Study of Mode Preferences of Personal Transport Based on Distance Traveled And Length of Trip

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Abstract—One of the factors causing congestion is the number of vehicles which are not proportional to the increase of the volume of the road. At the present time, people generally prefer to use private vehicles compared to public transportation due to various reasons such as convenience, travel time, faster trips, public transportation capacity which is not operated properly, etc.

This research is a study exploring perceptions transformation preference for personal transport users (four-wheel and two-wheel) in terms of mileage and travel time. Draft analysis approach consisted of descriptive statistical methods to obtain personal transport commuting characteristics and quality of public transport services based on mileage and travel time, as well as modeling regression equation to get the effect of the interaction characteristics of private transport commuter to the quality of public transport.
The result of the research by regression analysis results in get in the calculation of scores, respectively 812 for the characteristics of the trip in terms of mileage and travel time commuting private transport in the moderate category and in 1383 for the quality of public transport services in terms of mileage and travel time in the very high category. There is a negative relationship with the significant value of -0.027 between the characteristics of commuting modes of personal transportation and the quality of public transport services. There is a negative relationship with the significant value of -0.027 between the characteristics of commuting modes of personal transportation and the quality of public transport services. The coefficient of determination $r^2 = -0,027^2 = 0.00073 \times 100 \% = 0.073$. The remaining 99.92 % is determined by other factors.

Keywords : transformation , public and private transport modes , commuting , mileage , travel time

I. INTRODUCTION

Transportation problems in big cities like the City of Jakarta , Bandung , Surabaya , Medan and Makassar , is an issue that is quite alarming , especially in solving the problems of public transport connection with traffic congestion [3]. Comparing to major cities in developed countries, it is became an irony that the public transport service system in our country is very underdeveloped and quite alarming. In developed countries people are more likely to use public transport (public transport) as compared with the use of private vehicles. However, in big cities such as Makassar, in general, people prefer to use private vehicles compared to public transportation with various comments and reasons such as discomfort, longer travel time, the capacity of public transport is not operated as it should be so that security cannot be obtained and many other reasons. Aspects of the population, information technology, and values contained in those countries are different to the countries with cities in developing countries such as Indonesia. Therefore, this study specifically conducted on private transportation were compared to previous studies, both in the types of modes, as well as the level of service provision, even more priority to the supply side (supply) rather than the demand side.

Makassar City with an area of 175.77 km2 as the core city Mamminasata Metropolitan Region and serves as the National Events Centre in Eastern Indonesia with a population of approximately 1.5 million people experienced a growth rate of 9 % per year. Economic indicators town with the GDP dominated by trade and services.Therefore , the Makassar city owns a very high tourism charm, but it faces a variety of urban problems , namely urbanization and poverty, slums, transport, flood, water, sanitation, and solid waste. At an inter-city movement, modes choice factor plays a fairly important , someone who would move from one city to another would have to consider a lot of things, namely whether the movement is doing.

Transport problems encountered include: (1) an imbalance in the development of road infrastructure in comparison with the growth of the vehicle, (2) the growth of road infrastructure of approximately 4 % per year, and (3) the growth of the vehicle approximately 14-15 % per year. A survey conducted by ARSDS concluded that the ratio of use of private vehicles and public transport is 611 : 35. This clearly shows the inefficiency of the use of road space by

the pattern of use of the vehicle. The growth of the use of vehicles in Makassar indicate a trend the utilization of motor vehicles and the disappearance of non-motorized vehicles. This will cause the pressure on the environment both energy use and the environmental pollution. A policy adopted by the Government, in addition to building a supporting infrastructure for such an attempt restrictions on private transportation, with the expectation of traveling by public transportation. The fundamental purpose of public transport is organizing good and decent services for the community [12].

Thus, the practical is to encourage private vehicle users to change into public transport users. However, Makassar is experiencing economic growth and rapid population growth. The impact of rapid economic growth increase public revenues, which tends to encourage people to own and drive a private vehicle.

Improved quality of transport infrastructure and the lack of good tools and services to public transport are also increasingly encouraging people to own and drive a personal vehicle. These things will be an obstacle to efforts the "socialize " for the use of public transportation . In addition to the economic capability of a person and the availability of public transportation are sufficient in number, presumably other environmental factors affect a person's tendency to choose the mode of transport.

II. LITERATURE REVIEW

Transport in general (Department of Transportation, 1997) can be defined as the activities of the movement of goods and people from the place of origin to the destination which forms a relationship that consists of three parts: there are cargo to be shipped, availability of the facility as a means of conveyance, and availability of the infrastructure of road. Transportation process is the movement of the transport start from the place of origin to destination where the transport activities are terminated [3].

Transportation is done because the value from people or goods transported will be higher in another place (destination) than at the place of origin [7]. In Weber 's Locational Theory of Minimum Cost, an economist Alfred Weber Germany states that the location of any industry depends on the total cost of the transportation and labor where the sum of the two should be the minimum. The waiting time is the time taken by the passengers to wait for public transport in the halt. In general, the passengers need a relatively short time [1], [2], [5]. With the increasing mobility of people and goods in turn, people will demand transportation services with a higher level of safety, security, speed, smoothness and comfort [11]. Service performance indicator is an appropriate concept form which is a measure or means to reach the goal, concerning aspects of economic and technical or operation of the system performance. The performance indicators are the right size in the form of single data or comparison of two or more of a data [4], [6].

The former research in the field of transport that relevant to this study are: The evaluation obtained from the passengers' experience that waits can cause negative things like emotions and degrade the service. [14] in his research on "Dynamic Interactions between Private Passenger Car

and Motorcycle Ownership in Asia: A Cross-country Analysis", stating that Motorization in Asia is characterized by the rapid growth of motorcycles and cars in the possession and their interactions from time to time [5] examines about "Effects of Service Guarantee and Perceived Waiting Experience on Railway Passenger's Repurchase Intentions", stating that in rail transport, passengers have to wait for a delayed schedule [10].when they want to switch to using public transport, it should be in terms of travel costs and travel time at least as cheap and fast when using private transport modes [6]. whomodelling the interaction of traffic characteristics, physical aspects of the road, road environment, and the implications to traffic noise level [10]. the private transport users prioritize more on travel time, waiting time and total rate factor to be willing to move to modes of public transport which is also followed by other factors [12]-[13].

III. RESEARCH METHOD

A.   Research Design

Design or research design is a detailed planning used as a guide of the research studies that lead to the goal of the study,[1] . The method used is descriptive analysis, which depicts an event then performs an analysis of the problems that arise. The study began by collecting literature and secondary data relating to the research conducted then determine the used survey technique. In this study the events that will be observed is the selection of private transport modes. The variables studied are the attributes characteristic of the trip. The data collection technique is by interviews or questionnaires to users of private vehicles on the work (employees) with a random system . Question survey form consists of two things; the first one is questions are focused on determining the existing condition of the current characteristics of private vehicle users. In this case we want to know the travel information is done using private transport modes. Questions directed to know the preferences of respondents who have offered hypothetical conditions such as travel time and mileage. Using data from the perception of respondents are then analyzed to determine the characteristics of the characteristic variables traveling on private transport modes in Makassar.

B.   Method of Analyzing Data

Methods of data analysis used in this study are generally divided into three namely :
1. Descriptive Statistics Methods
This method is used to determine the characteristics of the trip private transport in the form of tables and diagrams, so it is easy to understand. The data used in this method is sourced on a questionnaire distributed to a sample transport users private cars and motorcycles to the employees of government offices. The method of sampling using Simple Random Sampling.
2. Descriptive Qualitative Methods
This method is used to determine the perception of personal transformation transport users based on the characteristics of the trip private transport users and the quality of public transport services in the city of Makassar.
3. Method Simple Regression Model Equations

This method is used to analyze the effect of the interaction of the characteristics of private commuter transport users to the perception of the quality of public transport services.

IV. DISCUSSION AND ANALYSIS

A. Distribution Characteristics Commuter Travel Modes Personal Transportation

In the aspect of characteristics commuting trip private transport modes in an office area in the city of Makassar, in this case it includes the allocation of costs, travel time and mileage. This study analyzed based on the results of interviews and direct observations in the field as well as on data taken from the user's perception mode of private transport people to work, through a questionnaire which was distributed to respondents with a number of 306 people, in an office area in the city of Makassar, it can be seen that the overall the average respondent assessed the characteristics of commuting modes of personal transport (X) that is in the category medium which is equal to 1019. In this case the overall condition of the commuting characteristics of users of personal transport modes ie for the type of trip characteristics of the average mileage of 10 respondents cover a distance of 0 km -5 km, or by 3.3%, as many as 70 people a distance of 5 km -10 km or by 22.9%, as many as 133 people a distance of 10 km -15 km or by 43.5%, as many as 67 people, a distance of 15 km - 20 km or by 21.9% and as many as 26 people who travel a distance>20 km or 8.5%, so that in the category of Medium with total score 889. For the type of trip characteristics of the travel time on average, as many as 64 respondents who use time of <30 minutes or by 20.9%,

as many as 170 people who use the time for 30 minutes - 1 hour, or by 55.6%, as many as 25 people using time 1 - 1.5 hours or by 8.2%, as many as 37 people who use the time for 1.5 - 2 hours or by 12.1%, and as many as 10 people using time> 2 hours or by 3.3%, so that in the category of High value total score of 1149.

Table 1.Distribution of respondents by   the characteristics of commuter travel

Characteristics of Travel Type	Frequency (N)					Total Score	Category Rating
	1	2	3	4	5		
Average Mileage	26	67	133	70	10	889	Moderate
Average Travel Time	10	37	25	170	64	1149	High
Average Number						1019	Moderate

Data Sources: Primary Data Processing.

Figure 1. Graph of the distribution of respondents bythe overall characteristicscommuter travel modes personal transportation (X)
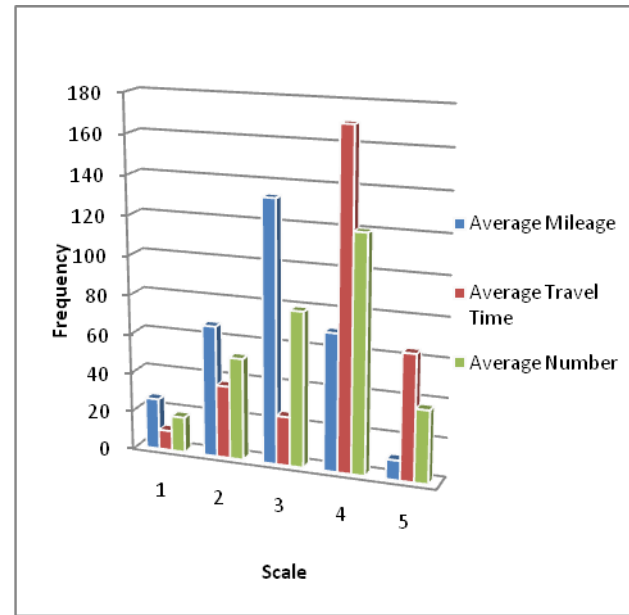
overall characteristicscommuter travel modes personal transportation (X)

Distribution Service Quality Public Transport

In the aspect of quality of public transport services in that it covers about mileage and travel time . Based on the research for mileage with a score of 1374 in the category of very high and for travel time with a score of 1400 in the category very high . So in order to know that the overall average of respondents' personal mode of transport users rate the quality of public transport services (Y) are in terms of mileage and travel time affect consideration in choosing public transport become a benchmark in the use of public transport are at very high category which amounted in 1387 with very high category.

Table 2. Distribution of respondents by Public

Public Transport Service Quality	Frequency (N)					Total Score	Category Rating
	1	2	3	4	5		
Travel Time	0	4	17	96	189	1400	Very high
Mileage	2	13	8	93	190	1374	Very high
Average Amount						1387	Very high

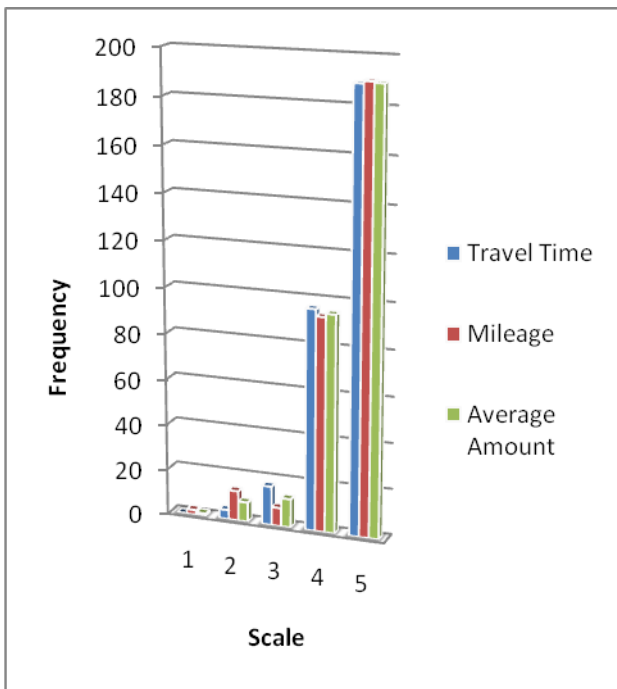Figure 2. Graph of the distribution of respondents by the overall quality servicepublictransport (Y)

Table 3.List of regression equationanalysis results based on the entire relationshipCharacteristicsof Commuter Personal Transportation Travel and Public Transport Service Quality

Type of Variable Description Equation	Mileage	Travel Time	Average Number Overall
Travel Characteristics EX	947	677	812
Service Quality Public Transport EY	1374	1391	1383
Amount X Average	3.09	2.21	5.31
EXi^2	3209	1811	2510
EYi^2	6364	6469	6417
EXiXi	4264	3055	3660
Constants a	4.36	4.70	4.53
Coefficient Regression b	0.04	-0.07	-0.015
Krls. Moment R	0.051	-0.105	-0.027
Krls. Moment r^2	0.003	0.011	0.00073
Klts.Srvc. Grade r^2 x 100%	0.26	1.11	0.073

DataSources: Primary Data Processing

Research Result

Based on the results of statistical tests using regression analysis of the relationship based on the overall variable yield value a = 4.53 and b = -0.015 while the simple linear regression equation regression equations characteristic modes of personal transport commuting to the value of quality public transport service is $\tilde{Y} = 4,53 + (-0.015) X$. It is means that ups and downs of the public transport service quality conditions for commuting characteristics of private transport modes can be predicted when the score of the characteristics of private commuter transport modes 5 , the quality of public transport services $\tilde{Y} = 4.53 + (-0.015) 5 = 4,46$. So when the characteristic value private transport commuting increased to a maximum of 5 , the service level drops from 4.51 to 4.46 . Furthermore, to calculate the correlation in getting the value of r = -0.027. R price table for error level of 5% with n = 306 is obtained 0.113 and for 1 % = 0.148 . Because the price is smaller than the count r good table for error of 1 % or 5 % (-0,027<0.148 > 0.113), it can be concluded that there is a negative correlation of -0.027 and is not significant between the characteristics of commuting modes of personal transportation and the quality of public transport service. The coefficient of determination $r^2 =$

-0,027² = 0.00073 . This means the quality of public transport services in terms of mileage and travel time amounted to only 0.073 % determined by the characteristics of commuting modes of personal transportation in terms of mileage and travel time , through the regression equation $\tilde{Y} = 4.53 + (-0.015) X$. The remaining 99.92 % is determined by other factors
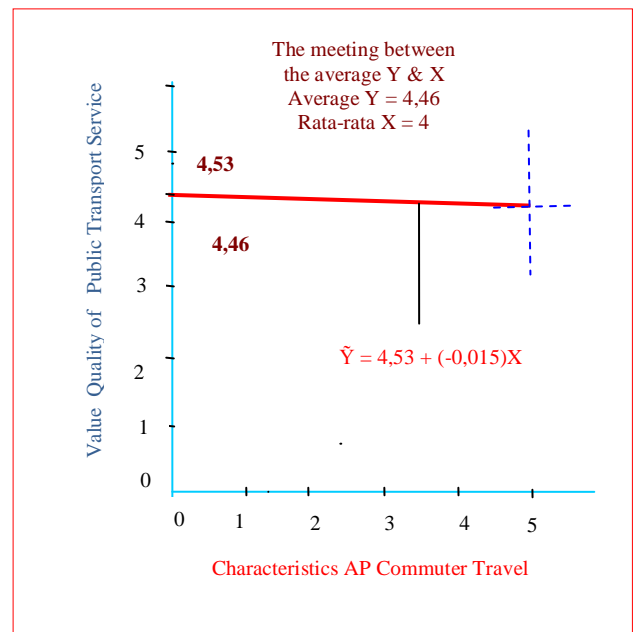

Figure 3.The regression line of characteristics commuter travel modes personal transportation

Overall, the result of the researchisa positive value that contained in the regression analysis which it suggests that there is a relationship between the characteristics of commuter private transport with public transport service quality, but the effect is very small not a significant. Then the other results in the calculation of each score is 1019 for the characteristics of commuting private transport with

medium or medium category and in 1406 for the quality of public transport services in the category of very high. This illustrates that the characteristics of commuting private transport on mileage and travel time using private transport respondents considered the mileage in the mid-scale or medium which is in the range of 10 km -15 km and the travel time is also considered in the medium- to place work that is in the range of 30 minutes - 1 hour, whereas for the quality of public transport services in terms of mileage and travel time , respondents strongly desires that the distance is shorter and the short travel time to get to work. Thus the user respondents private transport modes when you want to switch to using public transport, there are very wanted service with short distances and short travel time to get to work

V. CONCLUSION

Based on the study result and data analysis in the discussion before, it can be concluded :

1. Thoroughly average respondent assessed the characteristics of commuting modes of personal transport (X) is located in the Medium category for 1019.
2. For the quality of public transport services (Y), the overall average user respondents transport modes personally rate-in terms of mileage-greatly affect consideration in choosing public transit and travel time become a benchmark in the use of public transport are at very high category which amounted 1406.
3. In the regression analysis results in the calculation of scores get each of 812 for private transport commuters travel characteristics with the Average category and in 1383 for the quality of public transport services in the category of very high.
4. Using the regression equation as a whole showed that there is a negative relationship with the significant value of -0.027 between the characteristics of commuting modes of personal transportation and the quality of public transport services . The coefficient of determination r^2 = $-0,027^2$ = 0073 . This means the quality of public transport services amounted to only 0.073 % determined by the characteristics of commuting modes of personal transport, through the regression equation $\tilde{Y}$= 4.53 + (-0.015) X. The remaining 99.92% is determined by other factors. Therefore, the hypothesis is rejected , meaning that these hypotheses are not a significant direct effect on the dependent variable target
5. Overall, based on user perception mode of personal transportation commuters it can be stated that there is no link between the characteristics of commuting modes of personal transportation with quality public transport service based on mileage and travel time , but the perception of the mode of transport private in terms of public transport services want to be there mileage shorter and shorter travel time to get to work.

ACKNOWLEDGMENT

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