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Study of Modes Transformation Preferences of Private Transport Based on Travel Characteristics and user Behavior

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Abstract

This research is a study to explore the transformation preferences of modes of private transport (four-wheeled and two-wheeled) based on travel characteristics and user behavior. The design of the analysis approach consists of descriptive statistical method to obtain the travel characteristics and behavior of private transport user in terms of travel costs, vehicle operating costs, mileage and travel time, accessibility, mobility, service. It also uses Partial Least Square (PLS) SEM modeling to obtain the interactive travel characteristics of private transport preferences, public transport services quality to modes of transformation. From the results based on data analysis, it is found out that the travel characteristics of the commuters for private transport users with variable indicators of mileage and travel time is expected to affect the determination of modes of transport that is fast and time-efficient. In the case of private transport preferences, most respondents think that the prestige and traffic culture factor in using the modes of private transport have less impact. Next, for prestige factor in using public transport, most respondents think that it has less impact on the public transport service quality. Then for the transformation of modes of travel, 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.

Based on the hypothesis test results, it is found that Public Transport Service Quality (KPAU) does not significantly affect to Transformation (TRF) of 1.644. Commuters travel characteristics (KaerPerj) do not significantly affect to Private Transport Preferences (PAP) endogenous variable of 0.973. Commuters travel characteristics (KaerPerj) do not significantly give direct effect to Public Transport Service Quality (KPAU) of 1.471. Commuters travel characteristics (KarPerj) significantly give direct effect to Public Transport Service Quality (KPAU) of 5,461. Private Transport Preferences (PAP) does not significantly affect to Public Transport Service Quality (KPAU) of 0.224. Private Transport Preferences (PAP) significantly give direct effect to Transformation (TRF) of 7.401.

Keywords: transformation, modes of private transport, commuters, preferences, travel characteristics, user behavior

INTRODUCTION

Makassar City with an area of 175.77 km² plays as the core city of Mamminasata Metropolitan Region and serves as the National Events Centre in Eastern Indonesia Region with a population of approximately 1.5 million people, experiences a growth rate of 9% per year. The city economic indicators with GDP are dominated by trade and services sector, therefore, Makassar Metropolitan City has high attraction. However, it faces a variety of urban problems, namely urbanization and poverty, slums, transport, flood, water, sanitation, and waste. In a movement between cities, modes selection factors hold a quite important role, where someone who will move from one city to another would have to consider a lot of things, which is what kind of movement to do.

Transport issues encountered including: (1) imbalance in the development of road infrastructure compare to the growth of the vehicle, (2) growth of road infrastructure of approximately 4% per year, and (3) growth of the vehicle approximately 14-15% per year. A survey conducted by ARSDS concludes that the ratio of use of private transport and public transport is 611:35. This clearly shows the inefficiency in using the road space by the pattern of use of the vehicle. The growth of the use of vehicles in Makassar indicates a trend of motor vehicles utilization and the disappearance of non-motorized vehicles. This will cause the pressure on the environment both in energy use and environmental pollution. In addition to build the infrastructure to support the transport, the government adopted another policy such as the restrictions attempt to the private transport, with the hope that traveling by public transport increase. The fundamental purpose of public transport is organizing good and decent services for the community (Warpani, 1990).

Thus, it practically aims to encourage the private transport users to change into public transport users. However, Makassar experiences economic growth and rapid population increase. Rapid economy growth affects the increasing public revenues, which tends to encourage people to own and drive a private transport.

The better the quality of transport infrastructure and the lack of good instruments and services of public transport will also encourage people more to own and drive a private transport. Those become the obstacles in the efforts to "socialize" the use of public transport. In addition to the economic capability of a person and the availability of public transportation which are sufficient in number, other environmental factors might affect a person's tendency to choose the modes of transport.

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.

Transportation is done because the value from people or goods transported will be higher in another place (destination) than at the place of origin (Morlok, 1995). 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 (Sonny Siswandi MK, 2009). 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 (Paul Raga, 2004). 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. (Giannopoulos, G.A, 1989).

The former research in the field of transport that relevant to this study are: Lakawa, et al (2016) who modelling the interaction of traffic characteristics, physical aspects of the road, road environment, and the implications to traffic noise level. Kai Chieh HU (2011) 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. The evaluation obtained from the passengers' experience that waits can cause negative things like emotions and degrade the service. Vu Anh Tuan (2011) 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. Khaerat, et al (2015) 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.

RESEARCH METHODS

Design or research design is a detailed planning used as a guide of the research studies that lead to the goal of the study, Aaker et al. (2001: 24). The method used was descriptive analysis, which depicts an event then performs an analysis of the issues that arose. The study began by collecting literature and secondary data relating to the study conducted, then determined the survey technique used. In this study the events that would be observed was the selection of modes of private transport.

The variables studied were the attributes of travel characteristic and private user behavior. The data collection technique was by interviews or questionnaires to the private transport users on the working people (employees) with random system. The form of question survey planned consisted of two items. First, the questions were focused to determine the existing condition of the characteristics of private transport users today. In this case we wanted to find out the travel information done by using modes of private transport. The questions were directed to find out the respondents' preferences if a case of hypothetical condition was offered such as accessibility, mobility, services, travel costs and travel time. By using the data from the perception of respondents, then they were analyzed to determine the private transport preferences on the modes of commuters travel in Makassar.

This study was developed based on the issue of modes of transport of the commuters by emphasizing on the effect of travel characteristics, public transport service quality, private transport preferences to the transformation of the modes of transport of the commuters by using the simultaneous equation based on Structural Equation Modeling (SEM) based on Partial Least Square (PLS). The implementation of Structural Equation Model (SEM) in actual study was actually to compare or show the difference between the sample covariance (data) with covariance predicted by the model, the difference obtained was also called as residual (Wijanto, 2008).

This study was conducted in Makassar city, particularly the private transport users that are civil servants (PNS) who worked in the Office of the Governor of South Sulawesi Province, conducted directly and personally to the respondents, especially when distributing questionnaires. It was conducted on every working day.

The data analysis methods used in this study were generally divided into three, namely:

1. Descriptive Statistics Methods

This method is used to determine the travel characteristics, public transport service quality, private transport preferences of the commuters travel in the form of tables and diagrams, so it was easy to understand. The data used in this method was sourced on the questionnaires distributed to the sample of private transport users of the cars and motorcycles with the employee in the office of Governor of South Sulawesi Province as the respondents. The sampling method used was Simple Random Sampling.

2. Descriptive Qualitative Methods

This method was used to determine the perception of transformation of modes of private transport users based on private transport preferences of the commuters travel with the

employee in the office of Governor of South Sulawesi Province as the respondents.

3. Method of SEM PLS Model

This method was used to analyze the interactive effects of travel characteristics of private transport preferences, public transport service quality to the modes of transformation.

RESULTS AND DISCUSSION

A. Analysis of Travel Characteristics, Public Transportation Service Quality, Private Transport Preferences and Mode of Transformation

1) Latent Variable of Travel Characteristics of the Commuters who use Modes of Private Transport

The overall variable of distance and travel time of the commuters travel in running their activities daily from home to office, most indicators get a response on a scale of 2 and 3 with a distance of 10-15 km of 43.5% by using the average travel time of 30 minutes and 1 hour of 55.6%. Based on the objective conditions, it can be assumed that the travel characteristic of the commuters for private transport users with indicator variables of mileage and travel time are expected to affect the determination of the modes of transport that is fast and time-efficient.

Table 1. Characteristics of the mileage and travel time (JdW) variables and indicator variables (JdW1 and JdW2)

No. Indicator variables	Respondents' distribution (%)				
	1	2	3	4	5
1 the mileage and travel time (JdW)					
- Mileage (JdW1)	3.3	22.9	43.5	21.9	8.5
- Travel time (JdW2)	20.9	55.6	8.2	12.1	3.3

Data Sources: Primary Data Processing.

2) Private Transport Preferences

Based on the objective conditions in Table 2, it can be assumed that factor of Private Transport Preferences (PAP) of the commuters in general is an indicator that get a response on a scale of 5 and 4 with an average value of 85.0% which show the importance of these indicators from the variables associated with private transport service quality. But there are also indicators that get a bigger response on scale of 3 which is on the culture (image) indicator in which the respondents think that the use of private transport is less prestigious, and the culture (image) in terms of discipline in traffic is considered as lack of discipline with an average value of 45.95%. It means that the factors of prestige and traffic culture in using the modes of private transport of the commuters for most respondents are considered as do not give major impacts on Private Transport Preferences (PAP) of the commuters.

Figure 1. Distribution of Answer Percentage of Latent Variable of Characteristics of Private Transport Preferences (PAP and indicator variables).

3) Public Transport Service Quality

Based on the objective conditions, it can be assumed that the respondents' perception of private car users to the factor of public transport service quality in general shows that the indicators get response on a scale of 5 and 4 with an average value of 72.2%. It means that in general, these indicators are important related to the variable of public transport service quality. But there are also some indicators that get low response like in the prestige factor agreed by 46.5%, while the respondents who consider that the prestige factor is less or even does not affect the respondents in using public transport is 53.2%. It is interpreted that the prestige factor in using public transport means that most respondents think that it does give major impact on the public transport service quality.

Figure 2. Distribution of Answer Percentage of Latent Variable of Public Transport Service Quality (KPAU) and Indicator Variables.

time of 16.7% and total rate of the travel of 12.7%, in total, they reach 67.6% respondents who choose each of the three factors. This indicates that the private transport users prioritize more on factors of travel time, waiting time and total rate to be willing to move to modes of public transport which is followed other factors. It is understandable that the employees who work in government agencies prioritize on the speed to get to the workplace faster which is related to the demands of employee discipline based on government rules assigned to the employees. In addition, that reason also requires inexpensive cost on modes of public transport to the workplace.

Figure 3. Distribution of Answer Percentage of Latent Variabel of Transformation of modes of travel (TRF) and Indicators (TRF1 and TRF2).

4) Characteristics of Variable of Transformation of Modes of Travel (Y)

Respondents' perception of private car transport users to the factor that becomes the top priority affects the willingness to move using modes of public transport. From the nine existing indicators there are indicators that are very dominant, but there are three highest indicators selected by the respondent namely: factor of travel time of 38.2% followed by a waiting

B. Effect of Travel Interaction and User Behavior to Transformation of Modes of Private Transportation a. Conceptual Model

The design of the predictive relationship path (Path Diagram) illustrates the effect of exogenous construct to endogenous constructs, while the outer model describes the relationship between manifest variables to latent variables as shown in figure 4 on this page.

Figure 4. Path Diagram Full Model

Description:

Characteristics of Commuters Travel (KPK)

- Allocation of Transportation Cost (ABT)
- Distance and Time (JdW)

Private Transport Preferences (PAP)

- Safety (KSL)
- Security (KAM)
- Comfort (KNY)
- Culture (BDY)

Public Transportation Service Quality (KPAU)

- Accessibility (AKSES)
- Mobility (MOBIL)
- Services (PLYN)
- Transformation (TRF)

b. Evaluation (Goodness of Fit)

1) Outer Model

In Figure 5, there are loading factor values where most indicators of model execution results have already above 0, 50 (meet the criteria of the convergent validity). The correlation value of the indicator variables is bigger than the correlation value to other constructs. These results indicate good discriminant validity. On the latent variable correlation, construct discriminant validity for all variables: KarPerj, ABT, JDW, and transformation has been met, because they have the root value of average variance extracted (AVE) of 1.0, bigger than the value under. Reliability of indicator block that measures the construct is seen from the composite reliability. Composite reliability will show a good value when it is above 0.70.

Table 2. Reliability Test Results and Value of Determination of Coefficient

Variabel Laten/ Konst.	Composite Reliability	R Square
ABT	0.8	
Aksesibilitas	0.8	
BDY	0.8	
JdW	0.8	
KAM	0.8	
KNY	0.8	
KPAU	0.8	0.993
KSL	0.8	
KarPerj	0.7	1.000
Mobilitas	0.7	
PAP	0.8	0.988
PLYN	0.8	
Transformasi	1.0	0.26

Data Sources: Primary Data Processing.

2) Inner Model

Evaluation of structural model (inner model) is done by looking at the value of R-square, Q-square and T-test. R-square value for the variable of Public Transport Service Quality (KPAU) of 0.993, means that simultaneously it can be explained by variable of Public Transport Service Quality (KPAU) with three variable factors in the model, namely Accessibility, Mobility and Services.

For variable of characteristics of commuters travel (KarPerj) of 1,000, means that simultaneously it can be explained by the

variable of characteristics of commuters travel (KarPerj) with all four variable factors in the model, namely, Allocation of Transportation Cost (ABT), mileage and travel time (JDW).

For variable of Private Transport Preferences (PAP) of 0.988, it means that simultaneously it can be explained by variable of Private Transport Preferences (PAP) with four variable factors in the model, namely Safety (KSL), Security (KAM), Comfort (KNY) and Culture (BDY).

Then for variable of Transformation (TRF) is 0.260, 0.7% for KPAU, 0.0% for KarPerj, 1.2% for PAP and 74% for Transformation are explained by other factors which are not examined in this model. From the analysis, Q² value for KPAU is 0.9, KarPerj is 1.0, PAP is 0.9, and for Transformation is 0.2 are obtained. These suggest that the models resulted have good and quite good predicted level. It is where Q² value ranges from 0 to 1. The closer it is to 1, it means a better predictive relevance.

c. Hypothesis Testing

Hypothesis testing is done by re-sampling boots trapping method based on the significance of the coefficients of the structural model path. The confidence level used in this study is 95%, so the significance level (α) = 5% or 0:05 with t-table value of 1.96.

Table 3. Hypothesis Test Results

Hipotesis	T Statistics	P Values	Ket.
KPAU -> Transformasi	1.644	0.101	H1 is rejected
KarPerj -> PAP	0.973	0.331	H1 is rejected
KarPerj -> KPAU	1.471	0.142	H1 is rejected
KarPerj -> Transformasi	5.461	0.000	H1 is accepted
PAP -> KPAU	0.224	0.823	H1 is rejected
PAP -> Transformasi	7.401	0.000	H1 is accepted

Data Sources: Primary Data Processing.

Based on Table 3, it is shown that not all hypotheses have t-count value bigger than t-table (1.96), which is Public Transport Service Quality (KPAU) to Transformation (TRF) is 1.644, Characteristics of Commuters Travel (KarPerj) to Private Transport Preferences (PAP) is 0.973, Characteristics of Commuters Travel (KarPerj) to Public transport Service Quality (KPAU) is 1471, and Private Transport Preferences (PAP) to Public transport Service Quality (KPAU) is 0.224. It

means that the hypothesis does not significantly give direct effect to endogenous variable in question. Then there are two (2) most accepted hypotheses since they are above 1.96 namely, Characteristics of Commuters Travel (KarPerj) to Transformation (TRF) which is 5.461 and Private Transport Preferences (PAP) to Transformation (TRF) is 7.401. This means that the hypothesis is does not significantly give direct effect to endogenous variable in question.

CONCLUSIONS

Based on the results of research and data analysis in the discussion, it can be concluded as follows:

1. The results based on the data analysis, it can be known that the characteristics of commuters travel for private transport users with variable indicators of mileage and travel time is expected to affect the determination of the modes of transport that is fast and time-efficient. Factors of prestige and traffic culture in the use of modes of private transport for most respondents are considered to have less impact on Private Transport Preferences (PAP) of the commuters. Similarly, the respondents' perception of private transport users of the commuters on public transport service quality shows that the prestige factor in using public transport are considered to have less impact to public transport service quality as thought by most respondents.
2. Respondents' perceptions to modes of transformation manifested by the indicator variables in terms of willingness to move to use public transport means that respondents prioritize more on factor of travel time, waiting time and total rate to make them willing to move to modes of public transport which is followed other factors.
3. Based on the hypothesis test results, it is found that; Public Transport Service Quality (KPAU) does not significantly give direct effect to Transformation endogenous variables (TRF) of 1,644. Characteristics of Commuters Travel (KaerPerj) do not significantly give direct effect to endogenous variable Preferences Personal Transport (PAP) of 0.973, Characteristics of Commuters Travel (KaerPerj) do not significantly give direct effect to Public Transportation Service Quality (KPAU) endogenous variables of 1,471, Characteristics of Commuters Travel (KarPerj) significantly give direct effect to Public Transportation Service Quality (KPAU) endogenous variables of 5,46, Private Transport Preferences (PAP) do not significantly give direct effect to Public Transportation Service Quality (KPAU) endogenous variables of 0.224, and Private Transport Preferences (PAP) do not significantly give direct effect to Transformation (TRF) endogenous variables of 7,401.

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