Analysis of satisfaction and loyalty level of online taxi bike customer

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Abstract. Customer satisfaction in marketing research was defined as happiness and awful that was got from someone by comparing perceived performance with perception and expectation. Therefore, customer satisfaction was explained by application quality, driver’s quality and motorcycle quality. Customer loyalty in marketing research was defined by responses that reflected by continue purchasing. All component of application quality, driver’s quality and motorcycle quality is a latent variable that was measured by indicators. The purpose of this research is to know about correlation between loyalty level and satisfaction level depend on sample that was gotten by stratified random sampling. In each stratum, sample has got by systematic sampling. This research used Partial Least Square (PLS) method to find correlation between customer satisfaction and loyalty satisfaction. The results showed that there is positive correlation between satisfaction and loyalty level.

Keywords: loyalty level, partial least square, quality, satisfaction level.

1. Introduction
Along with the increase of people’s welfare, quality of life will increase. Similarly, what happens to the transport sector, transportation service users want a positive change in transportation services. In some cases, it is even prevalent for people with certain tariffs as long as service in this sector is safe and convenience. The increase of Depok’s population, as a support area of the city in Jakarta, is currently growing rapidly, the impression of cheap congestion on the highway. The government has succeeded in making public transportation services. However, the transportation provided by the Government has not enough to accomodate the needs of people in Depok. The government still improve the security and convenience of public transportation, such as offer the private sector to manage based on local regulation Depok City No. 02 in 2012 that is about Implementation of Transportation Sector specifically in the Fourth Section of People’s Transport Licensing (Article 81–84) [1]. One of the most chosen transportation is motorcycle taxi, or taxi bike known as ojek. Loyal customers start with satisfied customers [2]. Therefore, the level of customers satisfaction needs to be considered.

The high competition between online taxi bike operators makes customers faced with many choices when they decide to use online taxi bike as transportation. The costumer’s consideration in choosing an online taxi bike as transportation is the quality of the messaging application, the quality of the driver’s service and the quality of the motorcycle. These three factors will affect the level of customer satisfaction. Therefore researchers examined the level of customer satisfaction of one of the taxibike operators and get its correlation with the customer loyalty.
2. Research methods

In research, especially social research, it is often use latent variables, variable that cannot be measured directly but measured by several indicator variables. One common method used to analyze the correlation between indicator and latent variables, and also between latent variables is Structural Equation Modeling, known as SEM method. After some development, SEM method is divided into two, namely: SEM based on covariance (called SEM) and SEM based on variance called Partial Least Square (PLS). SEM based on covariance is usually used to estimate the parameters of the model, whereas PLS based on variance is usually used for predictive purposes, in the sense of the development of existing theories. The method used in this research is K-Means Clustering method, explanation of simple random sampling, systematic sampling, and stratified sampling, comparison of Structural Equation Model (SEM) and Partial Least Squares (PLS), explanation of PLS, PLS model, parameter estimation of model and model evaluation.

2.1. K-Means clustering

In partitioning approach or more often called optimization method, observation is separated in cluster g without using hierarchical approach based on distance matrix. One method of this approach is the K-Means method [3]. The K-Means cluster is a non-pararchic cluster analysis method in multivariate analysis. Cluster analysis is an analytical method used to classify observations based on one or more characteristics (or variables) such that observations in a homogeneous and intergroup group are heterogeneous [4].

2.2. Sampling method

Simple Random Sampling is a method of sampling where every possible sample has equal chance to be a sample → Simple Random Sampling is a sampling method so that each sampling unit has the same chance of being selected into a sample. Simple Random Sampling is a sampling technique that is the basis of other sampling techniques. SRS is performed for a homogeneous population. SRS is rarely done for populations that are too large. SRS can be done if researchers have frames.

Systematic Random Sampling is a simpler sampling technique than simple random. Called more simply because this technique does not require random number tables like in simple random. As the name suggests, the systematic random technique basically selects the samples in the population systematically. We need only do the first random elements of the population. The next element is to follow a certain pattern or systematics. A simple or systematic random technique is only suitable for homogeneous populations. In reality, there is small case as a homogeneous population. Especially for large populations that include many people, generally members of the population are made up of diverse people with different characters. In such conditions, we need another sampling technique known as random stratification. In a stratified random sampling, the population grouping into strata is based on the variables to be measured. The purpose of grouping is to obtain homogeneous strata against the observed variables.

2.3. SEM and PLS

Comparison between SEM and PLS is described in table 1.

2.4. Partial least squares

Just like SEM, PLS is used to look at patterns of relationship between latent variables with indicator variables and between latent variables. The relationship between the indicator variable and the latent variable is called the outer model, which is known by the model of the measurement in SEM. The relationship between latent variables is called the inner model which is called the structural model. PLS was first developed by Herman Wold as an alternative to structural equation modeling whose
theoretical basis is weak in SEM. As mentioned above, PLS can be used as a theoretical testing and recommend a relationship with no explanatory theoretical basis. Based on Jogiyanto and Willy [5], it states that in the PLS model there are two models, namely:

a. Outer model, which is a model that states the relationship of indicator variables with latent variables that formed.

b. Inner model, the model that states the relationship between latent variables.

2.4.1. Parameter estimation in model. The estimation method in PLS is differentiated between parameter estimation on outer model and inner model. To estimate the outer weight model parameters (the coefficients on the regression model) for formative and outer loading constructs (loading scores on factor analysis) for reflective constructs. To estimate the parameters in the inner model, we use the estimate path which is an estimate of the path coefficient parameters that connect between the latent variables. In PLS there is no distribution assumption, all parameter estimates are done iteratively.

2.4.2. Model evaluation. Model evaluation in PLS (goodness of fit test) is distinguished for outer and inner model models. Because in the PLS there is no assumption of distribution, then there is no conventional significance testing. Fixed model testing can be done through the bootstrap method (not discussed in this study).

2.4.3. Outer model with reflective construct. Goodness of fit test from reflective outer model construct is done by using AVE value, discriminant validity and composite reliability.

AVE is related to the principle that indicators of a latent variable must be highly correlated with the latent variables they establish. The correlations of the indicator variables and the latent variables formed are measured by loading and AVE factors. AVE of latent variable is defined as the number of squares loading factor divided by the number of indicators on the latent variable. Thus, AVE can be calculated by the equation (1):

\[ AVE = \frac{\sum_{i=1}^{n} \lambda_i^2}{n} \]  

\( \lambda_i \) is the loading factor of the i-th indicator, \( \lambda_i^2 \), is the variance of the latent variable described by the indicator variable and n is the number of indicators. A latent variable construct is said to be valid if the loading factor > 0.6; and AVE values > 0.5 [6].

Discriminant validity relates to the principle that the indicators of the construct on latent variable are not highly correlated. Discriminant validity in the reflective indicator measurement model is judged on the basis of cross loading by comparing the loading values of each indicator to the latent variable formed by the loading value of the indicator against the other latent variables. The value of loading for each indicator to the latent variable formed must be greater than the loading value of the indicator to the construct or other latent variables.

Similar to the Alpha Chronbach coefficient, composite reliability is used to measure the internal consistency of the reflective construct of a latent variable based on equation (2).

\[ \rho_c = \frac{(\sum_{i=1}^{n} \lambda_i)^2}{(\sum_{i=1}^{n} \lambda_i)^2 + \sum_{i=1}^{m} (1-\lambda_i)^2} \]  

To be able to say a constructive reflective construct, then the value of composite reliability should be > 0.7.

2.4.4. Inner model. Goodness of fit test on inner model is measured by Q-Square predictive relevance and path coefficient value. The interpretation of Q-Square predictive relevance is the same as the coefficient of determination on path analysis (similar to R\^2 in regression). Q-Square predictive relevance can be calculated based on the equation (3):

\[ Q^2 = 1 - (1 - R_1^2)(1 - R_2^2) \ldots (1 - R_p^2) \]  

where \( R_1^2, R_2^2, \ldots, R_p^2 \) is R-square on latent to i in model where i = 1, 2, ......... p; p is the number of latent variables, Q-square tend to 1 indicates that the model has good predictive relevance [7]. For the reflective model, the goodness of fit of the inner model is evaluated by the value of the path coefficient or t-values of each path for significance tests in the structural model.
### Table 2. High level of customer satisfaction proportion.

| Station                  | Proportion          |
|--------------------------|---------------------|
| Universitas Indonesia (UI) | 0.439 until 0.721  |
| Pondok Cina (Pocin)      | 0.613 until 0.747  |
| Depok Baru               | 0.33 until 0.47    |
| Depok                    | 0.51 until 0.65    |
| Overall                  | 0.52 until 0.65    |

### Table 3. High level of customer loyalty proportion.

| Station                  | Proportion          |
|--------------------------|---------------------|
| Universitas Indonesia (UI) | 0.661 until 0.898  |
| Pondok Cina (Pocin)      | 0.661 until 0.898  |
| Depok Baru               | 0.502 until 0.777  |
| Depok                    | 0.397 until 0.682  |
| Overall                  | 0.525 until 0.664  |

3. **Research Results**

The populations in this study are customers of one of the online taxi bike operators (Gojek) who live in Depok. Samples were taken by stratified random sampling technique where in each stratum, samples were taken by systematic sampling. Samples were taken from four train stations in Depok area: Universitas Indonesia, Pondok Cina, Depok Baru and Depok stations as many as 200 people during rush hour (07.00-09.00 WIB). Sampling was done on the ground of the train station where everyone gathered in the area. Gojek customers who do not live in the Depok area are not included in the study. Systematic sampling of each stratum is taken as follows: the determination of the first respondent is taken by selecting the 5th respondent who came after the researchers arrived at the relevant train station (07.00 WIB). When the researcher interviewed the respondents, the time and the number of Gojek customers who arrive at this interval, for example k, then the k obtained is considered as a hose in the systematic sampling. The proportion of Gojek customers who get a relatively high level of customer satisfaction at each train station is listed in table 2. From the table it appears that the lowest customer satisfaction is experienced by Gojek customers at Depok Baru train station. While the proportion of Gojek customers who have high level of loyalty at the four train stations is presented in table 3.

In this study, the researchers will make the model identification as the prediction of the initial model based on figure 1. From figure 1, it is obtained the following results:

- The latent variable of message application quality ($\xi_1$) is measured using the X-X indicator, but only the X-X indicator has a loading factor above 0.6. So the X, and X indicators are excluded from the model.
The driver latent quality variable ($\xi_2$) is measured using the X-6-X indicator, but only X-6-X and X-8 have a loading factor above 0.6. So that the indicators X-6, X-8, and X-11 are removed from the model.

The latent variable of motor quality ($\xi_3$) is measured using X-13-X-16 indicator. All indicators have a loading factor above 0.6; so no indicators are excluded from the model.

The satisfaction level construct ($\eta_1$) is measured using the Y-1-Y-4 indicator but only the Y-1-Y-4 indicator which has a loading factor above 0.6. So the Y indicator is removed from the model.

The loyalty level construct ($\eta_2$) is measured using the Y-6-Y-10 indicator. All indicators have a loading factor above 0.6; so no indicators are excluded from the model.

Next, we have to modified the model as shown in figure 2 to obtain the following result. It is shown that all loading factors of each indicator variable more than 0.6. Thus, no more variable indicators are excluded from the model. Next, an outer model will be evaluated with reflective indicators. This is done by looking at the value of AVE, discriminant validity and Composite Reliability on the modified model. From the data, obtained the following results.

Based on table 4, we can see that the AVE value for all reflective latent variables is greater than 0.5 and the composite reliability value is greater than 0.7. Next, we will see the discriminant validity of each latent variable in the modified model. To get that, it takes the value of cross loading. From the data obtained the value of cross loading as follows.

Based on the value of AVE, composite reliability and discriminant validity, it can be concluded that the outer model is fit.

The next step is model evaluation with bootstrap method measured from the value of Q-Square predictive relevance and path coefficient value. First, we will calculate Q-Square predictive relevance. The R-square value of the result is as follows: R-square for the satisfaction variable is 0.485 and 0.380 for the loyalty level variable. This means that 48.50 % satisfaction level variable of variance can be well explained by the variable quality of the message, driver and motor applications with values 38.0 % variance of the loyalty level variable can be explained by the satisfaction level variable.

\[
R^2_1 = 0.474 \\
R^2_2 = 0.38
\]

The result of R-square inputed into the Q-square predictive relevance equation as follows:

\[
Q^2 = 1 - (1 - R^2_1)(1 - R^2_2)
\]

\[
Q^2 = 1 - ((1 - 0.474)(1 - 0.38)) = 0.67388
\]

Based on the result of the calculation of Q-square predictive relevance value, it can be seen that the value of Q-square is 0.67388. It’s concluded that inner model is fit. Next, we will evaluate the model by testing the significance of the path coefficient value in the inner model. This is done by comparing the statistical value of T obtained from the bootstrap method with a significance level of 0.05. From the data analysis we got statistical results T as listed in table 6.
Table 4. Parameter estimation in modification model.

| Variable | AVE   | Composite Reliability |
|----------|-------|-----------------------|
| AQ       | 0.5829| 0.8072                |
| MQ       | 0.5630| 0.8365                |
| SL       | 0.5104| 0.8064                |
| LL       | 0.5334| 0.8509                |

Note: AQ: Application Quality  MQ: Motorcycle Quality  SL: Satisfaction Level  LL: Loyalty Level

Table 5. Cross loading in modification model

| Variable | AQ   | MQ   | SL   | LL   |
|----------|------|------|------|------|
| X1       | 0.7876| 0.3007| 0.5394| 0.4192|
| X2       | 0.7758| 0.1255| 0.4361| 0.3314|
| X3       | 0.7257| 0.1333| 0.4445| 0.2820|
| X13      | 0.1724| 0.6417| 0.3374| 0.2820|
| X14      | 0.2224| 0.7760| 0.3414| 0.1835|
| X15      | 0.1337| 0.7941| 0.3047| 0.1538|
| X16      | 0.2270| 0.7792| 0.3214| 0.2489|
| Y1       | 0.4616| 0.3557| 0.6728| 0.4943|
| Y2       | 0.5323| 0.2883| 0.7415| 0.3965|
| Y3       | 0.4076| 0.1739| 0.7053| 0.4915|
| Y4       | 0.3769| 0.4328| 0.6827| 0.3758|
| Y6       | 0.2929| 0.0538| 0.3547| 0.6749|
| Y7       | 0.2526| 0.1015| 0.4577| 0.7282|
| Y8       | 0.2879| 0.3288| 0.4451| 0.7251|
| Y9       | 0.4338| 0.3313| 0.4918| 0.7482|
| Y10      | 0.3569| 0.2141| 0.4837| 0.7719|

Table 6. Path coefficient by bootstrap method in modification model

| Variable | Weight Loading (W) | Standard Error (SE) | T Statistics (W/SE) |
|----------|--------------------|---------------------|---------------------|
| AQ -> SL | 0.5493             | 0.0780              | 7.0416              |
| MQ -> SL | 0.2982             | 0.0753              | 3.9589              |
| SL -> LL | 0.6166             | 0.0616              | 10.0079             |

Note: AQ: Application Quality  SL: Satisfaction Level  LL: Loyalty Level

From the output in table 6, it can be seen that all parameter estimates are significant at the 0.05 significance level. Based on these data obtained T-statistic value > 1.96. Figure 2 is an inner fit model. Based on figure 2, the following interpretations are obtained:

- The most powerful indicator reflects the variable of the quality of the message application is the X indicator i.e. the messaging application can be accessed well and easily.
- The most powerful indicator reflects the motorcycle quality variable is X indicator that is the cleanliness of the seat.
- The most powerful indicator reflects the variable of satisfaction level is Y indicator that is the operator answer customer requirement when need taxi bike.
- The most powerful indicator reflects the loyalty level variable is the Y indicator that the customer will not switch to other operator in the use of online taxi bike.
- The level of customer satisfaction influenced by the quality of messaging applications and motorcycle quality.
- The level of customer satisfaction affect the level of customer loyalty significantly.

Recommendation that can be given from the results of this study that the online taxi bike operator needs to evaluate its service at the Universitas Indonesia and Depok train stations. To get loyal customers in the Depok area, the operator needs to increase the level of customer satisfaction in the
Depok area by maintaining and improving the features of the application so that these can always be accessed properly and easily. The drivers always pay attention to the cleanliness of the motorbike, especially its seat. In addition, the online taxi bike operator also needs to prepare distribution points of interest (POI) of the driver so customers can reach them to get the service where- and whenever they need it. This research can be further developed by adding components that affect customer satisfaction and loyalty such as rates. This research can be extended to other areas such as the greater Jakarta, and can also be applied to other services available by operators such as taxi car (Gocar), food delivery (GoFood), packet delivery (GoSend) etc.

4. Conclusions
Variables that reflect the level of customer satisfaction are the quality of messaging applications and the quality of the motorcycle, especially the cleanliness of the motorcycle seat. The variable that reflects the level of customer loyalty is the reluctance of customers to switch to other online taxi bike operator. There is a relationship between the levels of customer satisfaction with a positive value of the level of customer loyalty. The higher the level of satisfaction experienced by the customer, the level of customer loyalty to the online taxi bike operator is also higher.

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