Available online at www.scientiaresearchlibrary.com

Scientia Research Library

ISSN 2348-0416
USA CODEN: JASRHB

Journal of Applied Science And Research, 2018, 6 (1):9-15

(*http://www.scientiaresearchlibrary.com/arhcive.php*)

PREDICTIVE ANALYSIS OF EXTERNAL FACTORS INFLUENCING THE SAFETY DRIVING BEHAVIOR AMONG INTER-CITY BUS DRIVERS IN EAST JAVA-INDONESIA

Dewi Kurniasih[1, 2], Tjipto Suwandi[3], Hamidah[4], Rachmat Hargono[5]

[1]Doctoral candidate,The Faculty of Public Health, Airlangga University, Surabaya, Indonesia
[2]Occupational Health Departement, Surabaya Shipbuilding Institute of Polytechnics, Indonesia
[3] Occupational Health Departement, The Faculty of Public Health, Universitas Airlangga, Surabaya, Indonesia
[4]Behavioral Department, The Faculty of Psychology, Universitas Airlangga, Surabaya, Indonesia
[5] Health promotion Departement, The Faculty of Public Health, Universitas Airlangga Surabaya, Indonesia

---

ABSTRACT

Background and aims:*The objective of this present research is to evaluate external factors consisting of the recruitment system of the bus driver, the speedometer condition, the speed limit during the day and night and the longest shift, the production year of the bus, the amount of the paid-in money, the trips per day and the income system as the prediction for the safety driving of the City Transport bus drivers in East Java province-Indonesia.****Methodology:****A quantitative approach with the analytical observational type and a cross sectional study design was employed.A systemic random sampling was employed in this present research to take the buses entering into the terminal each here where the data on the drivers were determined as the sample.****Analysis:*** *The variables of "turning off the speedometer during the driving activities, and "using a bus with theproduction year before 1990 are the predictive factors causing bad safety driving behavior among the Inter-city bus drivers in East Java province.****Conclusion:*** *From the results of the analysis, it is known that all variables from the external condition contributed to the safety driving behavior.*

Keywords : predictive, intercity bus driver, external, safety driving

---

INTRODUCTION

In Indonesia traffic accidents according to WHO are considered as the third greatest killers, while in the world, the traffic accidents become the main cause of death among children with the age range from 10-25 years [21].

The number of vehicles in Indonesia greatly increases each year. Up to 2016, the number of the vehicles was 124,348,224 units, where 2,398, 846 units are buses, and 437,186 bus units were operated in East Java[2,3]. According to the data from the Regional Police Office in East Java, in

2016, the greatest traffic accidents occurred at 06.00 – 12.00 namely 31.96% that involved bus amounting 14.4% from the total accidents.[13].

According to Gregerson et al., and Sagberg et al., factors that may minimize the number of accidents are among others the organization strategy such as travel scheduling, work predictability, payment system, fatigue management, proper training, and employee's driving fit, and the characteristics of controlled driving environment [17]. The first thing to do to avoid traffic accidents in the street is to motivate the drivers to change their driving behavior with the motivation to train safety driving. The second is to make the drivers implement the motivation in the street. Before the motivation is promoted, some cognitive changes should be made since the motivation itself is the function of the three social cognitive variables

[10]. The change may happen due to the supporting drivers' external factors. This present research would examine the external factors of the Inter-city buses drivers in East Java province what may be used as the factors to predict road accidents

MATERIAL AND METHODS

A systemic random sampling was employed in this present research to take the buses entering into the terminal each here where the data on the drivers were determined as the sample. The criteria of the drivers who had been taken as the sample would be substituted by the bus drivers with the order of the fifth interval for the next sample. The number of the samples was given the questionnaire was 215 drivers but the questionnaires returned and analyzed were 204 drivers from the total population of 516 drivers.

Findings

The variables of the drivers' External Conditions influencing the safety driving behavior and the results of the cross tabulation are presented in Table 1. The result of the bus driver recruitment system variable through recommendations from fellow drivers showed that the drivers had the tendency to drive safely in good category (15.5%). This condition may happen since the drivers working for the bus company through the recommendation will try to keep a good friendship with the persons giving recommendation.

Dealing with the condition of speedometer, it was shown that if the speedometer is on, the drivers tend to have safety driving behavior under good category, whereas when the speedometer is off, the drivers showed less category, The drivers driving at 60-80 km/hour in the morning to in the afternoon tended to have safety driving behavior under good category. The drivers who drove at night with the speed limit of 60-80 km/hour also were under good category (20%) in the safety driving behavior.

The buses that were mostly driven by the drivers were buses with the production codes from 2001 to 2010, and the drivers were under good category (18.5%) in their safety driving behavior. The drivers who gave the paid-in money with the amount of IDR 2.1 millions to IDR 2.5 millions tended to show good category (57.29%) in the safety driving behavior. This happens since the premium system given in this level was far higher. The drivers who should reach three trips (one trip = one travel to and fro) in a day tended to show the safety driving under good category (21.1%). This category would be lower when the number of trip was higher in a day. In the income system, the highest income obtained by the drivers are the premium system and this was under good category (16.8%) in terms of the tendency of safety driving behavior. This happens since the drivers get a high percentage in this system.For complete information, see Table 1.

Table 1. Cross Tabulation External Conditioning with Driving Safety intercity driver in East Java-Indonesia

No	*Safety Driving*	Baik		Cukup		Kurang		Total	
		n	%	n	%	N	%	N	%
1.	Recruitment system of bus drivers								
	Through a friend's recommendation	7	16,27	30	69,76	6	13,95	43	21,07
	Through the test	25	15,5	121	75,2	15	9,3	161	78,92
	Total	32	15,68	151	74,01	21	10,3	204	100
2.	Speedometer Condition								
	Intentionally switched off	2	16,7	8	66,6	2	16,7	12	5,88
	Damaged condition	16	13,4	93	78,2	10	8,4	119	58,33
	Good condition	13	17,8	51	69,9	9	12,3	73	35,78
	Total	31	15,20	152	74,50	21	10,3	204	100
3.	Speed limit used in the morning								
	60-80 kh	11	18,9	40	69	7	12,1	58	28,43
	81-100 kh	20	13,8	111	76,6	14	9,6	145	71,07
	101-120 kh	0	0	1	100	0	0	1	0,49
	Total	31	15,20	152	74,50	21	10,3	204	100
4.	Speed limit used in the nigth								
	60-80 km/jam	3	20	11	73,3	1	6,7	15	7,35
	81-100 km/jam	13	15,3	63	74,1	9	10,6	85	41,67
	101-120 km/jam	15	14,4	78	75	11	10,6	104	50,98
	Total	31	15,20	152	74,50	21	10,3	204	100
5.	Bus production year ridden								
	Bus production under 1990	1	16,7	4	66,6	1	16,7	6	2,94
	Bus production year 1990-2000	9	14,5	45	72,6	8	12,9	62	30,39
	Bus production year 2001-2010	15	18,5	59	72,8	7	8,7	81	39,70
	Bus production year over 2010	6	10,9	44	80	5	9,1	55	26,96
	Total	31	15,20	152	74,50	21	10,3	204	100
6.	Vehicle driving time								
	Driving in the morning until noon	8	15,1	38	71,7	7	13,2	53	25,98
	Driving day and night	10	12,8	63	80,8	5	6,4	78	38,23
	Driving night until morning	13	17,8	51	69,9	9	12,3	73	35,78
	Total	31	15,20	152	74,50	21	10,3	204	100
7.	Deposit amount								
	IRD a half million – IRD 1 millions	12	14,8	58	71,6	11	13,6	81	39,70
	IRD 1.1 millions – IRD1.5 millions	15	16,5	69	75,8	7	7,7	91	25,01
	IRD. 1.6 millions - IRD.2 millions	0	0	22	88	3	12	25	12,25
	IRD. 2.1 millions – IRD.2.5 millions	4	57,14	3	42,86	0	0	7	1,96
	Total	31	15,20	152	74,50	21	10,3	204	100

8.	Trips per day								
	2 Trips	5	14,3	25	71,3	5	14,3	35	17,15
	3 Trips	16	21,1	54	71,0	6	7,9	76	37,25
	4 Trips	9	11,1	63	77,8	9	11,1	81	39,70
	5 Trips	1	8,3	10	83,3	1	8,3	12	5,88
Total		31	15,20	152	74,50	21	10,3	204	100
9.	Income system								
	Deposit	1	4	21	84	4	16	25	12,25
	Profit sharing	30	16,8	131	73,6	17	9,6	178	87,75
Total		31	15,20	152	74,50	21	10,3	204	100

RESULTS AND DISCUSSION

Analysis

A good selection and recruitment of the drivers were adopted in order to obtain good human resources. For entrepreneurs, high quality drivers really determine the continuation of the company, for the consumers, such drivers are needed to assure their safety and comfort in their trips, and for the government, the high quality drivers help the government' programs on the improvement of safety in the street. At present, however, it can be stated the number of such high quality drivers is very limited, because the drivers of public transports either the bus or other public transports, obtain their driving skills in an self-educated way instead of official education. Moreover, the recruitment system of new drivers still adopts recommendations from fellow drivers instead of official test.

Dealing with the flow of a driver recruitment, the first thing to do to give an announcement of open recruitment, then some candidate drivers submit their CV to the Bus Company, they are screened, and required to do a series of tests either theory or practice. The theory usually includes the knowledge of the traffic regulations, the practice is the machine control ability and the direct test of driving buses, either in the field or on the street. If in this stage the candidates may pass the tests, they should do some trials by being involved in operational activities. Usually they will be asked to accompany the main drivers and once in a while are allowed to substitute the position of their seniors to be familiar with the route for one or two weeks. Thetheir capacities are risen from the positions as the reserve drivers into permanent drivers. But this kind of process is rarely done completely, due to the limited number of bus drivers in each bus company. It is I contradiction with the Law No. 22 year of 2009 on the Land Transportation Traffic stipulating that education and training should be given for those who expect to become public transportation drivers. Anyone proposing driving licenses for public transportation are required to have competence certificates from the institutions of training and education recognized by the government [19].

Concerning with the speedometer condition, most drivers responded that the speedometer was off because of out of order, instead of being turned off intentionally. The speedometer should be on, in order to know the speed of the vehicles after crashes (the first and next crashes). The sign resulted (the sing of post crash) may show the vehicle speed when a crash occurs. The speedometer that is out of order maydistract the safety and this may cause risks for fatal accidents, because speedometer is an instrument that may be used to know the speed limit during the driving, and be used as a reference for estimation for pushing the brake and for the evidence if an accident occurs.

Actually it is easy to know whether a speedometer functions well or not. The needle pointer usually

refers to the number 0 kh and does not move although the gas pedal is pushed. Another sign is that the needle pointer moves up and down when the vehicle moves. Sometimes the needle moves slowly. For example, when the vehicle move at the speed of 80 kh, but the speedometer just refers to 30 kh. This speedometer condition may often be found either because it is done intentionally or the cable is cut. The damaged gearbox serving to channel the power to other parts of the machine may also result in improper work of the speedometer. But it may also happen that it is the speedometer that is damaged.

The speed limit done by the drivers in morning to the afternoon was from 81-100 k/h and at night to the morning was 101-120k/h. According to the National Safety Council, the highest speed which violates the allowed speed often happens in rural areas[18]. The warning about the speed limit is often neglected, especially at night. Many people experience an "outburst of emotion" by driving in full speed after they pass through a crowded area where they cannot drive quickly to offset the time loss [9]. Many drivers drove their buses above the allowed limit speed because at night no police watched them and the traffics are not crowded. This kind of behavior is not in line with the Law No. 22 Year of 2009 on Traffic and Land Transport article 4 verse 21 that the lowest speed limit in the highway is determined with the absolute limit of 60 k/h, and in the free wave traffic in the city is 60k/h, in the inter city road is 80k/h, and toll, 100 kk/h. This regulation is also in line with the regulation issued by the Ministry of Transportation namely the Minister Regulation No. 111 year of 2015 on the Procedures of Determining the Speed Limit of Vehicles around 60-80 k/h which is the implementation of the President's Instruction No. 4 Year of 2013 regarding the Decade of Action for Road Safety Program. According to WHO, the average speed increase of one k/h causes the increase in the severity risk in traffic accident of 4-5% [14,15,19,20]. It is because the vehicle speed in the street is directly proportional with the severity level of traffic accidents[21]. Moreover, the research conducted by Sherry L. Baron and Sang Woo Tak stated that drivers would often experience fatigue when they should drive at night shift [16]. This finding is supported by the*Centre for Accident Research and Road Safety* – Queensland (2011) that one who is driving at a time where he should be sleeping would face risk of experiencing *microsleep*[5]. *Microsleep*is a condition where one often "yawns" or is sleepy. The symptoms shown by someone with microsleep is that his concentration is bad, his attention loses, and his gaze is empty.

Most buses driven by the drivers were produced from 2001 to 2010. From the research results of the Centre for Accident Research and Road Safety – Queensland (2011), buses contributed 10% of the causes of accidents. The newer the bus, the more specific the chassis is made. Chassis is the whole safety system that may work maximally. If all body specifications have followed the chassis specification then it may minimize any construction error and overload, and minimize the effects of accidents on the passengers [5]. Although a bus is produced earlier, if it is well maintained, it is feasible.

The most time used by the drivers to drive their buses was at night to morning. It is not far different from the number of the drivers of the Inter-City in the Province who drive their buses in the day and at night. The time of traffic accidents in East Java was 06.00 to 12.00 (in the day), while the driving time which is mostly done by the bus drivers is at night to morning (00.00 to 06.00). The results of the structured interviews with the drivers showed that the accidents involving buses mostly happen at the busy hours between 06.00 to 18.00, because it is the time where the students go to school and go home and the adults go to work. The accidents involving students were usually caused by the fact that the motor cycles (dominated by students) hit the buses. But the media usually form opinions that it is the buses that should be accused of in the accidents. It is usually stated that bus X hit a motor cycle. As a result the people think that the causes of accidents are buses, because media is used as a very good tool to change opinions [1].

The amount of paid-in money every day according to the drivers was from IRD 1,1 millions to 1,5 millions, where the trip that should be done is 4 trips. The income system adopted is the profit sharing system per day namely 10% to 17% from the total income per day. According to Murniati, and Dhamanya, et all in their researches on the bus driver of Metromini, one of the conditions the drivers faced is that they should pay a high amount of money, whereas on the other hand, the condition in the field did not support the fulfillment of the paid-in money targeted, moreover, there are many "illegal charges" along their routes [7,12].Chen, et all stated that a system which is very inefficient such as the overlapping division of routes and the high level of competition among buses, causes the financial condition of the drivers is not good[4].

From the results of the unstructured interviews with some drivers, it was shown that during the week day the number of passengers is fewer, so that they should twist in the middle of the road return and ask the passengers to other buses or they should stop to wait for passengers in certain places. This condition was different from the weekend or long holiday where the drivers should drive their buses fast because there are many passengers who were waiting for the busses. This may increase their incomes. But when their incomes are higher, they should also give a higher amount of the paid-up money.

CONCLUSION

From the results of the analyses, it is known that all variables from the external condition contributing to the driving behavior are among others self-educated driving skills, becoming drivers from the recommendation from fellow drivers, driving above the permitted speed limit, the production year of the bus, and the income system applied. All of them are the the mediating factors that then may be used as the predictive factors that may contribute to the causes of accidents.

REFERENCES

[1] Ashforth, B. E., Sluss, D. M., & Saks, A. M. (2007). Socialization Tactics, Proactive Behavior, And Newcomer Learning: Integrating Socialization Models. *Journal of Vocational Behavior*, vol *70,* edisi 3, pp. 447–462. Sitasi 16 Maret **2016**. http://doi.org/10.1016/j.jvb.2007.02.001

[2] Badan Pusat Statistik. (**2014**). Indeks Pembangunan Manusia 2014. *BPS*. Sitasi 20 Agustus 2017. http://doi.org/10.1017/CBO9781107415324.004

[3] BIN. (**2013**). Kecelakaan Lalu Lintas Menjadi Pembunuh Terbesar Ketiga. *Badan Inteligen Nasional*. Sitasi 29 Maret 2016. http://www.bin.go.id/awas/detil/197/4/21/03/2013/kecelakaan-lalu-lintas-menjadi-pembunuh-terbesar-ketiga

[4] Chen, H.-Y. W., Donmez, B., Hoekstra-Atwood, L., & Marulanda, S. (2016). Self-Reported Engagement In Driver Distraction: An Application Of The Theory Of Planned Behaviour. *Transportation Research Part F-Traffic Psychology and Behaviour*, Vol.38, pp.151–163. Sitasi 30 Januari **2015**. http://doi.org/10.1016/j.trf.2016.02.003

[5] Centre for Accident Research and Road Safety. (2014). *Fatigue*. Sitasion 5 Mei **2015**. http://www.carrsq.qut.edu.au/publications/corporate/fatigue_fs.pdf

[6] Choi, S. Y., Park, J., Kim, Y., Kim, S., & Jung, W. (**2016**). A Study For Unsafe Act Classification Under Crew Interaction During Procedure-Driven Operation. *Annals of Nuclear Energy*, vol 96, pp.187–196. Sitasi 30 Januari 2015. http://doi.org/10.1016/j.anucene.2016.05.020

[7] Dhamaniya, A., & Chandra, S. (2013). Speed Prediction Models for Urban Arterials under Mixed Traffic Conditions. *Procedia - Social and Behavioral Sciences*, Vol. 104.pp 342–351. Sitasi

29 April **2016**. http://doi.org/10.1016/j.sbspro.2013.11.127

[8] Imprialou, M. M., Quddus, M., Pitfield, D. E., & Lord, D. (2016). Re-visiting crash – speed relationships : A new perspective in crash modelling. *Accident Analysis and Prevention*, Vol.86, pp.173–185. Sitasi 10 oktober **2015** . http://doi.org/10.1016/j.aap.2015.10.001

[9] Jones, R. K., & Kent. (1976). A Systems Approach To The Analysis of Transportation Law. *Transportation Law Journal*, vol.11, pp.70–74.

[10] Li, P., Shi, J., Liu, X., & Wang, H. (**2016**). The Theory of Planned Behavior and Competitive Driving in China. Procedia Engineering, 137, 362–371. http://doi.org/10.1016/j.proeng.2016.01.270

[11] Muluk. H. (**1995**). Ketidak Berdayaan Dan Perilaku Ugal-Ugalan Sopir Metromini. Universitas Indonesia. Jurnal Psikologi Praktis. Penerbit UI.

[12] Murniati. J. (1995). Frustasi Dan Perilaku Mengebut Supir Metromini. *Jurnal Psikologi Sosial,* No.5. Sitasion 11 Januari **2015**

[13] Kepolisian Daerah Republik Indonesia, POLDA Jatim (**2016**) Laporan Data Kecelakaan di Jalan Raya. Kepolisian Daerah Jawa Timur

[14] Peraturan Menteri Perhubungan Republik Indonesia Nomor 111 tahun 2015 Tentang Tata Cara Penetapan Batas Kecepatan (**2015**). Sitasi 11 Januari 2015 ppid.

dephub.go.id/files/datahubdat/PM_111_Tahun_2015.pdf

[15] Peraturan Pemerintah Republik Indonesia Nomor 43 tahun 1993 Tentang Prasarana Dan Lalu Lintas Jalan (1993). Sitasi 11 Januari **2015** hubdat.dephub.go.id/peraturan.Menteri-no-43-tahun-1993-tentang-prasarana-dan-lalu-lintas-jalan

[16] Shahraki S, Bakar N.B. (2011). Review of Workforce Fatigue Models in Workplace. Interdisciplinary Journal of Contemporary Research in Business; Jul 2011, Vol. 3 Issue 3, pp. 693. http://eresources.pnri.go.id:2056/docview/887725484/fulltextPDF?accoun tid=25704

[17] Stuckey, R., LaMontagne, A. D., & Sim, M. (**2007**). Working in light vehicles-A review and conceptual model for occupational health and safety. Accident Analysis and Prevention, Vol. 39 Edisi 5, pp. 1006–1014. http://doi.org/10.1016/j.aap.2007.01.009

[18] Safety Institute Of Australia. (**2012**). Models of Causation : Safety.OHS Body of Knowledge. Victoria, Australia.

[19]Undang-Undang Lalu Lintas Antar Jalan Republik Indonesia. Undang-Undang Republik Indonesia Nomor 22 Tahun 2009 *Tentang Lalu Lintas dan Angkutan Jalan* (**2009**).Sitasi 11 Januari 2015. *hubdat.dephub.go.id/uu/uu-nomor-22-tahun-2009-tentang-lalu-lintas-dan-angkutan-jalan*

[20] Undang-Undang Republik Indonesia Nomor 38 Tahun **2004** *Tentang Jalan* (2004).

hubdat.dephub.go.id/uu/54-uu-no.2004-tentang-jalan

[21] World Health Organization. (**2013**). *Global Status Report OnRoad Safety 2013 (supporting a decadeof action)* (Vol. 1).