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Route Choice Analysis to Office Areas Using "All or Nothing" Approach and User Perceptions

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ABSTRACT

Route selection is a critical process in designing an efficient transportation system, as inaccuracies in route choice can lead to delays and adverse effects on worker health and productivity. The purpose of this study is to identify preferences and factors influencing the selection of travel routes, as well as to map alternative routes based on these influential factors. The methods employed in this study include a questionnaire survey of office workers, which was then analyzed using the ordinal logit model and multinomial logistic regression with the assistance of SPSS software. Additionally, the *all-or-nothing* assignment method was applied to determine the optimal routes, using ArcGIS as a geospatial mapping and analysis tool. The results indicated that traffic density, distance, travel cost, and travel time were the primary factors affecting route choice decisions, with cost being the most significant. Conversely, individual characteristics such as age, gender, and education level did not have a statistically significant effect. This study recommends the adoption of an alternative route selection model to identify the most efficient commuting routes from various zones within the region, considering key factors such as traffic congestion levels, distance, cost, and travel time efficiency.

Keywords: *All Or Nothing, ArcGIS, Route Choice, SPSS, Transportation*

INTRODUCTION

The global transportation movement system currently faces multiple challenges that impact efficiency, sustainability, and social equity (Manaugh et al., 2015). Heavy reliance on private vehicles has led to severe traffic congestion in many major cities, increased greenhouse gas emissions, and worsened air quality (ITF, 2021). Movement within the transportation system arises due to the process of meeting mobility needs, which is described in terms of movement flows—vehicles, passengers, and goods—that travel from origin zones to destination zones within a particular area over a specified period (O. Z. Tamin, 2000).

Transportation movement systems aim to be efficient as they support community mobility, economic growth, and environmental sustainability (Makarova et al., 2017). Efficiency in transportation is characterized by the system's ability to minimize travel time, operating costs, and environmental impacts, while still fulfilling users' mobility requirements (Javanpour et al., 2025). However, several factors contribute to inefficiencies in transportation systems, with reliance on private vehicles, inadequate infrastructure, and the lack of integration among transportation modes being primary causes (Martens, 2017).

Transportation movement systems play a crucial role in daily life, especially in densely populated urban areas. Public views and perceptions of the transportation system are strongly influenced by the quality of service experienced (Lewis et al., 2021). People's perceptions of service quality further influence travel behavior, including mode and route choice (Prabantari, 2020). Therefore, route selection is a vital component of the transportation movement system, considering aspects such as travel time, distance, cost, and congestion levels.

Route selection refers to the process by which an individual chooses a specific path from an origin to a destination, taking into account multiple factors such as travel time, distance, travel cost, and traffic congestion (O. Z. Tamin, 2008). This decision-making process is not solely rational but also influenced by individual perceptions and preferences related to traffic conditions, the environment, and prior personal experiences.

If workers do not properly consider route selection, various losses may ensue, including wasted time, adverse physical conditions, and increased costs. Inaccurate route selection can cause delays in reaching the workplace, which may result in reduced job performance, reprimands from supervisors, and cuts in incentives. Moreover, inefficient and time-consuming routes can elevate stress levels and fatigue, which negatively impact workers' health and productivity. Suboptimal route choices for work travel extend travel time and increase psychological burdens, making it essential for workers to consider factors such as time and convenience when selecting travel routes (Budiman et al., 2021).

Motorists exhibit varied opinions regarding route choice, influenced by both individual characteristics and road conditions. Some workers change routes to avoid traffic congestion, prioritize shorter travel times to prevent delays, and consider travel costs. For workers with higher incomes, travel costs may be less important, while travel time remains a critical factor.

According to the 2023 report from the Cirebon City Transportation Department, "Traffic congestion in the city of Cirebon has increased sharply, especially during peak hours such as the morning between 06:30 and 08:00 and the afternoon when economic activity is at its peak." This increase has caused a significant surge in vehicle volume, particularly in office areas located along Jalan Siliwangi. Workers must carefully select their optimal routes daily to avoid congestion.

The office area along Jalan Siliwangi in Cirebon City is a hub for office, educational, commercial, and service activities. It experiences substantial traffic, especially in the morning and evening peak periods, leading to congestion issues that affect route choice. The selection of commuting routes can be a decisive factor in minimizing travel time, distance, cost, and congestion levels.

Based on the above context, this research aims to identify worker preferences and determine the factors influencing route selection for travel to office areas along Jalan Siliwangi, while considering workers' perceptions of travel attributes. Additionally, mapping alternative routes to circumvent congestion is an essential aspect of this study. The findings are expected to provide not only academic insights but also valuable input for policymaking and traffic management improvements in Cirebon City.

METHOD

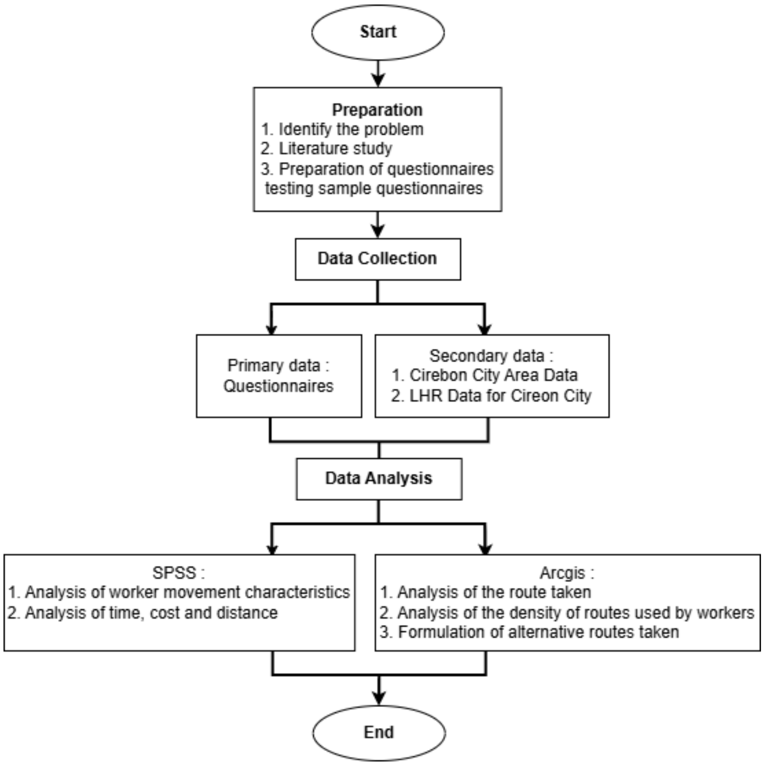


Figure 1. Research Flow

The research location was the Jalan Siliwangi area of Cirebon City. This research methodology used descriptive qualitative research, with qualitative data expressed in words to accompany and complement the descriptions obtained from quantitative data (Rasyid, 2022). The quantitative data, used as a measuring tool, consisted of questionnaires, analyzed using the *all-or-nothing* method related to determining route selection based on four urgencies, namely density, time, cost, and distance.

The *all-or-nothing* method was the simplest route selection model. In this model, it was assumed that all drivers tried to minimize their travel costs, which depended on road network characteristics and driver assumptions. It was also assumed that riders had the same perceptions and goals, so there was only one best route to choose. This method was not affected by congestion effects (Naufal & Triana, 2016). It effectively identified the shortest route based on distance or travel time, which was beneficial in less congested environments. Moreover, it could adapt to complex urban road networks, providing practical results that aligned with real-world conditions (Hui, 2014). However, this method did not consider traffic congestion, leading to unrealistic traffic volume predictions and potential overloading of certain routes. It lacked the ability to dynamically adjust to changing traffic conditions, which could result in inefficient route use during peak times (Suprayitno, 2017).

The data collection process involved a two-stage questionnaire survey, beginning with a preliminary survey during the preparation phase to test variables and refine the Route Choice Analysis model through small-scale trial sampling. The main survey then targeted 460 office workers from both government and private institutions in Cirebon City's Jalan Siliwangi area, focusing on gathering primary data through corrected questionnaires. The study required three types of data: respondent characteristics (socioeconomic and educational background), travel patterns (origin, mode, time, costs, and route decision factors), and route selection influences (density, distance, cost, and travel time). These criteria were evaluated using a Likert scale to model route choices based on the *all-or-nothing* method, incorporating both fixed and variable travel factors.

Secondary data, including Cirebon City's geographical information and Average Daily Traffic Reports (LHR), supported the primary findings. The Route Choice Analysis model categorized route conditions into four urgency factors—density, distance, cost, and travel time—each classified as "good" or "bad" in varying ratios (3:1, 1:3, or 2:2) to assess their impact on decision-making. This structured approach ensured a comprehensive evaluation of how commuters prioritized routes, combining quantitative metrics with user perceptions to enhance transportation planning accuracy. For future research, expanding the sample to include diverse occupational groups and integrating real-time traffic data could further refine the model's predictive reliability.

The study employed ordinal and multinomial logistic regression models to analyze factors influencing travel route selection. It began with validity and reliability tests in SPSS to verify the measurement instrument's quality. Descriptive analysis was conducted to examine worker movement patterns, focusing on time, cost, and distance variables. The ordinal logistic regression model assessed how independent variables (density, distance, cost, and time) influenced route choice decisions, with model fit tests (Model Fitting, Goodness-of-Fit Pearson/Deviance, and R Square) ensuring statistical robustness. This approach maintained the proportional odds assumption, where independent variables maintained consistent relationships across all logit functions. The analysis aimed to yield three key outcomes: identifying worker route preferences in Jalan Siliwangi, determining influential decision factors, and generating practical route selection recommendations for commuters.

Multinomial logistic regression complemented this by evaluating how demographic factors (age, gender, occupation, income) shaped route preferences, incorporating model feasibility tests, pseudo R-square analysis, and classification assessments. Spatial analysis in ArcGIS involved route visualization through district-level delineation, with travel paths determined by node-to-node mapping. Since ArcGIS lacked automatic density detection, manual blockade points were added to highlight high-traffic roads. This integrated methodology combined statistical modeling with geospatial techniques to comprehensively understand commuting behavior while addressing both quantitative decision factors and spatial route characteristics. For future research, incorporating real-time traffic data and expanding demographic variables could enhance the model's predictive accuracy and practical applicability.

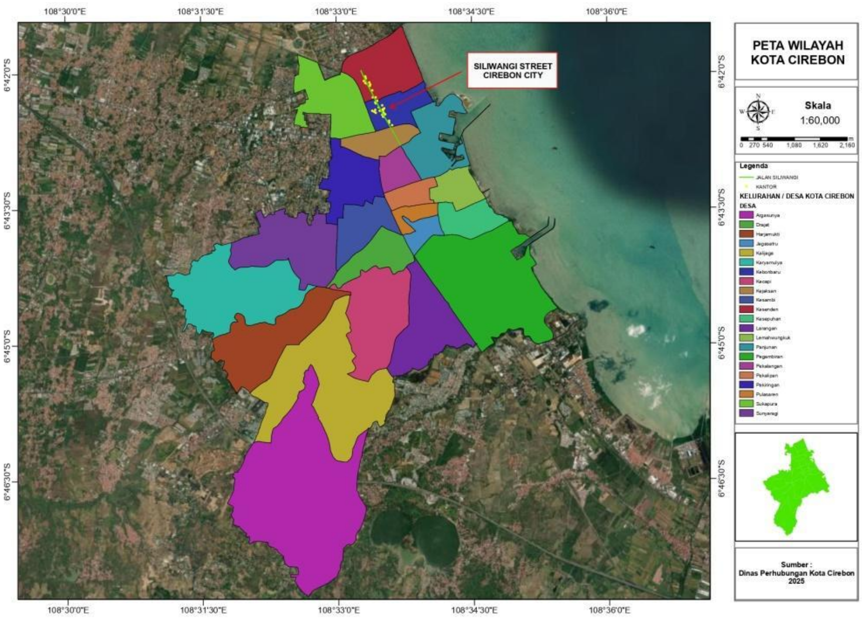


Figure 2. Research Location

RESULTS AND DISCUSSION

Determination of Respondent Samples

This study targets respondents who are workers with routine activities in the office area located along Jalan Siliwangi, Cirebon City. The population in focus includes all individuals who regularly travel to work in the area, either by private vehicle or public transportation.

Table 1. Respondent's institution

No	Agency/Office	Number of Employees
1	UPTD Pendidikan Kecamatan Kejaksan	13 Employees
2	Sekretariat Daerah Kota Cirebon	120 Employees
3	Inspektorat Daerah Kota Cirebon	60 Employees
4	DPRD Kota Cirebon	134 Employees
5	Dharma Wanita Persatuan Kota Cirebon	4 Employees
6	Hotel Langen Sari	25 Employees
7	Hotel Amaris	20 Employees
8	Asuransi Jiwa Bumiputera	4 Employees
9	Asuransi Jiwa IFG Life	7 Employees
10	Asuransi Jiwa Mandiri Inhealt	7 Employees
11	Asuransi Kredit Indonesia	11 Employees
12	PNM Venture Capital	10 Employees
13	Bank BJB	45 Employees
Total Employees		**460 Employees**

Based on the primary data above, the minimum sample requirement can be determined based on the Slovin formula with the following calculations

$$n = \frac{460}{(1+(460\ x\ (10\%)^2)}$$

$$n = 82 \text{ people}$$

In this study, 128 respondents were obtained from the offices mentioned above (**Table 1**.).

Validity & Reliability Test

Table 2. Validity and Reliability Test Variables

Symbol	Variables	Parameter Classification
Y	Selection Decision Route	Y_1 = 1; Strongly dislike Y_1 = 2; Do not want Y_1 = 3; Undecided Y_1 = 4; Want Y_1 = 5; Very favorable
X1	Route Selection Factors	X_1 = The streets are crowded X_1 = Short distance X_1 = Low cost of gasoline X_1 = Fast travel time
X2	Route Selection Factors	X_2 = The streets are not crowded X_2 = Long distance X_2 = Low cost of gasoline X_2 = Fast travel time
X3	Route Selection Factors	X_3 = The streets are not crowded X_3 = Short distance X_3 = Wasteful gasoline costs X_3 = Fast travel time
X4	Route Selection Factors	X_4 = The streets are not crowded X_4 = Short distance X_4 = Low cost of gasoline X_4 = Long travel time
X5	Route Selection Factors	X_5 = The streets are crowded X_5 = Short distance X_5 = Low cost of gasoline X_5 = Long travel time
X6	Route Selection Factors	X_6 = The streets are not crowded X_6 = Long distance X_6 = Wasteful gasoline costs X_6 = Fast travel time
X7	Route Selection Factors	X_7 = The streets are crowded X_7 = Short distance X_7 = Wasteful gasoline costs X_7 = Long travel time
X8	Route Selection Factors	X_8 = The streets are crowded X_8 = Long distance X_8 = Wasteful gasoline costs X_8 = Fast travel time
X9	Route Selection Factors	X_9 = The streets are not crowded X_9 = Long distance X_9 = Low cost of gasoline X_9 = Long travel time
X10	Route Selection Factors	X_{10} = The streets are not crowded X_{10} = Long distance X_{10} = Wasteful gasoline costs X_{10} = Long travel time

Table 2 is a classification of parameters used by research to determine workers' perceptions in route selection, then the results of workers' perceptions are used for validity testing and reliability testing. The validity test is carried out by calculating the correlation between each statement and the total score using the correlation technique formula. While the reliability test is carried out using the Cronbach Alpha technique greater than 0.6, it is said that the instrument is reliable.

The results of the validity test show that all variables are declared valid according to the valid r table showing the number> 0.174. The value of 0.174 is obtained from the r significance table with a sample size of 128 and a significance level of 5%. While the reliability test results show that the results of the analysis of the question aspects are reliable. This can be seen from the Cronbach Alpha value obtained, which is 0.863, the question aspect is greater than 0.6 and it is said that the question aspect is reliable.

Model Ordinal Logit Analysis

Based on the results of the Ordinal Logit Model research, this analysis is carried out to estimate the coefficients of the variables forming the route selection model and statistical tests are carried out using the help of SPSS software. If a statistically insignificant predictor variable is found (p-value > α) then the variable will be eliminated from the model.

Table 3. Estimation of Variable Coefficients and Thresholds in the Travel Route Selection Model to the Region Office

		Estimate	Std. Error	Wald	Sig.
Threshold	[Decision = 1,00]	-2,271	0,201	127,917	0,000
	[Decision = 2,00]	-0,251	0,146	2,953	0,086
	[Decision = 3,00]	0,833	0,147	32,236	0,000
	[Decision = 4,00]	2,817	0,166	287,976	0,000
Location	[Density = 1,00]	0,571	0,116	24,289	0,000
	[Density = 2,00]	0[a]			
	[Distances = 1,00]	0,411	0,117	12,282	0,000
	[Distances = 2,00]	0[a]			
	[Cost = 1,00]	0,910	0,109	69,929	0,000
	[Cost = 2,00]	0[a]			
	[Time = 1,00]	0,606	0,107	31,907	0,000
	[Time = 2,00]	0[a]			

Link function: Logit

a. This parameter is set to zero because it is redundant. ; α = 0,05

In (Table 3) shows the estimated coefficient values in the model, it can be seen that all variables are statistically significant (p-value <0.05). It can be said that distance, time, cost and density can influence route selection decisions. For the predictor variables distance, time, cost and density have a positive coefficient, which corresponds to an increase in people's willingness to choose a route (the route selection decision taken will be closer to category 5, which is very willing f o r category 1 predictor variables).

Apart from the significance value, there is a Wald test value which is the square of the ratio of the coefficient to its standard error. This means that the greater the Wald value, the higher the influence of the variable on the model. Consecutively, the predictor variables that most influence route selection decisions are cost, time, density, and distance.

Not only the coefficients of the predictor variables are estimated, but also the threshold or αj is a term similar to constant or intercept. However, the threshold value in this ordinal regression indicates where the latent variable range limits to predict five categories of response variables. In this case, if the value of β X (the sum of the multiplication of the coefficients with the predictor variable values) is$\leq$ -2.271, the prediction results of the route selection decision will be 1 (Very Unwilling) if β X is between the range of $-2.271 < \beta X \leq -0.251$ then the prediction result of the route selection decision will be 2 (Unwilling), and so on.

Thus, the ordinal regression equation is obtained, for categorical predictor variables (urgency of route selection), X1, X2, X3, X4 = 1, as follow.

$\ln(\theta 1) = -2{,}271 - (0{,}571X1 + 0{,}411X2 + 0{,}910X3 + 0{,}606X4)$

$\ln(\theta 2) = -0{,}251 - (0{,}571X1 + 0{,}411X2 + 0{,}910X3 + 0{,}606X4)$

$\ln(\theta 3) = 0{,}833 - (0{,}571X1 + 0{,}411X2 + 0{,}910X3 + 0{,}606X4)$

$\ln(\theta 4) = 2{,}817 - (0{,}571X1 + 0{,}411X2 + 0{,}910X3 + 0{,}606X4)$

It should be noted that the coefficient of the categorical predictor variable in the equation above applies if the category of the predictor variable is "1". If the category of the predictor variable is equal to "2" then the coefficient of the categorical predictor variable used is zero.

The analysis results show that cost is the main factor in route selection, this is in line with research (Budiman et al., 2021). Meanwhile, research (Saputra, 2021), distance is a major factor in route selection.

Multinominal Logistic Regression Analysis

Based on the results of the Multinominal Logistic Regression research, this analysis is used to identify the extent to which respondent characteristics influence the tendency to choose a travel route that is considered most appropriate to the needs or urgency of the user. The test used in the Multinominal Logistic Regression analysis is the Likelihood Ratio Test. The Likelihood Ratio Test is conducted to determine whether each independent variable (X) has a significant influence on the dependent variable (Y), namely route selection. The test results are shown in the following table:

Table 4. Partial Test

Model fitting Information				
Model	**Model Fitting Criteria-2 Log Likehood**	**Likehod Ratio Test**		
		Chi square	**df**	**.Sig**
Intercept	100.810[a]	000	.0	
Age	110.094	9.284	8	.319
Job	104.304	3.494	2	.174
Income	112.191	11.380	8	.181
Education	109.341	8.531	6	.202
Transportation	107.526	6.716	6	.348
Gender	103.609	2.799	2	.247

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.
a. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

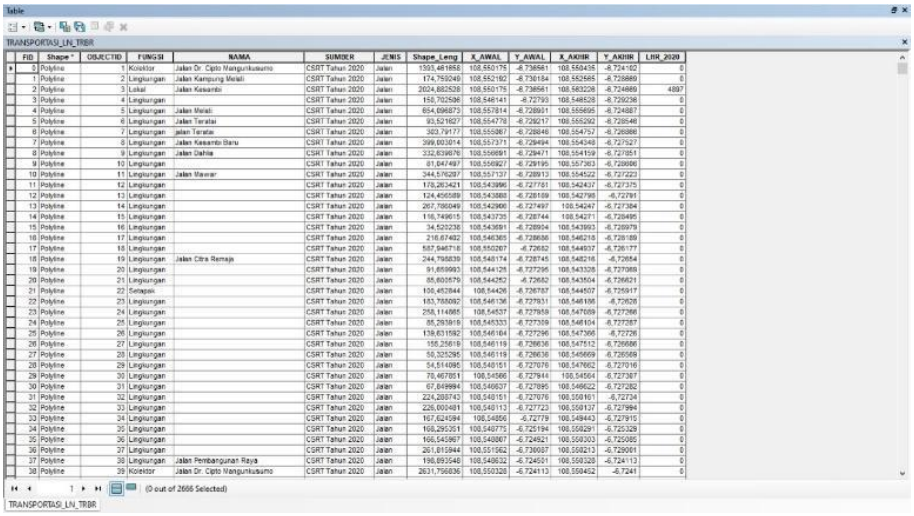
Based on the results in Table 4, it can be seen that all independent variables have a significance value (Sig) greater than 0.05. This indicates that no variable has a statistical effect on route selection at the 5% significance level. However, the variables of employment (Sig = 0.174), income (Sig = 0.181), and education (Sig= 0.202) have relatively smaller significance values than other variables. Although not significant, these three variables show the potential to contribute to the model and can be considered for inclusion in further analysis or further study.

Route Recommendation Analysis

In this study, ArcGIS software was used as the main tool to analyze and determine the best route for workers to travel to office areas on Jalan Siliwangi, Cirebon City. The analysis process starts with the creation of a network dataset that includes road network data, including important attributes such as segment length, maximum speed, and road classification (Figure 3). By using the Network Analyst (**Figure 5**), Network Analyst (Figure 5), the system can calculate the shortest and fastest route based on predefined criteria, namely distance, travel time, and travel cost.

The analysis results show that ArcGIS is able to provide route recommendations that are not only optimal in terms of distance, but also consider other factors such as traffic density that often occurs during peak hours. By implementing the All or Nothing method, the entire travel load is allocated to the route with the lowest impedance value, resulting in an efficient route and avoiding previously identified congestion points.

Visualizing the results of the analysis in the form of digital maps allows for a better understanding of the movement patterns and alternative routes that workers can take. In addition, the analysis also provides insights into how road characteristics and traffic conditions can influence route choices, which can be used as a basis for better transportation planning in urban areas. Thus, the use of ArcGIS in this study not only improves the accuracy in determining routes, but also makes a significant contribution to the management of traffic and community mobility in Cirebon City.



Table

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FID	Shape *	OBJECTID	FUNGSI	NAMA	SUMBER	JENIS	Shape_Leng	X_AWAL	Y_AWAL	X_AKHIR	Y_AKHIR	LHR_2020
0	Polyline	1	Kolektor	Jalan Dr. Cipto Mangunkusumo	CSRT Tahun 2020	Jalan	1393,461858	108,550175	-6,738561	108,550435	-6,724102	0
1	Polyline	2	Lingkungan	Jalan Kampung Melati	CSRT Tahun 2020	Jalan	174,759249	108,552192	-6,730184	108,552585	-6,728889	0
2	Polyline	3	Lokal	Jalan Kesambi	CSRT Tahun 2020	Jalan	2024,882528	108,550175	-6,738561	108,583228	-6,724889	4897
3	Polyline	4	Lingkungan		CSRT Tahun 2020	Jalan	158,702506	108,548141	-6,72793	108,548528	-6,729238	0
4	Polyline	5	Lingkungan	Jalan Melati	CSRT Tahun 2020	Jalan	654,096873	108,557814	-6,728931	108,555695	-6,724887	0
5	Polyline	6	Lingkungan	Jalan Teratai	CSRT Tahun 2020	Jalan	93,521627	108,554778	-6,729217	108,555292	-6,728548	0
6	Polyline	7	Lingkungan	jalan Teratai	CSRT Tahun 2020	Jalan	303,79177	108,555087	-6,728848	108,554757	-6,726888	0
7	Polyline	8	Lingkungan	Jalan Kesambi Baru	CSRT Tahun 2020	Jalan	399,003014	108,557371	-6,729494	108,554348	-6,727527	0
8	Polyline	9	Lingkungan	Jalan Dahlia	CSRT Tahun 2020	Jalan	332,839876	108,556691	-6,729471	108,554159	-6,727851	0
9	Polyline	10	Lingkungan		CSRT Tahun 2020	Jalan	81,047497	108,556927	-6,729195	108,557383	-6,728806	0
10	Polyline	11	Lingkungan	Jalan Mawar	CSRT Tahun 2020	Jalan	344,576207	108,557137	-6,728913	108,554522	-6,727223	0
11	Polyline	12	Lingkungan		CSRT Tahun 2020	Jalan	178,263421	108,543996	-6,727781	108,542437	-6,727375	0
12	Polyline	13	Lingkungan		CSRT Tahun 2020	Jalan	124,456589	108,543888	-6,728189	108,542798	-6,72791	0
13	Polyline	14	Lingkungan		CSRT Tahun 2020	Jalan	267,786049	108,542906	-6,727497	108,54247	-6,727384	0
14	Polyline	15	Lingkungan		CSRT Tahun 2020	Jalan	116,749615	108,543735	-6,728744	108,54271	-6,728495	0
15	Polyline	16	Lingkungan		CSRT Tahun 2020	Jalan	34,520238	108,543691	-6,728904	108,543993	-6,728979	0
16	Polyline	17	Lingkungan		CSRT Tahun 2020	Jalan	216,67402	108,546365	-6,728686	108,546218	-6,728189	0
17	Polyline	18	Lingkungan		CSRT Tahun 2020	Jalan	587,946718	108,550207	-6,72682	108,544937	-6,726177	0
18	Polyline	19	Lingkungan	Jalan Citra Remaja	CSRT Tahun 2020	Jalan	244,798839	108,548174	-6,728745	108,548216	-6,72854	0
19	Polyline	20	Lingkungan		CSRT Tahun 2020	Jalan	91,659993	108,544125	-6,727295	108,543328	-6,727069	0
20	Polyline	21	Lingkungan		CSRT Tahun 2020	Jalan	85,603579	108,544252	-6,72682	108,543504	-6,726621	0
21	Polyline	22	Setapak		CSRT Tahun 2020	Jalan	100,452844	108,54426	-6,726787	108,544507	-6,725917	0
22	Polyline	23	Lingkungan		CSRT Tahun 2020	Jalan	183,788092	108,546136	-6,727931	108,546186	-6,72828	0
23	Polyline	24	Lingkungan		CSRT Tahun 2020	Jalan	258,114865	108,54537	-6,727959	108,547089	-6,727268	0
24	Polyline	25	Lingkungan		CSRT Tahun 2020	Jalan	85,293819	108,545333	-6,727309	108,546104	-6,727287	0
25	Polyline	26	Lingkungan		CSRT Tahun 2020	Jalan	139,631592	108,546104	-6,727296	108,547366	-6,72726	0
26	Polyline	27	Lingkungan		CSRT Tahun 2020	Jalan	155,25619	108,546119	-6,726636	108,547512	-6,726686	0
27	Polyline	28	Lingkungan		CSRT Tahun 2020	Jalan	50,325295	108,546119	-6,726636	108,545669	-6,726569	0
28	Polyline	29	Lingkungan		CSRT Tahun 2020	Jalan	54,514095	108,548151	-6,727076	108,547662	-6,727016	0
29	Polyline	30	Lingkungan		CSRT Tahun 2020	Jalan	70,467851	108,54566	-6,727944	108,54564	-6,727387	0
30	Polyline	31	Lingkungan		CSRT Tahun 2020	Jalan	67,849994	108,546637	-6,727895	108,546622	-6,727282	0
31	Polyline	32	Lingkungan		CSRT Tahun 2020	Jalan	224,288743	108,548151	-6,727076	108,550161	-6,72734	0
32	Polyline	33	Lingkungan		CSRT Tahun 2020	Jalan	226,000481	108,548113	-6,727723	108,550137	-6,727994	0
33	Polyline	34	Lingkungan		CSRT Tahun 2020	Jalan	167,624594	108,54856	-6,72779	108,549443	-6,727915	0
34	Polyline	35	Lingkungan		CSRT Tahun 2020	Jalan	168,295351	108,548775	-6,725194	108,550291	-6,725329	0
35	Polyline	36	Lingkungan		CSRT Tahun 2020	Jalan	166,545967	108,548807	-6,724921	108,550303	-6,725085	0
36	Polyline	37	Lingkungan		CSRT Tahun 2020	Jalan	261,815944	108,551562	-6,730087	108,550213	-6,729001	0
37	Polyline	38	Lingkungan	Jalan Pembangunan Raya	CSRT Tahun 2020	Jalan	198,893548	108,548632	-6,724501	108,550328	-6,724113	0
38	Polyline	39	Kolektor	Jalan Dr. Cipto Mangunkusumo	CSRT Tahun 2020	Jalan	2631,756836	108,550328	-6,724113	108,550452	-6,7241	0

(0 out of 2666 Selected)

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Figure 3. Table Attribute in ArcGIS

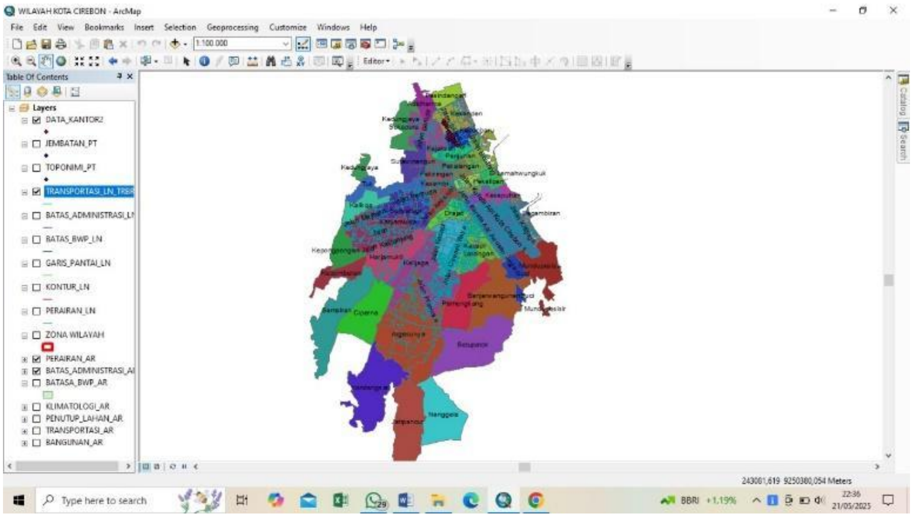

Figure 4. Deliniation Wilayah Kota Cirebon

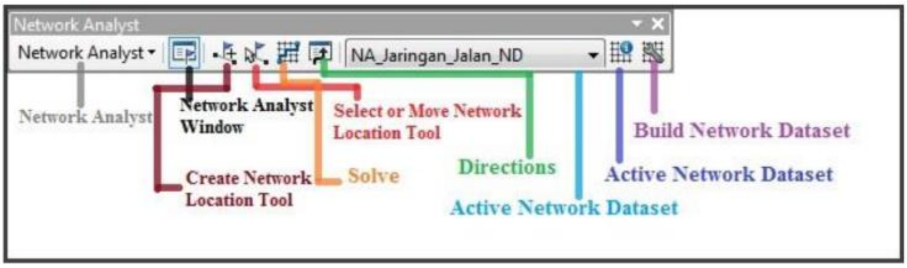

Figure 5. Tools Network Analysis

Table 5 is a table of origin and destination points for workers on Jalan Siliwangi. The points of origin are the top 4 neighborhoods that come from workers through filling out questionnaires.

Table 5. Destination Origin Points

Origin	Destination
Kalijaga Village	Siliwangi Street, Cirebon City
Kesambi Village	Siliwangi Street, Cirebon City
Kasepuhan Village	Siliwangi Street, Cirebon City
Karyamulya Village	Siliwangi Street, Cirebon City

Figure 6 is the result of the route analysis from Kalijaga Village to the office area on Siliwangi Street, Cirebon City, with a distance of 7.437 km, a travel time of 12 minutes, and a constant vehicle speed of 38.34 km/hour. This route was chosen because it passes through relatively smoother lanes and avoids points of traffic congestion that are common during peak hours. This route starts from Pramuka Penggalang Street – Pramuka Street - Asem Gede Street – Pramuka Street - Angkasa Raya Street - Kemlaten Street – Kanggraksan Street – Kesambi Street – Satria Street – Setia Street - Ampera Raya Street - Tentara Pelajar Street - P. Suryanegara Street - Sukalila Selatan Street - KS Tubun Street - Tanda Barat Street - Inspeksi PJKA Street - Stasiun Street - and ends at Siliwangi Street.

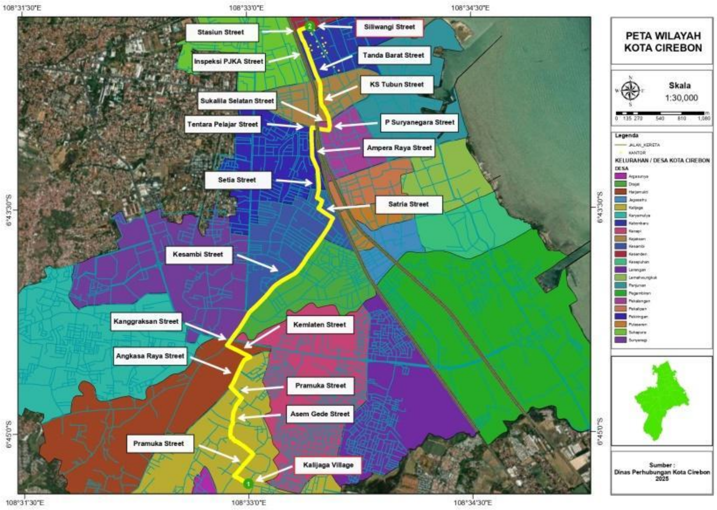

Figure 6. Best Route from Kalijaga Village

Figure 7 is the result of the route analysis from Kesambi Village to the office area on Jalan Siliwangi, Cirebon City, the distance is 3.176 km, the travel time is 5 minutes, and the constant vehicle speed is 38.34 km/hour. This route is the shortest route and has been designed to avoid congestion points, so it is ideal for transportation short and fast trip. This route starts from Melati Street – Teratai Street - Dr. Sutomo Street – Satria Street – Langensari Street – Setia Street - Ampera Raya Street - Tentara Pelajar Street - P. Suryanegara Street - Sukalila Selatan Street - KS Tubun Street - Tanda Barat Street - Inspeksi PJKA Street – Stasiun Street - and ends at Siliwangi Street.

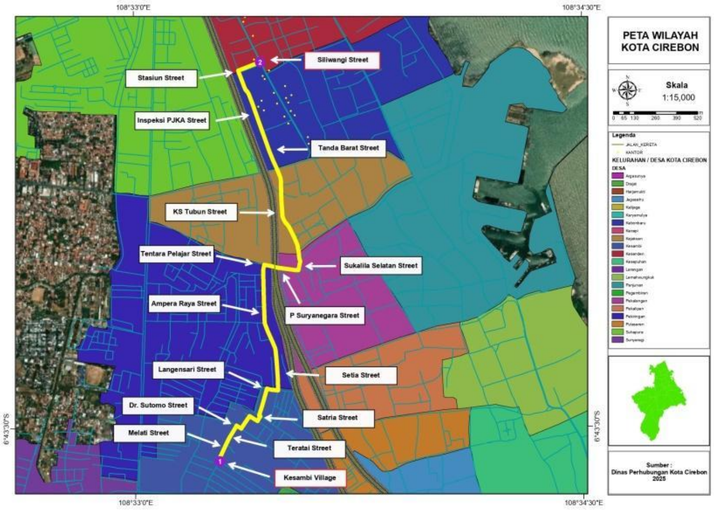

Figure 7. Best Route from Kesambi Village

Figure 8 is the result of the route analysis from Kasepuhan Village to the office area on Jalan Siliwangi, Cirebon City, with a distance of 3.45 km, a travel time of 5 minutes, and a constant vehicle speed of 38.34 km/hour. This route has been determined to be the shortest and optimal route because it actively avoids congestion points, so it is ideal for use in distribution or mobility that requires time and fuel efficiency. This route starts from Gambir Laya Street – Pesayidan Street – Ariodinoto Street – Merdeka Street – Talang Street – Pasuketan Street – Bahagia Street – Karang Kencana Street – Kalibaru Selatan Street – Karanggetas Street – and ends at Siliwangi Street.

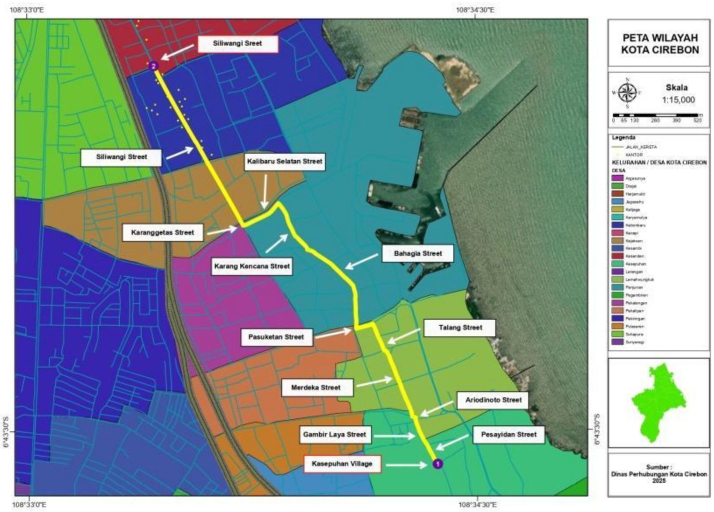

Figure 8. Rute Terbaik dari Kelurahan Kasepuhan

Figure 9 is the result of the route analysis from Karyamulya Village to the office area of Jalan Siliwangi, Cirebon City, the distance is 7.086 km, the travel time is 11 minutes, and the vehicle speed is constant 38.34 km/hour. This route has been designed to avoid points congestion, so that provide lanes that smoothly although passes through a number of neighborhood streets and arterials. This route is one of the optimal choices to reach the destination efficiently. This route starts from Cendana Raya Street – Kandang Perahu Street – Evakuasi Street – Sunyaragi Street – Karang Jalak Street – Pemuda Street – Dr. Cipto

Mangunkusumo Street – Dr. Sutomo Street – Cempaka I Street – Cempaka II Street – Arya Bangsa Street – Arya Kiban Street – Prakasa Muda Street – Tentara Pelajar Street – Cangkring II Street – RA. Kartini Street – Tanda Barat Street – Inspeksi PJKA Street – Stasiun Street – and ends at Siliwangi Street.

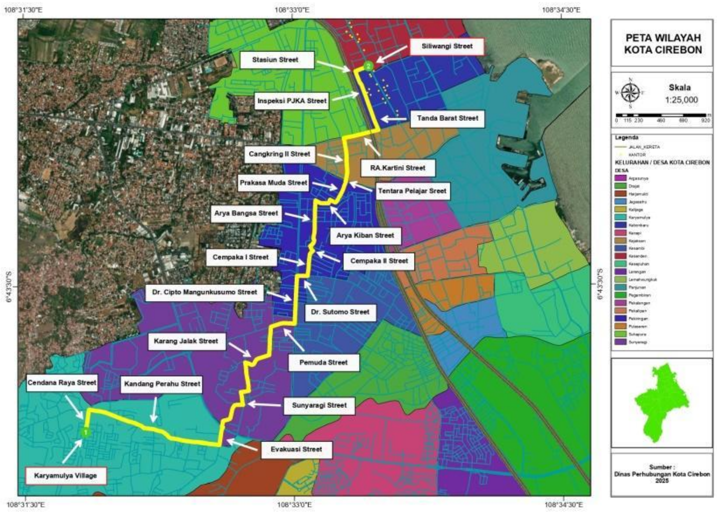

Figure 9. Rute Terbaik dari Kelurahan Karyamulya

In addition to the best route recommendations, this research issues details of the fuel costs of each route passed. This route recommendation uses Pertalite, Pertamax, and Pertamax Turbo fuel types as fuel prices. Motorcycles and cars are t h e vehicles studied for fuel. This fuel cost is the price for one trip.

Figure 10 and **Figure 11** are the results of the fuel cost analysis, the cheapest motor vehicle fuel costs are on the Kesambi Village route at a price of Rp 529,333 using the Pertalite fuel type, and for the most expensive motor vehicles on the Kalijaga Village route at a price of Rp 6,594,140 using the Pertamax Turbo fuel type. Meanwhile, the fuel cost of the cheapest car vehicle is on the Kesambi Village route at a price of Rp 1,628,718 using the Pertalite fuel type, and for the most expensive car vehicle is on the Kalijaga Village route at a price of Rp 8,195,052 using the Pertamax Turbo fuel type.

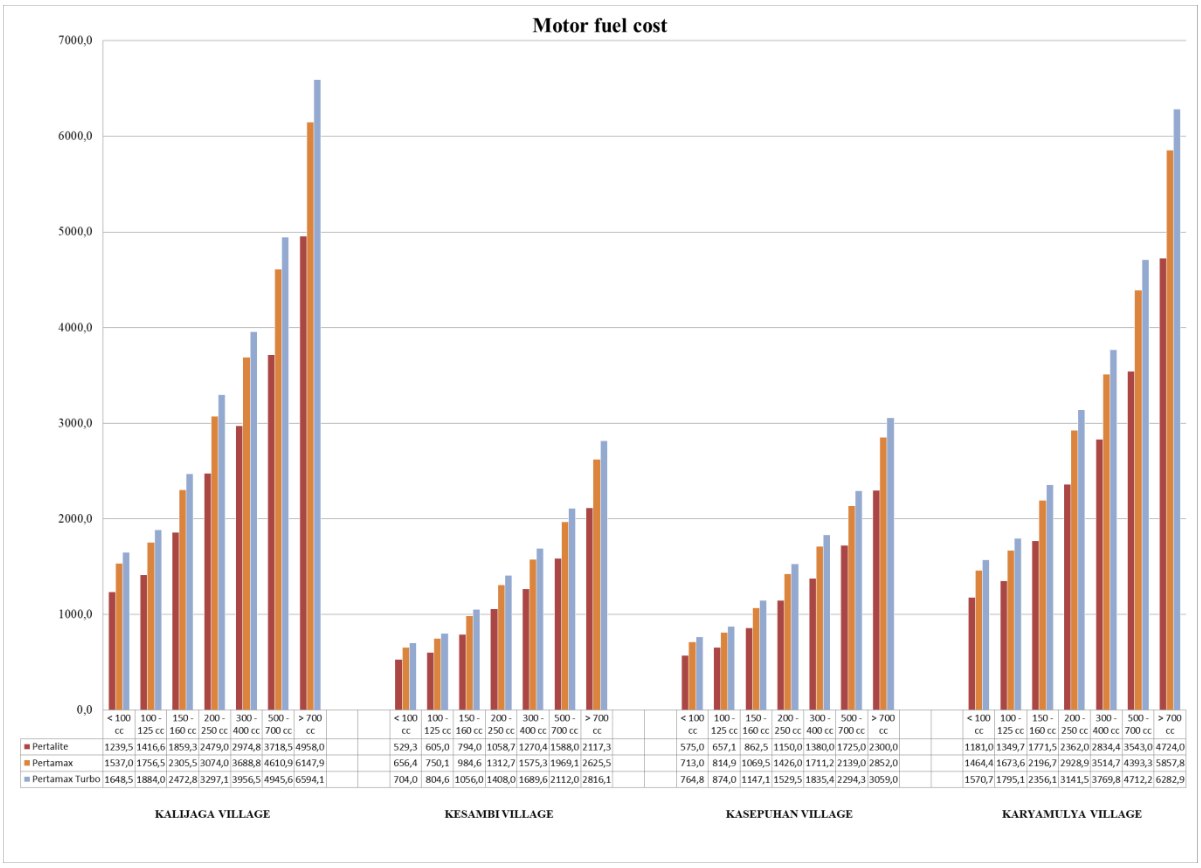

Figure 10. Motor fuel cost

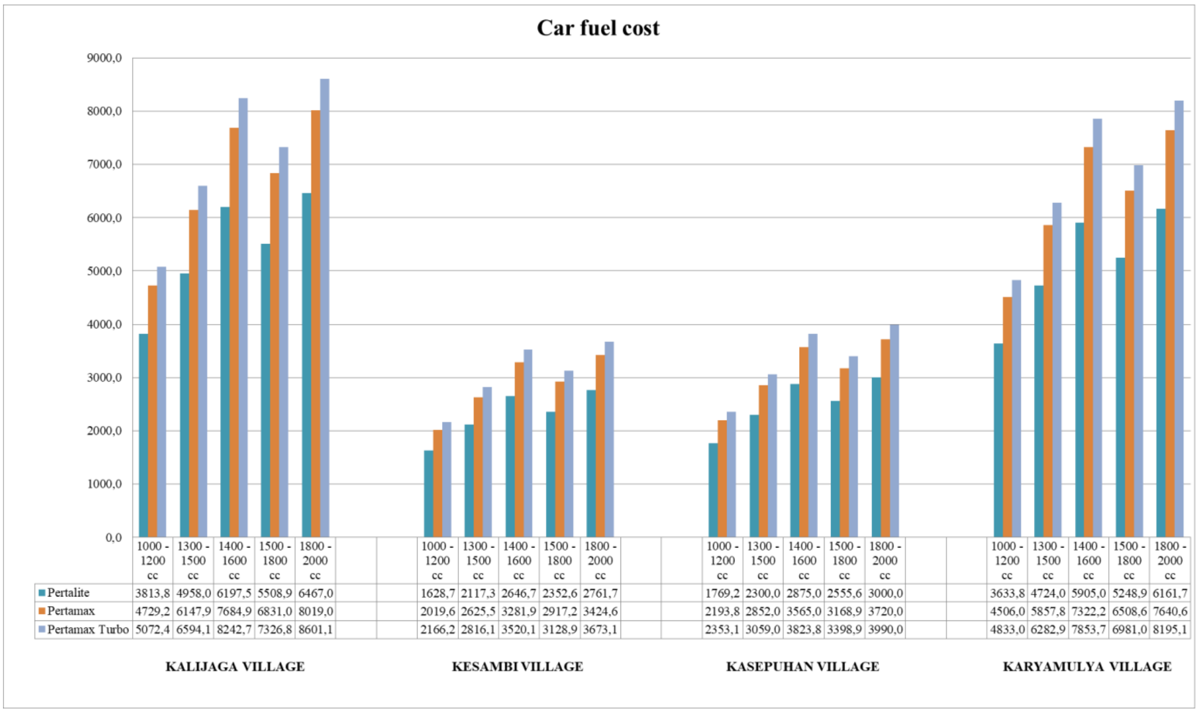

Figure 11. Car fuel cost

CONCLUSION

The analysis of route selection behavior among workers in Jalan Siliwangi revealed that key factors influencing route decisions were traffic density, distance, cost, and travel time, with cost identified as the most critical determinant. Multinomial logistic regression indicated that personal characteristics such as gender, age, and occupation had minimal impact on route preferences, underscoring that objective conditions rather than demographic factors primarily guided route choice. The study identified four optimal routes from various neighborhoods to Jalan Siliwangi, with travel times ranging from 5 to 12 minutes and distances between 3.176 km and 7.437 km, designed to maximize travel efficiency. It also highlighted that travel costs were significantly affected by vehicle engine capacity and fuel type, with motorcycles being more economical than cars and Pertalite fuel offering the lowest cost among fuel options. These findings offer practical recommendations for commuters aiming to reduce travel time and expenses in the area. For future research, incorporating additional variables such as time-of-day traffic variations and road quality impacts on vehicle maintenance costs could provide deeper insights into optimizing route selection.

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