that all questionnaire items had correlation values higher than the critical value of $r_{table} = 0.1599$. The correlation coefficients ranged from 0.381 to 0.789, indicating that all 90 items were valid and suitable for further analysis. The complete validity test results for all questionnaire items are presented in Appendix A.

Table 2. Summary of Validity and Reliability Test Results

Test	Indicator	Result	Interpretation
Validity test	Pearson correlation	$r\text{-value} > 0.1599$	All items valid
Minimum r-value	Pearson correlation	0.381	Valid
Maximum r-value	Pearson correlation	0.789	Valid
Reliability test	Cronbach’s Alpha	0.9852	Highly reliable
Number of items	Questionnaire items	90	Accepted

The reliability test produced a Cronbach’s Alpha value of 0.9852, indicating very high internal consistency. This means that the questionnaire items were consistent in measuring the service attributes examined in this study. However, because the reliability value is very high, future studies may consider reviewing item redundancy to ensure that each statement contributes uniquely to the measurement construct.

After the instrument was confirmed to be valid and reliable, a normality test was conducted. The results indicated that the data were not normally distributed; therefore, the comparison between motorcycle users and Commuter Line users was continued using the Mann–Whitney U test.

Table 3. Summary of Mann–Whitney U Test Results

Variable	Significance Result	
Travel security	< 0.001	Significant difference
Safety	< 0.001	Significant difference
Orderliness	< 0.001	Significant difference
Trip smoothness	< 0.001	Significant difference
User satisfaction	< 0.001	Significant difference
Comfort	< 0.001	Significant difference
Travel time	< 0.001	Significant difference
Intermodal integration	< 0.001	Significant difference
Accessibility	< 0.001	Significant difference

The Mann–Whitney U test results show that all nine service variables had significance values below 0.001. This means that there were statistically significant differences in perception between motorcycle users and Commuter Line users across all service attributes. These findings indicate that the two groups experience and evaluate transportation services differently.

Several patterns emerge from these findings. First, the differences are not limited to one attribute, but occur across all measured dimensions. Second, both basic service attributes, such as security and safety, and supporting service attributes, such as accessibility and intermodal integration, show significant differences. Third, the results suggest that motorcycle users and Commuter Line users represent two distinct behavioral groups. Therefore, transport policy should not assume that all commuters evaluate travel modes using the same criteria.

Determinants of Mode Choice Between Motorcycle and Commuter Line

Binary logistic regression was applied to examine whether transport service attributes affected the probability of choosing the Commuter Line rather than a motorcycle. The model fit was acceptable, as indicated by the Hosmer and Lemeshow significance value of 0.227, which is greater than 0.05. The Nagelkerke R Square value of 0.573 indicates that the model explains approximately 57.3% of the variation in mode choice.

Table 4. Model Fit Summary

Indicator	Value	Interpretation
Hosmer and Lemeshow test	0.227	Model fits the data
Nagelkerke R Square	0.573	57.3% of variation explained

The regression results show that three variables significantly affected mode choice at the 10% significance level: travel security, safety, and orderliness. Travel security had the strongest effect, with Sig. = 0.000 and Exp(B) = 19.485, followed by safety with Sig. = 0.003 and Exp(B) = 5.023. Orderliness also had a significant effect with Sig. = 0.013 and Exp(B) = 0.305.

Table 5. Summary of Binary Logistic Regression Results

Variable	Sig.	Exp(B)	Interpretation
Travel security	0.000	19.485	Significant positive effect
Safety	0.003	5.023	Significant positive effect
Orderliness	0.013	0.305	Significant effect
Trip smoothness	> 0.10	—	Not significant
User satisfaction	> 0.10	—	Not significant
Comfort	> 0.10	—	Not significant
Travel time	> 0.10	—	Not significant
Intermodal integration	> 0.10	—	Not significant
Accessibility	> 0.10	—	Not significant

These results indicate that mode choice on the Tangerang–Jakarta corridor is influenced more strongly by basic assurance-related attributes than by convenience-related attributes. Travel security was the most dominant factor, suggesting that users are more likely to choose the Commuter Line when they perceive it as providing better protection from travel risks. Safety also had a significant positive effect, showing that perceived safety is an important consideration in mode choice.

The significance of orderliness indicates that the organization of transport services also matters in shaping user decisions. However, because its Exp(B) value is below one, the direction of its effect should be interpreted carefully based on the coding of the questionnaire and regression model. Meanwhile, trip smoothness, satisfaction, comfort, travel time, intermodal integration, and accessibility did not show significant effects in the logistic model. This suggests that although these variables may differ between user groups, they do not necessarily determine mode choice statistically.

Overall, the findings show that the choice between motorcycles and the Commuter Line is mainly shaped by perceived security, safety, and orderliness. This supports the argument that modal shift policies should prioritize risk reduction, operational safety, and service discipline to strengthen the attractiveness of rail-based public transport.

DISCUSSION

This study examined mode choice behavior between private motorcycle users and Commuter Line users on the Tangerang–Jakarta corridor by analyzing user characteristics, perception differences, and the determinants of mode choice. The findings show three key results. First, the commuter population is dominated by young, productive-age workers, particularly private employees, indicating that the corridor is primarily driven by routine work-related travel demand. Second, there are statistically significant differences in perceptions between motorcycle users and Commuter Line users across all transport service attributes. Third, the binary logistic regression results reveal that travel security, safety, and orderliness are the only variables that significantly influence mode choice, while other variables such as comfort, travel time, accessibility, and intermodal integration do not show a significant effect.

The results can be explained by examining the nature of commuter travel behavior in urban environments. The dominance of security and safety variables suggests that travelers prioritize risk reduction over convenience when choosing a mode of transport. This is particularly relevant in the context of motorcycle use, which is often associated with higher accident risks and exposure to environmental hazards. Therefore, when commuters perceive that the Commuter Line provides better protection, controlled operations, and reduced uncertainty, they are more likely to shift toward rail-based transport. The significance of orderliness further reinforces this explanation, as structured and regulated transport systems tend to reduce perceived chaos and increase user confidence. In contrast, variables such as comfort, travel time, and accessibility may not significantly affect mode choice because these attributes are often perceived as comparable or already acceptable in both modes, especially in a dense metropolitan corridor where travel conditions are relatively constrained.

When compared with previous studies, the findings of this research show both alignment and distinction. Consistent with earlier studies, this research confirms that service quality and safety-related attributes are important determinants of public transport

usage (Priyanto et al., 2023; Tuan et al., 2022). Similarly, studies on accessibility and commuting behavior emphasize the role of service perception in shaping travel decisions (Ayuriany et al., 2023; Kühnel et al., 2025). However, this study provides a different perspective by showing that not all service attributes equally influence mode choice. While many previous studies highlight the importance of travel time, accessibility, and integration, this research finds that these variables are not statistically significant in the logistic model. This difference may be explained by the corridor-specific context, where commuters are already familiar with both modes and therefore prioritize basic assurance factors over additional service improvements. Moreover, unlike many previous studies that focus only on public transport users, this research directly compares motorcycle users and commuter rail users, thereby offering a more explicit analysis of mode competition. This represents the novelty of the study, particularly in the context of the Tangerang–Jakarta corridor.

From an interpretative perspective, the findings indicate that mode choice behavior in this corridor is fundamentally shaped by perceived risk and travel assurance rather than by convenience alone. This suggests that urban commuters do not necessarily seek the fastest or most comfortable option, but rather the option that minimizes uncertainty and potential harm. In a broader context, this reflects a shift in urban mobility preferences where safety and reliability become primary decision factors, especially in high-density metropolitan areas. The results also contribute to the understanding of travel behavior by showing that perception differences do not automatically translate into behavioral outcomes unless they are linked to critical user concerns such as safety and security.

The findings also present both functional and dysfunctional implications. On the positive side, the strong influence of safety and security indicates that improving these aspects can effectively encourage a modal shift toward public transport. This is beneficial for reducing traffic congestion, lowering emissions, and promoting sustainable urban mobility. However, on the negative side, the insignificance of variables such as accessibility and intermodal integration suggests that existing improvements in these areas may not yet be sufficient to influence user behavior. It may also indicate a mismatch between infrastructure development and user priorities, where investments in connectivity and integration have not fully translated into perceived value by commuters.

Based on these findings, several policy implications can be proposed. First, transportation authorities should prioritize enhancing security and safety measures in the

Commuter Line system, including surveillance systems, safety protocols, and operational reliability. Second, efforts to improve service orderliness, such as passenger flow management and schedule consistency, should be strengthened to increase user confidence. Third, although variables like accessibility and intermodal integration were not statistically significant, they should not be neglected; instead, they should be improved in ways that directly address user perceptions and real travel barriers, particularly in first-mile and last-mile connections. Finally, policies aimed at reducing motorcycle dependency should not rely solely on restricting private vehicle use but should be complemented by improving the perceived quality and trustworthiness of public transport services. Through these integrated efforts, a more effective modal shift toward sustainable transportation can be achieved.

CONCLUSION

This study concludes that mode choice on the Tangerang–Jakarta corridor is mainly shaped by commuters’ perceptions of travel security, safety, and orderliness. Although motorcycle users and Commuter Line users showed significant perceptual differences across all service attributes, the binary logistic regression results indicate that only these three variables significantly influenced the probability of choosing one mode over the other. This finding suggests that commuters do not choose transport modes merely based on convenience, travel time, or accessibility, but also on the extent to which a mode provides a sense of protection, control, and travel assurance.

The main scientific contribution of this study lies in its direct comparison between private motorcycle users and Commuter Line users within the same commuting corridor. By combining perception comparison through the Mann–Whitney U test and mode choice modeling through binary logistic regression, this research provides empirical evidence that not all perceived service differences become determinants of mode choice. The study therefore contributes to urban transport research by showing that basic assurance-related attributes may be more decisive than secondary service attributes in encouraging modal shift from private two-wheeled vehicles to rail-based public transport.

This study has several limitations. The sample size was limited to 107 respondents, and the survey was conducted only on the Tangerang–Jakarta corridor within a specific data collection period. The study also focused on nine service attributes and did not include other possible determinants such as total travel cost, parking availability, weather conditions, psychological attachment to motorcycles, or detailed first-mile and last-mile

travel patterns. Future research should use a larger sample, cover multiple commuting corridors, and include broader behavioral and economic variables to provide a more comprehensive explanation of urban mode choice.

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