Traffic Perception in Eskişehir Province

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Abstract. With the rapid growth of the world population that is becoming increasingly the use of motor vehicles. Also, due to technological advances that have become more accessible to a case having a motor vehicle. However, these developments have led to the emergence of some problems. Especially, highways of serious accidents occurred in transportation, to investigate measures that can be taken and identification of the problem is an important issue in Turkey. First, you need to identify the individual’s perception of traffic. This process is important to identify gaps in the application. This study was planned and carried out in order to measure the traffic perceptions of living in Eskişehir Province. For this purpose, a questionnaire aimed at determining demographic and socio-economic characteristics and attitudes of the individual’s perception of traffic was prepared. Data sets were analysed by factor analysis known as one of the most known multivariate statistical analysis techniques. The result of analysis obtained over the dimensions, traffic perceptions of individual’s in Eskişehir Province modelled. Looking for solutions for the traffic problem in institutions of the Eskişehir Province has obtained a series of results that could benefit in creating attitudes and behaviours about traffic.

1. Introduction

Traffic Safety; traffic rules to convert a natural attitude of individual’s in life, are the work to be done to ensure the safety of life and property of individual’s [1].

According to the 2013 report of the World Health Organization, each year worldwide are about 1.24 million people lost their lives as a result of road traffic accidents and about 20 to 50 million people are injured as a result of this accident [2]. Traffic accidents are a result of economic and social losses. Although it is possible to compensate the economic losses that occur, it is impossible to compensate for the social losses.

Seda Hatipoglu (2011), in her study entitled "Pre-School Age Children's Traffic Information and Perception", traffic information and perceptions of 804 preschool children in Turkey aged 3-6 years were detected by using questionnaire [3]. Fatih Guner and Salih Zeki Young (2011), in their study entitled "Elementary Students Traffic Safety Investigation Opinion on the Mass Media in the Context (Canakkale Province Case)'", of children who received elementary level education, was examined the views of the issue of traffic safety is presented in the mass media [4]. Ahmet Tortum, Muhammad Yasin is Corum and Burhanettin Kilinc (2012), in their study entitled "Modeling Traffic Accidents in..."
Turkey Using Regression Analysis”, the main flaw of the drivers causing traffic accidents, pedestrians, vehicles, passengers and road imperfections are sorted by degree of efficiency [5]. Ercan Ozen, Erhan Young and Zibeyde Kaya (2013), in their study entitled "Traffic Accidents Cause Awareness Thought and Traffic Related to: Usak Province Case", not the economic aspect of traffic accidents, it is considered a social dimension [6]. Atilla Mayda, Muammar Yilmaz, Scion Bolu and Nuray Çelebiler (2014), in their study entitled "Traffic accidents and risk factors: evaluation of a traffic accident that occurred in Düzce", have determined the factors that cause fatal / injury and property damage accidents [7]. Murat Delice (2015), in his study entitled "Investigation with Multiple Regression Analysis of the Related Factors Affecting Drive Traffic Accident", identified variables that cause a traffic accident in Erzurum [8]. Mahir Gökdağ and Ahmet Atalay (2015), in their study entitled "Traffic Accidents Traffic Education Impact", the negativity of the major problems with traffic accidents for Turkey, to eliminate traffic disturbances, traffic security and discipline, walking in the road and the vehicle time to settle people protecting information it is stated to be possible [9]. Yusuf Yuksel, Hamza Tosun and Ismail Cenk Demirkol (2016), in their study entitled "Factors Affecting Satisfaction of the senses of the Police Traffic Services Key Factors", the overall satisfaction level for traffic services in POMEM pre-school students and focuses on the factors affecting the level of this satisfaction [10].

2. Material and Method

This study was planned in order the measure of traffic perceptions of individuals living in Eskisehir Province was carried out. A questionnaire has been created in order to determine the attitudes of individuals living in Eskişehir Province on the demographic and socio-economic characteristics and traffic perception.

The questionnaire has been prepared in a simple language. All of the questions are closed-ended questions. The survey has 46 questions to determine their attitudes toward the traffic perception. The questionnaire consists of 41 items, 16 items of the demographic characteristics of individuals and the remaining 25 items are questioning their attitude to traffic perception. Expressions is graded according to a 5-point Likert scale type, "Strongly Agree (5) Agree (4) Neutral (3) Disagree (2) Strongly disagree (1)” were asked to evaluate with one option.

The purpose of this study is to determine the factors that make the Traffic Perception in Eskisehir Province. 5 100 people were selected from individuals living in Eskisehir Province, attitudes towards traffic perception and behaviour of selected individuals were analysed by factor analysis. Traffic Perception that are aimed to model using Maximum Likelihood extraction technique by factor analysis.

Factor analysis uses mathematical procedures for the simplification of interrelated measures to discover patterns in a set of items. Factor analysis that reveal new dimensions and is defined as the process of obtaining the functional definition of the concept. Thus, it is possible to reduced number of dimensions of the questionnaire items. Each of these dimensions is called “factor”. The purpose of factor analysis is to determine the moves of the observed items structure on unobservable items. Another purpose of factor analysis is to maximize the variance of items and derive the dimensions [11]. The two main factor analysis techniques are Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). CFA attempts to confirm hypotheses and uses path analysis diagrams to represent items and factors, whereas EFA tries to uncover complex patterns by exploring the dataset and testing predictions [12]. Factor analysis is useful for studies that involve a few or hundreds of variables, items from questionnaires which can be reduced to a smaller set, to get at an underlying concept, and to facilitate interpretations [13]. Factor analysis is based on the “common factor model” which is a theoretical model. This model postulates that observed measures are affected by underlying common factors and unique factors, and the correlation patterns need to be determined. There is an array of extraction techniques available, Maximum Likelihood extraction technique is one of them. Maximum Likelihood extraction technique using by factor analysis is that the observed
correlation matrix for the sample is based on the maximum likelihood and used to determine the loading factor for population [14].

3. Results and Discussions

Frequency table related to the demographic situation of individuals living in Eskisehir Province, is shown in Table 1-3. The frequency distribution of participated people in the Eskisehir Province in terms of their gender is as follows: 76% were men, 24% were women. According to the frequency distribution of traffic participated people in terms of age as follows: %59 of from 36 to 50 years old, 27% of from 31 to 35 years old. The frequency distribution of participated people in the Eskisehir Province in terms of their education levels is as follows: 39% were high school graduates, 37% were university.

Table 1. Frequency Distribution of Gender

|   | Frequency | %   | Cumulative % |
|---|-----------|-----|--------------|
| Men | 3882 | 76.1 | 76.1 |
| Women | 1218 | 23.9 | 100.0 |
| Total | 5100 | 100.0 |

Table 2. Frequency Distribution of Age

|   | Frequency | %   | Cumulative % |
|---|-----------|-----|--------------|
| 18-20 | 45 | 0.9 | 0.9 |
| 21-23 | 82 | 1.6 | 2.5 |
| 24-26 | 93 | 1.8 | 4.3 |
| 27-30 | 260 | 5.1 | 9.4 |
| 31-35 | 1399 | 27.4 | 36.8 |
| 36-50 | 3019 | 59.2 | 96.0 |
| 51-60 | 172 | 3.4 | 99.4 |
| 60-+ | 30 | 0.6 | 100.0 |
| Total | 5100 | 100.0 |

Table 3. Frequency Distribution of Education

|   | Frequency | %   | Cumulative % |
|---|-----------|-----|--------------|
| Primary | 967 | 19.0 | 19.0 |
| High | 2002 | 39.3 | 58.2 |
| University | 1892 | 37.1 | 95.3 |
| Ms/PhD | 239 | 4.7 | 100.0 |
| Total | 5100 | 100.0 |

Consisting of 25 questions, reliability analysis was applied for items listed in Table 4, Cronbach's alpha coefficient was found 0.682. 4 question were excluded from the survey because to be contrary to reliability. Reliability Analysis was performed again. Cronbach's alpha coefficient was found 0.711. Cronbach's alpha value is in the range 0.7-1.0, the reliability of the survey is high.

Maximum Likelihood extraction technique using by factor analysis was applied. KMO and Bartlett's test results are shown in Table 5 for Maximum Likelihood. Kaiser-Meyer Olkin Measure (KMO) of Sampling Adequacy is a test that provides information about the adequacy of the sample for
factor analysis. Bartlett’s Test of Sphericity provides information about the suitability of the items for factor analysis. As can be seen from the Table 5; The value of the KMO test was found to be 0.830. This value indicates that the sample is sufficient for factor analysis. If this requirement is met, this means that distinct and reliable factors can be produced. Bartlett’s Test of Sphericity test show that we do have patterned relationships amongst the items (Sig. < 0.05).

Total Variance Explained in Table 6 of ML using by factor analysis to determine the number of significant factors. It is important to note that rotated values are meaningful for interpretation. The factors are arranged in the descending order based on the most explained variance. The Rotation Sums of Squared Loadings is identical to the Eigenvalues except factors that have eigenvalues less than 1 are not shown. These columns show you the eigenvalues and variance prior to rotation. The Rotation Sums of Squared Loadings show that the eigenvalues and variance after rotation. We will use the rotated eigenvalues to determine the number of significant factors.

Table 4. Traffic Perception Items

| TRAFFIC PERCEPTION ITEMS (TPI) |
|--------------------------------|
| 1) The permitted alcohol level for driving is too much. |
| 2) Tougher penalties for drivers from breaking the rules should be implemented. |
| 3) Drivers who use vehicles in the distance followed closely are not aware of the danger. |
| 4) Distance between police checks on motorways does not attract the attention of the driver is away. |
| 5) People who are stopped by the police because of faulty overtaking is very unfortunate. |
| 6) I made myself the vehicle inspection and maintenance. |
| 7) The vehicle inspection that reduces traffic accidents originating from vehicle defects. |
| 8) The vehicle inspection increases traffic safety. |
| 9) Advanced and safe driving training must be mandatory. |
| 10) Advanced and safe driving training for drivers does not get experienced. |
| 11) Advanced and safe driving training is a waste of time. |
| 12) Advanced and safe driving training is a plus personal preference. |
| 13) If all drivers are trained in advanced and safe driving, the roads would be safer. |
| 14) Advanced and safe driving training to reduce traffic accidents. |
| 15) Advanced and safe driving training to get a discount on automobile insurance, it would be nice. |
| 16) I do not use the vehicle at night. |
| 17) I do not use the vehicle in bad weather conditions. |
| 18) I'm afraid as the driver involved in a the accident. |
| 19) I'm afraid as the driver injured in a traffic accident. |
| 20) I'm afraid to die in a traffic accident. |
| 21) I understand the mistakes of other drivers. |
| 22) I do not like the events can be a risk in traffic. |
| 23) Car insurance costs that impede driving. |
| 24) The car is a necessity. |
| 25) A person's car is that it gives information about the person. |

There are 7 factors with eigenvalues greater than 1. The first factor, which explains 23.301% of the total variance. The second factor, which explains 11.493% of the total variance. The third factor describes the 11.135% of the total variance. The fourth factor, which discloses the 7.361% of the total variance. The fifth factor, which describes 6.149% of the total variance. The sixth factor, which
explains 5.090% of the total variance, the seventh factor, which explains 4.387% of the total variance. 7 factors together explain the 68.915% of the total variance. It stated that the dimensions of the items shown in the Table 7. 1. factor: Traffic Rules Perception, 2. factor: Fear of Traffic Accidents, 3. factor: Advanced and Safe Driving Training, 4. factor: Advanced and Safe Driving Training Accident Prevention, 5. factor: Vehicle Maintenance, 6. factor: Accident Risk and 7. factor: Car Ownership Perception. It can be also compared the Reproduced Correlation Matrix with the original Correlation Coefficients Matrix. If the model is fit, we should expect small residuals between the two matrices. Maximum Likelihood technique is applied when the value of 1% residual value was determined to have a value greater than 0.05. It says the best fit model.

| Table 5. KMO and Bartlett’s Test |
|-------------------------------|
| Test                        | Value |
| Kaiser-Meyer-Olkin Test     | 0.830 |
| Bartlett’s Test             |       |
| Chi-Square                  | 37452.724 |
| d.f.                        | 210   |
| Sig.                        | 0.000 |

| Table 6. Total Variance Explained |
|-----------------------------------|
| Factor   | Initial Eigenvalue | % of Total | Cumulative % | Rotation Loadings | % of Total | Cumulative % |
|----------|--------------------|------------|--------------|--------------------|------------|--------------|
| 1        | 4.893              | 23.301     | 23.301       | 3.345              | 15.931     | 15.931       |
| 2        | 2.414              | 11.493     | 34.794       | 1.912              | 9.103      | 25.034       |
| 3        | 2.338              | 11.135     | 45.929       | 1.700              | 8.094      | 33.128       |
| 4        | 1.546              | 7.361      | 53.290       | 1.434              | 6.827      | 39.955       |
| 5        | 1.291              | 6.149      | 59.439       | 1.042              | 4.960      | 44.915       |
| 6        | 1.069              | 5.090      | 64.529       | 1.030              | 4.907      | 49.822       |
| 7        | 0.921              | 4.387      | 68.915       | 0.943              | 4.492      | 54.314       |
| 8        | 0.727              | 3.463      | 72.378       |                    |            |              |
| 9        | 0.679              | 3.233      | 75.610       |                    |            |              |
| 10       | 0.617              | 2.940      | 78.550       |                    |            |              |
| 11       | 0.556              | 2.650      | 81.200       |                    |            |              |
| 12       | 0.519              | 2.471      | 83.671       |                    |            |              |
| 13       | 0.516              | 2.458      | 86.129       |                    |            |              |
| 14       | 0.489              | 2.327      | 88.456       |                    |            |              |
| 15       | 0.469              | 2.235      | 90.691       |                    |            |              |
| 16       | 0.402              | 1.916      | 92.607       |                    |            |              |
| 17       | 0.354              | 1.683      | 94.290       |                    |            |              |
| 18       | 0.333              | 1.585      | 95.875       |                    |            |              |
| 19       | 0.320              | 1.524      | 97.399       |                    |            |              |
| 20       | 0.277              | 1.321      | 98.721       |                    |            |              |
| 21       | 0.269              | 1.279      | 100.000      |                    |            |              |
Table 7. Rotated Factor Matrix By ML

| TPI  | 1     | 2     | 3     | 4     | 5     | 6     | 7     |
|------|-------|-------|-------|-------|-------|-------|-------|
| TPI4 | 0.815 |       |       |       |       |       |       |
| TPI2 | 0.789 |       |       |       |       |       |       |
| TPI3 | 0.772 |       |       |       |       |       |       |
| TPI5 | 0.750 |       |       |       |       |       |       |
| TPI1 | 0.663 |       |       |       |       |       |       |
| TPI19| 0.928 |       |       |       |       |       |       |
| TPI18| 0.731 |       |       |       |       |       |       |
| TPI20| 0.666 |       |       |       |       |       |       |
| TPI10| 0.772 |       |       |       |       |       |       |
| TPI11| 0.743 |       |       |       |       |       |       |
| TPI19| 0.462 |       |       |       |       |       |       |
| TPI13| 0.737 |       |       |       |       |       |       |
| TPI14| 0.556 |       |       |       |       |       |       |
| TPI12| 0.474 |       |       |       |       |       |       |
| TPI15| -0.417|       |       |       |       |       |       |
| TPI6 | 0.715 |       |       |       |       |       |       |
| TPI7 | 0.635 |       |       |       |       |       |       |
| TPI21| 0.803 |       |       |       |       |       |       |
| TPI22| 0.577 |       |       |       |       |       |       |
| TPI23| 0.758 |       |       |       |       |       |       |
| TPI24| 0.568 |       |       |       |       |       |       |

4. Conclusions
Traffic perception of individuals carried out in the Eskişehir Province aimed to determine the behaviour of traffic and traffic perception. Some results regarding the attitudes and behaviours of traffic are listed below in Eskişehir Province.

- Police checkpoints on highways does not attract the attention of the driver.
- Tougher penalties for drivers who need to be given the foul.
- Drivers in Eskişehir, being injured and afraid to die in a traffic accident.
- Advanced Training and Safe Driving, the driver of the perception of that traffic has not experienced in Eskişehir Province.
- Advanced and safe driving training provided with vehicle of inspections, they believe reduce traffic accidents.
- Drivers in Eskişehir Province insight satisfy other drivers.
- Car insurance costs of individuals in Eskişehir Province, preclude the use of a car.

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