Analysis of the Passenger's Characteristics in Election of the Executive Ship Transportation Mode, Case Study at Bakauheni – Merak Port

A U Zhafira[1], R Sulistyorini[1], and K Usman[1,*]

[1]*Departement of Civil Engineering , Faculty of Engineering, Universitas Lampung, Indonesia*

[*]*Email: atikaulima@gmail.com*

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Abstract

Ferry is one of the strategic water transportations, but Ferry is often not considered important in its development, so research are needed to examine the effect of passenger characteristics on executive ferry transportation. Mode selection is one of the models used in transportation planning, this is due to the key role of public transportation in an effort to improve services from transportation modes. This study was conducted to determine the characteristics and factors that influence passengers in choosing modes. The analysis of the mode selection model in this study uses logistic regression analysis with the help of the SPSS program. The results in the study explain that the factors that influence the choice of mode for executive ferry passengers are Income Level Variables (X5), Transportation to Port Variables (X7) and Ship Schedule Considerations Variables (X10). Results Based on statistical tests, the following logistic regression was obtained: Y = 0.049 + 1.593 X5 + 1.017 X7 + 0.0834 X10

Keywords: *Mode Selection, Logistics Regression, Executive Ferry.*

I. INTRODUCTION

Ferry as one of water transportation has a strategic role in supporting region development. In Indonesia, Sumatera and Java Island has been served by Ferry as a transportation mode connected by Bakauheni – Merak Ports since 1921. Previously, there were only regular ships at Bakauheni – Merak Port, PT. ASDP Indonesia ferry built an executive jetty as a form of infrastructure development in the field of water transportation. The construction of the Executive Pier is an effort to improve the efficiency of national mobility for goods and people. Factors of community activity in encouraging people to choose the mode of transportation.

Mode selection is one of the models used in transportation planning, this is due to the key role of public transportation in an effort to improve services from transportation modes. Based on the previous study, it was stated that the Selection of Passenger Transport Modes for Executive Ships and Regular Ships at Bakauheni Merak Ferry Port, shows that passengers prefer executive ships compared to regular ships, this is because the main factors which influencing passengers in choosing modes are travel time and frequency [1].

This encourages us to know the characteristics that influence travel behavior in choosing modes and to find out a selection model that can explain the probability of passengers choosing a mode from a regular ferry to an executive ferry, using the binary logit method. Logit Binary Regression is a regression with the dependent variable on a dichotomous scale, namely a scale with two categories, for example Yes and No, Good and Bad or High and Low [2].

Based on this background, is important to know how passenger characteristics affected choice of transportation on executive ships. In this study, the characteristics and factors that influence the choice of transportation at the port of Bakauheni-Merak will be obtained by modeling data from observation, so that the influencing factors can be identified. This is the reason to find out how big the proportion from each variable affected passenger to choose Executive ferry [3].

The purpose of this study is to identify the characteristic factors influenced passengers in choosing the executive ferry at the port of Bakauheni – Merak, Analyzing the Characteristics of passengers of

executive ferry affected on the selecting transportation and analyzing the mathematic model of the executive ferry passenger on the selection of the executive ferry mode of transportation at the port of Bakauheni – Merak.

II. MATERIALS AND METHODS

This study uses several stages, he stages of research preparation, data collection, and data processing/data analysis. The data collected in this study are primary data observed and secondary data obtained by direct interviews and taking data from PT. ASDP Indonesia Ferry (Persero), the complete stages which can be seen in the flow chart below:

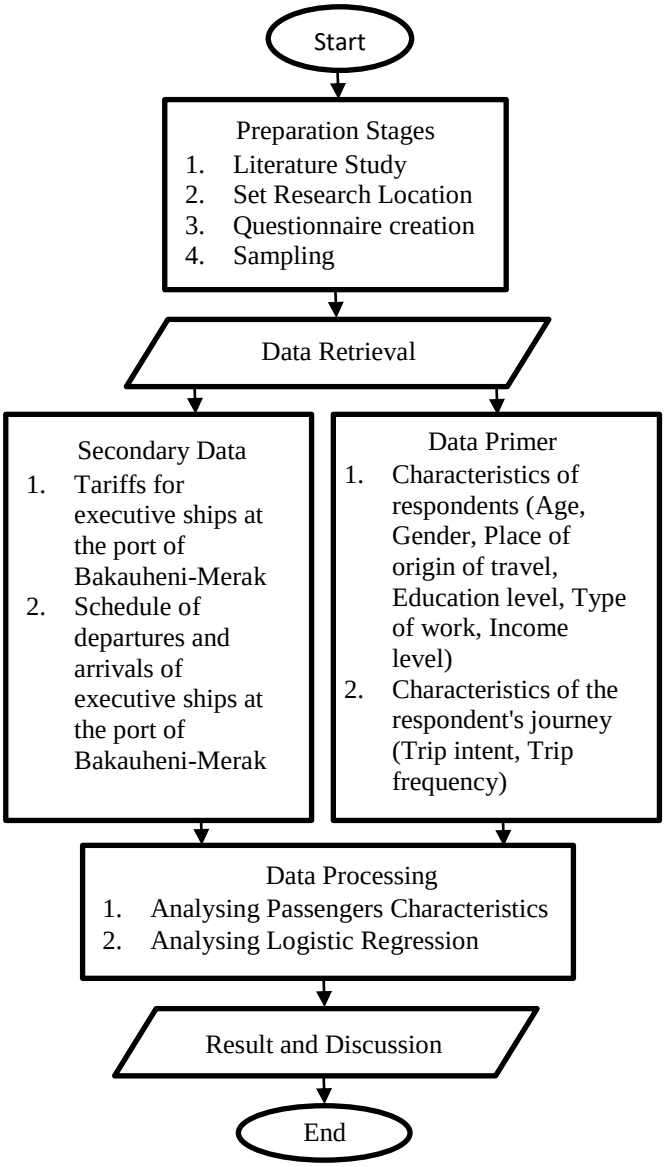

Figure 1. Research Flowchart

III. RESULTS AND DISCUSSIONS

A. Secondary Data

Secondary data obtained based on the results of requests to the relevant agencies, namely PT. ASDP Indonesia Ferry (Persero). The data obtained as a series of executive ships, departure schedules and executive ferry fares. Based on data obtained from PT. ASDP Indonesia Ferry (Persero) there are four ferries that will serve crossings via Bakauheni – Merak Executive Pier. The four ferries are KMP Batumandi, KMP Legundi, KMP Sebuku and KMP Jatra III. The data obtained is for the travel period in February 2022. The schedule listed are updated in every certain time period. The crossing time via Executive Pier is 90 minutes with a waiting time (unloading of people and goods) of about 30 minutes. Checking time at the port can be done two hours before the scheduled departure.

The data regarding the operating rates (costs) of the Ferry in Table 3 are data on the costs that must be incurred by passengers to pay the cost of transportation modes, both regular ships and executive ships. The crossing rates in the data obtained have been adjusted to the grouping of types of vehicles which are divided into several groups consisting of passengers who walk, passengers who use private vehicles such as bicycles, motorbikes, or private cars, passengers who use public transportation such as buses, trucks, goods cars and heavy equipment vehicles.

B. Primary Data

Primary data was obtained through the process of filling out questionnaires in the executive pier of Bakauheni – Merak port by respondents. The data obtained in this questionnaire is in the form of general respondent profile data such as name, age, address of origin and destination, as well as passenger characteristics such as occupation, income level, purpose of travel and reasons for choosing an executive ship. The results of data processing obtained from the questionnaire survey are as follows:

Table 1. Results Data By Questionnaire

Variable	Type	Frequency
Gender	Male	64
	Female	61
Age	< 13 years	0
	13 -20 years	18
	20 - 30 years	50
	30 - 40 years	22
	40 - 50 years	29
	> 50 years	6
Education	SD	2
	SMP	10
	SMA	63

	Diploma/S1	44
	S2/S3	6
Job	Businessman	31
	Private	22
	PNS/TNI/POLRI	20
	Student	26
	Other	26
Income	< Rp. 2.500.000	44
	Rp. 2.500.000 - Rp. 5.000.000	47
	Rp. 5.000.000 - Rp. 10.000.000	29
	Rp. > 10.000.000	5
Trip Purpose	Work/Business	47
	Family/ Friend Visit	38
	Shopping	6
	School/ College	12
	Recreation	18
	Other	4
Trip Expenses	Rp. 50.000 - Rp. 100.000	9
	Rp. 100.000 - Rp. 300.000	53
	Rp. 300.000 - Rp. 500.000	28
	Rp. 500.000 - Rp 800.000	16
	Rp. 800.000 0 Rp. 1.000.000	11
	> Rp. 1.000.000	8
Trip Frequency	0 - 10	90
	10 - 20	18
	20- 30	11
	> 30 kali	6
Alternate Transportation	bus	63
	Private car	32
	motorcycle	14
	Online Transportation	16
	Others	0
Transportation to Pier	bus	40
	Private car	49
	motorcycle	31
	Online Transportation	5
	Others	0

C. Correlations Test

Correlation test aims to determine the relationship between the independent variable and the dependent variable. In the regression equation, the independent variable and the variable must be related or correlated with the decision-making requirements is a significance value <0.05. Correlation test was carried out using data on filling out questionnaires at Bakauheni Pier Executive Port which had been classified based on the category of each data or coding was carried out using the SPSS program [4].

From the results of the correlation test, it is known what variables are interrelated. After obtaining the interrelated variables, only these variables can be used further in the SPSS program. Variables that are uncorrelated or unrelated can no longer be used in further data processing using the SPSS program because these variables are not correlated with each other.

Table 2. Results Data of Correlation Test by SPSS

Correlation	Executive Ferry
Gender	.927
Age	.743
Education	.671
Job	.780
Trip Purpose	.026
Transportation to Pier	.235
Trip Expenses	.069
Travel Time Considerations	.689
Ship Schedule Considerations	.237
Comfort and Safety Considerations	.047
Ship Type	.123

Based on Table 1. Data from the correlation test, relation between the independent variable and the dependent variable, it can be seen such as Gender, Age, Last Education, Occupation, Travel Purpose, Cost Considerations, Travel Time Considerations, and Comfort and Safety Considerations on the dependent variable have significance value of 0.927; 0.743; 0.671; 0.780; 0.235; 0689; 0.247 and 0.123. The significance has a value > 0.05 so that means that independent variable not correlated with the dependent variable [5-7].

Based on the results of the correlation test with a significant rate of 5%, it is known that there are two variables that have a significance value of <0.05, that are the level of income with a value of 0.026 and ship schedule considerations with a value of 0.047. This means that these variables have a significant relationship with the Passengers choice of executive ship transportation mode. While the results of the correlation test with a significance level of 10%, it is known that there are three variables that have a significance value < 0.10, that are income level variable with a value of 0.026, the transportation variable to the port with a value of 0.069 and the ship schedule consideration variable with a value of 0.047. This means that these variables have a significant relationship on the selection of executive ship

transportation modes, as presented elsewhere [8,9].

D. Logistic Regression

From the logistic regression analysis consist of several stages, so that the analysis can meet the test requirements, including the following:

1. Dependent Variable Encoding

Dependent Variable Encoding is the result of coding using the given SPSS program in order to facilitate reading and processing of data. Coding carried out on the data from the questionnaire

2. Case Processing Summary

Case Processing Summary is data from the number of respondents who will be analyzed in the study using the SPSS program. And from the results of the analysis, it was found that the data obtained from the results of the SPSS program did not contain Missing Cases, so that all data could be analyzed by the SPSS program with a total number of questionnaires used, namely 125 questionnaires.

3. Hypothetical Omnibus Test of Model Coefficient

The Omnibus test is carried out for joint testing to show whether an independent variable is significant to the dependent variable. The output results of the omnibus test in the SPSS program are as follows:

Table 3. *Omnibus Test of Model Coefficients*

Omnibus Tests of Model Coefficients				
		Chi-square	df	Sig.
Step 1	Step	13.912	3	.003
	Block	13.912	3	.003
	Model	13.912	3	.003

Based on the table, it can be seen that the significance value is 0.003 <0.05, so the independent variables simultaneously affect the model with a significance level of 5% or 10%.

4. Pseudo R Square Test

Pseudo R Square (nagelkerke r square and cox and R square) shows that the ability of the independent variable to explain the dependent variable. Cox & Snell R Square and Nagelkerke R Square values are used. These values are also called Pseudo R-Square or if in linear regression (OLS) it is better known as R-Square. The output results of Nagelkerke R Square in the SPSS program are as on the following tables [10-12].

Table 4. *Nagelkerke R Square*

Model Summary			
Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	119.069[a]	.105	.161
a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.			

In Table 4. Nagelkerke R Square above, the R-Square value is 0.161 and Cox & Snell R Square is 0.105 which shows that the ability of the independent variable in explaining the dependent variable is 0.161 or 16.1% and there are 100% - 16.1 % = 83.9% other factors outside the model that explain the dependent variable.

5. Goodness of Fit Test

Goodnes of Fit Test tests the suitability of the data or according to the model. If the value of Hosmer and Lemeshowi's Goodness of Fit Test Statistics is equal to or less than 0.05, then there is a significant difference between the model and the observed value so that the Goodness of Fit Model is not good because the model cannot predict. If the significance value is greater than 0.05, then the model is able to predict the value of the observation or can be said to be acceptable because it matches the observation data of the previous data [13,14]. The results of the SPSS program data output can be seen in Table 5.

Table 5. *Hosmer and Lemeshow*

Hosmer and Lemeshow Test			
Step	Chi-square	df	Sig.
1	.659	4	.956

In Table 5. Hosmer and Lemeshow above, it can be seen that a significance value of 0.956 > 0.05 indicates that Ho is accepted, then the model is able to predict the value of the observation or can be said to be acceptable because it matches the observation data. With a significance level of 5% or 10%.

6. Variables In the Equation

The independent variables that significantly influence the choice of mode at Bakauheni - Merak Port are the Revenue Level and Ship Schedule Considerations with a significance value of 0.043 and

0.025. The output results in the SPSS program can be seen in Table 6 below.

Table 6. *Variables in the Equation*

Variables in the Equation									
		B	S.E.	Wald	df	Sig	Exp (B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	Income rate	1.59	.667	5.70	1	.02	4.920	1.331	18.18
	Port Transportation	1.01	.525	3.75	1	.05	2.766	.988	7.745
	Schedule	.834	.475	3.08	1	.07	2.304	.907	5.850
	Constant	.049	.413	.014	1	.90	1.050		
a. Variable(s) entered on step 1: Income, port transportation, and schedule									

Based on Table 6, it is known that the significance score of the influential variables is the Income Level of 0.017, Transportation to the Port of 0.053 and Schedule Consideration of 0.079. So it can be concluded with a significance level of 5% income level has a significant effect, while transportation to the port and schedule has no significant effect. Meanwhile, with a significance level of 10%, these three variables have a significant effect on the choice of ship type. After obtaining the results of Variables in the Equation, the calculation will then be carried out using multiple linear regression equations to determine the tendency of each correlated variable, in this case the Income Level variable and ship schedule considerations [15,16].

So that a multiple linear regression equation is obtained based on the table results, namely Y = 0.049 + 1.593 X5 + 1.017 X7 + 0.834 X10 where Y is the mode of transportation, X5 is the level of income, X7 is transportation to the port and X10 is the consideration of ship departure schedules.

Characteristics of passengers in the selection of modes at the Executive Pier Bakauheni – Merak Port based on the level of income in the survey results obtained by respondents with income levels up to Rp. 5,000,000 as many as 91 people (73%) and respondents who have an income level of less than Rp. 5,000,000 34 people (27%).

Characteristics of passengers in the selection of modes at the Executive Pier Bakauheni - Merak Port based on the mode of transportation to the port, the survey results obtained 45 respondents using public transportation (36%) and 80 respondents using private vehicles (64%). Characteristics of passengers in the selection of modes at the Bakauheni - Merak Executive Jetty who made the Ship Schedule the main consideration were 97 people (78%) while those who did not make the ship schedule the main consideration were 28 people (22%).

IV. CONCLUSIONS

Based on the results of the analysis of mode selection at the Bakauheni-Merak Port Executive Pier using the SPSS program with a questionnaire totaling 125 respondents, the following conclusions were obtained that the factors that influence the choice of transportation mode of Bakauheni Port Executive Jetty with a significance value of 5% are income level (X_5) and ship schedule considerations (X_10). While the significance value of 105 there are three variables, namely income level (X_5), mode of transportation to the port (X_7), and ship schedule considerations (X_10). The model for selecting the mode of transportation for the executive ship of Bakauheni Port to Merak represented as the equation of Y = 0.049+1,593 (X_5+1,017X_7+ 0,834 X_10).

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