Foreign Tourists' Aggressive Driving Behavior in the Eyes of Bali Local Resident

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Abstract: Many foreign tourists choose to drive themselves on their vacations in Bali. Naturally, they will utilize the driving knowledge, skill, and attitude learned from their countries of origin and at same time be exposed to a different road environment. This combination may create aggressive driving behavior and become potential risk for local resident. This study aims to identify the factors of aggressive driving behavior carried out by tourists. With questionnaires that are distributed to more than thousand local people, they are required to assess aggressive driving behavior using 5-point Likert scale in three measured variables; aggressiveness, frequency, and weighted. The data are analyzed with factor analysis method, using IBM SPSS 25 software as the statistical tool. The analysis shows that according to local residents of Bali, tourists' aggressive driving behaviors comprises five factors: negative intention and emotion, risky driving, physical threat, psychological threat, and improper driving.

Keywords: driving tourist; driving behavior; aggressive driving; local resident; potential risk

1. BACKGROUND

WHO in 2015 stated that traffic accident was in the top ten mortality factor, causing 1.34 million people's death all over the world. This issue has become a special concern in Indonesia that ranks third in Asia for the number of deaths by traffic accident. Indonesian National Police, in 2017, also stated that there are 105,374 cases and 24,213 people died of traffic accidents (equal to 3 deaths per hour); 73% of which involve motorcycle, and the major cause is human factor. Human factor is very important in driving because it determines how motorists adjust to vehicles, traffic, and the road environment when they drive certain vehicles that will shape their driving behavior. Failure to adjust the new driving environment cause serious accident (Huang et al, 2006) that lead to traffic safety issue (Kaiser et al, 2016; AAA Foundation for Traffic Safety, 2009), and, on the other perspective, they greatly impact people's lives and economy (McTish and Park, 2016)

Foreign tourists who drive private vehicles can be found in Bali easily. The most common vehicles are motorbikes and cars that are rented in local businesses in Bali. This choice is popular due to the lack of integrated transportation system to reach tourist destinations in the island of Bali. The absence of reliable public transportation makes the tourists depend their journey on personal mode of transportation rather than public transportation. Personal transportation mode is seen as a comfortable means of mobility because it offers satisfaction, experience, and privacy. Driving a vehicle in and to tourist

destinations means that a foreign tourist performs drive tourism (Prideaux and Carson, 2011), and it is often seen as a tourism activity that has potentials to boost rural and regional economic development (Rolfe and Flint, 2017) by unavoidable increase of vehicles (Hardy, 2011). Driving tourism has the potential as an alternative tourism activity in Bali, but at the same time will increase safety issues caused by the driving foreign tourists especially related to the acceptance or tolerance of local residents towards driving tourists (Marpaung and Shimizu, 2018)

When the foreign tourists drive, they will drive with their primary driving knowledge, skill, attitude, and experience that they gather in their original countries. In their new driving environment in Bali, they may show out unusual tourist driving behavior (Lee and Jang, 2017). Foreign tourists prone to misunderstand rules, violate local traffic rule, and involve in accident (Yoh et all, 2014; Choocharakul & Sriroongvikrai, 2017) more than local residents. In 2017, Bali Police issued a special warning to foreign tourists who rode motorcycle to always obey or follow the road regulation, or else they will face criminal charges rather than traffic charges. This order was issued as an effort to suppress accident fatality rate that increased by 8%, with the accident involving motorcycle rate increased by 11% from 2016's rate. This warning illustrates how troublesome tourists' driving behavior is; not because they have poor driving ability, but they tend to drive aggressively, especially when riding motorcycle. This aggressive driving behavior has become an important issue to overcome and understand when Bali want to encourage drive tourism.

Existing researches conclude that aggressive driving behavior has a lot of understandings or definitions with many factors that represent it. In those researches related to aggressive driving behaviors, most use self-reported questionnaire in order to measure the aggressive level of driving behavior and use only a single variable to estimate that aggressiveness. The result of analysis of such researches has possibly be affected by the respondents' subjectivity in seeing the aggressiveness (Parker et al, 1998). This study identifies the factors that can represent aggressive behaviors of tourists according to locals' perceptions. Local residents' perception is an important aspect to ensure the sustainability of driving tourism because local residents have an important role in tourism activities and they have power to support or damage the driving tourist activities (Cheong & Miller, 2000) and local residents make judgments based on their perceptions and experiences not based on expert understanding (Slovic, 1987)

Aggressive driving behaviors are related to the increasing risk of traffic accident (Rowden et al, 2016) and the local residents also regard foreign tourists' driving behaviors as a potential risk to traffic conflict or accident. Although local people see driving tourists as an opportunity to boost tourism, on other side, they do not want to involve in traffic conflict or accident. Since driving tourists are considered as a potential risk, it should be measured using risk analysis approach and evaluated not only based on single aggressive variable to get the exact value of aggressive driving behavior. As a potential risk, aggressive behavior can be assessed to figure out its potential severity and its likelihood of happening (Anghel, 2014). Potential severity is defined as level of aggressiveness (severity) of driving behavior and likelihood is defined as potential frequency (likelihood) of driving behavior. In this study, the importance level, represented as weight (level of importance), is also considered to get more precise value of aggressive driving behavior

This study offers a way to estimate aggressive driving behavior factors based on local residents' perception and identify factors that represent aggressive behavior. The results of this study can be used by the government or the authorities to be able to carry out appropriate actions based on factors identified to reduce aggressive levels of foreign tourists

2. AGGRESSIVE DRIVING BEHAVIOR

Aggressive driving has many different definitions and broad meaning, ranging from less severe behaviors to extreme actions (Vanlaar et all, 2008), and personal perceptions may create different definitions to aggressive driving behavior factors. Dula and Geller (2003) has categorized three major classes of aggressive driving based on several study related to aggressive driving behavior: (1) intentional act of bodily and/or psychologically aggressive behavior toward other drivers; (2) negative emotion felt while driving; and (3) risk-taking behavior. These three classes are constructed from factors that represent aggressive behaviors as shown in Table 1. In this study, 36 factors representing aggressive driving behavior are gathered from Dula and Geller (2003)

Table 1. Factors representing aggressive behavior by Dula and Geller (2003).

No	Factor representing aggressive behavior	Source
1	Running stop/ red light signal	James & Nahl (2000), Tasca (2000), Sarkat et al (2000), Lajunen et al (1998), Shinar (1998), Ellison-Potter et al (2001)
2	Blocking intersection	James & Nahl (2000), Mizell (1997)
3	Failing to yield right of way	James & Nahl (2000), Stradling and Meadow (2000), Tasca (2000), The Steel Alliance (1999 & 2000), Sarkat et al (2000)
4	Weaving in and out of traffic	James & Nahl (2000), Tasca (2000), Sarkat et al (2000), Shinar (1998), Ellison-Potter et al (2001)
5	Speeding	James & Nahl (2000), The Steel Alliance (1999 & 2000), Sarkar et al (2000), Lajunen et al (1998), Hannessy and Wiesental (1999), Ellison-Potter et al (2001),
6	Tailgating	James & Nahl (2000), Tasca (2000), Joint (1995), Mizell (1997), The Steel Alliance (1999 & 2000), Sarkar et al (2000), Ellison, et al, (1995), Shinar (1998), Ellison-Potter et al (2001)
7	Failure to use signal	James & Nahl (2000), Mizell (1997), The Steel Alliance (1999 & 2000)
8	Changing speed erratically	James & Nahl (2000), Tasca (2000), Joint (1995), Ellison-Potter et al (2001)
9	Blocking others' vehicles	James & Nahl (2000), Tasca (2000), Mizell (1997), The Steel Alliance (1999 & 2000), Sarkat et al (2000), Ellison-Potter et al (2001)
10	Throwing threat or insulting language	James & Nahl (2000), Lowenstein (1997), Tasca (2000), Sarkat et al (2000), Lajunen et al (1998), Parker (1998), Hannessy and Wiesental (1999)
11	Gestures	James & Nahl (2000), Lowenstein (1997), Tasca (2000), Joint (1995), Mizell (1997), The Steel Alliance (1999 & 2000), Sarkat et al (2000), Lajunen et al (1998), Parker (1998), Turner (1975), Kenrick & MacFarlane (1986), Ellison, et al, (1995), Shinar (1998), Ellison-Potter et al (2001)
12	Horn-honking	James & Nahl (2000), Stradling and Meadow (2000), Mizell (1997), The Steel Alliance (1999 & 2000), Sarkat et al (2000), Doob & Gross (1968), Turner (1975), Kenrick & MacFarlane (1986), Ellison, et al, (1995), Diekmann et al (1996), Shinar (1998), Hannessy and Wiesental (1999), Ellison-Potter et al (2001)
13	Intentional sudden barking	James & Nahl (2000), Lowenstein (1997), Sarkat et al (2000)
14	Chasing others vehicle	James & Nahl (2000), Stradling and Meadow (2000), Sarkat et al (2000), Turner (1975)
15	Actual use or gesture of using gun/ weapon	James & Nahl (2000), Mizell (1997), Sarkat et al (2000), Hannessy and Wiesental (1999)
16	Using vehicle as battering	James & Nahl (2000), Mizell (1997), Sarkat et al (2000), Hannessy

No	Factor representing aggressive behavior	Source
	object	and Wiesental (1999), Ellison-Potter et al (2001)
17	Overtaking the opposite lane	James & Nahl (2000), Stradling and Meadow (2000), Hannessy and Wiesental (1999)
18	Thinking hostile	Lowenstein (1997)
19	Failure to stop for pedestrian	Lowenstein (1997)
20	Improper passing and lane changing	Tasca (2000), The Steel Alliance (1999 & 2000), Sarkar et al (2000), Lajunen et al (1998), Parker (1998), Shinar (1998)
21	Flashing headlight	Tasca (2000), Joint (1995), Mizell (1997), The Steel Alliance (1999 & 2000), Sarkar et al (2000), Turner (1975), Diekmann et al (1996), Shinar (1998), Hannessy and Wiesental (1999), Ellison-Potter et al (2001)
22	Physical assault	Joint (1995), Mizell (1997), Ellison, et al, (1995)
23	Taking space in parking (more than 1 space)	Mizell (1997), The Steel Alliance (1999 & 2000)
24	Cellular phone usage	Mizell (1997)
25	Offensive bumper sticker	Mizell (1997)
26	Making direct eye contact	Mizell (1997)
27	Overtaking parking space	The Steel Alliance (1999 & 2000)
28	Running yellow light	The Steel Alliance (1999 & 2000)
29	Racing away from traffic light	Lajunen et al (1998)
30	Racing	Parker (1998)
31	Easy to be provoked	Turner (1975), Gulian et al (1989)
32	Quickly seek for vengeance	Turner (1975)
33	Losing Temper	Gulian et al (1989)
34	Annoyed in Intersection	Gulian et al (1989)
35	Impatient	Gulian et al (1989)
36	Sense of power / overcapacity	Gulian et al (1989)

3. METHODS

3.1. Data Collection

The questionnaire is designed to examine local residents' perception about driving tourists, both car drivers and motorcycle riders. Before the questionnaire was distributed, clarification was given to several experts and local residents to ascertain whether the factors that represented aggressive driving behavior were sufficient to assess the behavior of foreign tourists in Bali. Based on the results of the discussion, it was found that there were two behaviors that were often carried out by foreign tourists but not shown in Table 1, namely improper safety equipment and improper clothes. Then these two factors are added to the factors that influence the aggressive behavior found in the questionnaire distributed to the local resident.

The data were collected in 2017 and it gathered 1,035 valid respondents from questionnaires distributed to local residents conducting their activity or living around tourist destinations area such as Kuta, Sanur, Nusa Dua, and Ubud as show in Figure 1. Figure 1 shown scatter of tourism destination area (yellow area), tourist destination (blue square), and data collection area (blue circle). Local residents are defined as residents who live in Bali excluding foreigners and know or have heard information about tourists who drive vehicles on Bali while on vacation. Respondents' data collection was carried out from morning to night every day for 7 days.

The questionnaire consists of two main parts. Part I gathers some information related to local resident's perception about driving tourist activities and Part II covers 38 questions about factor representing aggressive driving behavior done by driving tourists. In this part, all factors are measured using 5-point Likert scale in three dimensions of aggressiveness (scale ranges 1 = Not Aggressive to 5 = Very aggressive), frequency (1 = Never Happen to 5 = Always Happen), and weight (1 = Not Importance to 5 = Very Importance).
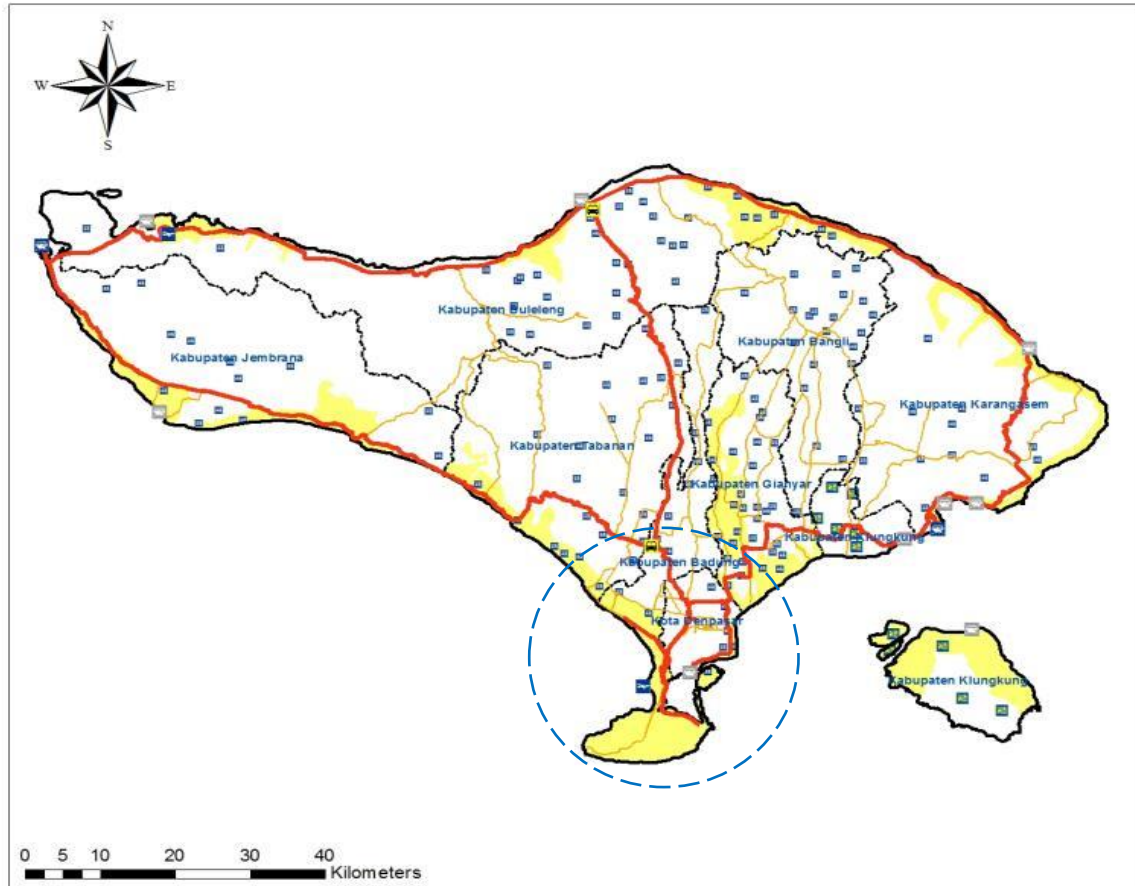

Figure 1   Tourism object and tourism area in Bali Island (MPWH, 2015)

3.2. Data Analysis

Three stages of analysis conducted in this study are generated using IBM SPSS Statistic 25 as statistical tool, to define the aggressive driving behavior factor of driving tourists. Those stages are as follows:

1) Descriptive statistical analysis
   Frequency analysis is conducted to explain circumstances or problems related to local resident perception to driving tourist.
2) Aggressive driving value analysis
   This analysis is conducted to examine and compare the values of aggressive driving generated by aggressiveness (agr) variable that represents the severity of driving behavior, frequency (fre) that represents the likelihood the driving behavior occurrence, and weight (wei) that represents the importance of driving behavior to

overall aggressive driving. In this study, aggressive driving is referred to as Aggressive Driving Behavior Recognition (ADB_R) and value of which is based on local resident observations.

The reliability and validity of analysis are evaluated to compare aggressive driving value of the three tests. The first test assumes aggressiveness (agr) as aggressive driving value. The second test assumed that aggressive driving is constructed by aggressiveness (agr), and frequency (fre) is calculated using equation (2), employing approach to risk analysis of equation (1). The third test assumed that aggressive driving is constructed by aggressiveness (agr), frequency (fre), and weight (wei) calculated in equation (3) using simple multiplication process. Aggressive driving value for the three tests are set between 1 to 5, so that those values are comparable. The second test, using the approach to risk assessment (Anghel, 2014), is calculated as follow:

$$Potential\ Risk = Severity \ \times Frequency \qquad\qquad (1)$$

$$(2)$$

$$ADB_R \ = \ \sqrt[2]{\prod_{i=1}^{j}(agr \ \times fre)}$$

The third test, applying the approach to risk potential and considered importance (wei) variables, is calculated as follow:

$$(3)$$

$$ADB_R \ = \ \sqrt[3]{\prod_{i=1}^{j}(agr \ \times fre \ \times \ wei)}$$

3) Factor analysis
   In this study, the type of factor analysis employed is Exploratory Factor Analysis (EFA). EFA method is used to generate less number of latent variables which represent original variables (Henson and Robert, 2006). Reliability and validity analysis should be done before factor analysis is conducted (Wang et al, 2018). Reliability test measures Cronbach's α coefficient and it has value above 0.70 (Hair et al, 2014), validity analysis measures KMO (Kaiser-Meyer-Olkin) whose value is closer to 1, and Bartlett spherical test measures F value sig. < 0.05.

4. RESULT

4.1. Descriptive Analysis

The data of perception to driving tourists is shown in Table 2. Local residents mostly can distinguish (mean = 4.00) local residents from foreign tourists and they see that sometimes

tourists (mean = 3.00) violate traffic regulations. Meanwhile, local residents feel that tourists' driving behaviors tend to be aggressive both in driving a car (mean = 3.43) or a motorcycle (mean = 3.67). This condition shows that aggressive driving is related not only to violation of traffic regulation, but also to violation local rules and manner. Violation to traffic regulations and local rules or manner lead to lower acceptance from local resident to car (mean = 2.26) and motorcycle (mean = 2.21) driving tourists.

Table 2 Perception to Driving Tourist

No	Questions	Frequency (%)				
		Never	Rarely	Sometimes	Often	Always
1	Can you distinguish tourist driver and local resident driver?	2.5	5.6	22.7	28.2	40.9
2	Do driving tourist involve in traffic violation?	4.5	19.5	50.2	23.2	2.5
		Not Agr	Less Agr	Indifferrent	More Agr	Very Agr
3	How aggressive tourist driving car in Bali?	4.3	6.5	42.3	38.0	10.0
4	How aggressive tourist driving motorcycle in Bali?	2.9	6.2	30.1	42.1	18.6
		Not Acc	Less Acc	Indifferent	More Acc	Very Acc
5	Do you accept tourist to driving car in Bali?	22.8	38.6	29.5	8.3	0.8
6	Do you accept tourist to driving motorcycle in Bali?	26.1	38.3	25.6	8.9	1.1

4.2. Aggressive Driving Behavior Recognition

Three values are tested for Aggressive Driving Behavior Recognition (ADB_R) to examine which values make better reliability and validity to collect data, as shown in Table 3. From the table of comparison, Value 1 for reliability in component number 4 is 0.671, less than 0.7, as recommended minimum Cronbach's Alpha (Hair et al, 2014). Most of value 3 have better reliability and validity data compared to value 2 with same number of components of factor generated. According to this justification, value 3 is used for the next factor analysis.

Table 3. Comparison Value 1, 2 and 3

		Value 1 (agr)	Value 2 (agr x fre)	Value 3 (agr x fre x wei)
Overall reliability	Cronbach's Alpha	0.952	0.955	0.959
KMO, Sample adequacy		0.956	0.959	0.960
Bartlett's test	Approx. Chi-square	20800.180	22084.667	23964.373
	df	703	703	703
	sig	0.000	0.000	0.000
Initial Eigenvalues Cumulative		55.1%	57.1%	59.2%
Rotated Component Matrix		4	5	5
Internal Reliability				
Component 1	Cronbach's Alpha	0.913	0.915	0.923

Component 2	Cronbach's Alpha	0.877	0.844	0.864
Component 3	Cronbach's Alpha	0.780	0.863	0.859
Component 4	Cronbach's Alpha	0.671* (<0.7)	0.800	0.821
Component 5	Cronbach's Alpha	-	0.713	0.740

4.3. Factor Analysis

The result of reliability and validity analysis is shown in table 3. The overall components of Cronbach's α coefficients is 0.956, and internal reliability for component 1 is 0.923; component 2 is 0.864; component 3 is 0.859; component 4 is 0.821, and component 5 is 0.740, all of which are above 0.70. It means that the ADBR data is adequate and reliable to use in further analysis. Kaiser-Meyer-Olkin (KMO) value is 0.960, close to 1, and F value of the Bartlett's spherical test equals to 0.000, which means that data has a good constructed validity.

Factor analysis is conducted to get fewer factors that can represent information of larger factor number. In this study, factorial loading is determined using principal component analysis, varimax rotation, eigenvalue of > 1, and factorial loading of > 0.6. The factors are reduced from 38 to 24 in 5 groups, after the rotation is converged in 8 iterations and is shown in Table 4 and summary of factor loading is shown on Table 5 as follows:

Table 4. Loading Factor

No	Factor represent aggressive behavior	Component				
		1	2	3	4	5
1	Running stop/red signals		0.615			
2	Blocking intersection		0.722			
3	Failing to yield right of way		0.675			
4	Weaving in and out of traffic		0.627			
5	Speeding		0.631			
6	Tailgating		0.612			
8	Changing speed erratically		0.692			
9	Blocking others vehicle		0.640			
10	Communication treat or insult voice				0.684	
11	Gesture				0.737	
13	Intentionally barking suddenly				0.613	
15	Actual use or gesture use gun/ weapon			0.727		
16	Using vehicle for battering object			0.777		
22	physical assault	0.622				
23	Taking space in parking (more 1 space)	0.684				
25	Offensive bumper sticker	0.618				
26	Making direct eye contact	0.683				
27	Overtaking parking space	0.736				
31	Easy to be provoked	0.655				
32	Quickly seek for vengeance	0.738				
33	Losing Temper	0.722				
34	Annoyed in Intersection	0.632				
37	Improper safety equipment					0.752
38	Improper clothes					0.791

Table 5. Factor Analysis result

No	Component 1	Component 2	Component 3	Component 4	Component 5
1	Physical assault	Running stop/ red light signals	Actual use or gesture use gun/ weapon	Communication treat or insult voice	Improper safety equipment
2	Taking space in parking (more 1 spaces)	Blocking intersection	Using vehicle for battering object	Gesture	Improper clothes
3	Offensive bumper sticker	Failing to yield right of way		Intentionally barking suddenly	
4	Making direct eye contact	Weaving in and out of traffic			
5	Overtaking parking space	Speeding			
6	Easy to be provoked	Tailgating			
7	Quickly seek for vengeance	Changing speed erratically			
8	Losing Temper	Blocking others vehicle			
9	Annoyed in Intersection				

Dula and Geller (2003) only divides dangerous driving behavior factors that are often associated with aggressive driving behavior into three groups, namely intention, negative emotion and risky behavior. Based on the result, this study provide more detailed groupings as follows; Component 1 is related to intention and emotion, Component 2 is related to risk-taking behavior, Component 3 is related to intention, Component 4 is related to intention, and Component 5 is related to risk-taking behavior. Component 5 is one of the findings in this study. Specifically for the Bali, improper driving in the form of not using safety equipment and not using proper clothing is one of the factors that causes foreign tourists to be said to behave aggressively. Humid and hot weather is always used by tourists to not use the equipment and use it properly to drive vehicles in Bali.

One way to reduce aggressive behavior is to discipline drivers with law enforcement in the traffic rules. However, even if it does not violate the traffic rules, some driving behaviors still categorized as aggressive behavior based on the views of the local resident. For that each component should classified by the category of violating or not violating traffic rules so that appropriate countermeasures can be determined to reduce the occurrence of aggressive factors as show on 6.

Table 6. Aggressive driving factor based on local perception

	Intention	Emotion	Risk taking behavior
Traffic rules violation	3. Physical threat		2. Risky Driving
			5. Improper driving
Non-Traffic rules violation	1. Negative intention and emotion		
	4. Psychology threat		

Based on table 6, factors that affect aggressive driving behavior are as follow:

1) Negative intention and emotion. These are related to the intention to harm other road users and have negative emotion during driving, but not violate the traffic rules. The example is physical assault; this behavior has intention to harm other people and may be charged with criminal rules rather that traffic rules.

2) Risky driving. This is related to risky driving without the intention to harm other road users, but violates the traffic rules. The example is going through the red light or stop sign. This behavior has no intention to harm other road users, but it violates traffic regulation.

3) Physical threat. It is related to the intention to physically harm other road users and potentially violates traffic regulations, such as using a vehicle to smash other object. This behavior has intention to harm other road users and may violate traffic regulations and/or get criminal charge.

4) Psychological threat. This is related to intention to harm other road users psychologically, but does not violate traffic regulations. The example is insulting voice. This behavior has intention to harm other road users psychologically, but it does not violate traffic regulations.

5) Improper driving. Finally, this is related to risky driving with no intention to harm other road users but it violates traffic regulation. The example is the improper use of clothes. This behavior has no intention to harm other road users, but it violates traffic regulations. People need safety equipment including proper clothes when driving to reduce the fatality of the driving.

5. CONCLUSION

Exploratory Factor Analysis (EFA) is used to obtain factors of Aggressive Driving Behavior Recognition (ADBR) according to local residents. In this study, the value of aggressive driving is calculated by considering three variables; aggressiveness, frequency, and importance which provide better reliability (Cronbach alpha) and validity (KMO and Significant). These values are used in factor analysis and generate five factors; negative intention and emotion, risky driving, physical threat, psychology threat, and improper driving more detail grouping compare to Dulla and Geller (2003).

This result shows the factors that must be of concern to the government and the authorities. In attempt to encourage tourists to drive in Bali, they should they must consider the local residents perception as one of the stake holders in tourism activities in Bali. In addition, they can carry out policies both in terms of transportation and tourism by involving the local community. Some things that can be done in the transportation sector are by increasing the law enforcement in the field of traffic and providing education about driving safety for tourists and for local residents. Because aggressive behavior of tourists can be an act of adaptation to the traffic conditions in Bali and adaptation to the driving behavior of local residents. In addition, carrying out traffic engineering such as the installation of surveillance cameras can reduce the potential of tourists to be aggressive. And things can be done in the tourism sector is introducing local culture to increase awareness of foreign tourists when entering sensitive areas such as places of worship or temples and involving local communities as law enforcers in their respective regions

Future researches are encouraged so as to get better understanding of aggressive driving behavior. This study analyses driving tourists, those who use both motorcycle and car.

In the current condition, motorcycle takes more than 70% of traffic composition and dominate the road capacity. If the composition of traffic changes, the perception of aggressive driving might be different. The location of study and the existence of domestic tourist drivers may also become affecting factors of aggressive driving. further studies are also needed by comparing the results based on the approach of perception and traditional approaches (self-reported).

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