Analysis of Transportation Mode Choice KRL, TransJakarta, and Online Transportation by LRT Users at Cikoko Station, Jakarta

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Abstract

Effective transportation mode integration plays an important role in reducing traffic congestion and improving travel efficiency in the Greater Jakarta area. The Cikoko LRT station is connected to the Cawang KRL station and the Cawang–Cikoko TransJakarta bus stop, and is supported by online transportation services, but intermodal integration in this area is not yet optimal and affects users' choice of subsequent transportation modes. This condition highlights the need for empirical studies on user behavior, so that the research results can be used as input for urban transportation planning in realizing a more integrated, efficient, and sustainable public transportation system in Jakarta. This study aims to identify the characteristics of LRT passengers at Cikoko Station, analyze the factors that influence subsequent mode of transportation choices, and calculate the probability of each mode. The analysis was conducted using a multinomial logit regression model with the help of SPSS software, based on a questionnaire survey of LRT users traveling to and from various zones in the Greater Jakarta area. The results show that the majority of respondents are aged 20–30 years old, have a high school/equivalent or Diploma IV/Bachelor's degree, work as students, earn <IDR 2,000,000, and prefer KRL. The choice of TransJakarta is influenced by travel frequency, social destination, distance of 10–20 km, and service/convenience considerations. Online transportation is more likely to be chosen for work/school/shopping purposes, distances of <10 km, costs less than IDR.15,000, and time considerations. The average probability of mode selection is KRL 47.44%, TransJakarta 28.88%, and online transportation 23.68%, making KRL a potential primary feeder mode for the Cikoko LRT Station.

Keywords: Mode choice, intermodal probability, Jabodebek LRT, multinomial logit regression

1. INTRODUCTION

The growth in population in the Greater Jakarta area, coupled with high daily mobility, has caused various transportation problems, including increased traffic congestion [1]. The government has responded to this issue by developing an efficient, integrated, and environmentally friendly public transportation system. The public transportation system itself is complex in nature because it is influenced by economic, social, and environmental factors [2]. As part of efforts to improve public transportation services, the Jabodebek Light Rail Transit (LRT) system was launched in 2023. This is a light rail system with dedicated tracks and an automated operation system without drivers [3]. The LRT has a track length of approximately 82.93 km and is aimed at reducing private vehicle usage and alleviating traffic congestion [4].

The Cikoko LRT Station is one of the strategic transportation hubs in the Jabodebek LRT network, located in the Cawang–Cikoko Transit Oriented Development (TOD) area. This station has direct connectivity with the Cawang KRL Station, the Cawang–Cikoko TransJakarta Bus Stop, and is equipped with online transportation services as a feeder mode. The potential for intermodal integration in this area is quite large, but there are still obstacles such as inadequate pedestrian paths, facilities that are not disability-friendly, and safety aspects that are not yet fully optimal [5]. Damage to supporting facilities such as elevators that occurred for more than a month also reduced passenger comfort and mobility.

The success of intermodal integration depends heavily on the availability of services that align with user characteristics, travel patterns, and the quality of each mode of transportation [6]. At Cikoko LRT Station, users' decisions to choose subsequent modes of transportation such as KRL, TransJakarta, or online transportation are influenced by various factors that have not yet been fully identified. Therefore, this study aims to analyze the characteristics of LRT users at Cikoko Station, identify the factors that influence the choice of subsequent modes of transportation, and analyze the probability of choosing KRL, TransJakarta, and online transportation.

1.1. Factors Affecting Mode Selection

There are three main groups of factors that influence travel or transportation user behavior in this study. Each factor consists of a number of variables that can be identified and assessed quantitatively and qualitatively, namely traveler characteristics factor, travel characteristics factor, and transportation system characteristics factor.

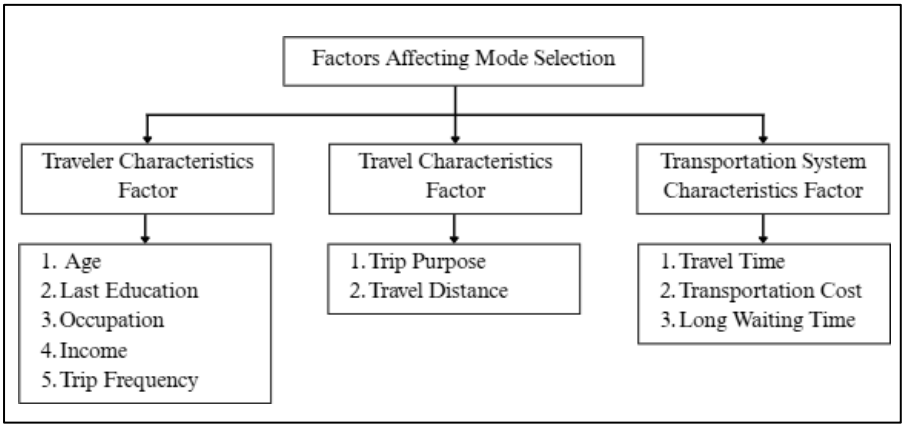

Figure 1. Factors Affecting Mode Selection

1.2. Multimodal Choice Model

1.2.1. Utility Function

The utility function represents the level of preference for an alternative, which is assumed to be optimized by individuals in making choices. In the context of transportation mode selection, utility values are influenced by service attributes, the socioeconomic conditions of users, and the characteristics of their trips [7]. The comparison of utility between two competing modes can be formulated in the form of a multiple linear equation as presented in Equation [8].

$$U_j = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_n x_n \quad \text{.....(1)}$$

Description:

U_j = Utility value of product/mode from alternative j
β_0 = Constant
$\beta_1 \ldots . \beta_2$ = Utility function parameter values for each variable, represented by regression coefficients
$x_1 \ldots . x_n$ = Independent variables that include mode selection (travel time, cost, comfort, etc.)

1.2.2. Multinomial Logit Model

Multinomial logit model assumes that individuals will choose the alternative with the highest utility value, which reflects their preferences or motivations in choosing a mode of transportation. In this study, the model was used to analyze the factors influencing the choice of KRL, TransJakarta, or online transportation to or from Cikoko Station. The probability of each mode was calculated from a linear combination of independent variables, with the most frequently chosen mode of transportation as the base outcome, which was determined based on the questionnaire results [8].

$$P_i = \frac{1}{1 + (e^{Uj} + e^{Uk})} \quad \text{..... (2)}$$

$$P_j = \frac{e^{Uj}}{1 + (e^{Uj} + e^{Uk})} \quad \text{..... (3)}$$

$$P_k = \frac{e^{Uk}}{1 + (e^{Uj} + e^{Uk})} \quad \text{.....(4)}$$

Description:

P_i = Probability of transportation mode choice as base outcome
$P_j = P_k$ = Probability of transportation mode choice b and c
$U_j = U_k$ = Utility function of transportation modes b and c
e = Exponent

2. METHOD

2.1. Study Area and Period

The research was conducted in March - July 2025 at Cikoko LRT Station, Jakarta. The coordinates of the Cikoko LRT station are at 6024'34.76“ S and 106085'71.02” E, with the station elevation at an altitude of 39.53 m. while the research respondents were LRT users at Cikoko Station who traveled onward to the Jabodetabek area.

2.2. Data Collection Method

The research data was obtained from two sources. First, primary data collected through questionnaires, both online using Google Forms and through face-to-face interviews with respondents in the research area. The questionnaires were given to eligible respondents, namely those who had used the KRL, TransJakarta, or online transportation services for trips to or from Cikoko LRT Station, Jakarta. Second, secondary data sourced from the results of PT KAI's data analysis.

2.3. Data Analysis Method

The analysis in this study used the multinomial logit regression method, processed using IBM SPSS Statistics 27, Microsoft Excel 2021, and OriginLab software. There were three dependent variables, namely KRL, TransJakarta, and online transportation, as well as thirteen independent variables. These variables include travel characteristics factor, traveler characteristics factor, transportation system characteristics factor, and factors influencing mode choice. All these variables were analyzed to identify their relationships and influences within the regression model. Sample selection was conducted using probability sampling with the simple random sampling method, where respondents were randomly selected from the population. The sample size was determined using the Slovin formula, based on population data obtained from secondary sources at PT KAI. Based on these calculations, the number of respondents in this study was 220 people.
The analysis stages in multinomial logit regression include multicollinearity testing, model fitting information, goodness of fit testing, pseudo R-square, likelihood ratio testing, regression model estimation, and odds ratio calculation, where each test has different assessment criteria. Before the analysis is carried out, the dependent and independent variables are first grouped according to predetermined categories.

Table 1. Category Variables Factors Affecting Mode Choice

Variable	Indicator	Description	
		Dependent Variable	
Mode Type	Transportation Mode	1 = Public Transport – KRL (Commuter Line)	
		2 = Public Transport – TransJakarta	
		3 = Online Transportation	
		Inddependent Variables	
Traveler Characteristics Factor	Age	1 = < 12 Years Old	4 = 30 – 40 Years Old
		2 = 12 – 20 Years Old	5 = 40 – 50 Years Old
		3 = 20 – 30 Years Old	6 = > 50 Years Old
	Last Education	1 = Primary School	4 = Diploma I/II/III
		2 = Junior High School / Equivalent	5 = Diploma IV/ Bachelor’s Degree
		3 = Senior High School / Equivalent	6 = Master’s / Doctoral Degree
	Occupation	1 = Civil Servant	7 = Factory/Industrial Worker
		2 = Private Employee	8 = Construction Worker
		3 = Student	9 = Educator
		4 = Enterpreneur	10 = Housewife
		5 = Transport Driver / Courier	11 = Unemployed
		6 = Medical/Healthcare Worker	12 = Others
	Income	1 = < IDR.2,000,000	4 = IDR. 6,000,001 – IDR. 8,000,000
		2 = IDR. 2,000,000 – IDR. 4,000,000	5 = >IDR. 8,000,000
		3 = IDR. 4,000,001 – IDR. 6,000,000	

Variable	Indicator	Description	
		Inddependent Variables	
Traveler Characteristics Factor	Trip Frequency	1 = 1 – 5 Trips / Month	3 = 11 – 15 Trips / Month
		2 = 6 – 10 Trips / Month	4 = >16 Trips / Month
Travel Characteristics Factor	Trip Purpose	1 = Work Trip	4 = School Trip
		2 = Recreational Trip	5 = Shopping Trip
		3 = Social Trip	6 = Others
	Travel Distance	1 = <10 Km	3 = 20 – 30 Km
		2 = 10 – 20 Km	4 = >30 Km
Transportation System Characteristics Factor	Travel Time	1 = <10 Minutes	3 = 25 – 40 Minutes
		2 = 10 – 25 Minutes	4 = >40 Minutes
	Transportation Cost	1 = <IDR. 5,000	3 = IDR. 10,001 – IDR. 15,000
		2 = IDR. 5,000 – IDR. 10,000	4 = >IDR. 15,000
	Long Waiting Time	1 = <5 Minutes	3 = 10 – 15 Minutes
		2 = 5 – 10 Minutes	4 = >15 Minutes
	Time Considerations	0 = Not the Main Consideration	
		1 = Main Consideration	
	Facility Considerations	0 = Not the Main Consideration	
		1 = Main Consideration	
	Service / Convenience Considerations	0 = Not the Main Consideration	
		1 = Main Consideration	

3. RESULTS AND DISCUSSION

3.1. Characteristics of Mode Choice

The characteristics of LRT users at Cikoko Station, Jakarta, are determined based on the category with the highest number of respondents for each variable, as obtained from the questionnaire results. The results can be seen in Tables 2 to 4. The selection of variables such as age, occupation, income, and others refers to common practices used in various studies of travel behavior and user characteristics of transportation modes in Indonesia [8].

Table 2. Traveler Characteristics Factor

No	Variable	Variable Value	Number of Respondents	Percentage
1	Age	20 – 30 Years Old	121	55%
2	Last Education	Senior High School / Equivalent	85	39%
		Diploma IV / Bachelor's Degree (S1)	85	39%
3	Occupation	Student	82	37%
4	Income	<IDR. 2,000,000	82	37%
5	Trip Frequency	1 – 5 Trips / Month	113	51%

Based on Table 2, the results of data processing from questionnaires and interviews show that 55% of respondents are in the 20–30 age range. The highest level of education is dominated by high school/equivalent and Diploma IV/Strata I graduates, each accounting for 39% of respondents. 37% of respondents are students, with the same percentage having a monthly income of less than IDR.2,000,000. The most frequent travel category is 1–5 times per month, accounting for 51% of the total respondents.

Table 3. Travel Characteristics Factor

No	Variable	Variable Value	Number of Respondents	Percentage
1	Trip Purpose	Work Trip	75	34%
2	Travel Distance	<10 Km	70	32%

Based on Table 3, the distribution of travel destinations shows that work-related travel dominates with a percentage of 34%. In addition, the most common travel distance among respondents is less than 10 km, with a percentage of 32%. These travel characteristics indicate that most travelers tend to engage in mobility over relatively short distances, which are typically related to routine activities such as work.

Table 4. Transportation System Characteristics Factor

No	Variable	Variable Value	Number of Respondents	Percentage
1	Travel Time	10 – 25 Minutes	71	32%
2	Transportation Mode	KRL	101	46%
3	Transportation Cost	IDR.5,000 – IDR.10,000	73	33%
4	Long Waiting Time	5 – 10 Minutes	106	48%
5	Time Considerations	Main Consideration	133	60%
6	Facility Considerations	Not the Main Consideration	132	60%
7	Service / Convenience Considerations	Not the Main Consideration	139	63%

Based on Table 4, the majority of respondents have a travel time of between 10 and 25 minutes, accounting for 32%. The most popular mode of transportation is the KRL, with a percentage of 46%. In terms of cost, around 33% of respondents spend between IDR.5,000 and IDR.10,000 on daily transportation. The most common waiting time experienced by respondents is 5 to 10 minutes, accounting for 48%. The primary consideration in choosing a mode of transportation is dominated by time-related factors, reaching 60%. Meanwhile, facilities and services or comfort are not the primary considerations for most respondents, at 60% and 63%, respectively.

3.2. Factors Affecting Mode Choice

The survey results from 220 respondents show that 101 respondents chose KRL public transportation, 63 respondents chose online transportation, and 56 respondents chose TransJakarta. A likelihood ratio analysis was conducted to identify independent variables that significantly influence the mode selection model. Variables are considered insignificant if their significance value is greater than 0.05. This test was conducted using SPSS.

Table 5. Likelihood Ratio Tests

Effect	Model Fitting Criteria -2 Log Likelihood of Reduced Model	Likelihood Ratio Tests		
		Chi-Square	*df*	*Sig.*
Intercept	287.804	0.000	0	
Trip Frequency	301.092	13.288	6	0.039
Trip Purpose	315.771	27.967	10	0.002
Travel Distance	303.589	15.785	6	0.015
Transportation Cost	344.358	56.554	6	2.2×10^{-10}
Time Considerations	307.151	19.348	2	0.00006
Service / Convenience Considerations	303.677	15.873	2	0.00036

The results of the likelihood ratio test found that six independent variables statistically significantly influenced the dependent variable. This is evident from the probability of each independent variable being less than 0.05, namely 0.039 (trip frequency), 0.002 (trip purpose), 0.015 (travel distance), 2.2×10^{-10} (transportation cost), 0.00006 (time considerations), and 0.00036 (service/convenience considerations).

Based on the results of the likelihood ratio test, the choice of transportation mode was analyzed using the multinomial logit method with the help of SPSS software version 27.0.0.0. This yielded a utility equation for each mode. This equation was used to identify the factors that influence the choice of transportation mode.

Table 6. Parameter Estimates

Mode Choice[a]	Variable	B	Std. Error	Wald	df	Sig.	Exp (B)	95% Confidence Interval for	
								Lower	Upper Bound
TransJakarta	Intercept	1.213	1.041	1.357	1	0.244			
	Trip Frequency (11 – 15 trips / month) = X1.3	1.474	0.74	3.968	1	0.046	4.365	1.024	18.610
	Trip Purpose (social) = X2.3	-2.096	0.989	4.491	1	0.034	0.123	0.018	0.854
	Travel Distance (10 – 20 km) = X3.2	1.332	0.581	5.262	1	0.022	3.789	1.214	11.824
	Service / Convenience Considerations = X6	-1.337	0.426	9.842	1	0.002	0.263	0.114	0.605
Online Transportation	Intercept	5.536	1.137	23.722	1	0.000			
	Trip Purpose (Work) = X2.1	-2.927	0.744	15.463	1	0.000	0.054	0.012	0.230
	Trip Purpose (School) = X2.4	-3.670	1.108	10.969	1	0.001	0.025	0.003	0.224
	Trip Purpose (Shopping) = X2.5	-2.532	1.038	5.952	1	0.015	0.079	0.010	0.608
	Travel Distance (<10 km) = X3.1	1.852	0.677	7.478	1	0.006	6.375	1.690	24.048
	Transportation Cost (<IDR.5,000) = X4.1	-5.807	1.102	27.762	1	0.000	0.003	0.000	0.026
	Transportation Cost (IDR.5,000 – IDR.10,000) = X.4.2	-3.291	0.777	17.924	1	0.000	0.037	0.008	0.171
	Transportation Cost (IDR.10,001 – IDR.15,000) = X.4.3	-1.990	0.745	7.144	1	0.008	0.137	0.032	0.588
	Time Considerations = X5	-1.835	0.558	10.811	1	0.001	0.160	0.053	0.477
	Service / Convenience Considerations = X6	-1.758	0.541	10.575	1	0.001	0.172	0.060	0.497

a. The Reference Category is: KRL

Based on Table 6, the utility function was obtained from the parameter estimation results with the KRL transportation mode as the reference category. This estimation produced a utility function within the multinomial logit model, expressed according to Equation (1).

$$U_{TJ} = 1.213 + 1.474X_{13} - 2.096X_{23} + 1.332X_{32} - 1.337X_{6} \quad (5)$$

$$U_{AO} = 5.536 - 2.927X_{21} - 3.67X_{24} - 2.532X_{25} + 1.852X_{31} - 5.807X_{41} - 3.291X_{42} - 1.99X_{43} - 1.835X_{5} - 1.758X_{6} \quad (6)$$

3.3. Mode Choice Probability

The analysis of transportation mode choice for KRL, TransJakarta, and online transportation by LRT users at Cikoko Station, Jakarta, in this study was conducted using a utility-based multinomial logit model. Data for the three modes of transportation were obtained from questionnaires that were distributed and then grouped into eleven zones in the Greater Jakarta area. Utility values were obtained by dividing the number of respondents in a particular category in each zone by the total proportion of respondents for that mode of transportation in the same zone. The average utility values for each mode of transportation can be seen in Table 7 and Table 8.

Table 7. TransJakarta Analysis Data

No	Zone	TransJakarta			
		$X_{1\,3}$	$X_{2\,3}$	$X_{3\,2}$	X_6
1	Bogor City	0.000	1.000	0.500	1.000
2	South Tangerang City	0.000	0.667	0.000	1.000
3	Tangerang City	0.000	1.000	0.667	1.000
4	Depok City	0.000	1.000	1.000	1.000
5	Bekasi Regency	0.000	1.000	0.000	0.000
6	Central Jakarta	0.000	0.600	0.200	0.800
7	Bekasi City	0.333	0.778	0.111	0.444
8	North Jakarta	0.000	0.667	0.667	0.667
9	West Jakarta	0.333	0.333	0.667	1.000
10	East Jakarta	0.182	0.091	0.273	0.636
11	South Jakarta	0.235	0.176	0.471	0.588

Table 8. Online Transportation Analysis Data

No	Zone	Online Transportation								
		$X_{2\,1}$	$X_{2\,4}$	$X_{2\,5}$	$X_{3\,1}$	$X_{4\,1}$	$X_{4\,2}$	$X_{4\,3}$	X_5	X_6
1	Bogor City	0.750	0.000	0.500	0.250	0.000	0.000	0.500	0.750	1.000
2	South Tangerang City	1.000	0.000	0.500	0.500	0.000	0.000	0.500	1.000	0.500
3	Tangerang City	0.000	0.667	1.000	0.000	0.000	0.000	0.667	0.000	0.333
4	Depok City	0.000	0.333	0.000	0.333	0.000	0.333	0.667	1.000	1.000
5	Bekasi Regency	0.000	0.000	0.500	0.500	0.000	0.500	0.500	1.000	1.000
6	Central Jakarta	0.667	0.000	0.333	0.333	0.000	0.000	0.667	0.667	1.000
7	Bekasi City	0.000	0.000	1.000	0.500	0.000	0.000	0.500	1.000	1.000
8	North Jakarta	0.500	0.500	0.000	1.000	0.000	0.000	0.500	1.000	1.000
9	West Jakarta	0.500	0.000	0.250	0.000	0.000	0.000	0.250	0.750	0.750
10	East Jakarta	0.600	0.000	0.000	0.600	0.000	0.200	0.600	0.800	0.600
11	South Jakarta	0.263	0.211	0.184	0.289	0.158	0.211	0.316	0.132	0.421

In this study, KRL was set as the reference category. Therefore, the probabilities of choosing KRL, TransJakarta, and online transportation modes were calculated using the multinomial logit model approach, as shown in Equations (2), (3), and (4). Furthermore, the application of these equations to the research data produced probability functions presented in Equations (7), (8), and (9).

$$P_{KRL} = \frac{1}{1+(e^{1.213+1.474X_{1\,3}-2.096X_{2\,3}+1.332X_{3\,2}-1.337X_6}+e^{5.536-2.927X_{2\,1}-3.67X_{2\,4}-2.532X_{2\,5}+1.852X_{3\,1}-5.807X_{4\,1}-3.291X_{4\,2}-1.99X_{4\,3}-1.835X_5-1.758X_6})} \quad \text{.....(7)}$$

$$P_{TJ} = \frac{e^{1.213+1.474X_{1\,3}-2.096X_{2\,3}+1.332X_{3\,2}-1.337X_6}}{1+(e^{1.213+1.474X_{1\,3}-2.096X_{2\,3}+1.332X_{3\,2}-1.337X_6}+e^{5.536-2.927X_{2\,1}-3.67X_{2\,4}-2.532X_{2\,5}+1.852X_{3\,1}-5.807X_{4\,1}-3.291X_{4\,2}-1.99X_{4\,3}-1.835X_5-1.758X_6})} \quad \text{.....(8)}$$

$$P_{AO} = \frac{e^{5.536-2.927X_{2\,1}-3.67X_{2\,4}-2.532X_{2\,5}+1.852X_{3\,1}-5.807X_{4\,1}-3.291X_{4\,2}-1.99X_{4\,3}-1.835X_5-1.758X_6}}{1+(e^{1.213+1.474X_{1\,3}-2.096X_{2\,3}+1.332X_{3\,2}-1.337X_6}+e^{5.536-2.927X_{2\,1}-3.67X_{2\,4}-2.532X_{2\,5}+1.852X_{3\,1}-5.807X_{4\,1}-3.291X_{4\,2}-1.99X_{4\,3}-1.835X_5-1.758X_6})} \quad \text{.....(9)}$$

The probability values in Table 9 were calculated using a multinomial logit model based on the results of the analysis of each mode of transportation in each zone. The calculations were performed consistently across all research zones, with varying results according to the differences in the average values of each zone. These results illustrate the likelihood of choosing KRL, TransJakarta, and online transportation in each region.

Table 9. Mode Choice Probability

No	Zone	KRL	TransJakarta	Online Transportation
1	Bogor City	70.67%	14.94%	14.39%
2	South Tangerang City	68.71%	15.01%	16.28%
3	Tangerang City	65.71%	17.34%	16.94%
4	Depok City	57.18%	23.53%	19.29%
5	Bekasi Regency	56.56%	23.39%	20.04%
6	Central Jakarta	55.09%	23.60%	21.31%
7	Bekasi City	45.31%	31.23%	23.46%
8	North Jakarta	41.05%	34.02%	24.93%
9	West Jakarta	24.84%	43.35%	31.81%
10	East Jakarta	20.38%	45.48%	34.14%
11	South Jakarta	16.33%	45.74%	37.93%
	Average	47.44%	28.88%	23.68%

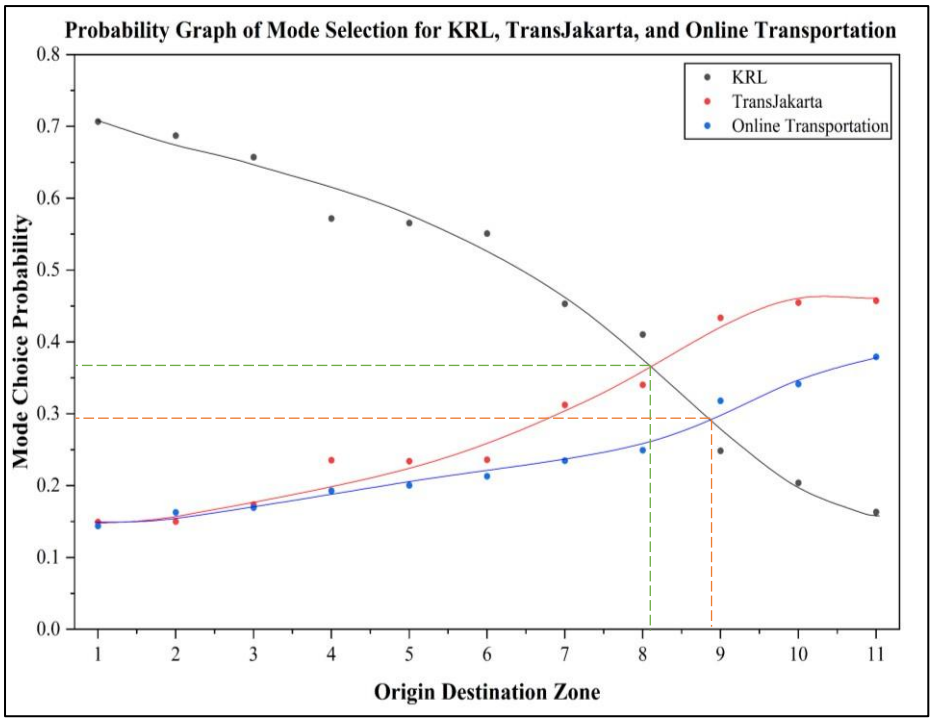

Figure 2. Probability Graph of Mode Selection for KRL, TransJakarta, and Online Transportation

The results of the analysis indicate that KRL has the highest average probability value of 47.44%, followed by TransJakarta at 28.88% and online transportation at 23.68%. The polynomial graph pattern generated using OriginLab software illustrates that the utilities of TransJakarta and online transportation intersect with KRL in Zones 8 to 9. As the reference category, KRL is assigned a constant utility value of 1 for comparison purposes.

4. CONCLUSIONS

Based on the results of the analysis conducted using the multinomial logit method, several conclusions were drawn as follows:

1. Users of the Cikoko LRT station tend to choose KRL as their main mode of transportation, followed by TransJakarta and online transportation. The majority are aged 20–30 years old, have a high school to bachelor's degree education, are students, have an income below IDR2,000,000, travel 1–5 times per month for work purposes, travel distances of less than 10 km, travel times of 10–25 minutes, Cost: IDR 5,000–10,000, and waiting time: 5–10 minutes.
2. Factors influencing mode choice vary. TransJakarta is influenced by travel frequency of 11–15 times, social purposes, distance of 10–20 km, and comfort; online transportation is influenced by work, school, and shopping purposes, distance <10 km, cost <IDR.15,000, as well as time and comfort. KRL is used as the reference category in the model.
3. The highest probability of selecting a subsequent mode of transportation is KRL (47.44%), followed by TransJakarta (28.88%) and online transportation (23.68%), indicating the dominance of KRL over other modes of transportation in the Jabodetabek area.

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REFERENCES

1. Maulana R. Yudhistira M.H. Socio-economic Factor Affecting the Choice of Transportation Mode in Jakarta Metropolitan Area. Jurnal Pembangunan Wilayah dan Kota. 2020; vol. 16. no. 4: 245 – 252. https://doi.org/10.14710/pwk.v16i4.32222
2. Shiddiqi A.A.A. Sutjiningsih D. Tjahjono T. Darmajanti L. Suprayoga G.B. Evaluating Sustainable Transport Indicators for Metropolitan Areas in Developing Countries: The Case of Greater Jakarta. The Open Transportation Journal. 2022; Volume 16: 1-12. https://doi.org/10.2174/18744478-V16-E2206130
3. Pangaribuan G.R. Purba D.D. The Impact of LRT Jabodebek in Enforcing Capability of the Intercity Transportation Network in the Greater Jakarta Area. International Journal on Advanced Science Engineering Information Technology. 2020; vol. 10. no. 2. pp. 828–836. https://doi.org/10.18517/ijaseit.10.2.11630
4. Susilo D. Na'at W.L. Analisis Kualitas Pelayanan Terhadap Kepuasan Pengguna KRL Commuter Line Yogyakarta – Solo. Jurnal Ilmiah Telsinas Elektro. Sipil dan Teknik Informasi. 2022; volume 5: 165 – 176. https://doi.org/10.38043/telsinas.v5i2.4336
5. Setiawan D. Efektivitas Transit Oriented Development (TOD) Cawang – Cikoko Sebagai Sistem Transportasi Berkelanjutan [Internet]. 2023 Sep 25 [cited 2025 Jul 27]. Available from: https://mapid.co.id/blog/efektivitas-transit-oriented-development-%28tod%29-cawang---cikoko-sebagai-sistem-transportasi-berkelanjutan
6. Rahmadhani A.W. Rifai A.I. Handayani S. The Perception of Travel Behavior on Public Transport Mode Choice: A Case of Depok – Jakarta Route. Citizen. Special Issue: Sustainability of Design. Public Transport. & Engineering. 2022; vol. 2. No. 5: 896 – 905. https://doi.org/10.53866/jimi.v2i5.207
7. Musthofiah A. Handayani D. Winata N.S. Studi *Willingness To Pay* (WTP) Calon Pengguna Jasa Kereta Api Bandara Internasional Adi Soemarmo. Jurnal Matriks Teknik Sipil. 2020; vol. 8. no. 2: 183 - 191. https://doi.org/10.20961/mateksi.v8i2.44020
8. Tamin O.Z. Perencanaan dan Pemodelan Transportasi. 2nd ed. Bandung: ITB; 2018.