Transportation model as distance measurement location from Perumnas Antang to Makassar City

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Abstract. The generation of transportation for residents of Perumnas Antang to the market location occurs as a result of transportation actors carrying out movements or activities at the same time to the market location to meet their food and clothing needs. The purpose of this study is to analyze the characteristics of the transportation modes of the Perumnas Antang population to the market location and to model the movement of the Perumnas Antang population to the market location. This research was conducted at the location of Perumnas Antang on Street Antang Raya, Manggala Village, Manggala District, Makassar. The sample in this study was taken from the Perumnas Antang location. Data collection methods are carried out in interviews and questionnaires. The data were analyzed using multiple linear regression analysis methods. The results of this study indicate that the generation at Perumnas Antang to the market location is influenced by travel time, distance traveled, the mode used, age, and type of work.

1. Introduction
Population development that occurs in cities generally tends to concentrate in the downtown area, but the city center has very limited land to accommodate population development because the downtown area has been filled with various social, economic, cultural, and political activities as a function of the life of a City. The problem in big cities is the high level of urbanization and population migration from hinterland areas, so that it is very vulnerable to the problem of space requirements, especially space for housing.

The development of large public housing areas in urban areas such as Perumnas Antang will cause the generation of movement to become centralized and at the same time will overload certain roads leading to the center of activities such as offices, education and trade, and recreation. One of the goals of the activity centers above is the goal to trade (markets) which occurs as a result of transportation players wanting to meet their food and clothing needs.

Makassar City as the capital city of South Sulawesi Province and the service center for Eastern Indonesia has developed into a metropolitan city with a population growth rate recorded from 2001-2011 reaching 156% (source: Central Bureau of Statistics of Makassar City). This creates more dynamic activities and population movements. Transportation problems also arise due to the influence of an increase in the number of vehicles, an increase in the number of families. This causes various problems such as traffic jams, delays, waste of fuel, air and noise pollution, and parking lots.

To reduce these transportation problems, it is necessary to make a transportation plan that can analyze the demand for movement by correlating the factors that influence it. Manggala sub-district in Makassar...
City is an area that is densely populated with residential housing, this causes the traffic of people and goods is also dense. One of the residential areas in Manggala District where there is a population of housing and residents is Perumnas Antang.

Perumnas Antang has become a traffic generator to activity centers such as offices, trade, education, and recreation. The generated generators will simultaneously overload the roads by using the network/route of street Perumnas Raya Antang and street Antang Raya leading to these activity centers. On the network/route above, there are market locations that are often crowded with various modes of transportation, both goods, and people, so it is no wonder that traffic jams always occur in this network/route. To overcome the above problems that will arise in the future due to movement generation, research is needed on "Analysis of The Perumnas Antang Transportation General Model to The Makassar City Market Location".

1.1 Formulation of The Problem
Based on the description above, the problem in this study is formulated as follows:

a. What are the factors that influence the generation of the movements of Perumnas Antang to the market location of Makassar City.
b. How the model of the movements of the Perumnas Antang to the Makassar City Market location.

Research Purpose

1.2 The aim of this study:

a. Analyze the factors that influence the generation of the movements of Perumnas Antang to the market of Makassar City.
b. Analyze the generated model of the Perumnas Antang movements to the market location of Makassar City.

2. Methodology

![Figure 1. Research Flow Diagram](image)

This type of research is exploratory and descriptive research, where the type of exploratory research is trying (finding out) to analyze the characteristics of Perumnas Antang to market locations and to model the movements to market locations. This type of descriptive research uses two qualitative and quantitative approaches, aims to provide a systematic, accurate, and accurate description of certain social phenomena in the form of factors, circumstances, the nature of an individual or group, and the relationship between the variables studied. A qualitative approach is used to analyze data that has been collected from field observations using directs interviews with respondents. While the quantitative approach is data processing in the form of the method used.
2.1 Research Time and Location
The research was carried out for 3 months so that the data obtained during the research period was complete so that it could be analyzed to provide answers to the formulation of research problems. The implementation of this research was carried out in Perumnas Antang which is in Manggala Village, Manggala District.

2.2 Sample
In this study, the total population was 2,352 households (source: Manggala Village Office). If the population is less than 100, it is better if all of them are taken if the population is greater than 100, a sample of 10% - 25% is taken (Arikunto). In this study, the population is greater than 100 so it is obtained up to 10% of 2,325 = 233 samples. The pattern of the model to be formed can be described by means of a hypothetical model below:

\[ Y = a + b_1X_1 + b_2X_2 + \ldots + bnX_n \]

with:
- \( Y \) = number of movements
- \( a \) = constant
- \( b_1, b_2, \ldots, b_n \) = regression coefficient (number to look for)
- \( X_1, X_2, \ldots, X_n \) = independent variables (influencing factors)

Influencing factors:
- \( X_1 = \) Traveling time
- \( X_2 = \) Mileage
- \( X_3 = \) Ownership of 2-wheel mode
- \( X_4 = \) Ownership of 4-wheel mode
- \( X_5 = \) The mode used
- \( X_6 = \) House type
- \( X_7 = \) Age
- \( X_8 = \) Type of work.

3. Result and Discussion
3.1 A movement to the Market

Table 1. Correlation Matrix Between Variables Movement to The Market

|     | Y  | X1  | X2  | X3  | X4  | X5  | X6  | X7  | X8  |
|-----|----|-----|-----|-----|-----|-----|-----|-----|-----|
| Y   | 1.000 |     |     |     |     |     |     |     |
| X1  | 0.598 | 1.000 |     |     |     |     |     |     |
| X2  | 0.834 | 0.872 | 1.000 |     |     |     |     |     |
| X3  | -0.173 | -0.775 | -0.977 | 1.000 |     |     |     |     |
| X4  | 0.197 | 0.991 | 0.822 | -0.662 | 1.000 |     |     |     |
| X5  | 0.122 | 0.086 | -0.270 | 0.671 | 0.084 | 1.000 |     |     |
| X6  | -0.192 | -0.261 | -0.281 | 0.512 | -0.977 | -0.118 | 1.000 |     |
| X7  | -0.813 | -0.828 | -0.494 | 0.659 | -0.999 | -0.999 | -0.333 | 1.000 |     |
| X8  | 0.130 | 0.758 | 0.470 | -0.970 | 0.839 | 0.049 | 0.511 | -0.973 | 1.000 |

Based on the correlation table above, it can be seen that between the independent variables (X) with the dependent variable (Y) which correlates (r count > 0.20) are:
- \( X_1 = \) Traveling Time
X2 = Mileage
X7 = Age

### 3.2 Multiple Linear Regression Analysis for Movements to The Market

Based on the results of the correlation analysis in table 1, it is known that the factors that have a big influence on the movement of the residents of Perumnas Antang to the market location are:

- X1 = Traveling Time = 0.598
- X2 = Mileage = 0.834
- X7 = Age = -0.813

Based on the results of the correlation test in table 1, then carried out the process of Multiple Linear Regression Analysis. The results of modeling the movement of residents of Perumnas Antang to the market location, with the analysis model can be seen in table 2 and the following equation:

**Table 2. The Results of Multiple Linear Regression Analysis**

| Model     | Unstandardized Coefficients | Standardized Coefficients t | Sig.  | 95.0\% Confidence Interval for B |
|-----------|-----------------------------|-----------------------------|-------|---------------------------------|
|           | B                           | Std. Error                  | Beta  | Lower Bound                     | Upper Bound |
| (Constant)| -4.669                      | 1.851                       | -2.523| 0.240                           | -28.185     | 18.847        |
| Traveling Time | 1.225                      | 0.071                       | 1.235 | 17.139                          | 0.037       | 0.317         | 2.133        |
| Mileage   | -0.150                      | 0.048                       | -0.144| -3.096                          | 0.199       | -0.765        | 0.466        |
| Age       | 0.186                       | 0.059                       | 0.139 | 3.149                           | 0.196       | -0.566        | 0.939        |

*a. Dependent Variable: Movement to The Market

\[ Y_1 = -4.669 + 1.225X_1 - 0.150X_2 + 0.186X_7 \leftrightarrow (R^2 = 0.735) \]

### 3.3 Model Testing Multiple correlation coefficient (Multiple R)

The multiple correlation coefficient (Multiple R) is good if it approaches value \( \pm 1 \). Based on the value of multiple linear regression analysis in table 3 summary correlation model \( R = 0.857 \), this shows a strong correlation (correlation) simultaneously between the two independent variables X1 (Traveling Time), X2 (Mileage), and X7 (Age) with the resulting movement to the market location.

**Table 3. The Correlation Coefficient and The Coefficient of Determination**

| Model        | R              | R Square        | Adjusted R Square | Std. An error of the Estimate |
|--------------|----------------|-----------------|-------------------|------------------------------|
|              | 0.857*         | 0.735           | -0.062            | 0.82141                      |

*a. Predictors: (Constant), Age, Mileage, Traveling Time.*

### 3.4 Coefficient Of Determination (R Square)

The coefficient of determination (R Square) has an interval value between 0 and 1(0 < R2< 1). The greater it is R2 (approaching 1) the better the results for the regression model and the closer to 0, the independent variable as a whole (simultaneously) cannot explain the dependent variable. Based on the results of multiple linear regression analysis, obtained \( R^2 = 0.735 \). This shows that 73.5% of the overall effect of the three independent variables X1 (traveling time), X2 (mileage), and X7 (age) can be explained through the movement to market equation model \( Y \) above, the remaining 26.5% is influenced by variations in other factors that are not included in this study.
3.5 Regression Coefficient Significance Test (T-Test)
Hypothesis:
H0: t count < t table (the regression coefficient on the independent variable is not significant)
H1: t count > t table (the regression coefficient on the independent variable is significant)

Based on the results of multiple linear regeneration analysis in the coefficient table, earned value (t count) for the three regression coefficients of independent variables X1 (Traveling Time), X2 (Mileage), and X7 (Age) each (17,139), (3,096) and (3,149), while for the t table the value is obtained t4;0,05 = (see statistical table with free degree, v = n - (k+1) = 8 - (3+1) = 4 with probability α = 5% so that t 0,05 = 2,132. Comparison of the two (t count and t table) produce count > t table, therefore Ho rejected; H1 accepted means that the regression coefficient individually (partially) has a significant effect on movement to the market location (Y).

3.6 Linear Relationship Significance Test (F-Test)
Hypothesis:
H0: There is no linear relationship between the independent variable (X) and the dependent variable (Y)
H1: There is a linear relationship between the independent variable (X) and the dependent variable (Y)

Table 4. The Correlation Coefficient and The Coefficient of Determination

| Model       | Sum of Squares | Df | Mean Square | F     | Sig. |
|-------------|----------------|----|-------------|-------|------|
| Regression  | 2165.829       | 3  | 721.943     | 0.991 | 0.022a |
| Residual    | 0.675          | 1  | 0.675       |       |      |
| Total       | 2166.504       | 4  |             |       |      |

a. Predictors: (Constant), Age, Mileage, Traveling Time
b. Dependent Variable: Movement To The Market

If F count < F table, then Ho be accepted; and if F count > F table then Ho rejected. From table 5 Anova, the calculated F value is obtained = 0,991. Whereas for F table 0,05 (3;4) = 9,120 (see table of statistical values F 0,05 with the numerator degrees = k = 3, and the denominator's degrees of freedom v, = n - (3+1) = 8 - (3+1) = 4. The comparison of the two results in F count < F table 0,991 < 9,120. Therefore, it is concluded that H0 is accepted and H1 is rejected, it means that in the regression model simultaneously (as a whole) there is no linear relationship between the independent variables X1 (Traveling Time), X2 (Mileage), and X7 (Age) with the dependent variable (Y1), so that the model used is correct.

3.7 Model Interpretation
From the model testing that has been carried out on the model towards the movement to the market location, the equation is as follows:

\[ Y1 = -4.669 + 1.225X1 - 0.150X2 + 0.186X7 \leftrightarrow (R^2 = 0.735) \]

This model can be interpreted as follows:

a. Constant = - 4.669, means that if X1 (Traveling Time), X2(Mileage), and X7 (Age) are worth 0 (zero), then the movement to the market location drops in value 4,669, movement/month, this is the result of other independent variables that were not included in this study.

b. Regression coefficient X1 = 1,225, meaning every addition / 1-hour increase in travel time, will affect / have the potential to increase / increase the movement to market locations of 1,225 movements / months.
c. Regression coefficient $X2 = -0.150$, meaning every addition / 1 km increase in travel distance, will have an effect / potential to reduce / reduce movement to market locations by -0.150 movements / month.

d. Regression coefficient $X7 = 0.186$, meaning every addition / 1-year increase in age, will affect / have the potential to increase / increase movement to market locations by 0.186 movements/month.

It is clear that the movement of residents of Perumnas Antang to the market is dominated by adults (age) and accurately calculates the distance and travel time where residents have been accustomed to traveling to the market close to their housing, namely the Antang market.

## 4. Conclusion

Based on the results of the analysis and discussion, it can be concluded that:

a. The factors that influence the generation of the Perumnas Antang movement to the Makassar City market location are traveling time, mileage, age.

b. Perumnas Antang movement generation model, the market location of Makassar City is dominated by adults (age) and still takes into account the distance and travel time where residents have been accustomed to traveling to the market close to their housing, namely the Antang market.

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