A simple model of the influence of gender on the driving behavior of students motorcycle riders on traffic violations and accidents in a Mataram city using a structural equation model

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A simple model of the influence of gender on the driving behavior of students motorcycle riders on traffic violations and accidents in a Mataram city using a structural equation model

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Abstract. Based on the accident data's, which recorded that 2016 until 2019, there were everage 225 traffic accidents involving students and college student riders. From these accident data's, was found that the male rider dominated traffic accidents than female rider. This study aims to determine how a simple model can be done base on gender influences, economic and social aspect the driving behavior of student and college students on traffic accidents in Mataram City. The Structural Equation Modeling (SEM) method, with the help of the AMOS program was used in this study. The number of respondents in this study were 792 people, consisting of 391 students and 391 college students. The model in this study consisted of 3 variables, namely behavior, violations and accidents. Driving behavior has a significant effect on traffic violations with a probability value (P) = 0.000 (<0.001), and a testing value of C.R> 1.64. The size of the estimated value in the student group shows that the effect of behavior on violations in male student rider is 30.08% stronger than that of female rider. And the effect of behavior on violations among female students is 0.8% stronger than college students. Traffic violations have a significant effect on traffic accidents with a probability value of 0.000 (<0.01), and a test value of C.R> 1.96. Traffic violations on male students have an effect on accidents by 0.992, 50.1% stronger than female students. The effect of traffic violations on student rider on accidents is 2.44% stronger than female student rider. Gender differences have a significant effect on driving behavior based on the probability value (P) = 0.000 (<0.001). On the otherhand, the results of the analysis show that the driving behavior model of the community on the Mataram City based on the review of the economic and social aspects shows a model with a variety of patterns where the GRDP review follows the Polynomial model, based on the number of cityzen population, the tendency of the Exponential model and the review of the gender probability aspect follows the Logarithmic model pattern.

Keywords: Student motorcycle rider; college student rider; gender; driving behaviour model

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1. Introductions

Traffic accidents are influenced by a couple of factors, such as environmental factors, vehicle factors, road factors and human / driver factor (ability, discipline, emotionand driver behavior) [1], [2], [3]. One of the factors associated with human factors is gender and age [2]. Most of traffic accidents are caused by the driver to, so driver behavior has an obvious effect on accidents and traffic violations. Accident are often preceded by traffic violation behavior[4], [5], [6]. A traffic violation can be defined as an intervening variable (*mediation variable*) between driving behavior that caused a traffic accident [4]. Violations and traffic accidents in Mataram City mainly involved high school motorcyclists. Therefore, there is a strong need to study, how much influence driving behavior has on the traffic accidents of student's motorcycle riders in Mataram City. Based on the accident data's, which recorded that 2016 until 2019, there were everage 225 traffic accidents involving students and college student riders, and the male rider dominated traffic accidents than female rider. The data obtained shows that violations and accidents in Mataram-Lombok City mostly involve riders between 16 - 40 years old (70.9%). During the last three years, the number of traffic accidents in Mataram City-Lombok have increased significantly. Likewise, traffic accidents by gender indicate that accidents involving male drivers are more dominant than female drivers, and interestingly, most of the accidents were dominantly involving high school students' that using motorcycle [4].

Several methods can be used to analyze the effect of driving behavior on traffic accidents according to age and gender [5], [6], [7], one of which is the Structural Equation Modelling (SEM) method. Structural Equation Modelling (SEM) is a multivariate analysis used to understand the relationship between complex variables [4], [5]. In this analysis, the researcher used the SEM method with the help of AMOS software. AMOS software's main advantage is it user friendliness**.**

The objectives of this research are as follow:

1. To investigate the influence of motorcyclist behaviors on traffic violations among several age groups in Mataram City.
2. To evaluate the impact of traffic violations on traffic accidents by comparing the differences in age and gender in Mataram City.
3. To determine the effect of gender on violations and accidents and to find a simple approach models to described the influence of behavior based on gender, economic and social aspects.

2. Literature Review

2.1. Sex Difference

Sex is the biological difference between women and men since a person is born. Sex is related to the body of men and women, where men produce sperm, while women produce cell of eggs and are biologicallycapable of menstruating, pregnant and breastfeeding [8], [9].

2.2. Definition of traffic violation and traffic accident

Traffic violations are actionsthat are contrary to traffic laws, either intentionally or unintentionally commited. According to the 2009 Indonesian Traffic Law No. 22Road Traffic and Transportation Laws, traffic accidents are an unexpected and unintentional accident involving vehicles, with or without other road users, resulting in human casualties and/or property damage. According to Suwardi (2009) in Wesli [7], traffic accidents can be defined as an incident in road traffic were at least one vehicle, is damagedand to the detriment of the victim and owner of the vehicle [7], [8], [9].

2.3. Traffic accident factors and driver behavior

Accident factors are identical to factors responsible for traffic, such as road users, vehicles, roads, and environmental conditions. According to Warpani (2002) in Wesli [7], the major cause of road accidents in Indonesia is human [7]. This is either due to the negligence or neglect of motorists or as a result of a deliberate disobedience of traffic laws on public roads. According to Lulie (2005), a driver's behavior is defined as the behavior of a vehicle owener or user in driving and caring for a vehicle. How a person drives has a significant impact on whether or not there will be an accident. Dwiyogo and Prabowo (2006), in Wesli [7], beams that a driver's behavior originates from the interaction of human factors with other factors such as vehicle's and road condition [10], [11].

2.4. Structural Equation Model

Santoso (2014), defined SEM as a multivariate statistical technique which comprises of factor analysis and regression analysis (correlation), with the aim of testing the inter-variable relationships that exist within a model, either inter-indicator with its construct, or the relationship between constructs [12].

2.5. Initial of research model

The multivariate statistical technique is defined as a combination of factor and regression analysis (correlation), used to test the inter-variable relationships in a model. This relationship is either inter-indicator with its construct, or between constructs. Researchers designed and developed a model based on the theories discussed in the previous literature reviews [11], [12]. The relationship model between variables is depicted in Figure 1:

Figure 1. Initial model of research

The initial hypothesis of the study

The hypothesis used in carrying out this research study is as follows:

H1: Used to denote the hypothesis that driving behavior positively affects the number of traffic violations.

H2: Used to denote the hypothesis that traffic violations have a positive effect on traffic accidents

2.6. Validity test

The instance is valid if the value of r count > r table and also if the questionnaire instrument can be used for data collection. Alternatively, when r arithmetic < r table, the instance will be declared invalid and will no longer be used in data collection [5]. The formula used for a validity test using the product of moment technique is:

$$r_{XY} = \frac{\Sigma XY}{\sqrt{(\Sigma X^2)(\Sigma Y^2)}} \quad (1)$$

Where:

R = relation coefficient.

X = The first score, in which case X is the scores of the item to be tested for its validity.

Y = The second score, in this case Y is the number of scores by each respondent.

ΣXY = Number of first score multiplication result with second score.

ΣX^2 = Quantity of first scores result.

ΣY^2 = Quantity of results of the second scores.

Validity testing was carried out using the SPSS program. The validity of each item can be seen by the total correlation value for each corrected question [3].

2.7. Reliability test

Reliability is described as the extent to which the measurement results obtained remain consistent, through multiple repetitions of the experiment with matching tools and circumstances. A research instrument is said to be reliable if the reliability coefficient (r11) is > 0.6 or greater than the r table (Sugiyono, [3]). The reliability tests is calculated by using the cronbach's alpha technique:

$$r_{11}=\left[\frac{k}{\sqrt{(k-1)}}\right]\left[1-\frac{\sum \sigma b^2}{\sigma 1^2}\right] \quad (2)$$

where:

r_{11} = reliability instrument
K = the number of questions
$\Sigma\sigma b^2$= number of variance point
$\sigma 1^2$ = all of variance

Table 1. The Level of Reliability is based on the Alpha Values

Alpha	Reliability Level
0.00 - 0.20	Less reliable
> 0.20 - 0.40	Somewhat reliable
> 0.40 - 0.60	Quite reliable
> 0.60 - 0.80	Reliable
> 0.80 - 1.00	Very reliable

3. Research Methods

3.1. Research areas, samples, variables and indicators A subsection

A sample of 792 motorcyclist covering six sub-district in Mataram City with in 391students riders and 391 college student rider, was used to carry out this research work. Other several variables were used include:

a. Exogenous variable (dependent variable), such as driving behavior
b. Intermediate variable (intervening variable), i.e.the traffic violation
c. Endogenous variable (independent variable), the traffic accident

To measure the latent variables of this research, a manifest variable or an indicator is required.

Table 2. Research Variables and Indicators

RESEARCH VARIABLE	INDICATOR	SYMBOL
Driving Behavior	Knowledge of driving	A1
	Driving skills	A2
	Emotion and physical conditions	A3
	Discipline in driving	A4
Traffic Violations	Completeness administration on riding	B1

	Violations of road marking and traffic sign	B2
	Precedes another vehicle from the left lane	B3
Traffic Accident	Perpetrator of violation	C1
	Victim of the violation	C2

3.2. Sampling Technique

The population in this study consist of motorcycle riders covering six sub-districts in Mataram City. The data obtained proofs that there is an estimated total population size of 495.681 motorcycle riders. The data was obtained from the 2019 official statistic motorcycle rider statistics. According to Sugiyono [3], the sample research number can be determined using Slovin formula [3]:

$$n = \frac{N}{1+N\alpha^2} \quad (3)$$

Where:

α = Denotes the deviation of the desired population or degree of reliability (4.42%)
N = Population size (495.681 people)
n = Sample Size

From the number of population data obtained the number of samples can be calculated using formula below:

$$n - \frac{N}{1+N\alpha^2} \rightarrow n = \frac{495681}{1+319900 \times 0{,}0442^2}$$

$n = 791{,}86 \approx 792$ Sampel.

3.3 *Data collection method*

Data was collected through the use of questionnaires distributed to the motorcyclist respondents. The questionnaire used in carrying out this research study made use of a likert scale, 1 – 5, to measure the attitudes of respondents towards each question. The likert scale used in this research is as follows:

Table 3. Likert scale with score

Alternative Answer	Score	
	positive	negative
Never	5	1
Ever	4	2
Sometimes	3	3
Often	2	4
Always	1	5

4. Results and Discussions

4.1 Respondent characteristics

There were 792 respondents in this study consisted of 391 students and 391 college students. Characteristics of respondents by age, it was found that the number of respondents with the age of 14 years was approximately 1 person (0.26%), respondents aged 15 years, about 37 people (9.44%), respondents aged 16 years amounted to 152 persons (38.78%), respondents aged 17 years of 171 persons (43.62%), 18-year-old respondents, 29 persons (7.40%), and 19-year-old respondents were 2 persons (0.51%). The results showed that 48.47% of students aged under 17 years had ridden a motorcycle. Respondents characterized by sex found that males and females distributed almost equally. Respondents of male sex numbered 207 respondents (52.81%) and female respondents were 185 respondents (47.19%). Characteristics of respondents based on riding licence show that the sample of 391 respondents consisted of 12.50% of respondents who did have riding licences and as many as 87.50% did not have riding licences.

4.2 Structural equation modelling (SEM) analysis with the AMOS program

The SEM process cannot be performed manually. In addition to the limitations of human capabilities, the complexity of the models and statistical tools used make manual calculations inefficient. So, it's necessary to use special software for calculation. Basic statistical tools of SEM include AMOS. Models analysed with the help of AMOS program in this study can be seen in Figure 2.

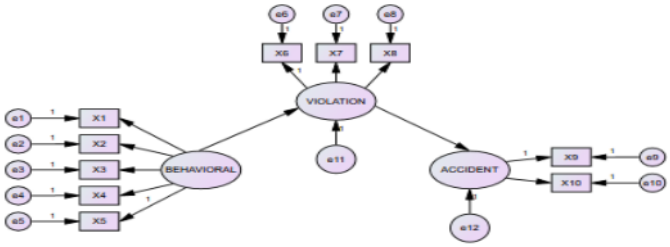

Figure 2. The Influence model of student driving behavior on traffic accidents

4.3 Modified SEM models

In AMOS, when the SEM model is determined to not be a fit, a recommendation is given to modify the model. Recommendations for model modifications will appear on the AMOS modification indices output [12].The fit model test recommendation to modify model can be summarized in the following table:

Table 4. *Goodness - of – fit indices* of model's modification

Goodness of Fit Indices	Cut off Value	Result	Model Evaluation
Degree of Freedom	Positive (+)	24	Identified
X2 (Chi square)	≤ 38.885 [=CHINV (0.05,	27.668	Fit
Probability of	≥ 0.05	0.274	Fit
CMIN DF	≤ 2.00	1.153	Fit

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GFI	≥ 0.90	0.985	Fit
RMSEA	≤ 0.05	0.020	Fit
AGFI	≥ 0.90	0.966	Fit
TLI	≥ 0.90	0.992	Fit
NFI	≥ 0.90	0.969	Fit

Table 5. *Goodness - of – fit indices*and *Chi-Square Value*

goodness of fit index	*cut of value*
Degree of freedom (DF)	Positif (+)
Chi-square	Diharapkan kecil
Signifikasi probability	≥ 0,05
CMIN/df	≤ 2,00
GFI	≥ 0,90
RMSEA	≤ 0,05
AGFI	≥ 0,90
TLI	≥ 0,90
NFI	≥ 0,90

Gender	Degree of freedom	Chi-square tabel	Chi-square hitung	Evaluasi
Laki-Laki (Pelajar)	25	≤34.382	85.196	*Fit*
Perempuan (Pelajar)	25	≤34.382	80.101	*Fit*
Gender	Degree of freedom	Chi-square tabel	Chi-square hitung	Evaluasi
Mahasiswa	25	≤34.382	57.351	*Fit*
Mahasiswi	25	≤34.382	50.364	*Fit*

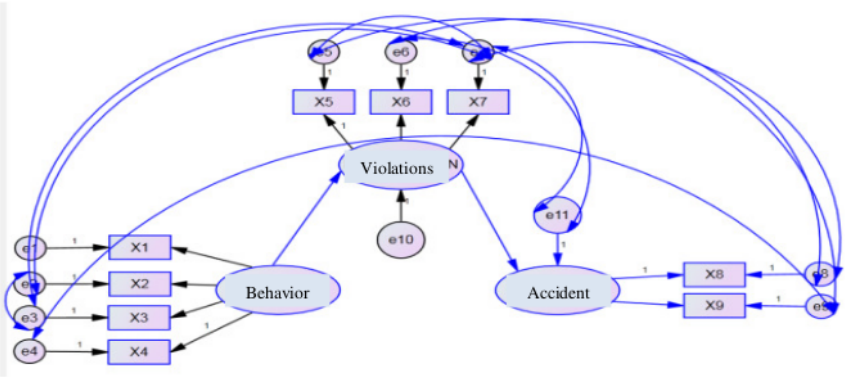


Figure 3. Model after Modification for male students

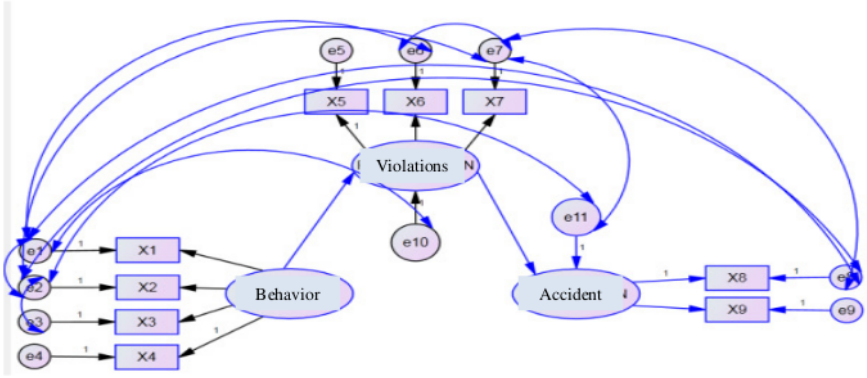


Figure 4. Model After Modification for female students

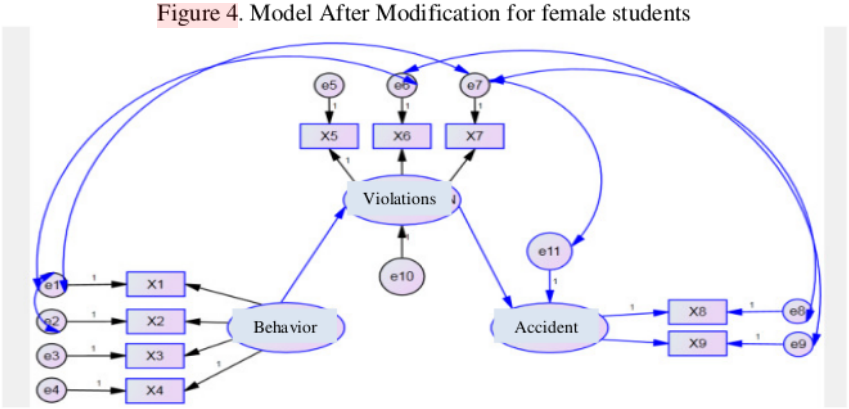


Figure 5. Model after Modification for male college students

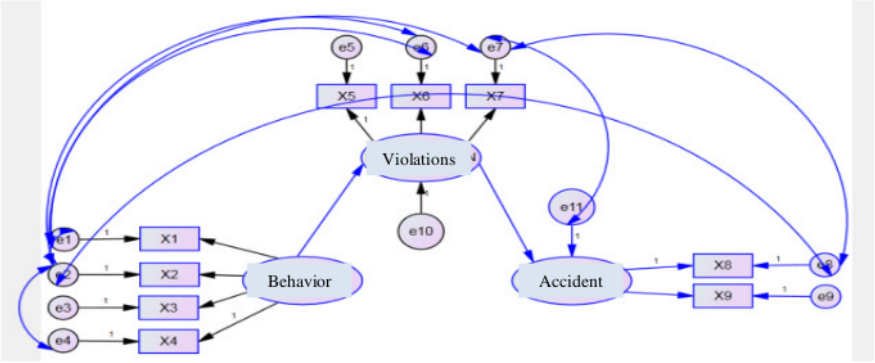


Figure 6. Model after Modification for female college students

4.4 *Analysis of indicator relationship with variables and inter-variables*

The results of the data analysis of the indicator's relationship with variable and the inter-variable is presented in Table 6 below:

Table 6. Value of Significance of *Loading Factor*

		Estimate	SE	CR	P	Label
Violations behavior	← driving	2.157	309	6.976	***	
Accident	← violations	0.578	089	6.507	***	
X5 behavior	← driving	1.478	219	6.750	***	
X4 behavior	← driving	1.226	166	7.400	***	
X3 behavior	← driving	1.386	205	6.757	***	
X2 behavior	← driving	0.781	214	3.656	***	
X1 behavior	← driving	1.000				
X6	← violations	1.000				
X7	← violations	0.780	078	9.990	***	
X8	← violations	0.774	115	6.744	***	
X9	← accident	1.000				
X10	← accident	0.973	140	6.951	***	

Regression Weights: (Group number 1 - Default model)

From the above output display, since all P values are ***, it can be concluded that all indicators can explain all constructs. Likewise, there is a significant relationship between constructs. In addition to the probability value (P), a relationship is considered significant if it has a CR (Critical Ratio) value ≥ 1.96. In the table above, all CR values have ≥ 1.96, indicating that the relationship between the indicator and the construct, and the relationship between constructs is significant.

Table 7. *Output Standardized Regression Weight*

Relationship	estimate
Violations ← Riding	0.439
Accident ← Violations	0.375
X5 ←Behavior	0.454
X4 ←Behavior	0.675
X3 ←Behavior	0.454
X2 ←Behavior	0.246
X1 ←Behavior	0.574
X6 ← Violations	0.655

X7 ← Violations	0.787
X8 ← Violations	0.416
X9 ← Accident	0.740
X10 ← Accident	0.674

Source: Output of AMOS V. 22.0

In the table above, the loading factor number shown in the column estimates > 0.5, it showing a close relationship between constructs. For examples result shown in table below.

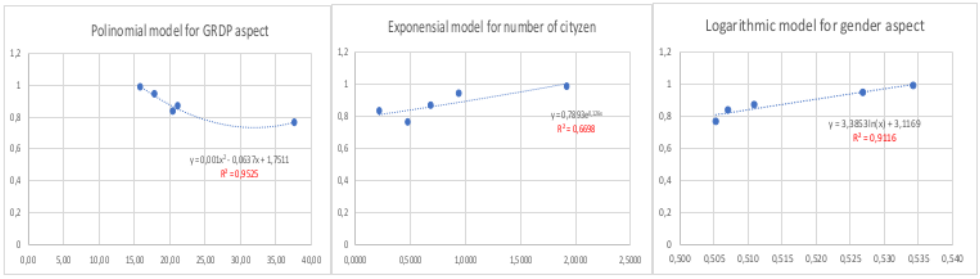
Table 8. Squared Multiple CorrelationsValue, Source: Output of AMOS V. 22.0

	Estimate
VIOLATIONS	0.814
ACCIDENT	0.285

The estimated value of the violation variable is shown in table 8 above [0.814], it can be interpreted that the BEHAVIOR variable affects 81.4% of the VIOLATION variable, while the rest (100% - 81.4% = 18.6%) is influenced by other factors, it is shown with error (e11) where the variable is outside this study. Likewise, the number 0.285 can be interpreted as a VIOLATION variable which affects 28.5% of the ACCIDENTS variable while the rest is indicated by an error (e12). The table above shows that only the X9 and X7 indicators have an effect of above 50%, 54.8% and 62%, respectively. On the one hand, gender and age analyzes for student and college student respondents also showed a difference in significance value (chi-square) between the "behavioral" and "offense" relationships. On the other hand, the gender and age variables also show differences in the significance value (chi-square) of driving behavior on traffic violations and accidents. From 195 male and 179 female respondents, the results of the analysis showed that the significant effect of driving behavior on violations and accidents was 6% lower for female drivers. Students under 17 years of age are more sensitive to traffic violations than others, this condition is different from college studentsresponden.

Overall, the relationship between the behavioral variables on violations or violations with accidents is significant because the probability (P) value is <0.05. and C.R values greater than 1.64, respectively. Thera are a very strong relationship between behavior and violations for both male college students and female college students is shown by an estimate value greater than 0.5, namely 0.981 for students and 0.989 for female students. Analysis of the Effect of Gender Differences on Driving Behavior shown that the estimated value of the relationship between behavior and violation variables in men is 0.994 and 0.695 women (> 0.5), this means that a very strong relationship between behavior and violation is dominated by male drivers, both in students and college students.

Based on data analysis on the model of the influence of driving behavior on violations and accidents on students and students, it is found that the driving behavior model of the community on the Mataram City based on the review of the economic and social aspects shows a model with a variety of patterns where the GRDP review follows the Polynomial model, based on the number of citizen population, the tendency of the Exponential model and the review of the gender probability aspect follows the Logarithmic model pattern.



a.Polinomial model b. Exponential model c. Logarithmic model

Figure7. A Simple Model the Influence of Driving Behavior to Violations and accident for several aspect

5.Conclusions

Based on the data analysis and discussions that have been done, few main conclusions are as follows:

1. Driving behavior has a significant effect on traffic violations with a probability value (P) = 0.000 (<0.05), and a CR test value> 1.64, where the estimated value shows the effect of behavior on violations on male students is 30.08% stronger than female students, and the effect of behavior on violations in female college students is 0.8% stronger than male college student.
2. Traffic violations have a significant effect on traffic accidents with a probability value of 0.000 (<0.05), and a CR test value> 1.96, where male students have a 50.1% stronger effect on accidents than female students, while Traffic violations by male college students against accidents were 2.44% stronger than female college students, this means that there is a significant difference (chi-square) between behavior and violations based on gender
3. A simple model shows that the tendency of changes in the income value or gross regional domestic product (PDRB) of the region and the number of populations give a higher impact of violations and a greater potential for accidents

References

[1] Anonim, Undang-undang Republik Indonesia Nomor 22 Tahun 2009 tentang Lalu Lintas dan Angkutan Jalan, Jakarta (2009) (in Indonesia).
[2] D.W. Ikroom, Bengkulu University, (2014) (in Indonesia)
[3] Sugiyono, Alfabeta, Bandung. (2010) (in Indonesia)
[4] Suteja, W., at all, Matecconf144, 4thICRMCE InternationalConference, Solo, Indonesia, (2018).
[5] Suteja, W., at all, ICAnCEE International Conference, Bali, Indonesia, (2018)
[6] Suteja, W., at all, 3thICST International Conference, Mataram, Indonesia, (2018).
[7] Wesli, Teras Jurnal, Vol. 5, No. 1, Maret 2015, p. 43-50. (2015) (in Indonesia).
[8] J. Bergdahl, The Social Science Journal, 42, 595–601),(2005)
[9] J. Bergdahl, M.R. Norris, M. R, The Social Science Journal, 39, 287–293), (2002)
[10] I. Ghazali, I, Diponogoro University, Semarang. (2011) (in Indonesia).
[11] Suraji, A., Widyagama Malang University,(2008) Jurnal Transportasi Vol. 10 No. 2 Agustus 2010: 125-134. (in Indonesia).
[12] Santoso, S., PT Elex Media Komputindo, Jakarta. (2014) (in Indonesia).

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