Application of Logistic Regression to Determine The Quality of Foreign Tourists to Indonesia

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Abstract. Tourism has become a priority sector in the development of the Indonesian economy. Tourism is expected to be a prime mover in accelerating economic growth in Indonesia through job creation and business opportunities, foreign exchange earnings, and infrastructure development. The role of tourism in the Indonesian economy is increasing, in 2018 the contribution of the tourism sector to GDP reached $16.426 million. In terms of quantity, the number of foreign tourists visiting Indonesia in the past five years shows a rising trend. The number of foreign tourists visiting 2018 reached 15.81 million visits, up 12.61 percent compared to the number of visits during 2017. In terms of the quality of foreign tourists, the average expenditure of foreign tourists during the last five years per visit while in Indonesia shows an increasing trend, but growth is still relatively small. This study aims to analyze the determinants in improving the quality of foreign tourists in supporting the tourism sector as the main driver in accelerating economic growth. By using logistic regression analysis, the results show that foreign tourists with the purpose of business visits is 1.41 times greater odds to spend their expenses above the average expenditure than with the purpose of personal visits. Furthermore, based on their nationality, foreign tourists who come from ASEAN continent have greater odds to spend their expenses above the average than the tourist who come from Asia (exclude ASEAN) and Non-Asia countries.

1. Introduction
Indonesia has a lot of the natural beauty and very diverse culture which is a tourist attraction. Some of the natural beauty and culture of Indonesia have been recognized by the world, as evidenced by the entry of Komodo Island as one of the New Seven Wonders of Nature. Tourism has become a priority sector in Indonesia's economic development. Tourism is expected to be the main driving force in accelerating Indonesia's economic growth through job creation and business opportunities, foreign exchange earnings, and infrastructure development. The role of tourism in the Indonesian economy is increasing, in 2018 the contribution of the tourism sector to GDP reached US$16,426 million, BPS Statistics Indonesia [3].

Another thing that shows the great potential of Indonesian tourism is the increasing number of foreign tourist visits to Indonesia from year to year. In terms of quantity, the number of foreign tourists visiting Indonesia in the last five years shows an increasing trend. The number of foreign tourist visits in 2018 reached 15.81 million visits, an increase of 12.61 percent compared to the number of visits during 2017 which recorded 14.04 million visits. This is inseparable from the role of the government, namely the tourism destination development strategy, which began in 2010. The Indonesian government issued
Government Regulation No. 50 of year 2011 concerning the National Tourism Development Master Plan (RIPARNAS) 2010-2025 related to National Tourism Development which focuses on developing tourism destinations, tourism industry, tourism marketing, and tourism institutions. The strategy mostly focuses on developing tourism infrastructure and ecosystems, increasing the quality and quantity of tourist destinations, empowering communities, and promoting tourism investment.

Future tourism development is not only oriented to the number / quantity, but also to improve the quality of tourists who come. Especially during the COVID-19 pandemic, the tourism sector is one of the sectors that is very impactful. In order to revive the tourism sector in accordance with the new normal, the direction of future tourism must be quality based.

Quality tourism here means improving the quality of tourists who come to Indonesia. That means foreign tourists with high income, longer length of stay, and large expenses so that their expenditure in Indonesia is much greater. Because if it only focuses on quantity or number of visits, it is not necessarily proportional to foreign exchange earnings. In this case, it is expected to attract as many tourists who like to do consumption in Indonesia so that they can increase foreign exchange income from the tourism sector.

The main targets to be achieved from quality tourism are increasing foreign exchange, added value to tourism and creative industries, the readiness of industrial and public destinations, and increasing the capacity of human resources. According to research by Adyaharjanti and Hartono [1], one of the causes for the GDP growth on tourism sector is the increase in spending by foreign tourists in Indonesia. Indirectly, the increase in foreign tourist spending has an effect on the Indonesian economy. In addition, it is hoped that it can create an image of tourism that is highly competitive, but still with local characters and emphasizes environmental sustainability. As in the research of Ferrari et al [4], an increase in tourist spending can increase the demand for regional agricultural and industrial products. So that tourism can become the largest foreign exchange contributor and provide added value to the creative industry which will ultimately improve the welfare of the public.

Tourist expenditure can be measured in four approaches, that are total vacation expenditure, daily expenditure per group, daily expenditure per person, and total expenditure per person [6]. Many things can affect tourist spending that one of which is the length of stay of tourists. Rastiyono [8] in his research showed that length of stay has a positive effect on the expenditure of foreign tourists to Indonesia. In 2015, the average length of stay of foreign tourists while in Indonesia has increased, by 0.87 days, and an increase also occurred in 2018, which is equal to 0.22 days, from 8.42 days to 8.64 days. In addition, Asgary et al [2], in their research showed that tourist expenditure is a function of income levels and socio-economic and demographic characteristics of tourists.

This study aims to analyze the determinants in improving the quality of foreign tourists who visit Indonesia in supporting the tourism sector as the main driver of accelerating economic growth. Marcussen [7] shows that one of the factor that influence the expenditure of foreign tourists is the demographic characteristics of tourists such as age, gender, type of accommodation used, and length of stay. This study will analyze how the characteristics of foreign tourists and their activities while in Indonesia can improve the quality of foreign tourists which will be viewed from the total expenditure per person in visiting Indonesia.

2. Methodology
2.1. Literature Review

Tourism

Based on Constitution Number 10 of 2009 concerning Tourism, tourism is a variety of tourism activities and is supported by various facilities and services that provided by the public, businessmen, government, and regional government. Meanwhile, according to the United Nations World Tourism Organization [9], tourism is a human activity in traveling and living in a travel destination outside their daily environment or area for no more than one consecutive year for vacation, business, and the others.

Foreign Tourists

Based on the definition of the United Nation on Convention Concering Costums Facilities for
Touring [5], explained that a foreign tourist is any person who comes to a country for valid reasons, other than to migrate and stay for at least 24 hours and at the longest 6 months in the same year. Meanwhile, according to UNWTO [9], a foreign tourist is any person visiting a country outside his/her place of residence who is motivated by one or several interests without intending to earn income at the place visited with a length of visit of not more than 12 months. This definition includes two categories, that are Tourist and Excursionist.

Tourist is a person visiting the destination country with a length of stay at least 24 hours but not more than twelve months at the place visited, with the following purpose of visit:

a. Personal: vacation, recreation, visiting friends or family, study, health, sports, religion, shopping, and others.

b. Businesses and professionals: attending meetings, conferences or congresses, performances, concerts, trade shows, etc.

Travelers (Excursionist) are people who visit the destination country with a length of stay of less than 24 hours in that place, including cruise passengers, that is visitors who arrive in a country on a cruise ship where they do not stay in accommodation available in the country concerned but lives on the cruise ship.

Quality of Tourists
Several measures that can be used to measure the quality of tourists are (I Gede Pitana, 2019):

1. Spending power (amount of transaction/expenditure) is the amount of tourist spending in a destination or attraction.

2. Respect to nature is the treatment of tourists to nature, like protecting nature.

3. Respect to social cultural is tourist treatment of social and cultural life around tourist area.

Tourist Expenditure
According to Kozak et al [6], tourist expenditure can be measured in four approaches, that are total vacation expenditure, daily expenditure per group, daily expenditure per person, and total expenditure per person. The tourist expenditures are grouped into 6 main types of expenses, namely accommodation, food and beverage, shopping, transportation, tour packages, and others.

2.2. The Scope of Research

This research uses secondary data sourced from the BPS Statistics Indonesia, namely data of Passenger Exit Survey (PES) 2018. The requirements for PES respondents are including the country of residence not in Indonesia, do not work and earn wages in Indonesia, are not being study in Indonesia, and have a minimum age of 15 years or are married. This means that the PES sample is foreign tourists visiting Indonesia in 2018. The data used in this study were 2504 samples with the unit of analysis, namely foreign tourists visiting Indonesia in 2018 who passed only land entrances and were interviewed directly in PES, does not include foreign tourists who are digitally registered that usually through the entrances of major airports and ports.

The variables used in this study include the dependent variable and the independent variable. The dependent variable used is total tourist expenditure which is categorized into two categories, that are above average expenditure (>US$134.82) and equal to or below the average expenditure (≤US$134.82). Meanwhile, the independent variables used are the characteristics of foreign tourists, that are sex, age, occupation/profession, length of stay, nationality, purpose of visit, and accommodation.

2.3. Analytical Method

The analytical method that used in this study is descriptive analysis and inferential analysis. Descriptive analysis uses chart and cross tabulation which aims to describe an overview of the characteristics of tourists according to total expenditure during their visit to Indonesia in 2018.
Meanwhile, the inferential analysis uses logistic regression analysis to determine the influence of each tourist characteristic on total expenditure. In this study, the total expenditure variable is divided into two categories, that are \( Y=1 \) total expenditure is more than the average tourist expenditure and \( Y=0 \) total expenditure is equal to less than the average tourist expenditure. In general, the logistic regression model is as follows.

\[
\hat{g}(x_i) = \ln \left( \frac{\hat{\pi}(x_i)}{1-\hat{\pi}(x_i)} \right) = \beta_0 + \beta_1 x_{i1} + \ldots + \beta_j x_{ij} \tag{1}
\]

The regression model formed in this study is as follows.

\[
\hat{g}(x_i) = \ln \left( \frac{\hat{\pi}(x_i)}{1-\hat{\pi}(x_i)} \right) = \beta_0 + \beta_1 \text{sex}_i + \beta_2 \text{age}_i + \beta_3 \text{age}_i^2 + \beta_4 \text{occupation}_i + \beta_5 \text{occupation}_i^2 + \beta_6 \text{occupation}_i^3 + \beta_7 \text{occupation}_i^4 + \beta_8 \text{occupation}_i^5 + \beta_9 \text{los}_i + \beta_{10} \text{nationality}_i + \beta_{11} \text{nationality}_i^2 + \beta_{12} \text{purpose}_i + \beta_{13} \text{accomodation}_i + \beta_{14} \text{accomodation}_i^2 \tag{2}
\]

The steps of the analysis in this study include the first is perform a model fit test to find out whether the model formed explains the data significantly using the Hosmer-Lemeshow Test, then forms the best logistic regression model as in equation (2), calculating the odds ratio value that shows the odds of a category to spend above average expenditure compared to its reference category on each tourist characteristic variable, and the last one is to evaluate the model formed, which are calculating the pseudo \( R^2 \) value that provides an indication of the amount of variation in the dependent variable explained by the model (from a minimum value of 0 to a maximum of approximately 1), calculating the concordance proportion which states the percentage descriptively of data that can be classified appropriately to each response category by a logistic regression model that formed, and forming confusion matrix to determine the level of accuracy, sensitivity, and specificity of the formed model.

3. Result and Discussion

3.1. General Overview of Tourists

In 2018, the number of foreign tourists visiting Indonesia came from various countries. Figure 1 shows that distribution of the number of foreign tourist arrivals to Indonesia through land entrances and as respondents of PES. Most of the foreign tourists came from Asian nationalities, such as Timor-Leste with 46.37 percent, followed by tourists from Oceania nationalities, such as Papua New Guinea (26.60 percent) and ASEAN, such as Malaysia (14.78 percent). When viewed from the purpose of their visit, foreign tourists who come from these three countries came to Indonesia to visit friends or family. Meanwhile, the least number of foreign tourist arrivals to Indonesia came from American and European nationalities, with only 0.20 percent and 1.36 percent respectively. If based on the purpose of visit, the arrival of foreign tourists from these countries to Indonesia is for vacation/recreation.
3.2. Visitor Expenditure

Figure 1. Distribution of international visitor arrivals to Indonesia by nationality (percent).

Figure 2. This is a figure describes the average international visitor expenditure by nationality. In general, the average total expenditure for foreign tourists to Indonesia is US$134.82. Based on nationality of foreign tourists, foreign tourists who came from the continent of America spend the largest amount during their visit to Indonesia, which is US$1,191.40. Furthermore, foreign tourists who came from Europe spend US$769.59 during their visit to Indonesia. Based on the purpose of visit, the arrival of these foreign tourists to Indonesia is for the vacation/recreation.
The visitor expenditure was classified into 6 main items, namely accommodation, food and beverages, shopping, transport, tour package, and others. The biggest expenditure were shopping which accounted for 41.11 percent, followed by transport 23.54 percent, and food and beverage 15.34 percent. Meanwhile, expenditure on food and beverages tends to have the same distribution according to tourist nationality, which is around 12-17 percent. In addition, tourists who came from Asian and Oceania have the largest distribution of spending on shopping. This is supported by the purpose of these tourist visits, who mostly visit for shopping, such as more than 85 percent of the total Papua New Guinean tourists who visit Indonesia for shopping.

3.3. Tourist Characteristics

In general, foreign tourists who visit to Indonesia spend a minimum of US $ 134.82 or the average of total expenses. Based on Table 1, there is a difference in the average total expenditure according to the characteristics of foreign tourists visiting Indonesia. Both male and female tourists spend more than average. Likewise, according to the age category, both young and old foreign tourists spend more than the average of total expenditure during their visit to Indonesia. However, according to their profession, foreign tourists who work as entrepreneurs tend to pay above the average of total expenditure during their visit to Indonesia. Most of the tourists who work as entrepreneurs are for shopping, followed by buying food and beverages and accommodation.

As for the length of stay, foreign tourists visiting Indonesia for more than 8 days tend to pay above the average of total expenditure. Based on nationality, foreign tourists who came from the ASEAN continent tend to spend above the average of total expenditure. Most of the expenditure of tourists who came from ASEAN are spent for shopping, followed by land transportation and buying food and beverages. Meanwhile, tourists visiting Indonesia for business or personal purposes tend to pay below the average of total expenditure. However, based from the accommodation, tourists who used hotel to...
accommodation tend to spend above the average of total expenditure. This is in line with the cost of renting hotel rooms which is more expensive than other accommodation rentals.

Table 1. Principal characteristic of tourists who arrive to Indonesia.

| Category of Total Expenditure | Total |
|-------------------------------|-------|
| <= 134.82USD | >134.82USD | % (n) | % (n) | % (n) |
| Sex | | | | | |
| Female | | | | | |
| Male | | | | | |
| <= 34 | | | | | |
| Age | | | | | |
| 35-54 | | | | | |
| >= 55 | | | | | |
| Occupation/Profession | | | | | |
| Entrepreneur | | | | | |
| Farmer | | | | | |
| Housekeeper | | | | | |
| Others | | | | | |
| Length of Stay | | | | | |
| <= 8 days | | | | | |
| > 8 days | | | | | |
| Nationality | | | | | |
| ASIA (exc. ASEAN) | | | | | |
| NON-ASIA | | | | | |
| Purpose of visit | | | | | |
| Personal | | | | | |
| Business | | | | | |
| Not use | | | | | |
| Accomodation | | | | | |
| Hotel | | | | | |
| Others | | | | | |
| Total | | | | | |

3.4. The Effect of Tourist Characteristics on Total Expenditure

The results of regression analysis to determine the extent of the influence of tourist characteristics on total expenditure can be seen in Table 2. Tourists visiting Indonesia who have the least opportunity to spend above the average of total expenditure (US$134.82) are male tourists, who is aged young (at least 34 years old), working as a farmer, length of stay equals less than 8 days, not from Asia, visiting for personal purposes, and not using accommodation while visiting Indonesia. The opportunity to spend above the average of total expenditure with those tourist characteristics is only 2.54 percent, which means that only 2-3 people out of 100 tourists with those characteristics will spend above the average of total expenditure.

Meanwhile, foreign tourists who have the highest opportunity to spend above the average of total expenditure are women tourists, who is aged 35-54 years, working as entrepreneurs, staying longer than 8 days, coming from ASEAN, visiting for business purposes, and using hotel accommodation while visiting Indonesia, that the opportunity is 99.53 percent. That means is if there are 100 tourists with those characteristics, 99 of them will spend above the average of total expenditure.
Based on Table 2, it can be seen that the odds of tourists to spend above the average of total expenditure for each characteristic. Neither female nor male tourists have a significant difference in odds to spend above the average of total expenditure. However, if viewed from age, middle-aged tourists who are aged 35-54 years have 1.32 times greater odds to spend above the average of total expenditure compared to young tourists who are aged at least 34 years old. The largest average expenditure for tourists aged 35-54 years old is for shopping, followed by the purchase of food and beverages and land transportation costs.

Meanwhile, by profession, for tourists who work as entrepreneurs, their odds to spend above the average of total expenditure are 1.20 times more likely than tourists who work in other fields. In line with the length of stay, tourists visiting Indonesia for more than 8 days are 8.24 times greater odds to spend more than the average of total expenditure compared to tourists who only stay for at least 8 days.

According to nationality, tourists who came from ASEAN have 5.96 times greater odds to spend more than the average of total expenditure compared to tourists who came from non-Asia. The largest average expenditure of tourists from ASEAN is for shopping, followed by the purchase of food and beverages and land transportation costs. Based from the purpose, for tourists visiting Indonesia for business purposes, their odds to spend more than the average of total expenditure are 1.41 times more likely than tourists visiting for personal purposes, such as vacations, visiting friends/family, and others. In addition, in line with the expensive level of accommodation costs, tourists who stay at hotels are

| Characteristic | Coefficient | Odds Ratio |
|---------------|-------------|------------|
| Intercept     | -0.57       | 0.56       |
| Sex           |             |            |
| Female        | -           | -          |
| Male          | -0.04       | 0.96       |
| Age           |             |            |
| <= 34         | -           | -          |
| 35-54         | 0.27*       | 1.32       |
| >= 55         | 0.20        | 1.23       |
| Occupation/Profession |     |            |
| Student       | -0.83*      | 0.44       |
| Professional/Employee | 0.16       | 1.18       |
| Entrepreneur  | 0.19        | 1.20       |
| Farmer        | -1.24*      | 0.29       |
| Housekeeper   | -0.96*      | 0.38       |
| Others        | -           | -          |
| Length of Stay|             |            |
| <= 8 days     | -           | -          |
| > 8 days      | 2.11*       | 8.24       |
| Nationality   |             |            |
| ASEAN         | -           | -          |
| ASIA (exc. ASEAN) | -1.77* | 0.17       |
| NON-ASIA      | -1.78*      | 0.17       |
| Purpose of visit |          |            |
| Personal      | -           | -          |
| Business      | 0.34        | 1.41       |
| Accommodation |             |            |
| Hotel         | 3.02*       | 20.61      |
| Others        | 0.94*       | 2.55       |

*significance of estimation at 0.05
20.61 times more likely to spend more than the average of total expenditure compared to tourists who do not use accommodation while visiting Indonesia.

4. Conclusion

Based on the results of this study, in terms of quantity, the largest number of tourist visits who passed only land entrances came from Papua New Guinea and Timor Leste with the majority of these tourists visiting Indonesia to meet family/friends, while in terms of quality, tourists who came from the nationalities of America and Europe had the largest average of total expenditure with the majority of tourist arrivals for vacation/recreation. In general, the biggest expenditure were shopping, followed by transport and food and beverage. Foreign tourists visiting Indonesia are dominated by male tourists, tourists from Asia, tourists who visit for personal purposes, such as vacation / recreation and to meet family/friends, and tourists who use accommodation other than hotels, such as homestays and staying at their family/friend’s houses. The tourist who has odds to spend more than the average of total expenditure is female tourists, middle-aged (35-54 years), working as entrepreneurs, length of stay more than 8 days, came from ASEAN, visiting for the business purposes, and using hotel accommodation during a visit to Indonesia.

In addition, after knowing the results of this study, the tourism sector which needs to be more promoted again and to improve services in tourist areas or recreational places that can attract the attention of foreign tourists to visit Indonesia. Furthermore, based on the distribution of total expenditures, Indonesia can further promote Indonesian products and improve the quality of its products so as to increase the shopping income of tourists who visit to Indonesia and improve hotel services so that tourists can be more comfortable and take longer to stay in Indonesia.

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