Evaluation of Drivers' Affectability and Satisfaction with Black Spots Warning Application

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Abstract

Since a significant percentage of crashes occur at black spots, different methods have been proposed to prioritize the modification of these spots and prevent crashes. One of these prevention methods in transportation is the hazard warning systems. The purpose of this study is to evaluate the satisfaction of drivers and their affectability from a map-based warning application is evaluated. To this end, black spots were identified on one of the two-way two-lane highways in the North-West of Iran and 32 male drivers were tested in the intervention group (warning state) and the control group (non-warning state). The evaluation of the warning application was done in two steps. In the first stage, drivers' affectability between the two groups was compared, where average speed and number of speed limit violations were studied in warning and non-warning states. In the second stage, drivers' satisfaction with application features was examined using questionnaires. The findings showed that the difference in mean speeds at black spots between warning and non-warning states was significant with 95% confidence level and the use of warning application was effective in reducing the number of drivers with speed limit violations at black spots. Most drivers were highly content with the warning from car speakers, advisory warnings and warning distance from black spot, and did not have enough satisfaction with visual warnings, the application installation procedure, and warnings from smartphone speakers. Additionally, the results of the questionnaire revealed that not only warnings did not cause distraction for the drivers, they were effective in increasing their caution. These findings can be used to eliminate the shortcomings of the hazard warning application.

Keywords: Highway Black Spots; Speed Study; Warning; Satisfaction; Affectability.

1. Introduction

Traffic crashes are inevitable accidents that occur due to various reasons. In addition to being a threat to society's safety and health, these crashes entail a high amount of costs, such as financial losses, delays in traffic and depletion of national resources. According to the World Health Organization, the damage inflicted on developing countries because of these crashes equals more than 1% of their gross national product (GNP); this value is more than 3% in Iran [34]. Iran, with a population of close to 77 million people and 25,000 annual traffic-related deaths, is one of the most dangerous countries regarding traffic accidents in the world [1] and, as a result, Iranian road safety specialists have recently conducted studies on road and vehicle safety performance [9, 17, 23, 37].

Since the majority of crashes occur at black spots, numerous methods have been employed to prioritize the modification of these spots and prevent crashes [16, 35]. One of these prevention methods is the hazard warning system. The driver is warned before reaching the black spot so that he/she can be more cautious to be able to prevent crashes. Some of these systems are map-based warning systems that drivers install on their smartphones, which warn the drivers

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