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# FERRY USER MODEL OPPORTUNITY IN THE ARCHIPELAGIC REGION

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## ABSTRACT

As an archipelagic region, ferry transportation is needed to connecting small and large islands, by means of ferry transportation the form of a roll-on roll-off vessel, better known as Ro-Ro vessel. The immediate impact felt by the public on ferry transportation is widening of its service network to remote islands, increasing economic growth and people's quality of life, increasing business opportunities, opportunities for education and so on. The purpose of this research is to know the model of ferry user opportunity in archipelagic region. The location of research is East Nusa Tenggara Province. The survey was conducted by distributing questionnaires to passengers at random. The total sample is 2,686 respondents (passengers). By using Multinomial Logistic Regression (MLR) Method, analysis result shows that: Ferry user opportunity every week equal to 0, 02%, every month 45, 71%, every year 54, 27%. There were 79, 86% of respondents said that ferry transportation is cheaper and affordable, 16, 68% choose because of high speed and safety, and the remaining 3, 46% stated no other option (by forced).

**Keywords:** model, opportunity, user, ferry, archipelago.

## INTRODUCTION

The base goal of transportation planning is to estimate number and allocation of demand for transportation in the future orthe year-based plan is used as a reference in making a clearly directed policy of investment on transportation planning. [1] explained that there are four benefits of transportation infrastructure for community: (a) opening the isolation of regions; (b) improving economical activity and supporting regional economic; (c) to facilitate technology access and utilization of social facilities; (d) enhancement mobility of people and social contact among them. Meanwhile, good transportation planning (effective, efficient, safe and comfortable) can be achieved through comprehensive transportation planning by considering the importance of regional characteristic, either from spatial aspect or user characteristic aspect [2] and regionaccessibility [3].

Ferry Transportation is the most popular transportation by people in the Region of East Nusa Tenggara Islands, is also a vital requirement in supporting regional development. The data of East Nusa Tenggara Ferry Transportation Agency (ASDP) in 2015 shows the average number of passengers per year of 302,777 person, the average vehicle load per year is 81,054 units and the average cargo load per year is 8,354 tons, with 15 crossing trajectory, and served by 7 fleet Ferry. The safety and security aspects are often overlooked where at certain times (Idul Fitri, Christmas and other holidays) the number of passengers increases so that the cargo load exceeds capacity, and has the potential to cause accidents such as sinking vessels. The Local Government and Ferry Transportation Agency (ASDP) is expected to provide more effective and efficient services to encourage smooth flow of passengers and goods in improving mobility, especially in remote areas.

The problem is quite inhibiting related to role of transportation in East Nusa Tenggara Archipelagic Region, according to [4], is related with poor condition of transportation infrastructure in East Nusa Tenggara Province which can be described as less integrated, lack of synergy, inefficient and ineffective.Transportation infrastructures service are not arranged in good hierarchy, especially when services from land and sea transportation must be coordinated. Immediate result is the slowing down of economical growth. Transportation service in East Nusa Tenggara must be put into development agenda because this region has a potential multimodal transportation involving highways, inter-island transport, sea and air. The presence of many transportation modes does not reduce the enthusiasms of people in using inter island transportation (ferry), and it is proved by the always fully loaded sailing. Ferry transportation mode is still interest by people because, as said by [5], it is an effective transportation alternative in terms of cheapness, punctuality, and high speed. All ferry users truly experience of such benefits. In consistent with this opinion, [6] who investigates socioeconomical impact of ferry transportation in the cluster of Zadar Islands, Croatia, has concluded that the presence of ferry has improved learning opportunity for the community in remote island, developed the nature of entrepreneurship in community, and empowered feasibility and sustainability of education. Main priority is that ferry service helps promoting island-based sea tourism in Zadar Region.

Although there are literatures about inter island transportation (ferry), but the discussion is focused more in scheduling or composing the service network as shown by [7]., [8], and [9]. Similar elaboration is also given by [10] whodiscusses issue about ferry transportation in Scotlandia where the fact indicates that of seven operators serving the route observed, four of them by perforce must extend its operational hour until overnight, while three others must close its service on the route. It is caused by the declining number of user drastically due to hostile policy of the management. In coping with this problem, high transit network at overflow route can be developed as

the solution and also be designed from algorithm program based on reliability as suggested by [11]. This fast transit service can minimize the cost because service is delivered by periodic and flexible transportation. Optimum and reliable services are then produced from two-phase solution algorithm as suggested. Ferry transportation service must be improved, and it is noted by [12]. Two improvements are needed to improve the efficiency of Aransas Harbor Ferry System. First improvement is done by additing two new ferries at bigger size for daily operation. Second improvement is conducting reconfiguration and semi-automation of Aransas Harbor Ferry System

From some of the studies described above, the research is more focused on scheduling or arranging service networks and the socio-economical impact of ferry supply in archipelagic region, meanwhile this current research is more focused on the ferry user opportunities model based on user characteristics in the archipelago. The purpose of this research is to know the model of ferry user opportunity in the East Nusa Tenggara archipelago.

## MATERIALS AND METHODS

### Multinomial Logistic Regression

Logistic regression is one method that can be used to find the relationship response variables that are dichotomous (nominal scale or ordinal with two categories) or polychotomous (having a nominal scale or ordinal with more than two categories) with one or more predictor variables and the response variable nature continuous or categorical [13]. Logistic regression (logit) is a statistical tool as part of a statistical model called a Generalized Linear Model (GLM), which generates a predictive equation. [14].

Multinomial logistic regression (MLR) also called Logistic Regression Model *polychotomous* is Logistic Regression Model used to resolve the case of regression with the response variable (Y) in the form of qualitative data in the form multinomial (more than two categories) with one or more explanatory variables (X). Multinomial logistic regression models with variable response of the three categories were coded as 0, 1, and 2 will get two logit function. [14].

The method used to estimate the parameters of the multinomial logistic regression model is maximum likelihood method. Likelihood equation on multinomial logistic regression equation is nonlinear in the parameters of the regression coefficients $\beta_{jp}$ , So as to solve these equations to obtain the estimated value of the parameter used Newton Raphson algorithm, then followed the real level test parameters by using the likelihood ratio test and Wald test. Where sne of the coefficients / parameters must be brought to zero. Categories with zero coefficient is also called the reference category. One of the categories (eg the first category, the last or the category with the highest frequency) was chosen as the reference category used for comparison in the analysis. For ease of interpretation, then users with lower category (Y = 0) is used as the reference category. That is, to 2584categor the respondents each month will be compared with the respondents each week.

Logistic regression equations [14] in general as follows:

$$P(Y=j|x)=\mu_j(x)=\frac{\exp[g_j(x)]}{\sum_{k=0}^{2}\exp[g_k(x)]}=\frac{\exp(\beta_{j0}+\beta_{j1}x_1+\beta_{j2}x_2+\cdots+\beta_{jp}x_p)}{\sum_{k=0}^{2}\exp(\beta_{k0}+\beta_{k1}x_1+\beta_{k2}x_2+\cdots+\beta_{kp}x_p)} \quad (1)$$

where $\beta_0=0$, so $g_0(x)=0$

Note:

$P(Y=j|x)$ = Conditional probability of response variable j on vector x

$\mu_j(x)$ = Logistic regression equation for response variable j

$g_j(x)$ = logit on respon variable j, j=0, 1

$x_m$ = Value of explanatory variable to-m, m=1, 2, 3,…,p

$\beta_{jm}$ = Coefficient / model parameters

For the multinomial logistic regression model, if the response variable was divided into three categories each coded 0, 1, and 2 and if category 0 is the reference category (β_0 = 0), then the probability of placing with the explanatory variable as much as p will produce the following equation:

$$P(Y=0|x)=\mu_0(x)=\frac{1}{1+\exp(\beta_{10}+\beta_{11}x_1+\cdots+\beta_{1p}x_p)+\exp(\beta_{20}+\beta_{21}x_1+\cdots+\beta_{2p}x_p)}$$

$$P(Y=1|x)=\mu_1(x)=\frac{\exp(\beta_{10}+\beta_{11}x_1+\cdots+\beta_{1p}x_p)}{1+\exp(\beta_{10}+\beta_{11}x_1+\cdots+\beta_{1p}x_p)+\exp(\beta_{20}+\beta_{21}x_1+\cdots+\beta_{2p}x_p)}$$

$$P(Y=2|x)=\mu_2(x)=\frac{\exp(\beta_{10}+\beta_{11}x_1+\cdots+\beta_{1p}x_p)}{1+\exp(\beta_{10}+\beta_{11}x_1+\cdots+\beta_{1p}x_p)+\exp(\beta_{20}+\beta_{21}x_1+\cdots+\beta_{2p}x_p)}$$

A response variable (Y) with two categoryies will form a logit equation, where each of these equations form a binary logistic regression comparing one group against the reference category, is as follows:

$$g_1(x) = \ln\frac{P(Y=1|x)}{P(Y=0|x)} = \ln\frac{\mu_1(x)}{\mu_0(x)} = \beta_{10} + \beta_{11}x_1 + \cdots + \beta_{1p}x_p \quad (2)$$

$$g_2(x) = ln\frac{P(Y=2|x)}{P(Y=0|x)} = ln\frac{\mu_2(x)}{\mu_0(x)} = \beta_{20} + \beta_{21}x_1 + \cdots + \beta_{2p}x_p \quad (3)$$

In general, the shape of the logit function with the response variable (Y), which consists of three categories are:

$$g_j(x) = \beta_{j0} + \beta_{j1}x_1 + \cdots + \beta_{jp}x_p\ ; \quad j = 0,1,2 \quad (4)$$

**Methodology**

The research was conducted in East Nusa Tenggara archipelagicregion.


**Figure-1.** Map of East Nusa Tenggara archipelagic region.

Population of this research is the community of East Nusa Tenggara (NTT) as the user of ferry transportation.

One way that was used to determine the number of samples eligible is Slovin formula approach [15] as follows:

$$n = \frac{N}{1+Ne^2} \quad (5)$$

where :
n = number of samples
N = number of population
e = limit oferror tolerance: 10%.

Data used in this research have two types.

**Secondary Data.** It is the supporting data that help the implementation of research. The example of secondary data in this research are population rate and passenger number in study area, which both data are used to determine level of sample representing the population. Other example of secondary data is the location map of study area to introduce audiences with the observed region.

**Primary Data.** It is data derived directly from observation at research location. In this research, primary data are obtained from passenger in study area because passenger is the user of inter-island transportation. This passenger is randomly selected and the selected is given questionnaire. The questionnaire contains with some questions related with ferry user characteristics, such as gender, age, education, marital status, occupation, income, reason of using ferry, intention of journey, and frequency of using ferry.

**Data Analysis Technique**

Data analysis in this research is using Multinomial Logistic Regression (MLR) to understand the relationship of response variable (Y) with one or more explanatory variables (X). Response variable (Y) comprises of three categories, respectively, frequency of using ferry every week ($Y_0$), every month ($Y_1$), and every year ($Y_2$). Each category is coded with 0, 1, and 2. Explanatory variable (X) involves eight variables, such as Gender ($X_1$), Age ($X_2$), Education ($X_3$), Marital Status ($X_4$), Occupation ($X_5$), Income ($X_6$), Reason of Using Ferry ($X_7$), and Intention of Journey ($X_8$).

## RESULTS AND DISCUSSIONS

**Characteristic Ferry User Analysis**

Descriptive method is a method of producing a picture in the form of a table as a percentage proportion explanation of each characteristic ferry users.

The recapitulation analysis of ferry usercharacteristics in East Nusa Tenggara archipelagicregion, can be seen in Table-1 below:

**Table-1.** Recapitulation of Ferry User Characteristics.

| **Ferry User Characterisistic** | | **N** | **Marginal Percentage (%)** |
|---|---|---|---|
| **Gender($X_1$)** | **Man** | **1681** | **62,6** |
| | **Women** | **1005** | **37,4** |
| Age ($X_2$) | Adult | 2090 | 47,8 |
| | Adolenscent | 596 | 22,2 |
| Education ($X_3$) | Elementry | 197 | 7,3 |
| | Junior High | 502 | 18,7 |
| | Senior High | 1437 | 53,5 |
| | Diploma | 237 | 8,8 |
| | Graduate | 313 | 11,7 |
| Marital Status ($X_4$) | Married | 1433 | 53,4 |
| | Unmerried | 1253 | 46,6 |
| Occupation ($X_5$) | Civil Servant | 563 | 21,0 |
| | Private | 1351 | 50,3 |
| | Student | 772 | 28,7 |
| Income ($X_6$) | <IDR 500.000 | 595 | 22,2 |
| | IDR 500.000 -1 M | 839 | 31,2 |
| | IDR 1 M – 2,0 M | 841 | 31,3 |
| | > 2 M | 411 | 15,3 |
| Reason of using Ferry ($X_7$) | High Speed | 125 | 4,7 |
| | Safety | 323 | 12,0 |
| | Cheap | 1828 | 68,1 |
| | Easiness | 317 | 11,8 |
| | No other option | 93 | 3,5 |
| Intention ofJourney ($X_8$) | Business/work | 612 | 22,8 |
| | Shopping | 221 | 8,2 |
| | Studying | 363 | 13,5 |
| | Vacation / Recreation | 1282 | 47,7 |
| Frequency ofUsing Ferry (Y) | Every week | 571 | 21,3 |
| | Every month | 890 | 33,1 |
| | Every year | 1225 | 45,6 |
| Valid | | 2686 | u100,0 |
| Missing | | 0 | |
| Total | | 2686 | |
| Sub population | | 949[a] | |

Source; Analysis Result, 2017
a. The dependent variable has only one value observed in 744 (78.4%) subpopulations.

**Multinomial Logistic Regression (MLR) Models**

*Concurrent Test and Suitability Model.*
In this test the Likelihood Ratio Test is used to test all models using all the explanatory variable (X), if the explanatory variable (X) affects the response variable (Y) as a whole.

**Table-2.** Likelihood Ratio Tests.

| Effect | Model Fitting Criteria | Likelihood Ratio Tests | | |
|---|---|---|---|---|
| | -2 Log Likelihood of Reduced Model | Chi-Square | Df | Sig. |
| Intercept | 3375.192[a] | .000 | 0 | . |
| X1 | 3498.160 | 122.968 | 2 | .000 |
| X2 | 3392.001 | 16.809 | 2 | .000 |
| X3 | 3624.656 | 249.464 | 8 | .000 |
| X4 | 3530.714 | 155.522 | 2 | .000 |
| X5 | 3463.818 | 88.626 | 4 | .000 |
| X6 | 3380.736 | 5.544 | 6 | .476 |
| X7 | 3444.853 | 69.662 | 8 | .000 |
| X8 | 3751.133 | 375.941 | 8 | .000 |

Source: Analysis result, 2017

Based on Likelihood Ratio Tests results in Table-2 above, indicates that the variable income ($X_6$) have significant value 0.476 greater than 0.05 (P> 0.05) means that the variable is not significant $X_6$ to be used in the model.

Furthermore, to determine whether the eight independent variable (X) can be used together, then tested the model fit as shown in Table-3 below:

**Table-3.** Model Fitting Information.

| Model | Model Fitting Criteria | Likelihood Ratio Tests | | |
|---|---|---|---|---|
| | -2 Log Likelihood | Chi-Square | df | Sig. |
| Intercept Only | 4439.423 | | | |
| Final | 3375.192 | 1064.231 | 40 | .000 |

Source: Analysis result, 2017

Based on Table-3 above, showing the value matches model (Model Fitting Criteria) of 3375.192, the value of Chi-square = 1064,231 and 0000 significant value of <0.05, thereby eighth independent variable (X) can be used together, and the model is worth using.

Furthermore, coefficient of determination on logit regression model can be seen in the value of Cox and Snell, Nagelkerte Rsquare, Mc Fadden partially follows:

**Table-4.** Determinant Coefficient (Pseudo R-Sguare).

| | |
|---|---|
| **Cox and Snell** | **.327** |
| Nagelkerke | .372 |
| McFadden | .188 |

Source: Analysis result, 2017

From Table-4 above demonstrate the value of Cox and Snell determination coefficient of 0.327 or 32.70%, Nagelkerke of 0.372 or 37.20% and MC Fadden of 0.188 or 18.80%. Coefficient of determination shows the value of the independent variable X diversity influence the chances of users ferry (Variable Y).

**Table-5.** Estimated Level of Variable Significance for Ferry users each week.

| **Characteristic** | | **Every Week ($Y_0$)** | | | |
|---|---|---|---|---|---|
| **Indepen-dent Variabel (X)** | | **B** | **Exp (β)** | **Sig** | **Note** |
| | **Intercept** | **-3.261** | | **0.000** | **Significant** |
| [X1=1] | Man | 1.392 | 4.03 | 0.000 | Significant |
| [X2=1] | Adult | -0.526 | 0.59 | 0.000 | Significant |
| [X3=1] | Elementary | -0.301 | 0.74 | 0.390 | Insignificant |
| [X3=2] | Junior High | 2.75 | 15.64 | 0.000 | Significant |
| [X3=3] | Senior High | 1.10 | 3.01 | 0.000 | Significant |
| [X3=4] | Diploma | 0.546 | 1.73 | 0.070 | Insignificant |
| [X4=1] | Married | -1.75 | 0.18 | 0.000 | Significant |
| [X5=1] | Civil Servant | 1.732 | 5.65 | 0.000 | Significant |
| [X5=2] | Private | 0.984 | 2.68 | 0.000 | Significant |
| [X6=1] | < IDR.500.000 | 0.323 | 1.38 | 0.110 | Insignificant |
| [X6=2] | 500.000 – 1 M | 0.299 | 1.35 | 0.120 | Insignificant |
| [X6=3] | 1 – 2 M | 0.075 | 1.08 | 0.700 | Insignificant |
| [X7=1] | High Speed | 0.112 | 1.12 | 0.780 | Insignificant |
| [X7=2] | Safety | 0.612 | 1.85 | 0.080 | Insignificant |
| [X7=3] | Cheap | -0.264 | 0.77 | 0.400 | Insignificant |
| [X7=4] | Easiness | -0.825 | 0.44 | 0.020 | Significant |
| [X8=1] | Business/Work | 1.976 | 7.22 | 0.000 | Significant |
| [X8=2] | Shopping | 1.904 | 6.72 | 0.000 | Significant |
| [X8=3] | Studying | 0.356 | 1.43 | 0.240 | Insignificant |
| [X8=4] | Recreation | -0.046 | 0.96 | 0.860 | Insignificant |

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**Table-6.** Estimated Level of Variable Significance for Ferry users each month.

| Characteristic | | Every Month ($Y_2$) | | | |
|---|---|---|---|---|---|
| **Indepen-dent Variabel (X)** | | **B** | **Exp (β)** | **Sig** | **Note** |
| | **Intercept** | **-2.185** | | **0.000** | **Significant** |
| [X1=1] | Man | -0.009 | 0.99 | 0.930 | Insignificant |
| [X2=1] | Adult | 0.035 | 1.04 | 0.790 | Insignificant |
| [X3=1] | Elementary | -0.399 | 0.67 | 0.100 | Insignificant |
| [X3=2] | Junior High | 0.742 | 2.10 | 0.000 | Significant |
| [X3=3] | Senior High | 0.498 | 1.65 | 0.000 | Significant |
| [X3=4] | Diploma | -0.542 | 0.58 | 0.020 | Significant |
| [X4=1] | Married | -0.105 | 0.90 | 0.390 | Insignificant |
| [X5=1] | Civil Servant | 0.419 | 1.52 | 0.020 | Significant |
| [X5=2] | Private | 0.742 | 2.10 | 0.000 | Significant |
| [X6=1] | < IDR.500.000 | 0.129 | 1.14 | 0.430 | Insignificant |
| [X6=2] | 500.000 – 1 M | 0.201 | 1.22 | 0.180 | Insignificant |
| [X6=3] | 1 – 2 M | 0.117 | 1.13 | 0.430 | Insignificant |
| [X7=1] | High Speed | -1.105 | 0.33 | 0.000 | Significant |
| [X7=2] | Safety | 0.278 | 1.32 | 0.360 | Insignificant |
| [X7=3] | Cheap | 0.136 | 1.15 | 0.610 | Insignificant |
| [X7=4] | Easiness | -0.073 | 0.93 | 0.810 | Insignificant |
| [X8=1] | Business/Work | 1.941 | 6.97 | 0.000 | Significant |
| [X8=2] | Shopping | 2.495 | 12.12 | 0.000 | Significant |
| [X8=3] | Studying | 1.377 | 3.96 | 0.000 | Significant |
| [X8=4] | Recreation | 0.286 | 1.33 | 0.150 | Insignificant |
| a. The reference category is: Setiap Tahun. | | | | | |
| b. This parameter is set to zero because it is redundant. | | | | | |

Tables 5 and 6 above shows significant and insignificant X variables to ferry users'opportunity every week and every month. An insignificant variable is not used in next analysis phase.

**Table-7.** Classification Results of Independent Variables (X) Affecting Significant Ferry user OpportunityEvery Week ($Y_0$).

| Characteristic | | Every Week ($Y_0$) | | | |
|---|---|---|---|---|---|
| **Independent Variables (X)** | | **B** | **Exp (β)** | **Sig** | **Note** |
| | **Intercept** | **-3.261** | | **0.000** | **Significant** |
| Gender ($X_1$) | Man | 1.392 | 4.03 | 0.000 | Significant |
| Age ($X_2$) | Adult | -0.526 | 0.59 | 0.000 | Significant |
| Education ($X_3$) | Junior High | 2.75 | 15.64 | 0.000 | Significant |
| | Senior High | 1.10 | 3.01 | 0.000 | Significant |
| Marital Status ($X_4$) | Married | -1.75 | 0.18 | 0.000 | Significant |
| Occupation ($X_5$) | Civil Servant | 1.732 | 5.65 | 0.000 | Significant |
| | Private | 0.984 | 2.68 | 0.000 | Significant |
| Reason of using ferry ($X_7$) | Easiness | -0.825 | 0.44 | 0.020 | Significant |
| Intention of journey ($X_8$) | Business /work | 1.976 | 7.22 | 0.000 | Significant |
| | Shopping | 1.904 | 6.72 | 0.000 | Significant |

Source: Analysis result, 2017

**Table-8.** Classification Results of Independent Variables (X) Affecting Significant Ferry user OpportunityEvery Month ($Y_1$).

| Characteristic | | Every Month ($Y_1$) | | | |
|---|---|---|---|---|---|
| **Independent Variables (X)** | | **B** | **Exp (β)** | **Sig** | **Note** |
| | **Intercept** | **-2.185** | | **0.000** | **Significant** |
| Education ($X_3$) | Junior High | 0.742 | 2.10 | 0.000 | Significant |
| | Senior High | 0.498 | 1.65 | 0.000 | Significant |
| | Diploma | -0.542 | 0.58 | 0.020 | Significant |
| Occupation ($X_5$) | Civil Servant | 0.419 | 1.52 | 0.020 | Significant |
| | Private | 0.742 | 2.10 | 0.000 | Significant |
| Reason of using ferry ($X_7$) | High Speed | -1.105 | 0.33 | 0.000 | Significant |
| Intention of journey ($X_8$) | Business/work | 1.941 | 6.97 | 0.000 | Significant |
| | Shopping | 2.495 | 12.12 | 0.000 | Significant |
| | Studying | 1.377 | 3.96 | 0.000 | Significant |

Source: Analysis result, 2017

As shown by Table-7, we get the Model of Ferry Users Opportunity Every Week:

$$Y_{week} = -3.261 + 1.392\ Gender_1 - 0.526\ Age_1 + 2.75\ Education_2 + 1.1\ Education_3 - 0.175\ Mart.Stat_1 + 0.1.732\ Occupation_1 + 0.948\ Occupation_2 - 0.825\ Reason_4 + 1.976\ Intention_1 + 1.904\ Intention_2$$

Calculate the utility rate of Ferry User Opportunities Every Week.

$$Y_{week} = -3.261 + 1.392\ (1) - 0.526(2) + 2.75(2) + 1.1(3) - 0.175(1) + 0.1.732(1) + 0.948(2) - 0.825(4) + 1.976(1) + 1.904(2)$$

$Y_{week}$=10.313

As shown by Table-8, we get the Model of Ferry Users Opportunity Every Month:

$$Y_{month} = -2.185 + 0.742\ Education_2 + 0.498\ Education_3 - 0.542\ Education_4 + 0.419\ Occupation_1 + 0.742\ Occupation_2 - 1.105\ Reason_1 + 1.941\ Intention_1 + 2.495\ Intention_2 + 1.377\ Intention_3$$

The utility rate of Ferry User Opportunities Every Month.

$$Y_{month} = -2.185 + 0.742\ (2) + 0.498(3) - 0.542(4) + 0.419(1) + 0.742(2) + 1.941(1) + 2.495(2) + 1.377(3)$$

$Y_{month}$=10.485

**Probability Test of Ferry User Opportunity**

To understand the probability of each ferry user, the utility value added into the logit opportunity equation model as follows:

$$P(Y = 0|x) = \pi_0(x) = \frac{1}{1+\exp(10.313)+\exp(10.485)} = 0.0002 = 0{,}02\%$$

$$P(Y = 1|x) = \mu_1(x) = \frac{\exp(10.313)}{1+\exp(10.313)+\exp(10.485)} = 0.4571 = 45{,}71\%$$

$$P(Y = 2|x) = \mu_2(x) = \frac{\exp(10.485)}{1+\exp(10.313)+\exp(10.485)} = 0.5427 = 54{,}27\%$$

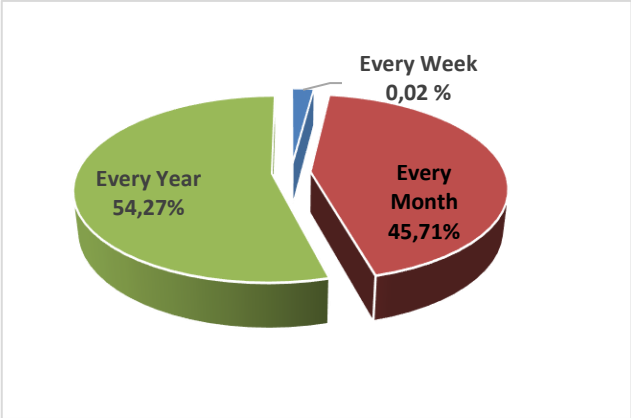


**Figure-2.** Chart of Ferry User Opportunity.

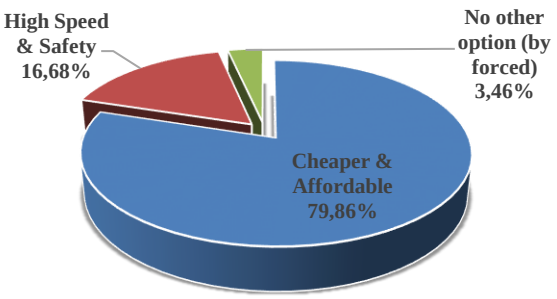


**Figure-3.** Chart of Reason Using Ferry.

## CONCLUSIONS

Based on the previous description of ferry user model opportunity in the archipelagic region: (a). suggesting opportunities for the ferry user every week is 0.02%, opportunities each month is 45.71%, and the opportunities each year is 54.27%. (b) The high opportunities of ferry users annually affected by the amount of interest people using ferry when the year-end holidays (Eid-Al Fitr/'Lebaran' and Christmas). (c). Based on the data contained 79.86% of respondents saying that ferry transportation services very cheap and affordable, 16.68% feel the fast and safety, and the remaining 3.46% stated no other option (by perforce). (d). To increase the opportunity of ferry users every week, it is necessary to increase the frequency schedule and the number of fleet operating, especially on the islands of Flores, Sumba and Alor. It is necessary to subsidize the ferry users by considering the operational costs of the management so that all parties feel not harmed, the legal protection of their rights as consumers, increasing the range and the wider service to the remote islands while still paying attention to the public interest and environmental sustainability in reliable and integrated transportation system.

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