Effect of climatic elements of road accidents axis on Shirvan – Bojnourd (North Khorasan, Iran)

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Abstract: One of the main factors in human lifes road. human change the road to network road for having good life. transportation road is the most simple system and public system. Anather system wich is used by human is the railroad and airline and navigation. one of the most important factors in roadplaning is the effect of claimetic elements on the transportation system. so claimetic phenomenal on important for human life and human help in the road networks. Road accidents and casualties on the scale of the country show the worry of experts about the road networks. Iran has 1 percent of word papulation but unfortuntly it has 2.5 percent road accident. Since 1986 about on 10 – 15 percent increase to road accidents, so that in 2006 iran with 27000 killed due road accident was in the first place in the world. in the other countries there are 5-6 dead for 10000 cars but in iran the number of deads due road accident. In this study the effect of climatic parameters on transport safety, the data daily, monthly and annual-based weather stations Shirvan - Bojnourd for a period of nine years of preparation and graphs were plotted using Excel software.The next step of accidents and traffic police department in North Khorasan province for a period of 9 years (2001-2009) have been received and analyzed, and the effect of weather phenomena based on the occurrence of road accidents in Shirvan - about Bojnourd the results of the study are presented.From the above study it was found that the main axis of the screw to screw Judge Western Rzaabad most accident occurred.Also a comparison between before and after the Dual Axis Shirvan - Bojnourd made up 19 percent of the band due to an accident after two vehicles speeding and increased traffic shows.
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1- Introduction:

Talk about road safety and transport is one of the topics that form The basis of traffic engineering and transportation urban planning. however today in developed countries along with the development of other sectors of traffic Engineering, safety issues have also been considered and with performance of necessary studies have tried that messages of the consequences of accidents minimize. But unfortunately, in our country and other third world countries and the rate of accidents caused by lack of attention to safety rules andfactors have been consistently to upward,So the cost of damage caused by accidents, imposes both economically and in terms of mental health, the society.

Several factors may have been involved in accidents including can be point human factors and environmental factors. And from the among environmental factors can be point to the causes of climate that has been identified the effects of weather conditions on the accident as documentary and logical. Although one can say has been done in this area very little research, but abundant evidence of the effects of climatic factors such as rain, snow, ice, fog, wind and temperature as a factor in the accident and found to be effective.

Julia Edward have been done on the relationship between road accidents and climatic phenomena and time accident in 1966 he in this research has been examines the relationship between water and road accidents in Wales and England. He in the level place of safety to comparison show accidents on rainy days,smoggy days, or days with strong winds and rainy days compared with no rain during.in the days, along with the fog, statistics of accidents the have increaed but in the case of strong wind gency,results did not show significant results.

Nokhndan Habibi was the first one that particular, the influence of climatic parameters chose on accidents in 1999 as the subject of his research. He in this study after extraction accident to the separation date, time, And suervy communicate each one of accident with weather conditions (temperature, strong winds, visibility and present weather) came to the following conclusions. Weather elements and phenomena have been the segnificent causes ocure accidents axces of haraz in the cold months such as that with seurvey the frequency of accidents on climate phenomenon was found in March 237 cases (26 per cent) in December 206 cases (22 percent), and in December 170 cases (about 17 percent) of the 931 accidents, with most of the phenomena associated with frost and snow was falling and other

accidents with frequently less have been climate phenomena.

Andrei and ouli (1990) deals to investigate accidents in winter, summer in Edmonton - Canada, This result is income 2 percent of the accidents that occur in the summer when the road surface is wet.While 40 percent of the accidents that occur in the winter. When is ice road surface is wet and snowing.

Erickson and lindquist (2002)deal with to investigate the causes slippery road surface as falling the snow and raine on the road surface during rain. this conditions occurs during the passage of a warm front over the area where the cold air is dominent road surface temperature is well below freezing. They In two regions of southern Sweden deal with eurvey.time and space distribution of rainfall and snow icy on surfaces find as results October, the road surface is still warm of months ago avd not were ice and in April, the same for the incoming solar radiation is high critical situation occurs less.

Yamamoto (2002) have been study about fog effects on great road accidents in Japan. he with using of level different maps and environment to pay upon how effect of fog in accidents . he eventually came to the conclusion the tim ocure most of accident has focused to fog cause of cold years seasons. also he found that the upper atmosphere condition has been different at the time of accidents. of other his findings can be noted visibility near the scene of the accident severely reduced about 20 minutes before the accident. but in the iran seurvey safety of roads with attention to very limited the phenomenon of climate is related to the past few years. which is related to academic work.

The following research questions are posed:

A - whether there is a relationship between road accidents and the elements?

B - you get two bands centered Shirvan - Bojnourd the higher the number and severity of road accidents is involved?

C - the spatial distribution of road accidents based Tectonic characteristics of Shirvan - Bojnourd in the relationship?

Effects of road accidents based on elements of Shirvan - Bojnourd planning to introduce its effect in reducing the number of accidents or injuries that reduce damage and determine the months and seasons where most accidents occur and their causes identified the time of day that most accidents have occurred at the time of the main objectives of the present study is the

2-Method:

Method performance in this study was analytical and collecting data was to the research library that were collected with using of databases, charts, satellite images, books, magazines, papers.

Firstly, the statistics for daily, monthly and annual meteorological stations in Shirvan have been prepared for a period of eight years (2001-2009). The next step statistics of accidents receive of Shirvan city of Rahvr police for above period and data collected and by computer software SPSS recorded then both descriptive and inferential statistics were adjusted, In cross section have used from frequency tables, graphs, frequency, mean, mode, and coefficient of variation and in inferential statistics section were used of the correlation coefficient and ANOVA tests.

3-Climate axis Shirvan – Bojnourd:

In order to meet the description and interpretation of climate stations analyzed Bojnourd has been nine years. The average rainfall is 633 mm, falling mostly in the spring and summer when the weather is rainy. In late autumn and winter is the snow, It Bojnourd station temperature records indicate that the study area is not at all true.

Surely the nature of the causes of rainfall in cool wet weather is a major factor climbs include volubility, convection, roughly., All these factors are not air stable and sustainable than air will rise [Nemati, 2004].

To study the effect of climatic elements [Falling Rain, fog, snow, temperature, relative humidity] on the Shirvan road accidents - Bojnourd has been studied as a sample.

In the beginning, according to the statistics of weather conditions weather station Bojnourd climetic elements to investigate the relationship between accidents and was paid in this way.

3-1-Temperature :

Temperature is one of the important elements for understanding and identifying the type of climate and climatic conditions prevailing in a region is important. Amount of solar radiation energy absorbed by the surface effects resulting from absorption of energy by converting solar radiation at ground level is short.

Other factors in different regions of the Earth's surface temperature has been determined it is possible to include them:

- Its relationship with surface radiation conditions
- Thermal conductivity of the upper layer of the earth's surface
- Altitude of land surface
- Rough ride Sun
- Vertical and horizontal movement of air
- Cloud Naky
- Ocean currents

Roughness of the surface temperature distribution largely determines their score, However, holes, pits and valleys because of the lack of mobility of air being trapped in their own environment to reach the final temperature, While the days are extremely hot and extremely cold. Move more air at high altitudes, which are small, rugged and thermal conditions are more balanced. Gradient and temperature affect distributions for the various openings, This issue in more extra-tropical regions, particularly in middle latitudes is important because of the scattered radiation to the total radiation, radiation energy represents the amount of domain directions. Usually a minimum and maximum temperature on Sunrise Toward the end of the sun, which occurs in the evening. The trend of increasing height and distance from the ground and yet be balanced, However, other factors, such as daily and seasonal weather changes, agitation systems, various atmospheric precipitation and temperature within the range of daily and sometimes it takes effect the change of the. Clear as the sun elevation angle is greater than the daily temperature fluctuations are severe, so the effect of these factors makes the daily temperature is generally a function of latitude.

Elevations continuous temperature decrease in the number of reducing environmental degradation temperature of the gradient of the vertical temperature called, usually between 6% to 5% ° C per 100 meters of The figure average possibility that the amount be reduced and sometimes sometimes called a temperature inversion with increasing height (Kaviani and Alijani 1992).

3-2-**recipitation :**

Important factor in the occurrence of rainfall in humid air cools to the dew point is simply nature. Precipitation that falls somewhere humid air is a factor of major climbs: the convection and the roughness of volubility. All these factors and more unstable air from the air to steady climb. Climbing convection occurs when an air mass is warmer than the air near its top. Ascent and convection within the high ground in the hot season, and the greater range of mountains and the spring is favorable for its occurrence. Main condition causing severe environmental degradation temperature rising convective, The sun in spring ranges is observed in temperate latitudes and higher latitudes in the summer, there is.

Convection factor alone can cause severe rainfall and the existence of the weak volubility operating needs. Warm air masses blowing cold air or hot water on the Earth climbed up the convection blower will develop this type of call. Surface roughness of obstacle climbing in the air is the air is forced to pass over it,As a result, some of the air mass density reaches saturation during the day. Basically, at the mouth of the mountain at an altitude of 1500-1000 meters windward precipitation occurs more snow is formed, Thus, the uneven distribution of precipitation contributes to the instability and climb the narrow, More rain on the mountain side of the lowlands adjacent to the top of the mountain looks like the rain earlier and less evaporates. Uniform distribution of rainfall in some places due to lack of rain and some areas of low rainfall.

Annual rainfall averages 633 mm is recorded at stations in the area Bojnourd maximum average precipitation occurs in January 88 ml minimum average amount of rainfall in July is 15 ml.

The highest winter rainfall of about 247 ml and the lowest rainfall occurs in summer.

The rain also be divided into three major types 0.1 - Cycle 2 - Move 3 - Highland.

When water vapor cools and condenses into clouds comes, the higher the temperature of the cold rain and snow into the clouds is below freezing temperatures will produce. Rains due to mountainous topography climbing a mountain or air masses come into existence, Most of this precipitation falls on the windward side and low-altitude winds are usually less rain. Barriers to climb mountains because the air may become the silicon rains (Kaviani and Alijani, 2007).

3-3-Relative humidity:

Relative humidity is a percentage of water vapor saturated atmosphere, as well as temperatures. The importance of relative humidity associated with the occurrence of thin films of ice on the road surface will be higher. Increase in ambient relative humidity, evaporation is reduced. So when the rain falls slightly due to the high humidity, evaporation is reduced. And some water remains on the surface of asphalt road surface will be the potential for Slippery scales.

3-4-Fog:

Fog in fact a ground-level cloud that is formed from one kilometer reduces vision below the horizontal joins.

Fog variety: the Fog incident, Fog blow, Fog range, the fog of war

Fog range: fog is kind of on the slopes when moist air is rising and cools through adiabatic is formed.

Front fog : Fog is kind of cool and dry weather conditions rainfall into layers near the surface Fog occur. Because the evaporation of water droplets in fog leads to saturating the film a big problem for sea transportation, air Earth provides.

According to studies of weather conditions, road conditions identified in the incidence of accidents has a close relationship oriented.

Because of accidents, in part driven by the station Bojnourd Bojnourd climates accidents during December, January, February in the year 2008 - 2009 on the frequency of accidents are more important.

Precipitation phenomena of climatic elements that are causing accidents.

Based on these results, since 2001 to 2009, between the elements of atmospheric clear air a major role in accidents there, so in the years 2001 to 2009 under clear air 2219 crash, the 1566 crash cloudy day and 717 accidents a day rainfall occurred, and in general the clear air of the other elements is.

3-5-When the frequency of accidents:

Most accidents in 2009-2001 was 9 years old in 2009, according to the type of accident and injury. However, if all year due to traffic accidents, accidents in 2009 is high. This indicates the importance of increasing Trddvsayl accidents during transportation.

3-6-Compared before and after a two-lane to two-lane off-axis Shirvan - Bojnourd:

The centerpiece since 2007, two-band has been compared to both periods above shows that the average number of collisions of Dual the years 2001 to 2006, 635 cases and the two band of 876 counts of 238 counts the difference in this comparison there or in other words 19 percent Dual crashes after the way you can see that they are due to the increase of vehicles and traffic.

3-7-Prioritizing black spots :

Time is needed to reduce accidents due to lack of funds, which focus more on Basrf lowest cost, highest reduction in accidents would be. Therefore, analysis of accidents, crashes into areas that most indicators are at least marked with appropriate methods for determining the causes of accidents, loss prevention, it is recommended, The use of economic evaluation methods, the proposed project was evaluated to select the most appropriate priority in the black spots are the center of attention. The various parameters are introduced and the advantages and disadvantages of each of the black spots is briefly described.

3-8-Indicators of black spots:

Terms of accident analysis, and interpretation of the results, it is very effective. Sometimes using inappropriate criteria analysis led astray and spread the results and create confusion analysis and decision making is wrong. Therefore, familiarity with all aspects of the standards and knowledge of the subject is essential in obtaining results. Therefore, different criteria are used in the analysis (North Khorasan Police Department, 2010).

According to the most time accidents is when visibility is reduced, ie there is an inverse relationship between traffic and the field of view. Reduce the number of accidents will increase the field of view (police Shirvan - Bojnourd, 2010).

Table 1: The average temperature of meteorological stations, 2009-2001

Description	Temprature
Average daily air	18
In the warmest months the average maximum air	25.7
Average maximum air in the coldest month of the year	2.1
The average maximum temperature in July	35.2
Average minimum temperatures in January	1.6

4-Conclusion:

According to Table 3 and Figures 1, 2 and 3 will be determined,The 2009 crash in clear air and cloudy conditions YEAR 2008 accidents in 2005, a higher percentage of accidents to accidents in air, precipitation is allocated.

The tables are numbered 3,4,5 and 4 hour charts 18-14 Most accidents occurred during 9 years. Cement factory- astane ghods factory, R. Abad Village, Ghazi Village and Baba aman the accident-prone place in terms of spatial distribution in most accidents happen.

About after Dual raceme of the comparison was the average number of 238 counts between increasing accident on the Dual of shows or phrases 19 percent of accidents shows that due to the increased traffic of vehicles that shows (Table 5).

5-Suggestions:

- Installation of deployment weather stations along the route
- Accurate and timely information about the status of the Shirvan-oriented ways - especially in Bojnourd weather by weather conditions from local newspaper
- Replacement chemicals less harmful than salt to melt the snow fast track
- Safety warning signs that might driven in places where there are slippery
- Provides data on the effect of climate variables in order to plan for climate phenomena
- Providing data of black spots around the track and try to improve and standardize
- Coordination and continuous communication between the police Meteorological Organization, Red Cross, Emergency Transportation for crisis situations
- Control of public vehicles such as buses, taxis along a line of safety devices and ensure the safety of the vehicle.
- Observing speed limits by drivers on the road during snow and ice

- Establishment of rescue centers and 115 at the headquarters of the accident-prone

Table 2: Average monthly rainfall stations Bojnourd years 2009-2001

Month	Dec	Nov	Oct	Sep	Aug	July	June	May	Apr	Mar	Feb	Jan
Total precipitation (mm)	65	45	34	21	16	15	42	50	76	74	85	88

Table 3: Climate-driven elements of accidents

axis	*year*	precipitation	Clear	cloudy	For most accdents	Total accidents (Ft- losses)
Shirvan- Bojnourd	2001	86	232	147	18 -22	639
	2002	68	245	121	14 -18	585
	2003	98	142	122	14 -18	535
	2004	97	243	195	18 -22	778
	2005	94	213	197	18 -22	761
	2006	58	251	256	14 -18	809
	2007	76	264	222	14 -18	853
	2008	72	287	195	14 -18	845
	2009	68	342	211	14 -18	932

Table 4: Marsalanh accidents axis Shirvan - Bojnourd

year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Accident	639	585	535	778	761	809	853	845	932

Table 5: Comparison between before and after the Dual Axis Shirvan – Bojnourd

Dual average of the 2001- 2006	635
After an average two band 2007-2009	876
Difference	238
Percent	19

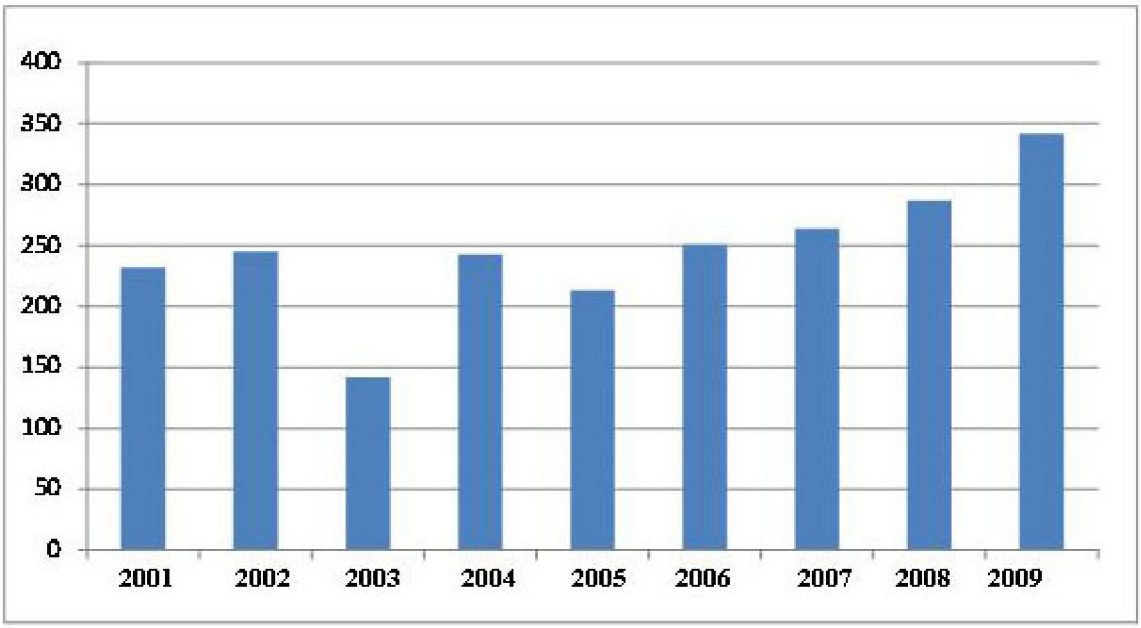

Figure 1: The rate of annual accidents atmospheric conditions (clear)

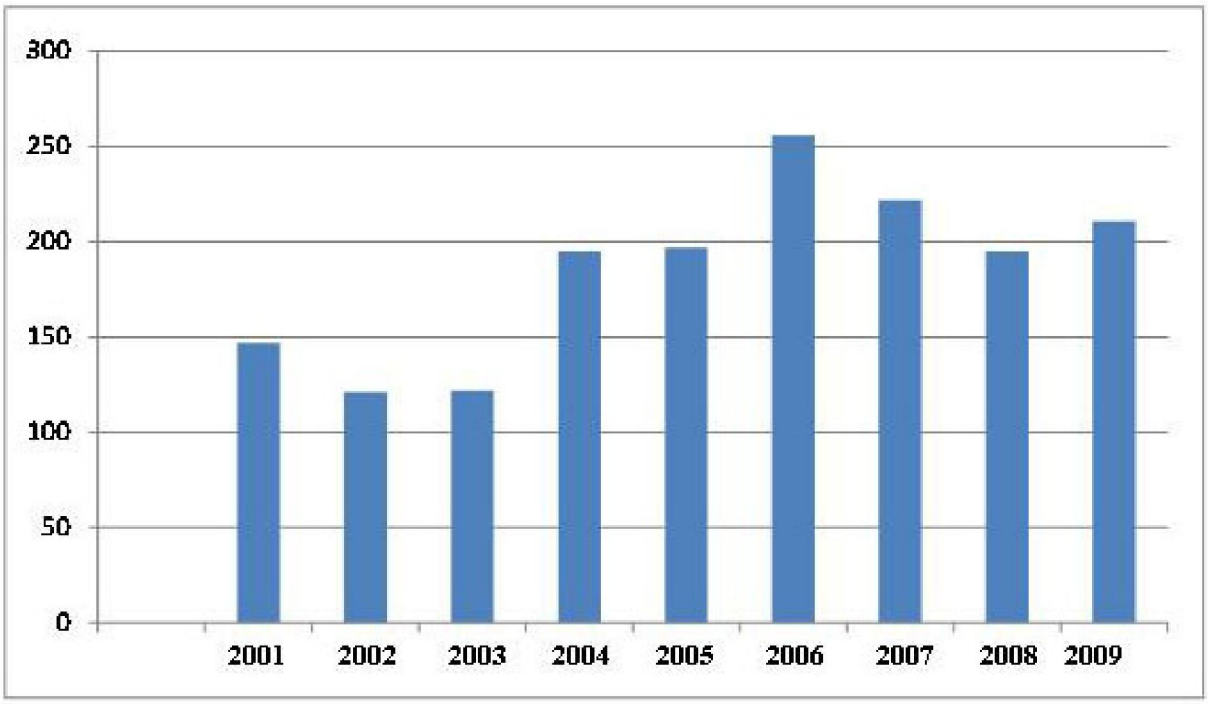

Figure 2: The rate of annual accidents in atmospheric conditions (cloudy)

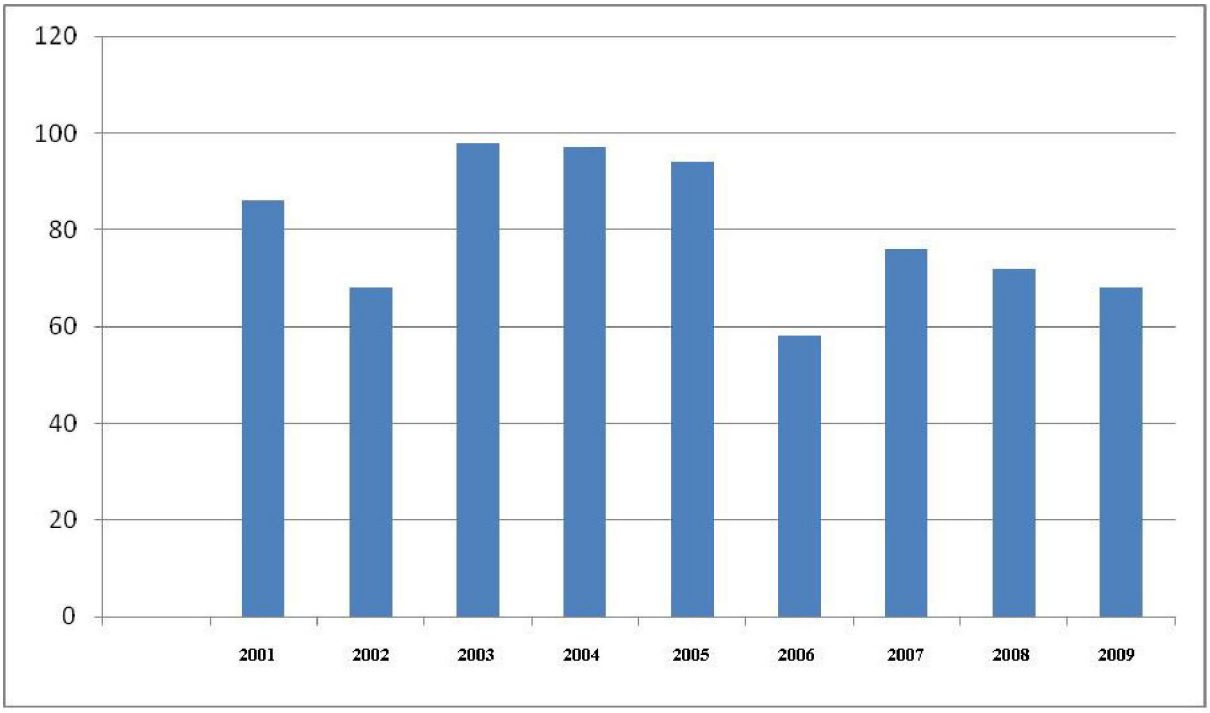

Figure 3: The rate of annual accidents weather conditions (rain)

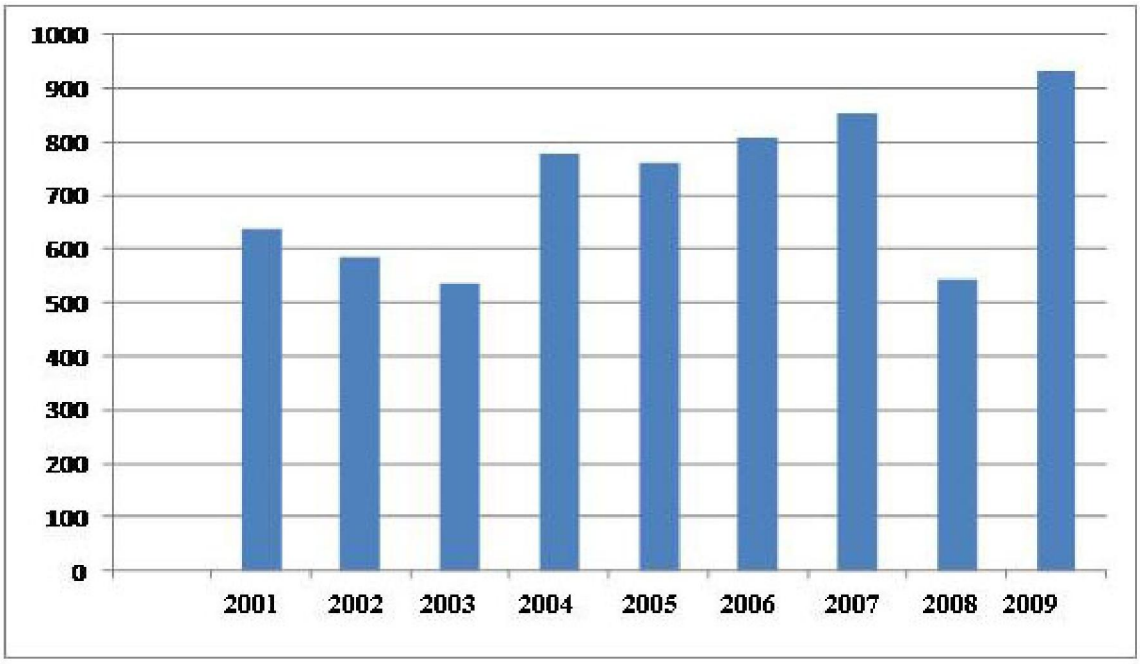

Figure 4: The annual number of accidents axis (Shirvan - Bojnourd)

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