Correlation of driving behavior with the need for self-recovery, work motivation, and emotional intelligence of an app-based motorbike taxi drivers

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Abstract. The increasing mobility drives demand for fast, reliable, and safe public transportation. Nowadays, the citizen of the main city in Indonesia relies on app-based transportation to fulfill these needs, especially the motorbike taxi services. Many factors affect the convenience and safety of the passenger, especially a driver’s driving behavior. This research aims to measure a motorbike taxi driver driving behavior level using a Manchester Driving Behavior Questionnaire (MDBQ). Furthermore, the correlation between emotional intelligence (X1), the need for self-recovery (X2), and work motivation (X3) variables with driving behavior (Y) was measured. Using a set of questionnaires, the 200 app-based motorbike taxi drivers' opinions on those variables were collected. The participants were drivers who operate in the Indonesian capital city and its four adjacent cities. To see the correlation of the variables, a Binary logistic regression method was applied. One way ANOVA was also utilized to find out whether the age, driver’s income, and driving duration differentiate the level of Y, X1, X2, and X3. The result showed that X1 had a negative influence on the Y, while X2 and X3 had a positive influence. The correlation can be explained by the equation $Y = -7.491 + 0.067X_1 + 1.388X_2 + 0.577X_3$. One way ANOVA results showed that the emotional intelligence level statistically different among the age class ($p = 0.095$), the work motivation level statistically different among drivers with different driving duration per day ($p = 0.035$). This research provides a new perspective that driving behavior is influenced by those variables. The implication, to manage or to correct the driving behavior of drivers, the app-based transportation company service could set some regulations related to this matter. The company may consider limiting the driving duration and give rewards to the drivers who able to manage their driving duration and their driving behavior.

Keyword: Aggressive driving behavior, App-based motorbike taxi, Binary logistic regression, Emotional intelligence, Need for self-recovery, Work motivation

1. Introduction
Currently, high mobility within the city is one of the characteristics of high economic activity and requires transportation support. As can be found in many countries, the availability of an application-based service platform on transportation services change the game. Now, the community become a provider as well as a user or passengers. In Indonesia, there are two app-based transportation services, Gojek and Grab that offered the transportation services including motorbike taxi [1]. This services become important to support people's quality lives [2], and become people first choice to fulfill the need on a fast, reliable and convenience transportation mode [3]. However, since this
services characterized by individual who join as a driver, it raises the question of whether the services provided are relatively the same between drivers, especially related to safety and user’s convenience that may affect customer satisfaction [4].

One of the important aspects that ensure customer satisfaction is safety. It influences by driver’s driving behavior and how they act in certain situations. Safe driving behavior is reflected in the way the driver controls the speed and directs their vehicle. The behavior varies between individuals and is reported relevant to a major cause of traffic safety problems [5]. Aggressive driving behavior cannot be expected to be totally eradicated, but an attempt to make them less dangerous (for both drivers and traffic in general) is possible. There are consequences of aggressiveness in driving that may cause accidents [6].

Motorcycle accidents reach 72% and influence by ego tendencies during driving. Safe driving behavior is also based on how a driver can process emotions when driving [7]. A study showed that emotional intelligence includes individual differences in emotional abilities, both intrapersonal (stress management) and interpersonal (perceiving emotions) have a positive relationship with behavior facing stressful situations. The level of emotional intelligence related to coping ability to facilitate emotional, evaluate, and perceived certain situations, and related to behavioral styles to deal with stressful situations [8]. Another factor contributing to driving behavior is the motivation factor in driving. Motivation in driving is a basic psychological need and a desire to feel the effects experienced on a motorcycle riding trip [9], and it’s important for creating work efficiency [10].

In some cities in Indonesia, especially the capital city and its four adjacent cities, a motorbike-taxi plays an important role in people's daily activities. It is perceived as an affordable and reliable transportation mode. However, the research related to app-based motorbike-taxi drivers is limited. The research in these topics could provide an overview of driving behavior related to safety aspects and passenger satisfaction as a user. This objective of this study was measuring a motorbike taxi drivers’ driving behavior level and its correlation with emotional intelligence, the need for recovery, and work motivation variables. The results are expected to yield an overview of the level of safety and comfort experienced by passengers as app-based transportation service users based on these four variables.

2. Literature review
In many research, finding the answer to research questions can be achieved by doing some differentiation test. The test involves some statistical methods, including binary regression linear model [11]. Using a statistical model also can help to define a relevant model as data obtained in the study. However, it should note that the actual true model may never know, but the research result hopefully will give a model as close as the true model [12]. In some cases, the number of data could help the estimation model process, but it not always guarantees in resulting good discrimination.

Logistic regression with the procedure quite similar to multiple linear regression is used to obtain the odds ratio in the presence of more than one explanatory variable. When logistic regression is applied, the important thing is the response variable is binomial. The result is the impact of each variable on the odds ratio of the observed event of interest. Logistic regression will model the chance of an outcome based on individual characteristics [11]. Probability is the ratio between the number of events favorable (that define earlier) to some outcome and the total number of events in the obtained data. On the other hand, odds are the ratio between probabilities: the probability of an event favorable to an outcome and the probability of an event against the same outcome. In logistic regression, the probability is constrained between zero and one, and odds are constrained between zero and infinity. The importance of this is that a large odds ratio (OR) can represent a small probability and vice-versa [11-12].

3. Methods
3.1. Participants and data collection
In this study, the participants were an app-based motorbike taxi driver who has a license to provide service under Gojek and Grab. The observations were conducted by collecting their perception on some statements arranged in a questionnaire. The researcher’s goal is to assess the potential of a motorbike-taxi driver in providing good services to consumers. In this study, there were 200 drivers as respondents, with the percentage of men 96.52% and women 3.48%. To distribute a questionnaire, a link was broadcasted using social media to be accessed by participants, and also it gave directly to the drivers while they having a rest in some places. Data collection was carried out from December 2019 to January 2020. A set of questionnaire was used to measure the level of need for self-recovery (11 questions), emotional intelligence (20 questions), work motivation (7 questions), and driving behavior (22 questions). The entire test items are arranged in a questionnaire using a Likert scale of 1-5, 1 indicates the participant strongly disagrees with the statement, and 5 indicates that participants strongly agree with the statement in the questionnaire.

3.2. Data analysis
Data analysis is carried out in a few steps. First, the collected data were checked to find out whether it is in accordance with the research observation measurement tool. After checking the answers carefully, a reliability and validity test was conducted. The result showed that a Cronbach's alpha value results were 0.789 which indicates high internal consistency for the scale with this specific sample. Level of driving behavior, motivation, need for recovery, and emotional intelligence defined based on its average value.

Data analysis was conducted using the Binary logistic regression analysis method to determine the relationship between the predictor variables of the need for self-recovery, emotional intelligence, and work motivation towards a driver driving behavior variables. In general, the logistic regression probability model involves several predictor variables to the dependent variable which has a dichotomous or binary category with 0 stating "Aggressive Driving Behavior" and 1 stating "Not Aggressive Driving Behavior" on the driving behavior variable [11][12].

The Hosmer and Lemeshow test was used to assess the feasibility of the model by measuring the result of the chi-square value. Testing can be done by looking at the Goodness of fit test value measured by the chi-square value at a significant level of 5%. Based on the results obtained, the model built is able to predict observations well. The hypothesis states that if the value of the Hosmer and Lemeshow test goodness of fit ≤0.05, then there is a significant difference in the model of the observations. If the value is ≥ 0.05, then the model does not have a significant difference with the results of observations [12].

In this study, the differences between age, driving time, and the average income for the variable needs for self-recovery, emotional intelligence, and work motivation, were analyzed using a one-way ANOVA statistical test.

4. Result and Discussion
The total respondents of this study were 200 respondents. Based on the results of data collection, there are various age differences. Age classification according to the Ministry of Health of the Republic of Indonesia 2009, for adolescents are 17-25 years old, adults 26-45 years, and for the elderly 55 years and above. Respondents classified into 25% of teenagers, 68% of adults, and 7% of the elderly. Based on the average driving hours per day, for less than 3 hours was about 7%, 3-5 hours was 10%, and longer than 5 hours per day was about 83%. For average daily income, it is classified into less than IDR 300.000 (16%), between IDR 300.000-500.000 (82%), and more than IDR 500.000 per day (2%).

Based on collected data, value obtained of each measured variable describe as follows:
- Need for recovery = 3.12 ± 0.36
- Emotional intelligent = 3.81 ± 0.54
- Motivation = 3.80± 0.56
- Driving behavior = 3.62 ± 0.99
The average value and its standard deviation for the variable self-recovery needs consisted of valid 11 questions with a value of > 2.5 scales of 1-5 (never - always), it can be said that the participants had a high need for self-recovery. For the emotional intelligence variable, there were valid 20 questions, it has average values > 3.5 scale of 1-5 (strongly disagree - strongly agree). This indicates that participants mostly aware of the importance of emotional intelligence and how to coping with their emotions while driving. A work motivation variable consists of 7 valid questions scale of 1-5 (strongly disagree - strongly agree), with an average value > 3.5 and it indicates the participants were motivated by economic reward and others in taking orders from customers. The driving behavior variable consists of 22 valid questions scale of 1-5 (never – always) with the average value < 3.5. It indicates that participants can be categorized into aggressive behavior during driving. This has several reasons, such as lack of knowledge of the importance of driving safely, demands for order completion, time to deliver, and other factors.

4.1. Correlation between research variables

Data analysis was performed to determine the relationship between driving behavior variables (Y) and the need for recovery (X1), emotional intelligence (X2), and work motivation (X3) variables using the Binary Logistic Regression Analysis Method. Driving behavior is classified into two categories; not aggressive (1) and aggressive (0). 99 drivers categorized into aggressive behavior and 101 into not aggressive behavior. Using the Hosmer and Lemeshow test, it showed that the probability of significance the behavior was obtained 0.184 which is greater than the value of $\alpha = 0.05$ so that it can be concluded that there is no difference between observations and predictions, in other words the model is fit or feasible to be use (chi-square = 11.317; df=8).

| Table 1 Percentage classification result |
|-----------------------------------------|
| Classification Table | Observed Driving Behavior | Predicted Driving Behavior | Percentage Correct |
|                        | Aggressive | Not Aggressive | Aggressive | Not Aggressive |                  |
| Driving Behavior       | 73         | 25            | 74.7       |                |
| Not Aggressive         | 27         | 74            | 73.5       |                |
| Overall Percentage     |            |               | 74.1       |

Based on Binary logistic regression analysis, it shows that the variable emotional intelligence ($X_2$) $p = 0.000$ and work motivation variable ($X_3$) $p = 0.026$ can significantly influence the driving behavior variable (Y) (Table 2).

| Table 2 Variables in the Equation |
|-----------------------------------|
| Variables in the Equation | B  | S.E. | Wald | df | Sig. | Exp(B) |
|-------------------------------|----|------|------|----|------|--------|
| Need for self-recovery ($X_1$) | 0.067 | 0.403 | 0.028 | 1 | 0.868 | 1.069 |
| Emotional intelligence ($X_2$) | 1.388 | 0.298 | 21.749 | 1 | **0.000** | 4.006 |
| Work motivation ($X_3$) | 0.577 | 0.312 | 3.409 | 1 | **0.025** | 1.78 |
| Constant | -7.491 | 1.897 | 15.597 | 1 | 0 | 0.001 |

The following is a mathematical model of logistic regression the study:

$$
\pi(x) = \frac{\exp(0.067 X_1 + 1.388 X_2 + 0.577 X_3 - 7.491)}{1 + \exp(0.067 X_1 + 1.388 X_2 + 0.577 X_3 - 7.491)}
$$
4.2. One Way ANOVA Result

This study utilized One-Way ANOVA to confirm the difference in average value data from several groups tested. Three demographic data are consisting of age, driving duration per day, and average daily income per day of driver. The demographic data was tested for the need for self-recovery, emotional intelligence, work motivation, and driving behavior variables.

Table 3 Between-subject factors

| Result                                      | Decision Label | Value Label      | Number of participants |
|---------------------------------------------|----------------|------------------|------------------------|
| Age                                         | 0              | Teen             | 51                     |
|                                             | 1              | Adult            | 135                    |
|                                             | 2              | Elderly          | 14                     |
| Duration of Driving (per day)               | 0              | Less than 3 hours| 15                     |
|                                             | 1              | 3-5 hours        | 21                     |
|                                             | 2              | More than 5 hours| 164                    |
| Average Income (per day)                    | 0              | Less than IDR300.000 | 163                   |
|                                             | 1              | IDR300.000-500.000| 32                     |
|                                             | 2              | More than Rp500.000 | 5                      |

As can be seen in Table 3, most of the participants were adult with driving duration per day longer than 5 hours and with daily income less than IDR300.000.
The differences on dependent variables as predictor of driving behavior, can be analyzed using One-way ANOVA table result (Table 4). The emotional intelligence level statistically difference among age class (p = 0.095) and the work motivation level statistically different among drivers with different driving duration per day (p = 0.035). In this study, it showed that tendency of driving behavior among drivers were not difference statistically. As describe previously, about 99 drivers categorized into have aggressive behavior while 101 have non aggressive behavior. Based on those result, the perception about customer satisfaction related to the how the drivers act during driving can’t be seen. However, based on interview with some customers, app-based motorcycle taxi users prioritize speed over safety. This also captured from the correlation between driving behavior and work motivation. Users are relatively ignorant of the reality of how drivers carry their vehicles, as long as they get there on time. The users may not agree and not satisfied with the way drivers, but the users still give 4-5 stars for the services.

5. Conclusions
The aim of this study is to measure a motorbike taxi drivers’ driving behavior level and its correlation with an emotional intelligence, the need for recovery and work motivation variables. The result showed that more than half of participants showed tendency of aggressive driving behavior and it has strong correlation with emotional intelligence and work motivation. This research provides a new perspective that the driving behavior can be influenced those variables. The implication, to manage or to correct the driving behavior of drivers, the app-based transportation company service could set some regulations related to this matter. The company may consider to limit of driving duration, and give rewards to the drivers who able to manage their driving duration and their driving behavior.

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