



Analysis of the Influence of Service Quality on Public Transport Mode Choice between Angkot Bimbar and Trans Batam on Corridor 6 (Piayu–Batam Centre Route)

Naufal Aditya Pratama¹, Femmy Sofie Schouten²

¹ Politeknik Transportasi Darat Indonesia–STTD, Bekasi, Indonesia

² Politeknik Transportasi Darat Indonesia–STTD, Bekasi, Indonesia

Correspondence: naufaladitya882@gmail.com

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ABSTRACT

Batam City, as an industrial hub and international transit city, requires public transportation services capable of effectively supporting community mobility. On Corridor 6 (Piayu–Batam Centre route), two public transport modes operate simultaneously: Angkot Bimbar and the Trans Batam Bus Rapid Transit (BRT). This study aims to analyze the influence of service quality on mode choice along this corridor using binary logistic regression, with independent variables of waiting time (X_1), travel time (X_2), and distance to node (X_3). Data were obtained through a questionnaire administered to 60 respondents determined using the Slovin method with a 10% margin of error. The results show that the binary logistic regression model achieved a classification accuracy of 95.0% and a Nagelkerke R Square value of 0.790. Partially, waiting time was the most dominant factor influencing mode choice ($\text{Exp}(B)=47.124$; $\text{Sig.}=0.005$), followed by travel time ($\text{Exp}(B)=16.313$; $\text{Sig.}=0.026$), while distance to node had no significant effect ($\text{Sig.}=0.407$). These findings indicate that reducing waiting time and improving travel time efficiency are key strategies for increasing public transport use in Batam City.



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INTRODUCTION

Batam City is an industrial and international transit city directly bordering Singapore and Malaysia, so the mobility of its residents heavily depends on land transportation that supports social inclusion and economic access (Putri et al., 2025). Significant traffic congestion occurs between 17.00–19.00 WIB during the evening rush hour. In early 2026, the Batam City Transportation Agency strengthened Trans Batam services with 20 new buses on the Piayu–Batam Centre route, accompanied by the construction of strategic stops at Plamo Garden, Bundaran Tembesi, and Putri Hijau. Along the same route, the public can also choose Angkot Bimbar (capacity of 8–9 passengers, flexible, able to pick up and drop off passengers at any point) as an alternative to the fixed-schedule Trans Batam, making the service competition between these two modes empirically relevant to examine. Piayu was selected as the research location because it is a densely populated residential area with high commuter generation toward Batam Centre.

Based on the above, this study is formulated to answer three questions: (1) how does the service quality of Trans Batam compare to that of Angkot Bimbar in terms of waiting time (X_1), travel time (X_2), and distance to node (X_3); (2) which service factor has the greatest influence on passengers' decisions in choosing a transport mode; and (3) under what service conditions does the binary logistic regression model predict passengers will switch modes from Trans Batam to Angkot Bimbar, or vice versa. In line with this formulation, the study aims to compare the service quality of both modes, identify the variable that most dominantly influences mode choice, and predict mode-switching conditions

through binary logit probability simulation. Theoretically, this study contributes empirically to the study of transport mode choice based on Random Utility Theory (McFadden, 1974) within the context of a developing industrial city in Indonesia, while also providing empirical data for Trans Batam operators and evidence-based recommendations for the Batam City Government to improve connectivity in the Piayu–Batam Centre Corridor.

Previous studies show variation in the determinants of mode choice across different contexts: Dodi and Nahdalina (2018) found that travel time and waiting time were the most determinant factors in mode choice toward Soekarno-Hatta International Airport; Rohmana and Kinasih (2025) confirmed the dominance of travel time on the Bekasi–Manggarai route; while Riawan (2024) examined Trans Batam waiting time but had not yet developed a comparative probabilistic model between modes. The novelty of this study lies in (1) integrating three level-of-service variables into a single binary logit model specific to Corridor 6; (2) probability simulation and sensitivity testing using an S-Curve; and (3) a comparative analysis of BRT versus conventional transport based on actual field user data.

RESEARCH METHODS

This study is quantitative-explanatory using a survey method conducted on Corridor 6 Trans Batam, Piayu–Batam Centre route, Batam City, in 2025. The conceptual framework refers to Random Utility Theory (McFadden, 1974), whereby individuals choose the mode offering the highest utility based on their perception of service quality. Three independent variables—Waiting Time (X_1), Travel Time (X_2), and Distance to Node (X_3)—were tested for their influence on Mode Choice (Y) as a dichotomous dependent variable, with $Y=1$ for Trans Batam and $Y=2$ for Angkot Bimbar, as summarized in Table 1.

Table 1 Summary of Research Hypotheses

Hypothesis	Statement
H1	Waiting Time (X_1) has a significant effect on mode choice on Corridor 6
H2	Travel Time (X_2) has a significant effect on mode choice on Corridor 6
H3	Distance to Node (X_3) has a significant effect on mode choice on Corridor 6
H4	X_1 , X_2 , and X_3 simultaneously have a significant effect on mode choice

Source: Authors, 2026

Primary data were obtained through an online questionnaire, field observation, and brief interviews with active Corridor 6 passengers, while secondary data were obtained from the Batam City Transportation Agency in the form of operational data, performance reports, and regional demographic data. The questionnaire consisted of respondent characteristics (age, occupation, income, trip purpose, and mode used) as well as perceptions of the three main variables measured using an ordinal scale: Waiting Time (X_1) was calculated from arrival at the pick-up point until the mode arrived; Travel Time (X_2) was the trip duration for Piayu–Batam Centre; and Distance to Node (X_3) was the distance from the respondent's residence to the nearest stop.

The study population consisted of active Corridor 6 passengers. Sampling used the Slovin formula (1960) with a 10% margin of error, yielding a minimum sample of 60 respondents proportionally divided into 39 Trans Batam users and 21 Angkot Bimbar users. Data analysis was conducted in stages using SPSS: Pearson correlation testing to identify initial bivariate relationships; binary logistic regression to test simultaneous and partial effects, evaluated through the Omnibus test, Nagelkerke R Square, the Hosmer-Lemeshow test, and classification accuracy; probability simulation; and sensitivity testing using an S-Curve.

RESULTS AND DISCUSSION

Based on the Slovin formula with a 10% margin of error, a minimum sample of 60 respondents was obtained, and all 60 cases were included in the analysis (100%) with no missing data. The Trans Batam user profile was dominated by ages 18–30 (70%), civil servants (39%), with commuting to work as the purpose (75%), while the Angkot Bimbar user profile was dominated by ages 30–50 (46%), self-

employed individuals (33%), with recreation/shopping as the purpose (46%). A comparison of the service characteristics of both modes across the three research dimensions is presented in Table 2.

Table 2 Comparison of Service Characteristics of Trans Batam and Angkot Bimbar on Corridor 6

Dimension	Trans Batam	Angkot Bimbar
Waiting Time (X_1)	Measurable and predictable; fixed schedule from the Piayu Laut Terminus.	Uncertain; depends on passenger density and vehicle availability.
Travel Time (X_2)	Consistent; fixed route, stopping only at official stops.	Variable; influenced by traffic conditions and drivers' habit of picking up/dropping off passengers anywhere.
Distance to Node (X_3)	Must walk to an official stop (Putri Hijau, Bundaran Tembesi, Plamo Garden); fixed and inflexible.	Flexible; can pick up and drop off passengers along the route without being tied to official stops.
Dominant User Profile	Ages 18–30 (70%); civil servants (39%); commuting to work (75%); regular commuters.	Ages 30–50 (46%); self-employed (33%); recreation/shopping (46%); non-commuters.

Source: Field observation, agency data, and research questionnaire results (2025)

Trans Batam excels in predictability and service consistency, while Angkot Bimbar is more flexible but has greater service variability. Before conducting binary logistic regression, Pearson correlation testing was used to identify the strength and direction of the bivariate relationship between the three independent variables and mode choice, as presented in Table 3.

Table 3 Pearson Correlation between Independent Variables and Mode Choice

Variable	Notation	r (Pearson)	Sig. (2-tailed)
Waiting Time	X_1	0.750	<0.001
Travel Time	X_2	0.589	<0.001
Distance to Node	X_3	0.643	<0.001

Source: SPSS Output

All independent variables were significantly correlated with mode choice ($p < 0.01$), with Waiting Time having the strongest correlation ($r = 0.750$), followed by Distance to Node ($r = 0.643$) and Travel Time ($r = 0.589$). The Omnibus test on the binary logistic regression model produced a Chi-square value of 51.183 ($df = 3$; Sig. < 0.001), so H_4 was accepted and the model was declared significant overall. The -2 Log Likelihood value of 26.511 indicates the model with predictors is much better than the model without predictors (Block 0 = 77.694), while the Nagelkerke R Square value of 0.790 means the three independent variables can explain about 79% of the variation in mode choice. The Hosmer-Lemeshow test produced Sig. = 0.015 (< 0.05), which statistically rejects H_0 of model fit; however, this test is known to be sensitive to small sample sizes (Hosmer et al., 2013), so with a Nagelkerke R Square of 0.790 and classification accuracy of 95.0%, the model is still considered to have strong predictive capacity. The model successfully classified all 39 Trans Batam user respondents (100% accuracy) and 18 of 21 Angkot Bimbar user respondents (85.7%), with an overall accuracy of 95.0%—a significant increase from 65.0% in the model without predictors. The model parameter estimates are presented in Table 4.

Table 4 Model Parameter Estimates (Variables in the Equation)

Variable	B	S.E.	Wald	Sig.	Exp(B)	Description
Waiting Time (X_1)	3.853	1.384	7.748	0.005	47.124	Significant**
Travel Time (X_2)	2.792	1.256	4.940	0.026	16.313	Significant*
Distance to Node (X_3)	0.983	1.186	0.687	0.407	2.673	Not Significant
Constant	-12.817	3.539	13.114	<0.001	0.000	Significant**

Note: ** significant at $\alpha = 0.01$; * significant at $\alpha = 0.05$. Source: SPSS Output

Waiting Time ($\text{Exp}(B)=47.124$) is the most dominant variable, so H1 is accepted; Travel Time ($\text{Exp}(B)=16.313$) also has a significant effect, so H2 is accepted; while Distance to Node is not significant partially ($\text{Sig.}=0.407>0.05$), so H3 is rejected. Based on these regression coefficients, the resulting binary logit model equation is as follows.

$$\text{Logit}(P) = -12.817 + 3.853(X_1) + 2.792(X_2) + 0.983(X_3)$$

Where X_1 =Waiting Time, X_2 =Travel Time, and X_3 =Distance to Node. The largest X_1 coefficient (3.853) confirms waiting time as the most dominant factor; the X_2 coefficient (2.792) also has a significant effect; while the X_3 coefficient (0.983), although positive, is not statistically significant. Based on this model equation, a probability simulation was conducted by varying X_1 and X_2 while holding $X_3=1$ constant, as presented in Table 5.

Table 5 Mode Choice Probability Simulation

Scenario	X_1	X_2	X_3	Utility Value (u)	P (Angkot Bimbar)	P (Trans Batam)
1	1	1	1	-5.189	0.55%	99.45%
2	2	1	1	-1.336	20.82%	79.18%
3	2	2	1	1.456	81.09%	18.91%

Source: Model Simulation Results, 2026

Under the most efficient condition (scenario 1), passengers predominantly chose Trans Batam (99.45%). The probability of switching to Angkot Bimbar increased to 20.82% when waiting time rose to scale 2, and reached 81.09% when both variables were at scale 2—the critical mode-switching point. The S-Curve sensitivity test measures the change in mode choice probability resulting from a change in one variable, *ceteris paribus*, forming a non-linear sigmoid curve. Changes in Waiting Time have the greatest impact on mode choice probability, with the indifference point ($P=50\%$) occurring at $X_1 \approx 1.5$ when Travel Time is at a moderate condition. The sensitivity pattern of Travel Time is similar but flatter, further validating Waiting Time as the most critical variable in mode choice on Corridor 6.

Overall, the simultaneous test (H4) shows the model is significant (Chi-square=51.183; $\text{Sig.}<0.001$); H1 and H2 are accepted, while H3 is rejected. Waiting Time and Travel Time have a positive effect on passengers switching to Angkot Bimbar, consistent with the Random Utility Theory framework (McFadden, 1974) and in line with the findings of Dodi and Nahdalina (2018) and Rohmana and Kinasih (2025) in other route contexts. Conversely, Distance to Node has no significant effect ($\text{Sig.}=0.407$), indicating that on Corridor 6, the walking distance to a transport node is not a primary consideration for passengers in determining their mode, in contrast to the findings of Supit et al. (2018) in the context of online mode choice in Manado.

CONCLUSION

Based on the correlation analysis and binary logistic regression on 60 respondents using Corridor 6 (Piayu–Batam Centre), all independent variables were proven to be significantly related to mode choice ($p<0.001$), with Waiting Time having the strongest correlation ($r=0.750$). The resulting logistic regression model is significant (Chi-square=51.183; $\text{Sig.}<0.001$) with a prediction accuracy of 95.0%, where Waiting Time is the most dominant factor, followed by Travel Time, while Distance to Node has no significant effect. The logit model shows that passengers tend to choose Trans Batam under efficient service conditions and switch to Angkot Bimbar under less efficient service conditions. Based on these findings, Trans Batam operators are advised to improve schedule consistency and real-time information services, Angkot Bimbar operators are advised to improve travel time efficiency by reducing stops outside official points, and the Batam City Government is advised to increase Trans Batam service frequency, especially during peak hours. Future research is advised to expand the geographic scope, add more level-of-service variables, and use a larger sample size, given that this study still has limitations in the form of a relatively small sample size (Hosmer et al., 2013), a Hosmer-Lemeshow value that does not yet indicate adequate model fit ($\text{Sig.}=0.015$), a cross-sectional research design, potential bias in the digital questionnaire, and a level-of-service scope still limited to three aspects.

REFERENCES

- Badan Pusat Statistik Kota Batam. (2023). Kota Batam dalam Angka 2023. BPS Kota Batam.
- Dodi, & Nahdalina. (2018). Analisis pemilihan moda transportasi dengan metode Discrete Choice Model (Studi Kasus: Bandara Internasional Soekarno Hatta). *Warta Ardhia*, 44(2), 81–92.
- Hosmer, D. W., Lemeshow, S., & Sturdivant, R. X. (2013). *Applied logistic regression* (3rd ed.). John Wiley & Sons. <https://doi.org/10.1002/9781118548387>
- Kementerian Perhubungan Republik Indonesia. (2022). Standar Pelayanan Minimal Angkutan Massal Berbasis Jalan (Peraturan Menteri Perhubungan Nomor PM 27 Tahun 2015). Kemenhub RI.
- McFadden, D. (1974). Conditional logit analysis of qualitative choice behavior. In P. Zarembka (Ed.), *Frontiers in Econometrics* (pp. 105–142). Academic Press.
- Nagelkerke, N. J. D. (1991). A note on a general definition of the coefficient of determination. *Biometrika*, 78(3), 691–692. <https://doi.org/10.1093/biomet/78.3.691>
- Ortuzar, J. d. D., & Willumsen, L. G. (2011). *Modelling transport* (4th ed.). John Wiley & Sons. <https://doi.org/10.1002/9781119993308>
- Putri, N. M., Widyawati, N. E., & Hayati, F. (2025). Evaluasi pemilihan moda transportasi antara Bus Rapid Transit (BRT) Trans Banjarmasin dan kendaraan pribadi. *Jurnal Transportasi*, 21(1), 87–96.
- Riawan, W. (2024). Kualitas pelayanan waktu tunggu Bus Trans Batam di kawasan Batam Center. *Jurnal Transportasi Multimoda*, 21, 1–13. <https://doi.org/10.25104/mtm.v21i1.2300>
- Rohmana, A., & Kinasih, R. K. (2025). Analisis pemilihan moda transportasi rute Bekasi–Manggarai (Studi kasus kendaraan pribadi dan KRL). *Akselerasi: Jurnal Ilmiah Teknik Sipil*, 6(2), 32–41. <https://doi.org/10.37058/aks.v6i2.12432>
- Setyobudi, Y., Lestari, L., & Gultom, V. (2021). Kinerja Dinas Perhubungan Kota Batam dalam peningkatan kualitas pelayanan transportasi Bus Trans Batam Koridor Sekupang Jodoh Tahun 2019. *Jurnal Trias Politika*, 5, 166–180. <https://doi.org/10.33373/jtp.v5i2.3608>
- Slovin, E. (1960). *Slovin's formula for sampling techniques*. Iowa State University Press.
- Sugiyono. (2019). *Metode penelitian kuantitatif, kualitatif, dan R&D* (Edisi ke-2). Alfabeta.
- Supit, R. M., Rompis, S. Y. R., & Lefrandt, L. I. R. (2018). Model pemilihan moda transportasi online di Kota Manado. *Jurnal Sipil Statik*, 7(1), 35–47.
- Tamin, O. Z. (2000). *Perencanaan dan pemodelan transportasi* (Edisi ke-2). Penerbit ITB.