

# Introducing the Main Factors of Accidents on the Roads of Iran and Studying its Causes and Strategies Applied to Decrease it

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**Abstract**—Road transportation system is the most important method of transporting the goods. Considering the most suitable geographical situation of Iran to transport the goods between Europe and Asia and placement of this country in direction of international corridors (east- west) , (north-south) and Asian land transport to infrastructure development “A.L.T.I.D” and Transport corridor Europe - Caucasus - Asia “T.R.A.C.E.C.A”, noticing the security of road transportation system in this country is so important. In this paper the main factors of accidents on the roads of Iran are categorized regarding the rate of accidents occurred. Then apart from studying the main reasons of accidents of every category, the main factors of these events are studied and its strategies in Iran are introduced.

**Keywords**—Road, Transportation, Accident, Factors

## I. INTRODUCTION

IN the field of commerce, now the value of goods exchange has increased more than 1000 billion dollars between Europe and Asia and the volume of trade increases between these two neighbor continents considering the significant economic development of east Asia countries; the suitable geographic situation of Iran as an appropriate relational direction for transporting the goods between Asian and European countries has caused that this country is noticed by the international organizations of transportation, such that selection of Iran as one of the main countries in the direction of transportation in North- South Corridor as well as “A.L.T.I.D” and “T.R.A.C.E.C.A”, the importance of transportation security in this route is mentioned.

Nowadays this transportation passes Iran through road and rail system; in the present paper the security of road transportation system in the country is studied. Based on the statistics extracted from accidents rate the main factors of accidents are explained and the suitable strategies for its reduction in recent years are represented so that it is used by the authorities as a case study.

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## II. FAMILIARIZATION WITH INTERNATIONAL PASSING CORRIDORS OF IRAN

The importance of proceeding to the issue of security in road transportation of Iran is for this reason that some main international transportation routes pass Iran while their security should be provided.

The economic growth in the eastern Asia countries in 1980s caused that the economic-Social committee of Asia and Pacific “E.S.C.A.P” and UN represent the plan of Asian land transport to infrastructure development (“A.L.T.I.D”) to flow the commerce between Asia and Europe in which three northern, central and southern corridors were suggested to transport the goods. The changes of middle Asia area and appearance of new countries and increasing the requirement for international trade in this region and some capital problems in “A.L.T.I.D” route caused that in 1993 Economic committee of Europe “E.C.E” suggests the new corridor of “T.R.A.C.E.C.A”. Along these routes a new one called north-south corridor was defined in transportation ministers summit which connects the northern Europe and Russian federation through passing from our country by Caspian sea to Persian gulf and from there to southeast of Asia and Indian sub continent [1].

Therefore currently three main corridor of “T.R.A.C.E.C.A” (Connecting east of Europe to Caucasian region, Caspian sea and middle Asia), southern corridor of “A.L.T.I.D” project (southeast of Europe, Turkey, Iran, central Asia) as well as north-south corridor pass from Iran north-south and east-west routes from Iran which one exploited, and it shows the strategic importance of Iran to become sure from it as a suitable international transit direction among various routes [2]. Beside these corridors, Asian-highway routes, silk road and east & west corridor include some routes in passing from the territory of Iran which has been shown in the following maps [3].



(a). The map of ALTID corridor



(b). The map of (North-South) corridor



Fig.1 The map of TRESCA corridor and important corridors in Asia

### III. THE RATE OF ROAD ACCIDENTS IN IRAN

Over 8 past years, the rate of road accidents in Iran has been represented in (Table I) [4].

TABLE I  
STATISTICS AND INFORMATION ON SAFETY AND TRAFFIC IN IRAN

Number of injuries	Death toll	Number of accidents	year
108100	17059	292284	2000
117566	19727	340047	2001
167372	21873	448304	2002
222309	25722	554849	2003
245754	26089	625030	2004
274257	27746	780514	2005
245418	22918	811981	2006
272877	23362	78000	2007

In addition, the indexes specified in the safety commission of the roads which distinguishes the comparisons of this statistics with other countries shows the killed number to 10000 vehicles as well as killed in 100000 people as (Table II).

TABLE II  
ESTIMATES OF SAFETY INDICATORS

Death toll per 100000 of populations	Death toll per 10000 vehicles	year
26.6	23	2000
30.4	25.5	2001
33.3	25.7	2002
38.7	24.8	2003
38.6	20.8	2004
40.5	18.8	2005
38	18.9	2006
39	19	2007

However along with all of these cases it should be mentioned that over one past decade, the annual growth of the country in average has been 1.3% while the ownership coefficient of the vehicle for every 1000 persons has become 3 times over 10 recent years. So it can be concluded that the growth of losses caused by traffic events over the past decade in Iran with 9.3% obtained its coefficient from higher rate of motorization, and performing distant travels with private vehicles has become easy due to less cost of fuel, tax etc. as an essential factor of accidents and damages involved.

### IV. STUDYING THE MAIN CAUSES OF ACCIDENT IN IRAN

In studying the results of accidents factors, the causes of accidents are grouped into four categories including human factors, vehicle factors, road factors and environmental factors.

According to the statistics represented on the effect of the individual mentioned factors, share of the individual above-mentioned factors, is referenced as Fig. 2.

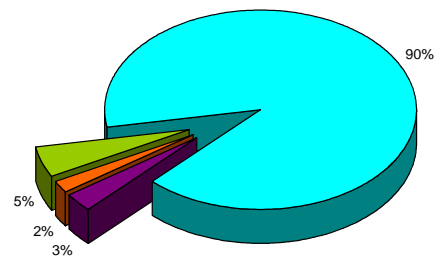
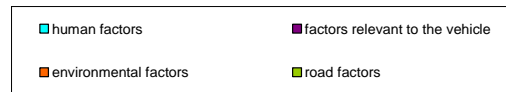


Fig. 2 Comparison of percentage of accidents causes in Iran.

Percent of the accidents occurred in Iran based on the main factors of accidents in the country is determined according to the above diagram. Share of man factor in the accidents occurred out of the city has been more which will be studied later.

Considering that the description of statistics is not included in this paper just the statistical results and causes of accidents in Iran have been represented [5].

It should be mentioned that the statistics which is represented then is the average of statistics obtained over five past years except the statistics of the recent years on which no complete estimation has been performed

### V. HUMAN FACTORS

The main effective factors on accidents in Iran have been shown in Fig. 3 [6].

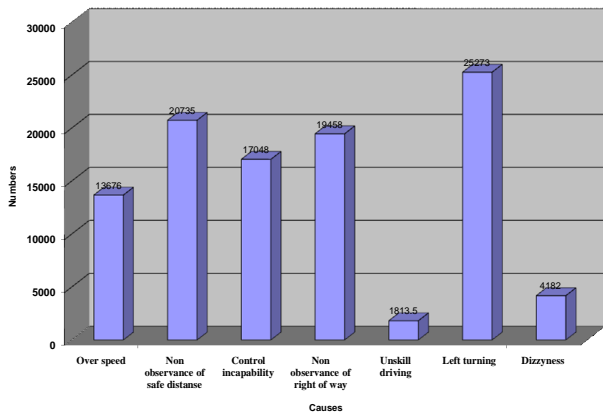


Fig. 3 Comparison of accidents causes in Iran

Considering the table it is distinguished that the main factor of accidents is the lack of following the distance and priority in deviation from routes which indicates requirement for education and culture for the lack of drivers' infringement from their right in Iran and creating the road super visional system for the police and other authorities involved.

Also its reason is habit of Iranian drivers for less consideration of priority and the necessary concentration upon route change to use traffic signal light and informing other drivers on overtaking this results from the lack of suitable training of traffic behavior in Iran over the recent years.

In analyzing the reasons of these accidents It has been distinguished that the less- level culture of driving and some economic problems of drivers cause that they become lawless and ignorant of legal speed for carrying more passengers within a determined time which is of the main reasons of man errors.

These type of offender drivers have mainly less educations (they are diploma or under-diploma) in "20-40" years old [7].

VI. FACTORS RELEVANT TO THE VEHICLE

The statistics of non-urban accidents has been shown in Fig. 4.

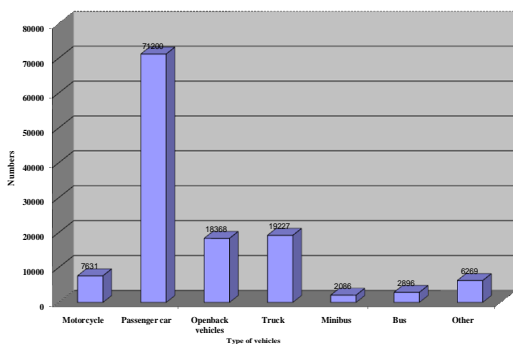


Fig. 4 Comparison of accidents due to vehicle type in Iran

The main factors of these accidents are the behaviors of the drivers of different vehicles. Accidents of personal vehicles result from the un familiarization of drivers with the roads and high speed. About the drivers of heavy vehicles, open back vehicles and buses, the accidents result from their special culture such that they mainly feel a false power on driving and do not feel any horror about loss of accident, on open back vehicles, lack of right put loads in order is the cause of accident. But on motorcycles their inclination for violation due to their size as well as their high power of maneuver are the cause of accident. Due to the lack of their skill in controlling their vehicles, the drivers of other vehicles face with accidents especially in the field of agricultural machineries.

The reduction of public fleet accidents has been resulted from more sensitivity on traffic, innovation of the fleet during recent years in Iran and confronting with transportation infringements in this sector and canceling the activity permit of the companies.

Apart from the above factors, studying the accidents in all vehicles indicates that high rate of accidents in private vehicles is for the following reasons: their higher ownership and inclination of people for trip through their private car, lack of necessary culture and unsuitable development of public transportation system, most of these accidents have been observed in the provinces with the most voyage attraction and development.

Furthermore, accidents of buses have been happened mostly in North- South or east- west corridors and in the final hours of trip for tiredness and sleepy of drivers, accidents of motorcycles and vans have been occurred in the northern provinces of country where towns and villages have less distance with each other, due to easy traffic with these vehicles and more utilization of them [8].

VII. ENVIRONMENTAL FACTORS

According to Fig. 5 it is observed that the most rates of accidents has been over August and September which resulted from more travels in these months. But more accidents in December and January caused by imprudence of drivers, no usability of tires and brake defects.

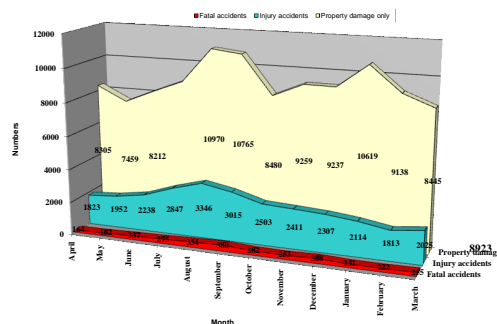


Fig. 5 Rate of variation of accidents

Furthermore, rise of accidents at night than day has increased (Fig. 6). About 60% of the night accidents have occurred in 7 provinces of 30 provinces of Iran. By calculating the percent of brighten Kilometers from all of the provincial roads considering Fig. 7 and efficiency dispersion of night accidents, it is determined that the main factor of raising night accidents in Iran has not been the defect of light systems, and it can indicate the night velocity of automobiles and the rate of traffic at night [9].

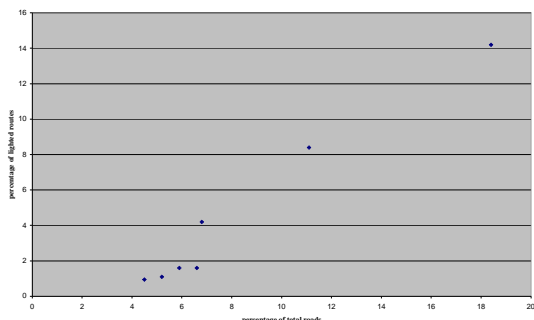


Fig. 6 Diagramming the distribution of lighting effect on accident rate

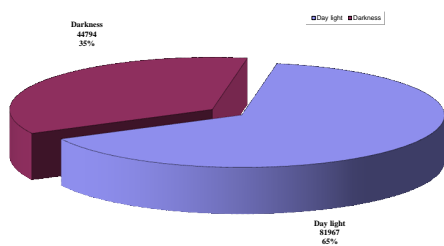


Fig. 7 Rate of accidents in daylight and darkness

VIII. ROAD FACTORS

According to Fig. 8, based on road factors effective on accidents it is observed that the most non-urban accidents have been in the main routes and highways. The main reason of accidents in main roads is more vastness of these roads, more traffic, less width of the road and not following the regulations.

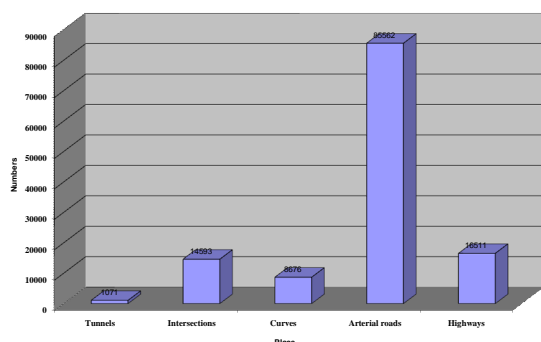


Fig. 8 Number of accidents in “accidents black spots”

Also low level of service in these routes and high capacity of them is an important factor. Development of industries and living on the fringes of these cities cause accident in the distance of 50 kilometers from cities.

The accidents occurred in highway result from the lack of suitable repair of these roads and signs. In intersections, the cause of accidents is inappropriate plans, paying no attention to sight triangle in the corner of intersections and lack of necessary signboards.

Of the other factors effective on junctions and winding roads are less-width of band in the outer part of winding roads, not making the accident – prone areas secure and lack of traffic calming near the junctions

By studying the mentioned factors, about “60%-80%” of events caused by the above factors have been occurred in 8 provinces(from 30 province) which indicates attention to dangerous points in Iran [10].

IX. STRATEGIES OF CONFRONTING WITH RAISING ACCIDENTS IN IRAN

The main strategies existed in Iran over 3 past years are with safety commission of roads which belongs to transport ministry [9] , [11].

A. Strategies Relevant To Man Factor

Main strategies are:

- Executing the comprehensive plan of educating the drivers of heavy vehicles, managers of transportation institutes and establishing safety secretariat of transportation in education ministry and traffic training in mass media
- Improving the methods of driving test and periodical control of health, skill and efficiently of drivers by cooperating the ministries state, transportation and health
- Supervision on transportation and delegating experienced force in the police and new technology of traffic control and determining severe limitations to violators.

To exert these decisions, the transportation organization of Iran has held the training periods for the drivers of heavy vehicles and has allocated special advantages in paying insurance costs for the drivers without accident record so that they are encouraged for non violation. For this purpose some health controlling tests are performed on the drivers and also the police lie in eventful routes so that the drivers are obliged to follow the regulations. Installing “GPRS” sets by the police cause that the drivers to be more careful which can increase the consideration of drivers and their adaptation with regulatory conditions in driving.

B. Strategies on the Factor of Vehicle

Main executed strategies are:

- Innovating the fleet through removing worn out vehicles and helping to governmental credits through cooperation of ministries industry, transportation, oil, state, environment organization and plan and budget.
- Compiling the vehicle standards by standard institute and industry ministry and necessitating the automobile factories to

follow them and applying new technology in manufacturing automobile in Iran.

In this direction, the government removes the vehicles in the lifetime of more than 10 years from the roads and replaces them with new ones by giving less interest and long-time loans. In addition, the automobile factories have been obliged to apply the new standards of the world in designing their automobiles. Furthermore by controlling the vehicles the police prevents from trafficking the defective automobiles and obliges the drivers to refer the technical examination centers to lest chair cars. This has caused that the environmental pollution reduces during the recent years.

#### C. *Strategies of Time Factor*

Reinforcing the speed management, planning of night supervisory patrols, determining traffic limitations for vehicles with more accidents to reduce driving events at night are the major strategies in this sector. It is prospected that through these strategies the night time accidents are reduced

#### D. *Strategies of Road Factor*

Main reformations in this direction are:

- Improving and developing urban and non-urban road system considering traffic demand by state ministry (10700 kilometers highway and 3337 kilometers main road).
- Identification prioritizes and improves the dangerous points by the state ministry.
- Auditing the road system and providing checklist of road safety for the establishing roads and 15000 kilometers main roads by road ministry.
- Producing secure places for pedestrians.
- Developing and improving transportation substructures and equipping the road with "I.T.S" system.

Of the execution decisions made in this field is to repair and improve the road pavements, installing intelligent signs, providing lightness in the roads and installing security equipments in eventful places as well as development of high ways and making mechanized bridges in dangerous areas as which can reduce the convenience of drivers in roads.

### X. DISCUSSION SECTION

Considering that the man factor is regarded as the main cause of accidents in roads of Iran. due to not paying attention to raising traffic culture in Iran, habit for following the traffic regulations is not common; most of these violations which is disregarding priority and deviation are due to higher speed. So the effect of suitable strategies in this field is not palpable. According to the reports of the police, its statistics has been reduced relatively during the past years. Drivers of personal vehicles cause accident because of less driving experience on the roads. Because of necessity for more supervision in this field, in opinion of the police, reduction of accidents among bus vehicles is in priority. Also the accidents have been reduced through necessary trainings on controlling the loads, tires, lights by the police.

On time factors, the night time accidents result from higher velocity of the vehicles at night which is due to the reduction of police patrolling on roads during night. In summer increase of tourism trips and in winter un equipment of the vehicles and imprudence of drivers increase the rate of accidents. Identifying the eventful areas, repairing the roads and installing signboards in all routes have reduced the rate of accidents.

### XI. CONCLUSION

By considering the studies it is distinguished that the main cause of man factors are high speed and disregarding the priority which originate from inappropriate traffic behaviors. In studying the factors relevant to the vehicles, the inappropriate traffic habits of violator drivers cause accidents; and tendency to disregarding regulations by the drivers of motorcycles and heavy vehicles together with tear of tires, brake system, steering-wheel and lights cause accident. On the night and environmental factors, apart from more speed in first hours of night, occurrence of accidents in the entrance of the city has been more. On road factors non improvement of the roads, lack of signs and eventful areas are the causes of accidents. Meanwhile after occurrence of road accidents the necessary measures are considered less, the approved strategies of the government should be executed in this field.

### REFERENCES

- [1] "Guideline on Road Safety action plans and programs" United Nations Economic and Social Commission for Asia and the Pacific, 1999.
- [2] Available: <http://www.instc.ir/main.asp>.
- [3] E. Rasouli, M. S. Moosavi, "Introduction of strategic situation of Iran from the view point of possible application of its transportation potentials" 10th international conference on applications of advanced technologies in transportation, Athens, 2008, pp. 2-4.
- [4] "Statistics of fatalities and injuries in accidents" Ministry of health and medical education, 2008.
- [5] M. Saffarzadeh, "Traffic engineering" Tarbiyat Modarres University, Tehran, Iran, 2005, pp. 50-60.
- [6] "Accident statistics in non-urban ways for Iran" Islamic republic of Iran police, 2008.
- [7] E. Rasouli Sarabi, "Research and evaluation of safety methods for suggest the suitable methods for organizing the signs and barriers in roads" Islamic Azad university, Tehran, Iran, 2004, pp. 17-50.
- [8] H. Abdus, "Safety analysis of road transportation for Iran" road and transportation ministry, 2007, pp. 20-40.
- [9] E. Rasouli, R. Vafaei, "Analyzing the main causes of non urban accidents in road transportation of Iran and measures taken for its reduction" 10th international conference on applications of advanced technologies in transportation, Athens, 2008, pp. 2-7.
- [10] "International road traffic and accident database (IRTAD/OECD)" Accidents statistics, 2008.
- [11] "Statistics of fatalities and injuries in accidents" Reports about increase transportation safety in Iran, Ministry of road and transportation education, 2007.