

The analysis of the factors affecting the severity of traffic accident

Jaehong Park 1^a, Dukgeun Yun 2^a, Junggon Sung 3^a

^a Korea Institute of Civil Engineering and Building Technology 1,2 & 3

Abstract

According to the traffic accident statistics in Korea, the number of fatalities and injuries caused by traffic accidents has been decreasing over the last 5-years. However, since traffic accidents are constantly occurring, it is needed to find out the factors affecting the accident. This study was performed to analyze the factors using the Ordered Probit Model and Random Effect Probit Model. The results of both models were compared to the influence and severity for traffic accidents of vehicle accidents. Independent variables concerning road cross sectional factor and severity of traffic accident were used and the severity of accidents were dependent variables. The results of this study are expected to improve the traffic safety.

Background, Method, Results and Conclusions

In the report of the traffic accident statistics, the number of fatalities and injuries of traffic accidents has been decreasing over the last 5-years but the severity of traffic accident was showed a high value. Especially, the value of vehicle accidents related with the fixed objects on the road shows a 7.9 which is 4 times greater than the average for all accidents. Generally, traffic accidents compacted with the fixed object were related with the road composition such as the radius, vertical curve, cross sectional grade, road width, median, and curb. Therefore, this study was conducted to analyze the factors affecting the traffic accident using the Ordered Probit Model and Random Effect Probit Model. The ordered probit model was mainly used to analyze the severity of traffic accident and random effect model was used to compare the effects of changes in similar sections.

This study was conducted by operating an equipped vehicle to investigate the road information. So, the data at the point where the traffic accident occurred was directly acquired to improve the reliability. The lane width(m), radius(m), vertical curve(%), cross sectional grade(%), road width(m), median, curb, number of main stream, climbing lane, shoulder lane, intersection, weather, drink were used as independent variables. The dependent variable was used as a traffic accident data for 3 years on the national highway of about 2500 km, and classified 3-category(Fatal, severe injury, injury into the severity of traffic accident were classified.

The results of ordered probit model was shown in table 1. The weather is the significant factor between the models. It appeared that the number of observations was 544 and the iterations were 112, the value of log likelihood was -63.43. The same variables were used in random effect probit model. The differences between the models were compared according to the mean, standard error of variables. As a result, the common value affecting the traffic accidents was weather.

Table 1. The results of ordered probit model

Variable	coefficient	Std.	z-value	P-vlaue
Constant	-6.071	8.069	-0.752	0.452
Lane width	0.072	2.206	0.329	0.742
Radius	0.000	0.000	0.091	0.927
Vertical curve	-0.006	0.015	-0.398	0.691
Cross sectional grade	0.015	0.014	1.029	0.303
Road width	-0.006	0.015	-0.040	0.968
Median	0.039	1.407	0.278	0.781
Curb	0.061	0.095	0.642	0.521
Number of main stream	-0.002	0.099	-0.030	0.976
Climbing Lane	-16.400.	1316.000	-0.001	0.999
Intersection	-10.210	246.000	-0.049	0.961
Weather	-1.166	0.077	-1.109	0.268
Drink	-0.001	0.000	-0.024	0.981

It is required to discuss the results from models. And the results of this study are expected to improve the technologies of traffic accident.

References

AASHTO, Median barrier guidelines revision of the roadside design guide, 2005

KoRoad, 2016 Traffic Accident Statistical, 2015

Ministry of Land, Infrastructure and Transport, Development of next generation equipment for road safety inspection, 2012

Ministry of Land, Infrastructure and Transport. Regulation on Geometric design/Facilities Standards of roads, 2013

S. W. Lee, Logit and Probit Model, 2005