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ANALYSIS OF TRANSPORTATION MODE CHOICE PREFERENCES OF SERANG RAYA UNIVERSITY STUDENTS USING THE STATED PREFERENCE METHOD

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ABSTRACT

Transportation mode choice is an important aspect of transportation planning and is influenced by trip characteristics and users' socioeconomic conditions. Students at Serang Raya University have diverse travel characteristics, necessitating an analysis of factors affecting transportation mode choice preferences. This study aims to analyze the influence of travel cost, travel time, comfort, and safety and security attributes on the transportation mode preferences of Serang Raya University students, and to evaluate students' Ability to Pay (ATP) and Willingness to Pay (WTP). The study uses a quantitative method with a Stated Preference approach by distributing questionnaires to 100 respondents. Data were analyzed using validity and reliability tests, binary logistic regression, and ATP and WTP analyses. The results show that all research attributes are valid and reliable with a Cronbach's alpha of 0.842. Binary logistic regression analysis indicates that travel cost and travel time significantly affect transportation mode preferences, with travel cost being the most dominant factor. The students' average ATP was IDR 1,432,323 per month, while their average WTP was IDR 10,227 per trip. The study also showed that motorcycles were the most commonly used transportation mode by students commuting to campus. These findings are expected to support policy formulation and the development of a more effective and efficient transportation system that meets students' mobility needs.

Keywords: transportation mode choice, stated preference, binary logistic regression, ability to pay (ATP), willingness to pay (WTP).

1. INTRODUCTION

Transportation is an important means of supporting student mobility for travel to campus. Transportation mode choice is influenced by various factors, such as travel cost, travel time, comfort, and the safety and security perceived by users. Differences in travel characteristics and socioeconomic conditions cause students to have different preferences when selecting a transportation mode [1].

Serang City, as the center of educational activities in Banten Province, has experienced increased mobility, as indicated by the high number of motor vehicles. According to data from the Banten Province Central Statistics Agency, the number of motor vehicles in Serang City in 2024 reached 401,640 units, with motorcycles accounting for 322,435 units, or approximately 80.28% of the total [2]. The widespread use of private vehicles indicates that the community, including students, tends to choose transportation modes considered more flexible and efficient for daily activities [3], [4].

The Stated Preference (SP) method is widely used to analyze user preferences for transportation modes based on scenarios involving changes in trip attributes. Budiman et al. [1] found that travel cost, travel time, comfort, and safety and security influence students' transportation mode choices. Priambodho et al. [5] also found that changes in transportation service attributes can affect students' preferences when choosing a travel mode to campus.

Besides travel attributes, economic aspects also play an important role in transportation mode choice. Ability to Pay (ATP) reflects an individual's financial capacity to afford transportation costs, whereas Willingness to Pay (WTP) represents the maximum fare users are willing to pay based on their preferences and perceived service quality [6], [7]. Although ATP and WTP are not the primary methods used to analyze transportation mode choice in this study, these indicators provide complementary information regarding transportation affordability and users' willingness to pay. Therefore, ATP and WTP analyses can support transportation planning by evaluating whether transportation services are affordable and acceptable to users [8].

Although numerous studies have examined transportation mode choice among university students using the Stated Preference approach [1], [3], [5], most have primarily focused on travel attributes and mode preferences, while others have applied binary logistic regression to identify significant determinants of transportation mode choice. Several studies have also analyzed Ability to Pay (ATP) and Willingness to Pay (WTP) in the context of transportation fare affordability. However, studies integrating Stated Preference, binary logistic regression, and complementary ATP–WTP analyses within a single framework to evaluate transportation mode choice among university students remain limited. Furthermore, to the best of the authors' knowledge, no previous study has specifically investigated these aspects among Serang Raya University students. Therefore, this study addresses this research gap by integrating the Stated Preference method, binary logistic regression, and complementary ATP–WTP analyses to provide a more comprehensive understanding of transportation mode choice behavior and transportation affordability among Serang Raya University students.

Accordingly, this study aims to analyze the influence of travel cost, travel time, comfort, and safety and security on the transportation mode choice preferences of Serang Raya University students using the Stated Preference method. In addition, this study includes complementary analyses of Ability to Pay (ATP) and Willingness to Pay (WTP) to provide supporting information regarding students' transportation affordability and willingness to pay for transportation services.

2. RESEARCH METHOD

This study used a quantitative method with a survey approach to analyze the transportation mode preferences of Serang Raya University students [9]. Data were collected by distributing questionnaires directly and online to students who commute to campus using various transportation modes.

The data used in this study consisted of primary and secondary data. Primary data were obtained from the questionnaire responses, which include respondent characteristics, travel characteristics, Ability to Pay (ATP), Willingness to Pay (WTP), and transportation mode preferences based on Stated Preference scenarios. Secondary data were obtained from the Central Statistics Agency (BPS), literature, and previous studies related to transportation mode choice.

The study used purposive sampling, a method based on specific criteria established by the researcher [9]. The respondents were active students of Serang Raya University who commuted to campus and were willing to complete the research questionnaire. The sample comprised 100 respondents.

The research stages are presented in Figure 1. The flowchart illustrates the sequence of activities from problem identification to drawing conclusions.

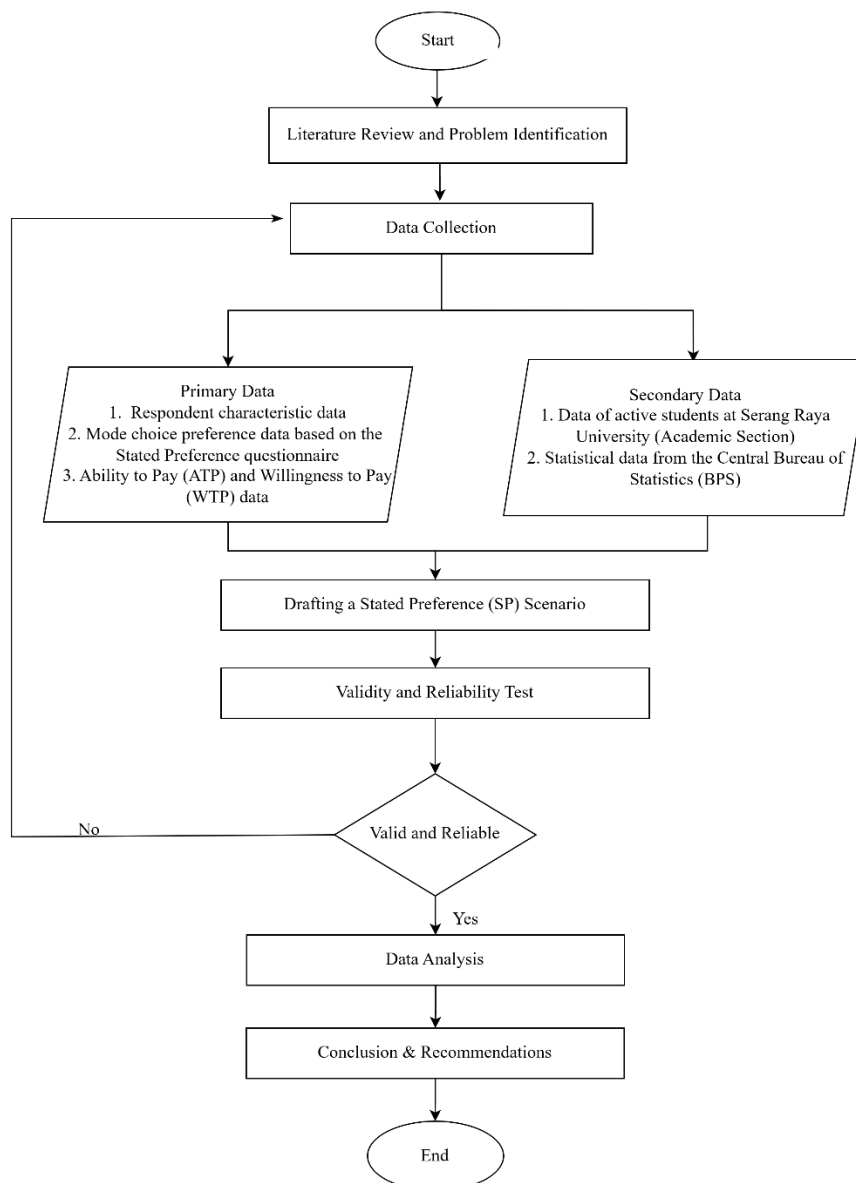


Figure 1. Research Flowchart

The Stated Preference (SP) method was used to determine students' preferences regarding changes in travel attributes, including travel cost, travel time, comfort, and safety and security [3], [4], [5]. Respondents were given several hypothetical scenarios depicting changes in transportation service attributes and were asked to choose their preferred transportation mode. The survey results were then transformed into a utility scale to develop a transportation mode choice model.

The Stated Preference questionnaire consisted of eight hypothetical travel scenarios developed to evaluate students' transportation mode choice preferences. Each scenario presented transportation alternatives with different combinations of travel cost, travel time, comfort, and safety and security attributes. The attribute values were systematically varied across the eight scenarios to represent different transportation service conditions. Respondents were asked to select their preferred transportation mode based on the attribute combinations presented in each scenario.

The transportation mode preference model was analyzed using binary logistic regression. The dependent variable was transportation mode choice, while the independent variables included travel cost (X_1), travel time (X_2), comfort (X_3), and safety and security (X_4). For the binary logistic regression analysis, the dependent variable was coded into two categories, where a value of 1 represented respondents who chose private transportation and a value of 0 represented respondents who chose public transportation.

This coding scheme was used to estimate the probability of choosing private transportation based on the travel attributes evaluated in this study.

The logit model was formulated as follows:

$$\text{Logit}(p) = \ln \frac{p}{1-p} \quad (1)$$

where:

p = Probability of a respondent choosing a particular transportation mode.

$(1-p)$ = Probability of a respondent not choosing the transportation mode.

$\ln$ = Natural logarithm (base e).

(Source: Hosmer, Lemeshow, and Sturdivant, 2013)

In addition to the main analysis using the Stated Preference method and binary logistic regression, this study included Ability to Pay (ATP) and Willingness to Pay (WTP) analyses as complementary analyses to provide supporting information regarding students' transportation affordability. Unlike the binary logistic regression, which was used to identify the significant factors influencing transportation mode choice, the ATP and WTP analyses were conducted descriptively based on respondents' questionnaire responses. The ATP value represents respondents' self-reported monthly financial capability to allocate funds for transportation, while the WTP value represents the maximum transportation fare respondents were willing to pay for transportation services. Therefore, the ATP and WTP results were summarized using descriptive statistics, including the minimum, maximum, and mean values, to describe respondents' transportation affordability and willingness to pay. These analyses were intended as supporting analyses and were not used as explanatory variables in the binary logistic regression model [6], [7].

3. RESULTS AND DISCUSSION

3.1. Validity and Reliability Test Results

Validity testing was conducted to determine the ability of the research instrument to measure the variables studied. The test was performed using Pearson correlation on four research attributes: travel cost (X_1), travel time (X_2), comfort (X_3), and safety and security (X_4).

Table 1. Validity Test Results

Variable	Calculated r	Critical r	Result
Travel cost	0.641	0.197	Valid
Travel time	0.649	0.197	Valid
Comfort	0.574	0.197	Valid
Safety and security	0.649	0.197	Valid

Source: Authors' Analysis, 2026.

The validity test results show that all research attributes meet the validity criteria because their calculated r values are greater than the critical r value (0.197) and significance values are less than 0.05. This indicates that the research instrument is able to accurately represent the variables measured. Therefore, all items for the variables of travel cost, travel time, comfort, and safety and security are suitable for use in the analysis of transportation mode choice preferences of Serang Raya University students.

Table 2. Reliability Test Results

Cronbach's Alpha	Number of Items	Result
0.842	4	Reliable

Source: Authors' Analysis, 2026.

Based on the reliability test results in Table 2, a Cronbach's alpha value of 0.842 was obtained, which is greater than 0.70. This result shows that the research instrument has a high level of reliability. Therefore, all research attributes are considered reliable and can be used in the analysis of transportation mode choice preferences of Serang Raya University students.

The questionnaire used in this study was developed using the Stated Preference (SP) approach. Unlike conventional questionnaires that consist of several statement items for each variable, the SP questionnaire presented respondents with hypothetical travel scenarios containing combinations of four transportation attributes, namely travel cost, travel time, comfort, and safety and security. In each of the eight scenarios, respondents were asked to select one preferred transportation mode based on the combination of attribute levels presented. Therefore, the validity and reliability tests were performed on the four research attributes used in constructing the SP scenarios.

3.2. Binary Logistic Regression Analysis

Although the study considered four transportation attributes (travel cost, travel time, comfort, and safety and security), only the statistically significant variables are presented and discussed in the final regression model to facilitate interpretation.

Table 3. Binary Logistic Regression Results

Variable	B	S.E.	Wald	df	Sig.	Exp(B)
Travel cost	0.001	0.000	91.534	1	0.000	1.001
Travel time	-0.067	0.015	20.235	1	0.000	0.935
Constant	1.322	1.541	5.966	1	0.015	3.750

Source: Authors' Analysis, 2026.

Based on Table 3, the logit modeling equation for transportation mode preference of Serang Raya University students is as follows:

$$\begin{aligned}
 \text{Logit}(p) &= \ln \frac{p}{1-p} \\
 &= \beta_0 + \beta_1 X_1 + \beta_2 X_2 \\
 &= 1.322 + 0.001X_1 - 0.067X_2
 \end{aligned}$$

Table 3 presents the results of the binary logistic regression analysis. In this study, the dependent variable was coded as 0 for public transportation and 1 for private transportation. Therefore, the binary logistic regression model estimates the probability of respondents choosing private transportation based on the independent variables included in the model.

The Wald test results show that the travel cost and travel time variables have significance values of less than 0.05, indicating that both variables significantly influence the transportation mode choice of Serang Raya University students. Among these variables, travel cost has a Wald statistic of 91.534, which is higher than that of travel time (20.235). This indicates that travel cost provides stronger statistical evidence in explaining transportation mode choice within the estimated binary logistic regression model.

The positive regression coefficient for travel cost ($B = 0.001$) indicates that higher travel cost values are associated with a higher probability of choosing private transportation, considering that the dependent variable was coded as 1 for private transportation. This result suggests that travel cost is one of the significant variables affecting respondents' transportation mode choice in the binary logistic regression

model. Meanwhile, the travel time variable has a negative regression coefficient ($B = -0.067$), indicating that longer travel time is associated with a lower probability of choosing private transportation.

The odds ratio, represented by $\text{Exp}(B)$, provides a practical interpretation of the regression coefficients. The $\text{Exp}(B)$ value of 1.001 for travel cost indicates that each one-unit increase in the travel cost variable increases the odds of choosing private transportation by a factor of 1.001, assuming that the travel time variable remains constant. Conversely, the $\text{Exp}(B)$ value of 0.935 for travel time indicates that each one-unit increase in travel time decreases the odds of choosing private transportation by a factor of 0.935, assuming that the travel cost variable remains constant.

Furthermore, the Omnibus Test of Model Coefficients produced a Chi-Square value of 208.412 with a significance value of 0.000 ($p < 0.05$), indicating that the binary logistic regression model provides a significantly better fit than the null model. Therefore, the independent variables included in the model jointly contribute to explaining the transportation mode choice of Serang Raya University students. These findings indicate that travel cost and travel time are the two significant determinants of transportation mode choice in this study.

3.3 Ability to Pay (ATP) and Willingness to Pay (WTP) Analysis

The ATP and WTP analyses were conducted as complementary analyses to support the main findings of the transportation mode choice analysis. While the Stated Preference method and binary logistic regression were employed as the primary analytical methods, the ATP and WTP analyses provided additional information regarding students' transportation affordability. Therefore, ATP and WTP should be interpreted as supporting analyses rather than as the primary analytical framework of this study.

Based on the responses of 100 respondents, the average Ability to Pay (ATP) was IDR 1,432,323 per month. This value represents the average monthly financial capability reported by respondents to support transportation expenditures. The minimum ATP value reflects respondents with relatively limited financial capability, whereas the maximum ATP value represents respondents with considerably greater financial capability. These differences indicate variations in respondents' economic conditions and their capacity to allocate financial resources for transportation needs.

Meanwhile, the average Willingness to Pay (WTP) was IDR 10,227 per trip. This value represents the average maximum fare respondents were willing to pay for transportation services. The WTP result indicates that students generally expect transportation services with fares that remain affordable while providing adequate service quality.

Overall, the ATP and WTP analyses complemented the main findings of this study by providing additional insights into students' transportation affordability and willingness to pay. However, these analyses were intended as supporting analyses and were not used as explanatory variables in the binary logistic regression model.

4. CONCLUSION

This study analyzed the transportation mode choice preferences of Serang Raya University students using the Stated Preference method and binary logistic regression. The results indicate that travel cost and travel time significantly influence students' transportation mode choice, while comfort and safety and security were not statistically significant and therefore were excluded from the final regression model. Among the significant variables, travel cost provides stronger statistical evidence than travel time based on the Wald test results. Furthermore, the binary logistic regression model was statistically significant, indicating that the selected independent variables jointly explain students' transportation mode choice.

As complementary analyses, the ATP and WTP results provide additional information regarding students' transportation affordability. The average ATP was IDR 1,432,323 per month, while the average WTP was IDR 10,227 per trip. These findings indicate that students' financial capability and willingness to pay should be considered in planning transportation services that are affordable and meet users' expectations.

The findings of this study provide useful information for universities and local governments in developing transportation policies for students. Improving the availability of affordable, reliable, and time-efficient public transportation services may encourage a shift from private transportation to public transportation and support more sustainable campus mobility.

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