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## Analyzing the Influence of Accessibility and User Factors on Mode Choice for Daily Commuters

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## Abstract

The population growth of Surabaya City is increasing every year with a growth rate of 0.42% in the range of 2020-2023. However, the increase is also in line with the increase in private vehicles and travel needs, it is inversely proportional to the lack of optimal use of public transportation, especially Trans Semanggi Suroboyo. Trans Semanggi Suroboyo West-East corridor crosses residential areas to the city center, so it is expected to connect residences with places of education and work. One of the causes of this non-optimality based on previous research is the accessibility factor. This study aims to explore accessibility-related influences on mode choice. The methodology used in this study is the assessment of accessibility levels using the public transport accessibility levels method and continued with mode selection using the binary logistic regression method. The results of this study show that there is evidence of the influence of accessibility in the selection of transportation modes. In addition, there are variables of user characteristics that influence the selection of modes that complement the model. This study has potential as an evaluation material in improving accessibility to support the optimization of the use of public transportation, especially on daily trips.

## Keywords

Accessibility, Daily Commuters, Mode Choice, Public Transport Accessibility Levels.

## 1. Introduction

In 2023, Surabaya City's population reached 3,009,286 across 31 sub-districts and 154 villages, with a density of 8,958 people/km<sup>2</sup>. The city's population has grown at a rate of 0.42% annually from 2020 to 2023, driving increased demand for transportation and contributing to urban development challenges. This growth has led to a surge in private vehicle ownership and travel needs, which contrasts with the underutilization of public transportation systems, notably the Trans Semanggi Suroboyo bus service. The West-East corridor of Trans Semanggi Suroboyo, connecting residential areas to the city center, is designed to serve key destinations such as educational institutions and workplaces. However, its usage remains suboptimal, with accessibility identified as a critical factor in previous studies (Indahsari et al., 2019; Larasati & Handayani, 2021).

Surabaya's urban mobility challenges are compounded by rising private vehicle numbers, particularly motorcycles and cars, which increased significantly between 2018 and 2020. This trend aligns with a 4.62% annual increase in daily commuter trips, predominantly using private. The Surabaya City Government has implemented policies to address these issues, as outlined in the Surabaya city detailed spatial plan 2018-2038, which emphasizes infrastructure networks and land use planning to manage traffic flow and reduce congestion. Diverse land use patterns influence traffic volumes and contribute to congestion, highlighting the need for efficient public transportation. The rise in private vehicle use is partly attributed to inadequate public transport services and policies favoring private vehicles (Tahir, 2005).

The Trans Semanggi Suroboyo service, particularly the Kejawan Putih Tambak-UNESA route, operational since February 2022 and managed by the Surabaya City Government as of July 2024, aims to enhance connectivity. Despite this, its occupancy rate remains low, ranging from 13-22% according to the Sustainable Urban Mobility Plan (SUMP) study for the Surabaya Metropolitan Area (Egis, 2024) and below 30% based on load factor evaluations. This low ridership underscores the need to investigate accessibility as a determinant of mode choice, as prior research suggests connectivity and service quality significantly impact public transport usage (Indahsari et al., 2019; Larasati & Handayani, 2021).

Accessibility, defined as the ease of reaching destinations via transportation networks, is a key variable in mode choice, with high accessibility linked to increased public transport use (Cheng et al., 2020). This study focuses on daily commuters individuals traveling regularly for work, education, or other routine activities who contribute significantly to road congestion (Nguyen-Phuoc et al., 2020; Hidayati, 2023). By examining the accessibility of the Trans Semanggi Suroboyo West-East corridor and comparing it with private vehicle use, this research aims to identify factors influencing mode choice. Using the Public Transport Accessibility Levels (PTAL) method to assess accessibility and binary logistic regression to analyze mode choice, the study seeks to provide evidence of accessibility's impact on transport preferences. The findings are expected to inform strategies for improving public transport utilization, supporting sustainable urban mobility in Surabaya.

## 2. Literature Review

### 2.1. Accessibility, Motorcycle Ownership, and Mode Choice

Accessibility refers to the ease with which individuals can connect locations using available transportation networks, such as roads or public transport systems (Blunden, 1971). It is influenced by two primary factors: distance-related aspects, including proximity to land use activities, and transportation conditions, such as travel time, costs, land use intensity, and travelers' income (Miro, 2005). High accessibility is achieved when destinations are closer and transportation networks

are efficient, facilitating seamless movement (Nupus & Ichwanudin, 2021). Conversely, accessibility diminishes when land uses are distant or transportation infrastructure is inadequate. Accessibility also affects the perception of ease in reaching destinations, which can indirectly influence people's decision to rely on private vehicles.

Research by Poorthuis and Zook (2023) demonstrates that public transport accessibility is typically highest in city centers, declining as distance from the core increases. This spatial variation underscores the importance of strategic infrastructure planning to enhance connectivity. Additionally, studies like Adhvaryu et al. (2019) highlight the effectiveness of the Public Transport Accessibility Levels (PTAL) method in mapping accessibility, particularly in urban contexts like India, where it has been applied to assess service coverage and inform policy (Adhvaryu & Kumar, 2021). In Surabaya, low accessibility has been identified as a barrier to public transport adoption, particularly for routes like Trans Semanggi Suroboyo, necessitating targeted improvements to enhance service reach and efficiency (Indahsari et al., 2019; Khairunnisa & Widyastuti, 2024). In this context, vehicle ownership particularly motorcycles can serve as an alternative means to improve personal accessibility, especially when public transit is perceived as unreliable or limited (De Witte et al., 2013; Masoumi et al., 2022). Furthermore, destination accessibility directly shapes mode choice behavior (Cheng et al., 2020). Areas with better connectivity and easier access are more likely to attract public transit users.

H1: The number of motorcycles owned has a significant effect on mode choice.

H2: The accessibility of the destination location has a significant effect on mode choice.

## **2.2. Total travel time, Total travel cost, and mode choice**

Mode choice reflects the proportion of trips assigned to available transportation options, influenced by multiple factors, and is critical in understanding urban mobility patterns (Tamin, 2000). These factors are categorized into four groups: trip characteristics (e.g., distance, time, and destination), traveler characteristics (e.g., vehicle ownership, income), transportation system attributes (e.g., travel time, cost, frequency, comfort), and city or zone characteristics (e.g., urban density) (Tamin, 2008). Research indicates that accessibility is a pivotal determinant, with higher accessibility increasing the likelihood of choosing public transport over private vehicles (Cheng et al., 2020). A comprehensive understanding of these variables helps identify leverage points for shifting commuter behavior toward sustainable transportation alternatives.

Private vehicle ownership, particularly motorcycles, significantly reduces public transport usage due to perceived flexibility and convenience (De Witte et al., 2013; Masoumi et al., 2022). In Surabaya, studies show that the use of private vehicles remains dominant, largely because of gaps in accessibility and the low quality of public transport services (Larasati & Handayani, 2021; Indahsari et al., 2019). Economic and operational factors also influence user decisions, with individuals more inclined to choose options that are affordable, time-efficient, and reliable (Litman, 2022). As highlighted by Banister (2008), shifting mode choice requires improvements in service integration and the relative attractiveness of public transport systems.

Total travel time is another essential consideration in mode selection. While shorter travel time generally increases public transport desirability, perceptions of comfort and predictability may moderate this relationship (Zhou et al., 2022). Likewise, total travel cost remains a sensitive factor, particularly among cost-conscious commuters (Litman, 2022).

H3: Total travel time has a significant effect on mode choice.  
 H4: Total travel cost has a significant effect on mode choice.

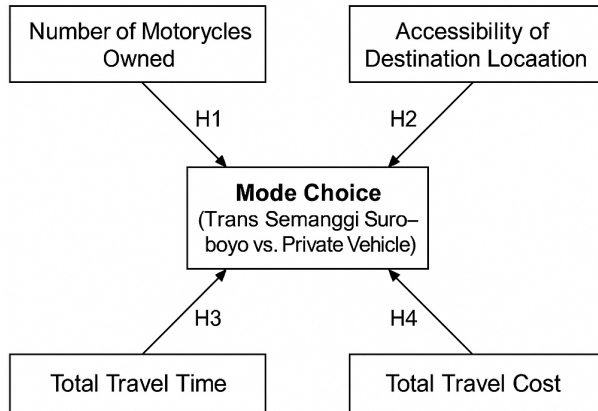


Figure 1. Research framework

Figure 1 presents the conceptual framework of this study, which outlines the relationship between four independent variables and transportation mode choice. These variables include number of motorcycles owned, accessibility of the destination location, total travel time, and total travel cost. Each variable is hypothesized to influence the likelihood of choosing Trans Semanggi Suroboyo over private vehicles, as indicated by hypotheses H1 through H4.

### 3. Methods

In this study, there are two main stages carried out, namely the assessment of the existing conditions of the level of accessibility of public transportation in this case, Trans Semanggi Suroboyo route Kejawan Putih Tambak-UNESA in the west-east corridor and will be continued with the selection of transportation modes by the community, especially on daily commuters.

The method used in assessing the level of accessibility is Public Transport Accessibility Levels (PTAL). PTAL considers the duration of walking to and from bus stops and the availability of transportation services when determining accessibility from the origin to the destination (Transport for London, 2014). The steps in this stage can be seen in Figure 2.

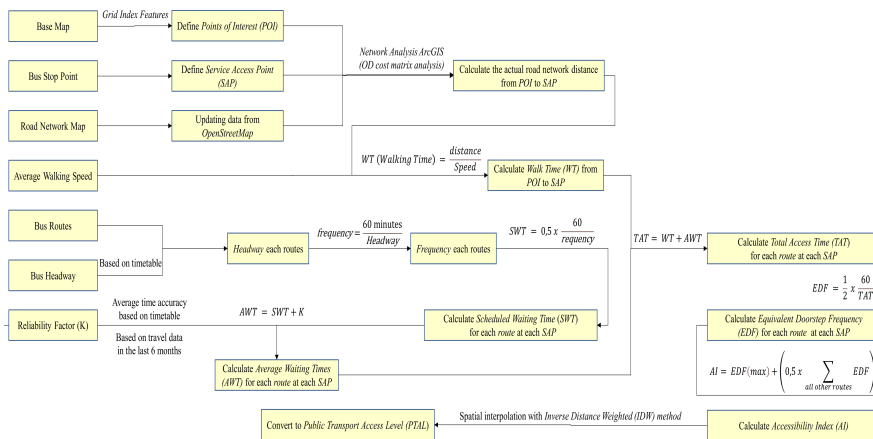

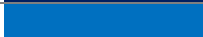







Figure 2. Steps and Processes of the Public Transport Accessibility Levels (PTAL) Methods

The process, outlined in Figure 2, involves defining Points of Interest (POI) using a 50 x 50 meter grid across the study area. Service Access Points (SAP), such as bus stops, are identified next. Scheduled Waiting Time (SWT) and Average Waiting Time (AWT) are calculated based on headway and reliability of the Trans Semanggi Suroboyo route. These are combined with travel time from POI to SAP to determine Total Access Time (TAT), yielding an Accessibility Index (AI) classified into categories as shown in Table 1. Higher PTAL values indicate better accessibility, while a value of 0 signifies areas beyond walking distance (800 meters) from SAP.

**Table 1.** Accessibility Index of PTAL Methods

PTAL	Accessibility Index Range	Accessibility Levels	Map Color
0	0	Worst	
1A	0.01 - 2.50	Very Poor	
1B	2.51 - 5.00	Very Poor	
2	5.01 - 10.00	Poor	
3	10.01 - 15.00	Moderate	
4	15.01 - 20.00	Good	
5	20.01 - 25.00	Very Good	
6A	25.01 - 40.00	Excellent	
6B	40.01 +	Excellent	

*Source: Transport for London, 2014*

The mode choice analysis examines attributes influencing daily commuters' transportation preferences through a primary survey of 210 respondents, selected via purposive sampling. Respondents are daily travelers in Surabaya, commuting at least three days per week within 800 meters of Trans Semanggi Suroboyo bus stops, based on the maximum walking range in Surabaya. Variables include socio-economic factors (gender, age, education, income, vehicle ownership, driver's license) and travel characteristics (purpose, distance, time, cost), supplemented by accessibility of origin and destination from the PTAL analysis. Binary logistic regression is used to test these variables' impact on mode choice, identifying significant factors influencing preferences for Trans Semanggi Suroboyo versus private vehicles. This approach ensures a robust evaluation of how accessibility and commuter characteristics shape transportation decisions.

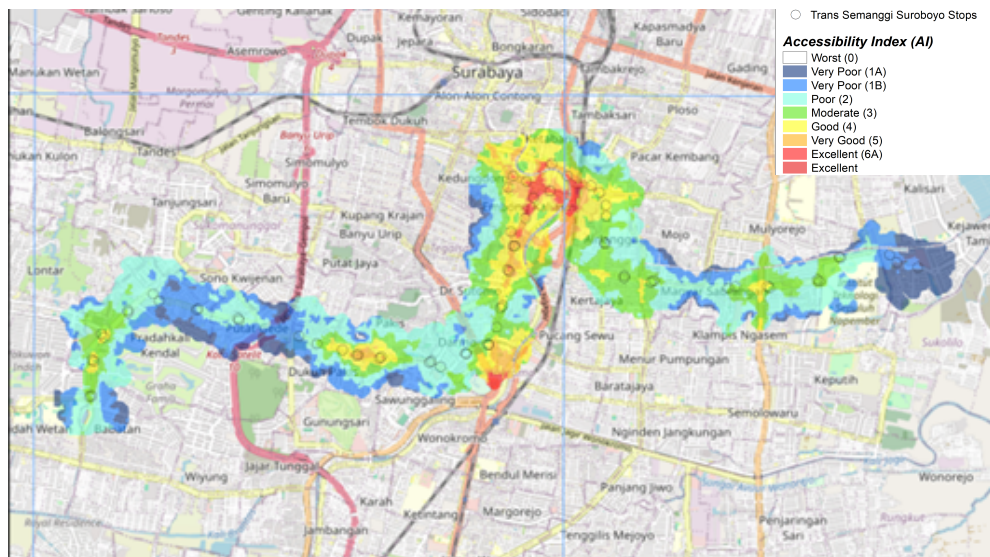
#### 4. Results

This section presents the empirical findings of the research, which examines the influence of accessibility and user characteristics on transportation mode choice between Trans Semanggi Suroboyo and private vehicles. The results are structured based on the sequence of analysis: starting from the measurement of public transport accessibility using the PTAL method, followed by statistical analysis through binary logistic regression to identify significant factors influencing commuter decisions. The interpretation of data is informed by a total of 210 respondents, representing daily commuters in Surabaya.

The first stage of the analysis evaluates the spatial accessibility of the Trans Semanggi Suroboyo West-East corridor, particularly the Kejawan Putih Tambak - UNESA route. Using the PTAL method, a total of 136,348 Points of Interest (POI) representing each box measuring 50 meters x 50 meters. The number of SAP points is 63 bus stops, with some bus stops being shared with other public transportation into intersecting stops. In addition, the performance of other public transportation services, namely headway and reliability values of various public transportation

routes serving 63 Trans Semanggi Suroboyo bus stops that are also used by other routes. For the value of the average maximum reach ability of pedestrians in Indonesia, especially in Surabaya, it is also a consideration in measuring POIs against SAP with an average speed of 3.2 km / h based on the consideration of literature review from similar studies (Adhvaryu et al., 2019; Saxena et al., 2021).

The following are the results of the accessibility level assessment of the Trans Semanggi Suroboyo route Kejawen Putih Tambak-UNESA (West-East Corridor) in Figure 3 and Table 2.



**Figure 3.** Accessibility Map of the Trans Semanggi Suroboyo (West-East Corridor) in Surabaya

**Table 2.** Accessibility Coverage Area of the Trans Semanggi Suroboyo (West-East Corridor) in Surabaya

PTAL	Accessibility Index Range	Accessibility Levels	Coverage Area (ha)	Percentage
0	0	Worst	31,281.71	
1A	0.01 - 2.50	Very Poor	223.97	9.44%
1B	2.51 - 5.00	Very Poor	423.72	17.85%
2	5.01 - 10.00	Poor	816.27	34.39%
3	10.01 - 15.00	Moderate	477.07	20.1%
4	15.01 - 20.00	Good	274.89	11.58%
5	20.01 - 25.00	Very Good	117.38	4.95%
6A	25.01 - 40.00	Excellent	40.1	1.69%
6B	40.01 +	Excellent	-	

Figure 3 and Table 2 present the results of the analysis of the accessibility level of Trans Semanggi Suroboyo route Kejawen Putih Tambak-UNESA with the PTAL method, showing that there are 8 categories of accessibility levels in Surabaya City. The worst category (0) is all areas that are within a distance of more than 800 meters from the bus stop marked in white. The color gradation shows the accessibility level category, with darker colors leading to brighter colors, including the categories very poor (1A), very poor (1B), poor (2), moderate (3), good (4), very good (5) and excellent (6A). The poor category dominates in the area within 800 meters from the

bus stop with an area of 816.27 or 34.39% of the area. Thus, from this analysis, the area and coverage of the bus accessibility level has been known.

Based on the results of the primary survey to 210 daily traveler respondents, the following results were obtained. The survey results showed that the number of private vehicle and public transportation respondents were 105 Trans Semarang Suroboyo users and 105 private vehicle users, respectively. The characteristics of respondents in this survey are presented in Table 3.

**Table 3.** Characteristics of the Majority of Respondents

Characteristics	Trans Semarang Suroboyo Respondents	Private Vehicle Respondents
Gender	Female (56.2%)	Male (59%)
Age	16-20 (29.5%)	26-30 (15.24%)
Education	Bachelor's Degree (S1) or Applied Bachelor's Degree (D4) (51.4%)	Senior High School / Vocational High School (64.8%)
Monthly Income	No Income (42.9)	3,000,000 – 4,000,000 (23.8)
Number of Motorcycles Owned	Owns 1 motorcycle (50.5%)	Owns 2 motorcycles (94.3%)
Number of Cars Owned	No car owned (81.9%)	No car owned (54.3%)
Driver's License Ownership	Yes (82.9%)	No (95.2%)
Travel Purpose	Work (56.2%)	Work (86.7%)
Accessibility of Origin Location	Poor (41.0%)	Poor (34.3%)
Accessibility of Destination Location	Moderate (32.4%)	Poor (41.9%)
Total Travel Distance	5-6 km (15.24%)	5-6 km (16.2%)
Total Travel Time	51-55 minutes (15.24%)	31-35 minutes (22.86%)
Total Travel Cost	11,000 (16.2%)	10,000 (66.7%)

Table 3 presents the characteristics of the majority of respondents who have contributed to this study. Based on the survey results, the parameter distributions on the variables appear to be spread and balanced. Thus, it can be continued for the next process. The feasibility of a model in binary logistic regression analysis can be seen as a whole from the predictor variables tested using the backwise approach. This approach will select variables that are not significant and leave variables that are only significant. For the first test, namely the suitability of the model using the simultaneous test (overall test) at the output of Table 4 Omnibus Test of Model Coefficients.

**Table 4.** Omnibus Tests of Model Coefficients

Chi-square	Chi-square	df	Sig.
Step	-5.308	1	0.021
Block	262.649	4	0.000
Model	262.649	4	0.000

Table 4 presents the results that the p-value  $\leq \alpha$  (0.05), then the result is H0. This means that there is at least one x variable that significantly affects the y variable so that it can be concluded that the independent variables used, together or at least one

independent variable has an effect on mode selection. The calculation of the chi-square value is based on the maximum likelihood calculation. There is a decrease in the -2 log likelihood number, namely the -2 log likelihood block number = 0 has a greater value of 291.12 compared to the -2 log likelihood block number = 1 value of 28.47. This indicates that the logistic regression equation by including independent variables can be said to be feasible to use. These results can be seen in Table 5.

**Table 5.** Model Summary

Model	Value
-2 Log likelihood	28.472g
Cox & Snell R Square	0.714
Nagelkerke R Square	0.952

Table 6 shows that the Cox & Snell R Square value is 0.714 and Nagelkerke R<sup>2</sup> is 0.952, which means that the variability of the dependent variable can be explained by the variability of the independent variable by 95.2% or it can be said that there are variables that affect the selection of transportation modes. The next test is the Hosmer and Lemeshow test which produces a sig. value of 0.926. The significance value is greater than 0.05, which means that the binary logistic regression model used has a goodness-of-fit model. Thus, there is no significant difference between the predicted and actual values.

Table 6 shows that all independent variables included are significant in influencing mode choice because the variables have a significance value smaller than  $\alpha = 5\%$ , so they can be included in the equation model. The logistic regression model equation is as follows:

**Table 6.** Variables in the Equation

Variable	B	S.E.	Wald	df	Sig.	Exp(B)
Number of Motorcycles Owned	-4.081	1.269	10.341	1	0.001	0.017
Accessibility of Destination Location	1.343	0.503	7.123	1	0.008	3.831
Total Travel Time	0.397	0.103	14.703	1	0	1.487
Total Travel Cost	-0.001	0	4.906	1	0.027	0.999
Constant	-7.724	3.812	4.105	1	0.043	0

The results reveal that structural and situational variables play a dominant role in mode choice. High motorcycle ownership diminishes public transport demand, while accessible destinations increase it. Longer travel time does not necessarily reduce the preference for public transport, likely due to perceived safety, comfort, or convenience associated with Trans Semanggi. Cost remains a consideration, but its effect is smaller in magnitude compared to vehicle ownership and accessibility.

These findings align with the hypotheses formulated in the literature review. H1 is supported, as the number of motorcycles owned negatively influences the use of Trans Semanggi. H2 is also confirmed, demonstrating that accessibility of the destination has a strong positive effect. H3 finds empirical backing, where total travel time correlates positively with mode choice for public transport. Finally, H4 is validated through the negative influence of travel cost, although its effect size is relatively modest. The model's overall prediction accuracy stands at 98.1%, reflecting the reliability of the binary logistic regression in identifying key determinants. These findings emphasize the need for policies that improve accessibility at destination points, reduce dependency on private vehicles, and consider pricing structures that make public transport a more attractive option for daily commuters.

## **5. Discussion**

The results of this study show several key factors that significantly influence an individual's decision to use the Trans Semanggi Suroboyo mode. One of the most prominent is the amount of motorcycle ownership, which has a strong negative relationship with the probability of choosing a public transportation mode. This finding is in line with previous research by De Witte et al. (2013); Masoumi et al. (2022), which states that high private vehicle ownership tends to reduce dependence on public transportation. The odds ratio value of 0.017 indicates that respondents who own an additional motorcycle are about 59 times less likely to use Trans Semanggi Suroboyo compared to those who do not own an additional motorcycle. This indicates a strong urban preference for private vehicle use, mainly due to flexibility and control over travel time.

In contrast, destination accessibility has a significant positive influence on mode choice. Respondents who rated their destination as having high accessibility were 3.8 times more likely to choose Trans Semanggi Suroboyo. This finding reinforces the importance of connectivity and ease of access in increasing interest in public transportation, as also confirmed in previous literature (Currie & Delbosc, 2011; Larasati & Handayani, 2021; Khairunnisa & Widyastuti, 2024; Indahsari et al., 2019; Cheng et al., 2020).

This finding is also consistent with the results of the accessibility level assessment using the PTAL method, where most of the areas with high PTAL scores are around the Trans Semanggi Suroboyo corridor and bus stops. Areas with high PTAL scores also tend to be frequented travel destinations, such as campuses, commercial centers, or office areas. This shows that respondents' perceptions of accessibility are in line with the PTAL-based spatial analysis, which reinforces the conclusion that real accessibility and user perceptions support each other in encouraging the selection of public transportation modes.

In addition, the total travel time variable also shows a positive influence on mode choice. This may seem unintuitive, but it could mean that despite the longer travel time, users still choose Trans Semanggi Suroboyo for other reasons such as convenience, safety, or lower cost. Similarly, Zhou et al. (2022) found that users are willing to accept longer travel times if other factors are considered more favorable.

The total cost of travel has a significant but relatively small negative effect. The odds ratio value of 0.368 indicates that each increase in travel costs of Rp1,000 reduces the likelihood of using the Trans Semanggi Suroboyo mode by around 63.2%. This finding is consistent with economic theory which states that fixed costs are a sensitive factor, especially among lower-middle-income respondents (Litman, 2022).

These findings indicate that while travel time and cost remain relevant, structural factors such as accessibility as well as personal characteristics such as vehicle ownership exert a stronger influence on travel behavior. Therefore, strategies for improving public transportation services need to focus on improving physical accessibility to destination points, intermodal integration, and controlling the use of private vehicles, as also emphasized in Banister's (2008) concept of sustainable transportation planning.

## **6. Conclusion**

This study investigated the factors influencing daily commuters' decisions in choosing between Trans Semanggi Suroboyo and private vehicles, with a focus on accessibility and user characteristics. Through spatial analysis using the PTAL method and binary logistic regression, the results revealed that four variables significantly affect mode choice: number of motorcycles owned, accessibility of the destination, total travel time, and total travel cost. Motorcycle ownership was found

to be the strongest negative predictor of public transport usage, while better destination accessibility increased the likelihood of choosing Trans Semanggi Suroboyo. Interestingly, longer travel time was not a deterrent for bus users, suggesting other contributing factors such as convenience or reliability.

The findings of this research offer practical implications for urban transport development, emphasizing the need to improve accessibility to key destinations and to design policies that reduce reliance on private motorcycles. However, the study is limited by its geographic scope, which focuses only on one corridor of the Trans Semanggi Suroboyo system, and by its reliance on a relatively small survey sample. Future research should expand to include more corridors and integrate multimodal transport assessments. It is also recommended to apply mixed-method approaches to capture deeper insights into user preferences, motivations, and behavioral patterns beyond what quantitative data alone can provide.

## References

- Adhvaryu, B., Chopde, A., & Dashora, L. (2019). Mapping public transport accessibility levels (PTAL) in India and its applications: A case study of Surat. *Case Studies on Transport Policy*, 7(2), 293–300.
- Adhvaryu, B., & Kumar, S. (2021). Public transport accessibility mapping and its policy applications: A case study of Lucknow, India. *Case Studies on Transport Policy*, 9(4), 1503–1517.
- Azka, F. M., & Handayani, K. D. M. E. (2021). Modeling Trans Jateng BRT user satisfaction Corridor 1 Purwokerto - Purbalingga with structural equation modeling method. *Journal of Spatial Planning*, 16(2), 104–119.
- Banister, D. (2008). The sustainable mobility paradigm. *Transport Policy*, 15(2), 73–80.
- Blunden, W. R. (1971). *The land-use/transport system: Analysis and synthesis*. Oxford: Pergamon Press.
- Cheng, J., Yan, R., & Gao, Y. (2020). Exploring spatial heterogeneity in accessibility and transit mode choice. *Transportation Research Part D: Transport and Environment*, 87(3), 502–521.
- Currie, G., & Delbosc, A. (2011). Understanding bus rapid transit route ridership drivers: An empirical study of Australian BRT systems. *Transport Policy*, 18(5), 755–764.
- De Witte, A., Hollevoet, J., Dobruszkes, F., Hubert, M., & Macharis, C. (2013). Linking modal choice to motility: A comprehensive review. *Transportation Research Part A: Policy and Practice*, 49, 329–341.
- Egis, C. (2024). *Sustainable urban mobility plan*. Paris: Egis.
- Hidayati, I. (2023). Breaking the commute barrier: How women in Jabodetabek overcome daily challenges on commuting for work. *Etnosia: Jurnal Etnografi Indonesia*, 8(1), 44–62.
- Hu, N., Legara, E. F., Lee, K. K., Hung, G. G., & Monterola, C. (2016). Impacts of land use and amenities on public transport use, urban planning and design. *Land Use Policy*, 57(3), 356–367.
- Indahsari, D. A. R., Kartika, A. A. G., & Herijanto, W. (2019). Analysis of Suroboyo bus performance on west-east routes towards offender satisfaction. *Jurnal Teknik ITS*, 8(2), 20–25.
- Khairunnisa, S. Z., & Widyastuti, H. (2024). Improving the integration and connectivity of Feeder Wira Wiri, Suroboyo Bus, Trans Semanggi Bus, and Trans Jatim Bus in Surabaya City Purabaya-Rajawali routes. *Journal of Civil Engineering*, 39(2), 147–147.
- Larasati, A. F., & Handayani, K. D. M. E. (2021). Using confirmatory factor analysis to evaluate the factors determining the bus usage in Surabaya City, Indonesia. *IOP Conference Series: Earth and Environmental Science*, 778(1), 120–137.
- Litman, T. (2022). *Evaluating public transit benefits and costs - Best practices guidebook*. Victoria: Victoria Transport Policy Institute.
- Masoumi, H., Chakamera, C., Mapamba, L., Pisa, N., & Soltanzadeh, H. (2022). Relations of public transport use and car ownership with neighborhood and city-level travel purposes in Kerman, Iran. *Urban Science*, 6(3), 48–61.

- Miro, F. (2005). *Perencanaan transportasi untuk mahasiswa, perencana dan praktisi*. Jakarta: Erlangga.
- Nguyen-Phuoc, D. Q., Young, W., Currie, G., & De Gruyter, C. (2020). Traffic congestion relief associated with public transport: State-of-the-art. *Public Transport*, 12(2), 455–481.
- Nupus, H., & Ichwanudin, W. (2021). Business network accessibility, customer relationship management and value co-creation on family business performance. *Research Horizon*, 1(4), 126–135.
- Poorthuis, A., & Zook, M. (2023). Moving the 15-minute city beyond the urban core: The role of accessibility and public transport in the Netherlands. *Journal of Transport Geography*, 110(3), 613–629.
- Saxena, A., Gupta, V., & Shrivastava, B. (2021). An assessment of public transport accessibility levels for slums in Bhopal. *International Journal of Engineering and Advanced Technology*, 10(5), 252–258.
- Tahir, A. (2005). Mass transit as an alternative to overcoming traffic congestion problems in Surabaya City. *Smartek*, 3(3), 169–182.
- Tamin, O. Z. (2000). *Perencanaan dan pemodelan transportasi*. Bandung: Penerbit ITB.
- Transport for London. (2014). Assessing transport connectivity in London. Retrieved on July 23, 2025, from [content.tfl.gov.uk/connectivity-assessment-guide.pdf](https://content.tfl.gov.uk/connectivity-assessment-guide.pdf)
- Zhou, T., Zhang, J., Peng, L., & Zhang, S. (2022). Exploring the determinants of public transport usage and shared mobilities: A case study from Nanchang, China. *Sustainable Cities and Society*, 87(1), 134–146.

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Ethical approval was obtained for this study. The manuscript represents original work and has not been previously published, nor is it under consideration by another journal.

***Data Disclosure Statement***

The data that support the findings of this study are available from the corresponding author upon reasonable request.



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