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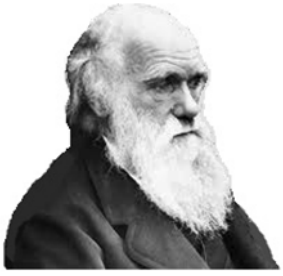

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Survey the effective factors on accidents decrement in the road of Hamadan – Sanandaj

Hooshmand Khaledyan

Department of Civil Engineering, University of Zanjan, Zanjan, Iran

E-mail address: Hooshmand.khaledyan@gmail.com

ABSTRACT

In the current research, we surveyed the effective factors of accidents that had occurred on the road from Hamadan to Sanandaj. Road transportation is an inseparable part and the backbone of all transportation networks of most countries. Driving accidents are considered the major problem of road transportation and the increment process of accidents is so that it has reached crisis proportions. Basically, in road accidents, three factors are considered to be of importance: human activity, road and vehicle condition. The current research is a field study in the terms of data collection method and is considered to be Applied Research in the terms of purpose (or objective) and studied subject nature. The study population consists of suburban public transport fleet drivers working the Sanandaj - Hamadan road (26 persons). The tool was a questionnaire. In order to analyze the statistical data, the resulting information from the questionnaires were firstly extracted and then analysed by applying the Pearson correlation test. The results show that there is a clear relationship between the effective factors of accidents and road accidents.

***Keywords*:** Road, effective factors, vehicle, transportation, accidents

1. INTRODUCTION

Transportation and communication are considered as infrastructure sections of each country's economic and nowadays, this phenomenon is considered as an index of country's development. The transporting policies obviously need a growth to develop along with the increasing orientation for displacement and keep the life quality.

Nowadays, the road accidents are increasing in our country and as a result, their caused financial damages that are imposed on families and government are very high, and according to this matter that the financial and psychological and social damages are inevitable in some cases, it's essential to apply and perform effective solutions for preventing the damages resulted by driving accidents (Salmani et al, 2008). Road accidents are the major cause of death worldwide. During the past decades, on average, almost 2.1 million people are dead due to the road accidents. Approximately 90 percent of accidents occur in developing countries. In recent years, the role of climate changes in road accidents has received the most of researchers" attention. Although it's possible that climate changes do not be considered as the main factor of road accidents, but it's undoubtedly considered as one of the environmental components. Most of the people assume that climate conditions cannot be considered as an obstacle in driving unless in a condition that trip does not be possible because of unsuitable climate and road conditions. Despite this imagination, various studies have been conducted in the field of relationship between climate conditions and transportation. These studies reveal that the risk of road accidents increases under the unpleasant climate conditions (Habibi Nokhandan and Mokhtari, 2005).

Problem design

The annual crashes kill 1.2 million people worldwide and lead to the disability of more than 50 million people. In Europe, more than 40 thousand people annually die and more than 150 thousand get disable because of driving accidents. About 200 thousand families have one disable member due to the driving accidents or they are hurt in the death of their loved ones. Furthermore, the economic costs of driving accidents are devoted 1 percent, 1.5 percent and about 2 percent of gross national product to themselves in countries with low income, medium income and developed countries, respectively (Shaw-PinMiaou, 1994).

The numbers of injuries and deaths from driving accidents in countries with low income are disproportionately high; while there are just 40 percent of vehicles in these countries. The injuries resulted from driving accidents will be the second factor of disability in developing countries and the third factor of death and disability worldwide until 2020. Our country is exposed to various weather conditions along its ways regarding to the existence of elevations and ground transportation network. So that every year, there are more than 270 snowstorms and mountainous mountains of extensive and prolonged glaciations, falling massive avalanches, snowstorms, slipping roads, storm dust and sand, and thus disturbing the transportation network.

The statistics of road accidents in Iran is 20 times more than global average and in the other words, 2.5 percent of world's road accidents are related to Iran. In the survey of related factors to the accidents, we can refer to human, vehicle and road. The current research is up to answer this question that how much there is a relationship between the effective factors on accidents and their decrement?

Importance and essentiality

The current study surveys the human, road and transportation factors utilizing experiences and resources related to the road accidents that how much the studied factors have role in accidents occurrence. This article obviously attempts to present suitable solutions in order to decrease the accidents and study the accident-prone regions along with surveying the level of human, road, and transportation factors.

Literature and history

Khalili et al (2009) in survey the role of human factor in the incidence and severity of road accidents based on LR and CART regression models declare that accidents are one of the biggest problem of general health in the world. This matter is so important because most of the victims are youths that were completely healthy before the accident occurrence. This article surveys the role of human factor among the effective factors on road accidents. The considered statistic society is road accidents which have occurred in Iran, and statistic samples are road accidents that happened in 2006 that were obtained based on the self-selected sampling and they were 343 thousand and 82 items. For data collection, the data sources of 114 road maps which are considered as road accidents have been used. The results showed that human factor was existed in 97.5 percent of accidents. But the role and the relative level of this factor effectiveness to the other factors was 49 percent. The obtained results indicate that 38 percent of those who was killed were not driver. Over 22 percent of killed people in road accidents were consisted of non-manned people including of pedestrians and cyclists. In 48 percent of driving accidents, the severity of drivers' injuries was high. The greatest percent about the effect of human factor in occurrence and severity of road accidents is related to disregard for regulations (64.5 percent) and then drinking and drug use (24.3) which have devoted the highest abundance percentage to themselves.

Al-Imran and Al-Imran (2015) surveyed the long-term relationship between road accidents and their effective factors. The objective and purpose of the current article was to survey the long-term relationship between road accidents and their effective factors in Iran. This research is the causal-analytic method in terms of the method, and the applied in the terms of target and purpose, and also the information collection tool was library and statistics and information related to the used variables in the research were extracted from Central Statistical Bureau of the Islamic Republic of Iran. The tool used in this study is econometrics. In this regard, for estimating the long-term relationship between road accidents and their effective factors, Johansen-Jocelius Coagulation Technique was used.

The results of the research showed that the effectiveness of coefficients of variables was expected based on the theoretical basis and meaningful and significant in the terms of statistics. Also, the results suggest the existence of the Kuznets hypothesis, namely the existence of an inverse relationship between per-capita gross domestic product and road accidents and the other results indicate the existence of positive and meaningful relationship of motor vehicle numbers and per-capita and number of displaced passengers through the road transportation on road accidents.

In evaluation the role of climate elements on road accidents in studying Sanandaj - Saqez road declared the affection of weather effects on road accidents in Sanandaj – Saqez road. Sanandaj – Saqez road with 187 kilometers length is one of the main and dangerous roads of Kurdistan. In this survey, distribution map of accidents and accident risk in each climatic condition (snowy, frosty, rainy, foggy and sunny) are provided. The accidents data in statistical period of 2006-2008 about the road layer were used. Then, according to the abundance of accidents in communication of climate conditions, the categorization and dangerous regions were identified.

In snowy weather, the abundance of accidents is 213 percent between 53 to 87 kilometers; in frosty condition, the abundance of accidents is 21 percent between 93 to 152 kilometers; in rainy condition, the abundance of accidents is 16 percent between 48 to 71 kilometers; in foggy condition, the abundance of accidents is 11 percent between 73 to 85

kilometers and in sunny condition, the abundance of accidents is 9 percent between 51 to 79 kilometers and also in all climate conditions, the abundance of accidents is 493 cases and between 75 to 168 kilometers which has the maximum abundance of accidents that in this regard is considered as dangerous regions. Mohammadi and Mahmudi (2006) studied the effect of climate phenomena on traffic and road accidents in Sanandaj – Hamadan road. They firstly determined the critical thresholds of Sanandaj – Hamadan road and then, analyzed the accidents which were occurred in this road in cold months of the year and reached this conclusion that Esfand with 4.22 percent had devoted the largest amount of accidents to itself. Finally, the importance of current study implies on the role of climate factors in occurrence and severity of road accidents in mountainous conditions. Surveyed the slider of the road surface during rainfall and snowfall. They use sequence map of the meteorological stations of the road register rain or snow on the road surface and 265 Road Meteorological Station data to show the advancement of frontier in Sweden (A.H.R.W. Simpson, 11992; Illingworth, 1981; Katila, 2004).

2. OBJECTIVES

Major objective

- ✓ Survey the effective factors on accidents decrement in Sanandaj – Hamadan road.

Minor objectives

- ✓ Identify the effective human factors in road accidents.
- ✓ Identify the effective road factors in road accidents.
- ✓ Identify the effective factors related to the vehicle in road accidents.

Hypotheses

Major Hypothesis

- ✓ There is a relationship between effective factors in decreasing the accidents of Sanandaj – Hamadan road.

Minor Hypothesis

- ✓ There is a relationship between effective human factors in road accidents.
- ✓ There is a relationship between effective road factors in road accidents.
- ✓ There is a relationship between effective factors related to the vehicles in road accidents.

3. METHODOLOGY

Methodology is a way to achieve deep knowledge and a systematic trick to theorizing or the aim of methodology is the used techniques and methods for collecting and analyzing data.

The used method firstly in this research is analytical – descriptive that for analyzing the results and hypotheses tests, the correlative tests from statistical methods were used.

The society is a collection of possible observations that can be resulted with the repetition of a test which society is totally consisted of a collection of people or units that have at least one common property and the definition of statistic society should be complete and comprehensive (Sarmad, 2005). The statistic society of current research is suburban public transport fleet drivers that work in on Sanandaj - Hamadan road that they are 26 persons.

Information gathering tool

The major data gathering tool of the research is questionnaire. In this regard, the ascertained questionnaire was used. The utilized spectrum in the questionnaire was Likert Spectrum and answers were designed in 5 options.

Statistical analysis method

In order to analyze the statistical data of the current research, the resulted information from the questionnaires were firstly extracted and analyzed and for hypothesis analyzing of this study, Pearson correlation test was used.

4. RESULTS

Table 1. The relationship between effective factors and accidents decrement

Variables	Number	Amount of r Pearson	Sig
Effective factors	26	0.285	0.003
Accidents decrement			

Major hypothesis

Hypothesis H_0: there isn't relationship between effective factors and road accidents decrement.

Hypothesis H_1: there is relationship between effective factors and road accidents decrement.
In the regard of major hypothesis of the research, the results of Pearson correlative coefficient were shown in table 1. According to the table, the correlative coefficient in the level of $P < 0.05$ is ($r = 0.285$) that it's meaningful and significant in the term of statistics. Therefore, based on ($sig = 0.003$) in Pearson test, the hypothesis H_0 is not confirmed and hypothesis H_1 about the relationship between variables is confirmed.

Table 2. The relationship between human factors and accidents decrement.

Variables	Number	Amount of r Pearson	Sig
human factors	26	0.399	0.007
Accidents decrement			

First minor hypothesis:

Hypothesis H_0: there isn't relationship between human factors and road accidents decrement.

Hypothesis H_1: there is relationship between human factors and road accidents decrement.
In the regard of major hypothesis of the research, the results of Pearson correlative coefficient were shown in table 2. According to the table, the correlative coefficient in the level of $P < 0.05$ is ($r = 0.399$) that it's meaningful and significant in the term of statistics. Therefore, based on ($sig = 0.007$) in Pearson test, the hypothesis H_0 is not confirmed and hypothesis H_1 about the relationship between variables is confirmed.

Table 3. The relationship between road factors and accidents decrement.

Variables	Number	Amount of r Pearson	Sig
Effective factors	26	0.517**	0.044
Accidents decrement			

Second minor hypothesis:

Hypothesis H_0: there isn't relationship between road factors and road accidents decrement.

Hypothesis H_1: there is relationship between road factors and road accidents decrement.
In the regard of major hypothesis of the research, the results of Pearson correlative coefficient were shown in table 3. According to the table, the correlative coefficient in the level of $P < 0.05$ is ($r = 0\ .324$) that it's meaningful and significant in the term of statistics. Therefore, based on ($sig = 0.044$) in Pearson test, the hypothesis H_0 is not confirmed and hypothesis H_1 about the relationship between variables is confirmed.

Table 4. The relationship between transportation factors and accidents decrement.

Variables	Number	Amount of r Pearson	Sig
Effective factors	26	0.244**	0.036
Accidents decrement			

Third minor hypothesis:

Hypothesis H_0: there isn't relationship between transportation factors and road accidents decrement.

Hypothesis H_1: there is relationship between transportation factors and road accidents decrement.

In the regard of major hypothesis of the research, the results of Pearson correlative coefficient were shown in table 4. According to the table, the correlative coefficient in the level of $P < 0.05$ is ($r = 0.244$) that it's meaningful and significant in the term of statistics. Therefore, based on (sig = 0.036) in Pearson test, the hypothesis H_0 is not confirmed and hypothesis H_1 about the relationship between variables is confirmed.

5. DISCUSSION AND CONCLUSION

According to the mentioned contents and reminding that natural and environmental factors are considered as effective in occurrence of road accidents, among the natural factors, the climate factor has the most important role. The climate factors regarding to the region conditions are included of Mountainous-ness, extreme cold, avalanche, frost, rock fall, mistletoe, sandstorms and dust and etc. If these factors are known, it can be of great help to the transportation system and, more importantly, it reduces the financial and psychological damages that are resulted. According to the research results and sig level, the human factors with 0.007 sig level, transportation level with 0.036 sig level and road factors with 0.044 sig level have the highest effects.

According to the Khalili's et al research (2009) and the role of human factors in accidents that human factor has mostly lead to the accidents and effectiveness of this factor is more than others which it has compatibility with the results of first minor hypothesis. In the regard of transportation and road factors also based on the results of hypotheses testing, the results have compatibility in the terms of accidents abundance in communicational climate conditions with identifying the dangerous regions and climate effects on road and vehicle transportation. Among three human, road and vehicle factors, human factor includes 80 percent of accidents. According to studies, distraction and drowsiness are the main cause of human road accidents. In this field, the required trainings can have marvelous effects on the

level of accidents decrement. Although human factor is a determining factor in road accidents but sometimes the developed design of a path can undergo and cover the human mistakes and help the decrement of accidents and prevent the financial and life damages by more notifying the transportation condition and creating suitable road.

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