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MODEL OF INTER ISLAND SEA TRANSPORTATION SELECTION IN SOUTHEAST SULAWESI

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ABSTRACT

Indonesia is an archipelago country. The concept of sea transportation is the backbone of Indonesia's integrated multimodal transportation system. The urgency of revitalizing people living in the archipelago makes sea transportation an absolute necessity. The marine transportation system has multi-dimensional, economic, socio-cultural, political and defence roles. The mode of sea transportation between islands in Southeast Sulawesi using sea transportation as passenger transportation, namely the ferry mode and the inter-island sea ship mode on the Kendari - Muna route. This study examines the mode selection model of passenger ships on the Kendari - Muna route (which operates at night) and the ferry route Torobulu-Tampo Southeast Sulawesi-Indonesia. This research method using methods quantitative descriptive by proving existing theories. Yiatu research results independent sample t-test test on the number of passengers obtained x^2value of 34.522 with df of 1 significance of 0.05. Income obtained t value of 84.663 with df of 1 and a significance of 0.05.

KEYWORDS: *Model, Mode Selection, Ferry, Sea Ship*

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INTRODUCTION

Geographically, Indonesia is an archipelago country with a logical consequence, namely the emergence of inter-island movement traffic to meet the needs for goods and services. Likewise, what happened to the Kendari-Muna movement, which geographically is in Southeast Sulawesi, which is separated by the sea.

The current mode of marine transportation has a passenger load capacity of around 300-425 passengers, the availability of the Torobulu-shampoo crossing managed by PT ASDP is very important for sea transportation, especially as ferry and sea transportation on the Kendari-Muna route which operates at night.

The operation of the sea ship mode as a means of transportation managed by a private company and a ferry managed by PT ASDP has a lot of impact on trips between the islands of Kendari - Muna. The modes of ships and ships each have their own characteristics in terms of the services offered to prospective passengers, however the probability of selecting ferries and ships is highly dependent on the preferences of users of transportation services between marine and ferry modes.

LITERATURE REVIEW

Water Transportation

Sea transportation as a part of the transportation system can be interpreted as a system of moving goods / people from one place on land to another land as a destination through sea waters.

Sea transportation means a device used to transport goods or passengers. This tool is equipped with the driving force to run it. As for sea transportation: (1). Ship, ship is a vehicle for carrying passengers and goods that is large enough and is equipped with a lifeboat or small ship in it. (2). Ferry, ferry or ferry is a ship that is used for a distance that is closer than the ship in general. Ferries have an important role in the transportation system for coastal areas [10].

Selection of Transportation Modes

Choosing a mode of transportation is influenced by factors, namely speed, travel distance, comfort, pleasure, reliability, availability of modes, city size, as well as the age, composition and socio-economic of the traveller. [2]. Choosing the mode of transportation for a certain type of product, usually the sender considers the following criteria:, travel time, frequency of scheduled deliveries, reliability in meeting the schedule on time, the ability to handle the transportation of various goods, the number of places for loading or unloading, cost per ton - kilometre, [9]

Travel Behaviour

The trip maker behaviour is identical to the group of influencing variables such as:

- Travel Characteristics Factor, Variables that affect the behaviour of users of transportation services in choosing the mode of transportation, namely: (1) Trip purpose such as work, school, social and others, (2) Time of trip made such as morning, noon, midnight, day holidays and others, (3). Trip length, is the physical distance (kilometres) between origin and destination, including the length of the route.
- Traveller Characteristics Factor, Variables that affect individual travellers, namely: (1). Income, in the form of the traveller's purchasing power to pay for his trip, (2). Car ownership, in the form of availability of private vehicles as a means of travelling, (3) Condition of private vehicles (old, ugly, new, etc.), (4). Density of residential development, (5). Other socio-economies, such as family structure and size, age, gender, type of work, location of work.
- Transportation System Characteristics Factor, The variables that influence travel behaviour in choosing the mode of transportation are related to the performance of transportation system services such as relative travel time, relative travel cost, relative level of service, accessibility, reliability.
- Special Characteristics Factor, Variables that affect the Special Characteristics Factor, such as the distance between the residence and the place of activity, population density.

METHODOLOGY

Method Approach

This study uses quantitative and qualitative methods referring to literature references, field data collection is carried out by observation and questionnaires on marine transportation users who choose the sea transportation mode that operates at night and who chooses the ferry mode that travels between islands on the Kendari - Muna route. Southeast Sulawesi - Indonesia.

Research Data

The population in this study were all passengers of ferry boats and ships operating at night, with the Kendari-Muna route, Southeast Sulawesi.

Table 1: Data on Passenger Modes of Transportation

No.	Sea Transportation Mode	Number of Passengers (Person)
1	Ferry	112
2	Ship	221
Source: Survey Results		

Data Collection Methods

Research data analysis is a random sampling analysis technique using the equation:

(1)

Where

n = number of questionnaire data

N = Number of passengers using inter-island sea transportation

e = data collection accuracy error value (5%)

Technique Data Analysis

The data analysis technique uses nonparametric statistical tests which are used to perform nominal or ordinal data analysis [16].

Table 2: Non-Parametric Statistical Model

No.	Statistical Model
1	(sign test)
2	(wilcoxon)
3	Rank correlation test (Spearman)
4	Chi Square test

The non-parametric statistical model with the Chi-square test is a technical analysis used to determine the difference in the frequency of observation (Oi) and the expected frequency (Ei) of a certain category. This test can be carried out on discrete data or the frequency of observation or frequency of expectations based on the hypothesis. The mathematical expression of the chi squared distribution depends only on a parameter, namely the degrees of freedom (df); the Chi-square test used is shown in the following equation:

(2)

Information

= the value of chi squared

= observed frequency

= expected frequency

The use of chi square to test how well the fit between the observed frequencies and the expected frequencies is based on the distribution to be hypothesized, [16]. This hypothesis uses the stated Chi-square test, H_0: there is an effect of the operation of ships operating at night as a mode of sea transportation on the ferry mode, H_1: there is no influence on the sea ship mode operating at night on the ferry mode

RESULTS AND DISCUSSION

The Chi Square test was carried out to determine how much influence it had on the number of passengers using the ferry mode and the mode of ships operating at night on the Kendari - Muna route, the results of the processed data are shown in the following table.

Table 3: Chi Square Number of Passengers

Ferry Passengers	
Chi-Square	34.552[a]
Df	1
Asymp. Sig.	.000
Source: Analysis Results	

The Chi-Square test results of the two sample groups obtained that the X^2value of 34.522 with a df of 1 and a significance of 0.05. The value of X^2velue is greater than the value of X^2table which is 3,841, so the alternative hypothesis states that there is an influence on the number of users of sea transportation modes operating at night on the ferry mode.

Selection of Sea Transportation Mode on the Kendari - Muna Route

Ferry and ship mode as a means of transportation for inter-island passenger trips, the results of this study obtained several considerations from the variables using the reason for using the sea transportation mode of the Kendari - Muna route as shown in the following table:

Table 4: Selection of Marine Transportation Modes

Reasons for Choosing a Mode		Modes of Transportation			
		Ferry Ship		Ship	
No.	Variable	Total	Percentage	amount	Percentage
1	speed / time	5	9.43%	18	26.09
2	safety / security	9	16.98%	9	13.04
3	Convenience	11	20.75%	16	23.19
4	Convenience	11	20.75%	19	27.54
5	Cost	17	32.08%	7	10.14
Total		53	100%	69	100

Source: Analysis Results

The choice of mode that travels between islands is a choice for transportation users with user characteristics described as follows:

a. The Purpose of Travel for Mode Users

The purpose of passenger travel is a characteristic of inter-island travellers who choose the ferry mode and ship mode, the results of the research are shown in the following table:

Table 5: Purpose of Passenger Travel

Purpose of the Trip		Modes of Transportation			
		Ferry		Ship	
No.	Variables	Total	Percentage	Amount	Percentage
1	Work	5	9.43%	21	30.43%
2	Education	9	16.98%	11	15.94%
3	Recreation	11	20.75%	19	27.54%
4	Shopping	11	20.75%	5	7.25%
6	Other	17	32.08%	13	18.84%
Total		53	100	69	100%

Source: Analysis Results

b. Income

Passenger income is one of the important factors affecting the choice of mode of travel, while the total of passenger income using ferries and ships is shown in the following table:

Table 6: Passenger Income

Income		Modes of Transportation			
		Ferry		Ship	
No.	Variable	Total	Percentage	Total	Percentage
1	<IDR 1,000,000	17	32.08%	23	33.33%
2	IDR 1,000,000-IDR 1,500,000	13	24.53%	16	23.19%
3	IDR 1,500,000-IDR 2,500,000	13	24.53%	17	24.64%
4	> IDR 2,500,000	10	18.87%	13	18.84%
Total		53	100%	69	100%

Source: Analysis Results

c. Ownership of Passenger Vehicles

Vehicle ownership is one of the important factors that affect the mobility of travellers as well as ownership of passenger vehicles using ferries and ships on the Kendari - Muna route in the following table:.

Table 7. Ownership of Passenger Vehicles

Vehicle Ownership		Modes of Transportation			
		Ferry		Ship	
No.	Variable	total	Percentage	total	Percentage
1	Motorcycle	30	56.60%	29	42.03%
2	There are no vehicles	23	43.40%	40	57.97%
Total		53	100%	69	100%

Source: Analysis Results

Model Crosstab to Passenger Characteristics

The model analyzed was Crosstab on passenger characteristics, namely gender variables on age and income in the choice of sea transportation modes between islands in Southeast Sulawesi.

Gender to Years

a. Gender Crosstab for Years

Crosstab of passenger characteristics of ferry modes and inter-island marine modes in Southeast Sulawesi for gender variables for age, the results of statistical tests are shown in the following table:

Table 8: Gender Crosstab for Age

Ferry Mode							Ocean Ship Mode			
			Years				Years			
			20-30	30-40	> 40	Total	20-30	30-40	> 40	Total
Gender	Male	Count	16	10	7	33	17	7	11	35
		Expected Count	13.1	13.1	6.8	33.0	12.8	12.2	10.0	35.0
		Residual	2.9	-3.1	.2		4.2	-5.2	1.0	
	Girls	Count	5	11	4	20	6	15	7	28
		Expected Count	7.9	7.9	4.2	20.0	10.2	9.8	8.0	28.0
		Residual	-2.9	3.1	-.2		-4.2	5.2	-1.0	
Total		Count	21	21	11	53	23	22	18	63
		Expected Count	21.0	21.0	11.0	53.0	23.0	22.0	18.0	63.0

Source: Analysis Results

The results of the comparative analysis of the choice of ferry mode and marine vessels are dominated by male passengers with the age of 20-30 years, the results of the ferry ship crosstab statistical test results are expected to be 13.1 male passengers, so there is a residue of 2.9 people, while ships have the expected value. 12.8 male passengers, then there is a residue of 4.2 people.

b. Chi Square Gender for Years

Model fit test, namely testing the relationship or influence of two nominal variables and measuring the strength of the relationship between the coefficient of gender contingency variables on years, ferry and ship mode are listed in the following table.

Table 9: Chi Square Gender of Years

Ferry Mode				Ocean Ship Mode		
Chi-Square Tests				Chi-Square Tests		
	Value	Df	Asymp.Sig. (2-sided)	Value	df	Asymp.Sig. (2-sided)
Pearson Shi-Square	3.659[a]	2	.160	8.385[a]	2	.015
Likelihood ratio	3,714	2	.156	8,576	2	.014
Linear-by-linear	1,067	1	.303	1,019	1	.313
N of Valid Cases	53			63		

Source: Analysis Results

The ferry mode test results of the Chi Square model count for 3.659 with a df 2 and a significance level 5%. The Chi Square count is smaller than the Chi Square table 5.99. H_0 is accepted, meaning that there is no relationship between gender and passenger age in choosing the ferry mode. Meanwhile, the ship mode test results of the Chi Square model count 8.385 with a df 2 and a significance level 5%. The Chi Square count is greater than the Chi Square table 5.99 H_1 is accepted, meaning that there is a relationship between gender and the years of the passenger in choosing the marine ship mode.

Gender on Income Mode Choice

a. Gender Crosstab on Income

Cross tabulation of passenger characteristics of the Kendari-Muna route ferry for gender variables to the statistical test results as in the following table:

Table 10: Crosstab of Gender on Income

Ferry Mode							Sea Ship Mode			
Crosstab							Crosstab			
			Income in Million				Income in Million			
			<1	1-2	> 2	Total	<1	1-2	> 2	Total
Gender	Male	Count	8	15	10	33	9	17	9	35
		Expected Count	8.7	14.3	10.0	33.0	10.6	15.6	8.9	35.0
		Residual	-7	.7	.0		-1.6	1.4	.1	
	Girls	Count	6	8	6	20	10	11	7	28
		Expected Count	5.3	8.7	6.0	20.0	8.4	12.4	7.1	28.0
		Residual	.7	-.7	.0		1.6	-1.4	-.1	
Total		Count	14	23	16	53	19	28	16	53
		Expected Count	14.0	23.0	16.0	53.0	19.0	28.0	16.0	53.0

Sources of Analysis Results

The results of the analysis of the choice of ferry and ship mode choices are dominated by male passengers, the results of the ferry crosstab statistical test are expected to be 14.3 people, an income of 1 - 2 million, there is a residue of 0.7 people, while male passenger ships are expected to be 12.8 people, income of 1-2 million then there is a residue of 4.2 people

b. Chi Square Gender on Income

The fit test of the relationship model between two variables, measuring the coefficient of gender contingency on the ferry mode output is shown in the following table.

Table 11: Chi Square Gender to Income

Ferry Mode				Ocean Ship Mode		
Chi-Square Tests				Chi-Square Tests		
	Value	df	Asymp.Sig. (2-sided)	Value	df	Asymp.Sig. (2-sided)
Pearson Shi-Square	.242[a]	2	.886	.821a	2	.663
Likelihood ratio	.241	2	.887	.820	2	.664
Linear-by-linear	.078	1	.778	.318	1	.573
N of Valid Cases	53			63		

Source: Analysis Results

Model test results Chi Square count of 0.242 with df of 2 and a significance level of 5%. The Chi Square count is smaller than the Chi Square table of 5.99. H_0 is accepted, meaning that there is no relationship between passenger gender and income in choosing the ferry mode. While the results of the Chi Square model test are calculated at of 0.821 with a df of 2 and a significance level of 5%. The Chi Square count is smaller than the Chi Square table of 5.99. H_0 is accepted, meaning that there is no relationship between the gender of the passenger and the passenger's income in choosing the marine ship mode.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Sea trips between the islands of Kendari - Muna passengers choose the ferry mode, the dominant factor for choosing the mode is cost considerations, while passengers choose the marine mode. The dominant factor for choosing the mode is the consideration of convenience

Model test results Chi Square regarding the characteristics of sea transportation users on the ferry mode and the night boat mode, there is no relationship between gender and passenger income between the 2 modes.

Recommendations

The sea transportation journey between the islands of the Kendari - Muna route, the ferry mode and the night boat mode, is necessary to improve passenger service in terms of comfort, safety, punctuality. For further research, it is necessary to add variables, especially port terminal services.

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