Development of Passenger Preference Model
In Selecting Sea Transportation Mode: Case On Kendari - Raha Route in Southeast Sulawesi Province

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Abstract

The rapid development of commercial activity center in Kendari City caused the high level of travel that occurred between Kendari City with several regencies in Muna Island, especially Muna Regency and West Muna Regency. Where in the nodal region system the relation of nucleus and hinterland regions is an uncoordinated entity so that the role of the core and hinterland regions is an important element of the regional system.

The purpose of this study was to identify the characteristics of users of the speedboat modes and night vessels. Another goal is to model the selection of modes between the two, identify the factors that influence the mode selection and test the sensitivity of the traveler when a change is made to one of its attributes, and compare the sensitivity between the binary binary curve model and the binary probit. From these two models can be known the probability of choosing the mode of transportation of Fast Ship and Night Ship.

The result of the analysis of the selection of modes obtained by the equation of the function of the difference of the Quick Ship and Ship Utility as follows: UKC - KM = -1.468 - 0.0000579 X1 - 0.609 X2 + 0.435 X3 + 0.439 X4, with X1 (attribute cost), X2 (time attribute), X3 (frequency attribute), X4 (service attribute).

Keywords:
stated preference, binary logit, binary probit, attribute, modal selection

I. Introduction

Transportation and regional development is a two-way interaction. Transport services provide encouragement and service to various activities to enhance regional development. While the development of the region requires the availability of effective and efficient transportation services throughout the region (Adisasmita, 2011).

Along with the increase and development of the population and the increasingly tight competition tendency in economic and other aspects of social causes the high level of activity/movement that occurs and the variety of travel behavior in choosing a mode to achieve a goal of meeting the needs. Fulfillment of the various needs where the need is not met where he is located but fulfilled elsewhere. For that reason moves between two places, where the goods/
services are needed to the place where the goods / services are available. This means that inter-regional or inter-island interconnection is very instrumental in creating travel. The model of selection of sea transportation modes and characteristics of inter-island passengers is a very decisive variable in understanding and developing the concept of the relationship model between demand and supply of transportation within a region. If in the planning of transportation of a region is not known the characteristics of travelers and the model of the choice of travel modes of the community, it will have a disruptive impact on the transportation system in an area due to the mismatch of community needs with the availability of existing transportation facilities in a planning (Adiputra, B. P, 2013).

Southeast Sulawesi Province is one of the areas in Indonesia which has several urban centers and some are buffer areas. The trend in Southeast Sulawesi Province is the existence of a centralized travel pattern, especially the trip from several districts in the archipelago to the capital of Southeast Sulawesi province namely Kendari. This is due to the rapid development of commercial centers in the capital while at the same time newly developed residential areas in some of the districts of the archipelago or new regions are not receiving adequate services. In the nodal region system the relationship between the center and hinterland is an uncoordinated entity so that the role of some core and hinterland regions in Southeast Sulawesi Province is an important element of the regional system.

Muna Island is one of the largest islands in Southeast Sulawesi Province whose territory consists of several districts. Muna Regency and West Muna Regency is a district in Muna island that has a considerable amount of movement to the city of Kendari through the archipelago Raha vice versa. The means of transportation connecting the two zones is a means of sea transportation where the dominance of social, economic and political activities in the region of Muna and West Muna is influenced by the activities in Kendari City.

Increased travel between island routes Raha and Kendari City is marked by the average movement in the last 4 (four) years of departure of 71,187 inhabitants/year and the arrival of 90,300 inhabitants/year (Raha Port Management Unit Office, 2009-2015), the figure is certainly larger, because some passengers are not buying tickets so they are not listed in the ship’s manifest data. Based on data from the Central Bureau of Statistics of Muna Regency and West Muna Regency in 2016, the population in Muna Regency is 211,622 people and West Muna Regency as many as 77,084 people. Muna Regency and West Muna Regency have different characteristics of the community, both in terms of social, cultural, occupation, and income level, can make this District as the origin of the largest inter-island travel to get to the center of activity in the Capital of Southeast Sulawesi Province.

II. LITERATURE REVIEW

A. Transport Planning And Modeling

Transport planning can be defined as a process whose purpose is to develop a transportation system that allows people and goods to move or move safely and cheaply (Pignataro, 1973) and according to (Tamin 1997) Transport planning is a systematic systematic transportation planning activity that aims to provide transportation services both facilities and infrastructures tailored to the needs of transportation for the community in a region and other community objectives.

Transport planning is intended to determine the factors that affect the needs of people will travel people or goods. These factors may include land use, economic, socio-cultural, transportation technology and other factors that may be related. Recent developments led to the planning of a sustainable transport system that combines transport efficiency, economic growth and resource sustainability.

B. Modeling Concepts

The activity of summarizing and simplifying the realistic (real) condition is the modeling activity. Thus we can define the model as follows:

1) The model is a concise representation of the real condition and the form of a design which may describe or represent the real condition for a particular purpose (Black, 1981, Miro 2004).

2) A model is a representation or formulation in a particular language agreed from a real condition (Simatupang, 1995, Miro 2004)

3) The model is a main framework or formulation of information / data about the actual conditions collected to study/analyze the real system (Gordon, 1978, Miro 2004).

C. Concept of Mode Selection

The selection of modes enters in the third stage of transport planning after the stage to obtain travel awakening and movement distribution. In this third stage it aims to know how travelers travel divided into (or choose) different modes of transport. In other words, the mode selection stage is a transportation planning process aimed at assigning to impose
travel expenses or knowing the number (in terms of proportion) of persons and or goods that will use or select the various modes of transportation available to serve a particular point of origin, for some specific travel purposes (Miro, 2002).

D. Stated Preference Technique
According to (Permain, 1991), Stated Preference is one approach to the respondents in choosing the best alternative by making an alternative. The questionnaire contains questions about what options they want or how they make a rating or ranking in one or more alleged situations.

Stated Preference is an approach by conveying a choice statement in the form of a hypothesis to be assessed by the respondent. With this method, we can exercise real-life experimental controls in the transport system (Ortuzar and Willumsen, 1994).

The Stated Preference technique offers a technique for providing information about travel demand and behavior well for a particular expenditure for some reason. The technique stated preference refers to an approach that uses statements about how respondents respond to different situations or change.

III. RESEARCH METHODS
A. Location and Time of Study
This research will be conducted at two places, namely at Raha City Port and Kendari City Port by distributing questionnaires to sea vessel passengers in port and aboard either fast vessel or night vessel.

This research survey was conducted for 1 month in November to 160 respondents and the process of preparation / processing of data approximately 3 (three) months starting from December to February 2017.

B. Research Variables
In the primary data collection, the variables that influence the making of the Characteristics of Travel Actors and the Model of Inter-island Passenger Passenger Mode are:
1) Respondent Characteristic Variables
   (Name, gender, age, education, occupation, origin-purpose, mode used, reason using mode, travel intent, total travel, and income).

2) Variables Attribute Stated Preference mode selection are Cost, Time, Frequency and Service)

C. Data Analysis Technique
The analysis technique used in this research is done in three stages, namely:
1) The first data processing involves the compilation of data on social / economic characteristics of fast vessel users or night ships, which is the respondent's answer on sheet one questionnaire. This data presentation is completed with Excel Program.
2) The second data processing concerning data compilation of result of Stated Preference selection of modes, which is answer from result of second sheet questionnaire. The presentation of this data was completed with the SPSS 23 Program.
3) The third data processing is the test of binary logitity sensitivity and binary probit, with Excel program. Sensitivity test is done to understand the change of probability value of Fast Ship selection and night vessel in case of change of service attribute value.

The variable attributes used in assessing the user preferences of the mode of sea transport to the type of modes used consist of service attributes namely:

Table 3.1 Comparison of Fast Ship Travel Attributes and Existing Night Vessels

<table>
<thead>
<tr>
<th>Travel Attribute</th>
<th>Fast Ship</th>
<th>Night Ship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Rp.125.000</td>
<td>Rp.115.000</td>
</tr>
<tr>
<td>Time Travel</td>
<td>+/- 3 hours</td>
<td>+/- 6 hours</td>
</tr>
<tr>
<td>Frequency</td>
<td>2 times a day</td>
<td>1 time a day</td>
</tr>
<tr>
<td>Service</td>
<td>TV, AC, Canteen, WC</td>
<td>Fan, AC, Cafetaria/Canteen, Karaoke, Bed, WC, (Wide Space)</td>
</tr>
</tbody>
</table>

Source: Research Results 2017
The data stated preference is processed in order to be used as input data in the analysis process, where the qualitative data analysis of field survey results presented in the semantic scale is transformed into a numerical scale (a value expressing the individual response to the choice statement). Numeric scale values are used as non-free variables and as independent variables are the difference in the value of fast ship attributes and night ships.

Table 3.2 Numerical scale values

<table>
<thead>
<tr>
<th>Rating Point</th>
<th>Pr (Quick Ship)</th>
<th>R = Ln(\frac{Pr_{\text{Kapal Cepat}}}{1 - Pr_{\text{Kapal Cepat}}})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definitely Choose QS</td>
<td>0,9</td>
<td>R1 = 2,1972</td>
</tr>
<tr>
<td>Maybe choose QS</td>
<td>0,7</td>
<td>R2 = 0,8473</td>
</tr>
<tr>
<td>Balanced Choose</td>
<td>0,5</td>
<td>R3 = 0,0000</td>
</tr>
<tr>
<td>Maybe choose NS</td>
<td>0,3</td>
<td>R4 = -0,8473</td>
</tr>
<tr>
<td>Definitely Choose NS</td>
<td>0,1</td>
<td>R5 = -2,1972</td>
</tr>
</tbody>
</table>


IV. RESULTS AND DISCUSSION

A. Descriptive Analysis of Characteristics of Sea Transport Travel Agents Route Raha-Kendari and Kendari-Raha

Characteristics of selection of sea transport routes Raha-Kendari and Kendari-Raha route describes the passengers of fast boats and night ships as respondents in this study. The number of respondents who qualify in this study as many as 150 people.

1. Age

Age is one of the important factors that affect one's mobility. Where the younger a person/diusia productive will be the greater the movement in comparison with the age of someone who is not productive. Although this does not happen automatically and apply in absolute terms but can represent real conditions. Based on the age of respondents who travel, it can be seen that the characteristics of fast boat users and night ships are more dominant in the productive age of traveling ie between the ages of 21-35 years by 53% for fast boats and 54% for night ships. The percentage of respondent age users of fast ships and night ships can be seen in Figure 2.
2. Education

Education is one index of socioeconomic status. In some studies found a significant relationship between education and mobility of a person, although generally not directly meaning, education is more closely related to income with work. The higher a person's education will have an impact on the increase of position (occupation) and income. Although this does not take place automatically and in absolute terms it can be considered to represent real conditions. Based on the education of the respondents who travel, it can be seen that the characteristics of fast boat users and larger night ships with S1 education background is 49% for fast vessels and 46% for night ships. Further followed by high school education background with percentage of 34% for fast boat and 29% for night ships. The percentage of educational background of respondent users of fast ship mode or night boat can be seen in Figure 2.

3. Job

Job is one of the socioeconomic status index where due to the varying status of one's work will affect the higher mobility of a person in the activity or travel. Although this does not take place automatically and in absolute terms it can be considered to represent real conditions. Based on the work of respondents who travel can be seen that the characteristics of fast ship users dominant with civil servant background is with a percentage of 31% while for the larger vessel users with a background of self-employment with a percentage of 32%. The percentage of educational background of respondents of fast ship mode users or night ships can be seen in Figure 3.

4. Revenue/ Earnings/ Income

Revenue is one of the variables that affect the rate of movement of a person, where the greater the income a person will be the greater the need and mobility of a person to cause a greater movement as well. Although this does not take place automatically and in absolute terms it can be considered to represent real conditions. Based on the income of respondents who travel can be seen that the characteristics of fast boat users with revenue above Rp.2.000.000 with a percentage of 58% as well as users of night vessels with revenue above Rp.2.000.000 with percentage of 57%. The percentage of respondents' income of fast vessel and overnight vessel users can be seen in Figure 3.

5. Purpose of Travel

Measurement of respondent intent variable in this study, intended to get a picture of how the movement conditions that occur in people who travel with fast boat modes and night vessels.
Based on the intentions of the respondents can be seen that the characteristics of fast ship users more dominant with the intention of travel affairs family and official affairs with a percentage of 34% and 18%. While the user of the night boat mode with the intention of the biggest trip is with the intention of family affairs and business / work trip intent with a percentage of 29% and 20%. The percentage of travel intentions of respondents of users of fast ships or night ships can be seen in Figure 4.

Figure 3. Distribution Chart Job and Income of Respondents User Fast Ship Modes (Kapal Cepat) And Night Vessels (Kapal Malam) Routes Raha-Kendari And Kendari-Raha
Source: Data Analysis Result, 2017

Where:
PNS = Government Employee
Wiraswasta = Entrepreneur
TNI/Polri = National Army and State Police
Lain-Lain = the other jobs

Pegawai Swasta = Private employee
Petani = Farmers
Pelajar/Mahasiswa = Students/College Students

6. Reasons to Use Mode
Measurement of the respondent's variables in choosing frequently used modes is intended to get an idea of the reasons for using the fastest sea transport vessels or night ships that are most often used by people traveling. Based on the reason for choosing the mode that is often used by the respondent, it can be seen that the reason for the use of fast boat with the biggest speed / time is with percentage of 61% and the night vessel with the reason of comfort that is with the percentage of 38%. The percentage of reason in using the fast ship mode or night boat can be seen in Figure 4.

Figure 4. Distribution Charts The Purpose and Reason to Use Mode of Travel User Respondents Fast Ship Modes (Kapal Cepat) And Night Vessels (Kapal Malam) Routes Raha-Kendari And Kendari-Raha
Source: Data Analysis Result, 2017
Where:
Travel Purpose
Bisnis/Bekerja = Business  Lain-lain = the Others Purpose
Pendidikan = Education  Belanja = Shopping
Urusan Keluarga = Family Affairs  Berlibur/Rekreasi = On Holiday/Recreation
Urusan Dinas = Official Affair  Urusan Politik = Political Affair
Pulang Kampung = Back to Hometown

Reason to Use The Mode
Kecepatan/Waktu = Fast/Time  Kemudahan = convenience
Kenyamanan = Comfort  Harga Tiket Murah = cheap ticket price
Lain-lain = other reason

7. The Origin and Destination Movement
Measurement of the respondent's origin variable in this study is intended to get an idea of what sub-district people travel by fast boat mode and night boat route Raha-Kendari and kendari-Raha route.
The percentage of origin and destination of respondents of users of sea transport mode Raha-Kendari route can be seen in Figure 5.

Figure 5. Map of the Origin of the Raha and Kendari Route Movement
Source: Data Analysis Result, 2017

B. Inferential Analysis Characteristics of Sea Transport Travel Actors Routes Raha-Kendari and Kendari-Raha
The analysis used to see how much the linkage between the characteristics of travelers, which consists of age, education, employment, and income to the choice of mode of transportation.
To measure whether age, education, occupation, and income have correlation with the level of selection of modes of transportation, the chi square test method is used. Before doing the test, first formulated statistical hypothesis, namely:
H0: There is no frequency difference in choosing a mode of transportation.
Ha: There is a frequency difference in choosing a mode of transportation.
Table 4.1 Chi-Square Test Results Using SPSS

<table>
<thead>
<tr>
<th>Variables Characteristic</th>
<th>DF</th>
<th>Asymptotic significance</th>
<th>Chi Square</th>
<th>Ket.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Conting</td>
<td>Table</td>
</tr>
<tr>
<td>Age</td>
<td>4</td>
<td>0.388</td>
<td>4.139</td>
<td>9.48</td>
</tr>
<tr>
<td>Education</td>
<td>6</td>
<td>0.740</td>
<td>3.529</td>
<td>12.59</td>
</tr>
<tr>
<td>Job</td>
<td>6</td>
<td>0.100</td>
<td>10.644</td>
<td>12.59</td>
</tr>
<tr>
<td>Income</td>
<td>3</td>
<td>0.509</td>
<td>2.316</td>
<td>7.81</td>
</tr>
</tbody>
</table>

Source: Data Analysis Result, 2017

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Based on the output of Table 4.1 above, it is known that the chi-square value of the four characteristic variables Xcount <Xtable it can be concluded that H0 is accepted, which means there is no difference in the frequency of age, education, employment and income in choosing the mode of transportation.

C. Utility Function Equations Analysis

The equation of the utility velocity functions of fast vessels and night liners used in the mode selection model in this study is linear equations. The general form of the linear equation is:

\[ U_{(KC-KM)} = a + b_1.X_1 + b_2.X_2 + b_3.X_3 + b_4.X_4 \]

Where:
- \( UKC-KM \) = Utility Selection Difference Mode
- \( X_1 \) = difference of cost attribute (cost)
- \( X_2 \) = difference of time attribute (time)
- \( X_3 \) = frequency attribute difference
- \( X_4 \) = difference of convenience attribute

Next will be made some alternative equations that can be formed from the equation, to then selected one equation which is the best utility difference function.

Table 4.2 Alternative equations of Utility Functions

<table>
<thead>
<tr>
<th>No.</th>
<th>Alternatif Persamaan</th>
<th>( F_{hitung} )</th>
<th>( R^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>( UKC - KM = 0.671 - 0.0000579 X_1 )</td>
<td>960,509</td>
<td>0.235</td>
</tr>
<tr>
<td>2</td>
<td>( UKC - KM = -1.737 - 0.609 X_2 )</td>
<td>117,044</td>
<td>0.036</td>
</tr>
<tr>
<td>3</td>
<td>( UKC - KM = -0.257 + 0.406 X_3 )</td>
<td>84,516</td>
<td>0.026</td>
</tr>
<tr>
<td>4</td>
<td>( UKC - KM = 0.153 + 0.429 X_4 )</td>
<td>283,445</td>
<td>0.083</td>
</tr>
<tr>
<td>5</td>
<td>( UKC - KM = -1.158 - 0.0000579 X_1 - 0.609 X_2 )</td>
<td>581,227</td>
<td>0.271</td>
</tr>
<tr>
<td>6</td>
<td>( UKC - KM = 0.323 - 0.0000579 X_1 + 0.406 X_3 )</td>
<td>552,888</td>
<td>0.261</td>
</tr>
<tr>
<td>7</td>
<td>( UKC - KM = 0.732 - 0.0000579 X_1 + 0.429 X_4 )</td>
<td>729,116</td>
<td>0.318</td>
</tr>
<tr>
<td>8</td>
<td>( UKC - KM = -2.085 - 0.609 X_2 + 0.406 X_3 )</td>
<td>104,015</td>
<td>0.062</td>
</tr>
<tr>
<td>9</td>
<td>( UKC - KM = -1.676 - 0.609 X_2 + 0.429 X_4 )</td>
<td>211,504</td>
<td>0.119</td>
</tr>
<tr>
<td>10</td>
<td>( UKC - KM = -0.218 + 0.435 X_3 + 0.439 X_4 )</td>
<td>199,570</td>
<td>0.113</td>
</tr>
<tr>
<td>11</td>
<td>( UKC - KM = -1.506 - 0.0000579 X_1 - 0.609 X_2 + 0.406 X_3 )</td>
<td>440,885</td>
<td>0.297</td>
</tr>
<tr>
<td>12</td>
<td>( UKC - KM = -1.096 - 0.0000579 X_1 - 0.609 X_2 + 0.429 X_4 )</td>
<td>571,262</td>
<td>0.354</td>
</tr>
<tr>
<td>13</td>
<td>( UKC - KM = 0.361 - 0.0000579 X_1 + 0.435 X_3 + 0.439 X_4 )</td>
<td>556,504</td>
<td>0.348</td>
</tr>
<tr>
<td>14</td>
<td>( UKC - KM = -2.047 - 0.609 X_2 + 0.435 X_3 + 0.439 X_4 )</td>
<td>182,824</td>
<td>0.149</td>
</tr>
<tr>
<td>15</td>
<td>( UKC - KM = -1.468 - 0.0000579 X_1 - 0.609 X_2 + 0.435 X_3 + 0.439 X_4 )</td>
<td>487,460</td>
<td>0.384</td>
</tr>
</tbody>
</table>

Source: Data Analysis Result, 2017

Considering the lowest constant value, \( F_{hitung} \), and \( R^2 \) is the largest one is chosen equality utility binominal function logit the best difference is the equation 15, with the largest \( R^2 \) value, in addition has the largest \( R^2 \) value of the equation also has a large \( F_{hitung} \) value of 487.460. The equations are:

\( UKC - KM = -1.468 - 0.0000579 X_1 - 0.609 X_2 + 0.435 X_3 + 0.439 X_4 \)

The equation has the highest coefficient of determination or \( R^2 \) that is 0.384 or 38.4%. This shows that 38.4% of utility variation (Y) is variable cost (X1), time variable (X2), variable frequency (X3), and service variable (X4).

D. Sensitivity of Binary Logit Model

1. Sensitivity to the cost attribute (Cost)

Based on the sensitivity analysis to the cost attribute change as shown in Figure below, it can be concluded several things as follows:
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Figure 6. Graph of Binomial Logit Sensitivity Model on Travel Costs.
Source: Data Analysis Result, 2017

a) Shows the direction of the slope of the ship Fast Probability line, indicating the direction of the negative slope, ie the greater the difference in cost difference (Cost) fast ship, the more decrease the probability of choosing a fast ship.
b) Considering only the difference in cost difference, for the mode selection competition between speedboats and night ships, it can be seen that the probability of selection of modes will be balanced when the probability is at 0.5. So the probability of choosing a speedboat will be greater than the probability of choosing a night liner if the difference or change is less than Rp.12,000,-.

2. Sensitivity to time attribute (Time)
Based on the analysis of the sensitivity to the change of time attribute as shown in Figure below, it can be concluded several things as follows:

Figure 7. Graph of Binomial Logit Sensitivity Model on Frequency of Travel.
Source: Data Analysis Result, 2017

a) Shows the direction of the slope of the ship's Fast Probability line, indicating the direction of the positive slope, ie the smaller the difference in the frequency of the speed of the speedboat, the less the probability of choosing a speedboat.
b) From the above graph it can be seen that the probability of selection of modes will be balanced when the probability is at the number 0.5. So the probability of choosing a speedboat will be greater than the probability of choosing a night liner if the travel frequency difference is greater than 0.65 times or 1 times.

3. Sensitivity to service level attributes (service)
Based on the analysis of sensitivity to service level attribute change as shown in Table and Picture below, it can be concluded several things as follows:
Figure 8. Graph of Binary Logit Sensitivity Model on Service Level.
Source: Data Analysis Result, 2017

- Shows the direction of the slope of the ship Probability line Fast, indicating the direction of the positive slope, i.e. the greater the difference between the service level between the fast boat and the vessel night will further increase the probability of choosing a fast ship.
- From the above graph it can be seen that the probability of selection of modes will be balanced when the probability is at the number 0.5. So the probability of choosing a speedboat will be greater than the probability of choosing a night vessel if the service difference is greater than - 4%.

E. Sensitivity of Probit Binary Model

1. Sensitivity to the cost attribute (Cost)
Based on the sensitivity analysis to the cost attribute change as shown in Figure below, it can be concluded several things as follows:
- Shows the direction of the slope of the ship Fast Probability line, indicating the direction of the negative slope, i.e. the greater the difference in cost difference (Cost) fast ship, the more decrease the probability of choosing a fast ship.
- Considering only the difference in cost difference, for the mode selection competition between speedboats and night ships, it can be seen that the probability of selection of modes will be balanced when the probability is at 0.5. So the probability of choosing a speedboat will be greater than the probability of choosing a night liner if the difference or change is less than Rp.12.000,-.

Figure 4.11 Graph of Probit Binary Model Sensitivity to Travel Expenses
Source: Data Analysis Result, 2017

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2. **Sensitivity to time attribute (Time)**
   Based on the analysis of the sensitivity to the change of time attribute as shown in Figure below, it can be concluded several things as follows:
   
   ![Figure 4.12 Graph of Probit Binary Model Sensitivity To Travel Time](source)
   
   Figure 4.12 Graph of Probit Binary Model Sensitivity To Travel Time  
   Source: Data Analysis Result, 2017
   
   a) Shows the direction of the slope of the ship Fast Probability line, indicating the direction of the negative slope, i.e., the greater the difference in the time difference of time of the fast vessel, the less the probability of choosing a speedboat.
   
   b) From the above graph it can be seen that the probability of selection of modes will be balanced when the probability is at the number 0.5. So the probability of choosing a speedboat will be greater than the probability of choosing a night liner if the travel time difference is less than -2 hours 50 minutes.

3. **Sensitivity to frequency attributes (Frequency)**
   Based on the analysis of sensitivity to the change of frequency attributes as shown in Figure below, it can be concluded several things as follows:
   
   ![Figure 4.13 Graph of Probit Binary Model Sensitivity to Travel Frequency](source)
   
   Figure 4.13 Graph of Probit Binary Model Sensitivity to Travel Frequency  
   Source: Data Analysis Result, 2017
   
   a) Shows the direction of the slope of the ship's Fast Probability line, indicating the direction of the positive slope, i.e., the smaller the difference in the frequency of the speed of the speedboat, the less the probability of choosing a speedboat.
   
   b) From the above graph it can be seen that the probability of selection of modes will be balanced when the probability is at the number 0.5. So the probability of choosing a speedboat will be greater than the probability of choosing a night liner if the travel frequency difference is greater than 0.65 times or 1 times.

4. **Sensitivity to service level attributes (service)**
   Based on the analysis of sensitivity to service level attribute change as shown in Table and Picture below, it can be concluded several things as follows:
Figure 4.14 Graph of Sensitivity Probit Binary Model on Service Level
Source: Data Analysis Result, 2017

a) Shows the direction of the slope of the ship Probability line Fast, indicating the direction of the positive slope, i.e., the greater the difference between the service level between fast boats and night ships will further increase the probability of choosing a fast ship.

b) From the above graph it can be seen that the probability of selection of modes will be balanced when the probability is at the number 0.5. So the probability of choosing a speedboat will be greater than the probability of choosing a night vessel if the service difference is greater than -4%.

V. CLOSING
A. Conclusions
1) From the results of descriptive and inferential analysis, the characteristics of fast vessel and overnight boat users are:
   a) The result of descriptive analysis of user characteristics of inter-island sea transport modes; Based on age of 21-35 year old traveler with fast ship percentage of 53% and night vessel 54%; Based on the education of travelers is S1, with the percentage of fast vessels by 49% and night vessels 46%; Based on the work of travelers for fast vessels are civil servants with a percentage of 31% while the night ships are 32% self-employed; Based on the dominant traveling traveler's income is > Rp.2,000,000 with the percentage of fast vessels of 58% and night vessels of 57%; Based on the intention of travel is a family affair with the percentage of fast ships by 34% and vessels 29%.
   b) Characteristics of age, education, employment and income there are no difference in frequency in choosing the mode of sea transportation between fast ship and night ships.

2) The probability of mode choice utility model between fast ship and night ship route Raha-Kendari and Kendari-Raha which reviewed in this research are:
   UKC - KM = -1.468 - 0.0000579 X1 - 0.609 X2 + 0.435 X3 + 0.439 X4
   The model has a value of R² of 0.384 or 38.4%. The most influential variable in this mode selection model is time/ time. Time has the greatest coefficient value among other variables. Time has a negative coefficient value, this means the longer the journey time the lower the utility value. The most significant factor in influencing the selection of modes by travelers with Raha-Kendari and Kendari-Raha routes is the time factor of travel.

3) The results of model application analysis indicate that departure frequency and service level are the most significant factor in influencing probability of choice of modes due to changes in departure frequency and service level giving the largest percentage value in the change of probability of mode selection.

4) The results obtained from the analysis of the sensitivity of the utility function of binary logit model and binary probit that of the four attributes analyzed the result is the cost (Cost) and time (Time) attribute shows the direction of the negative slope of the line. Which means if the difference between time and cost attributes is getting bigger, then the probability of fast ship mode selection will decrease, and vice versa the probability of choosing the night mode vessel will be bigger. While the attributes of frequency and service level show the direction of the positive line slope, which means that if difference attribute of frequency and service level is bigger, then the probability of choosing fast ship mode will be bigger, and vice versa the probability of night vessel mode selection will the smaller.
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