

RECOGNITION OF THE RELATIONSHIP BETWEEN CLIMATIC ELEMENTS AND INSURANCE LOSSES IN RASHT COUNTY

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ABSTRACT: Since Guilan Province has a humid-temperate climate and considering the “rainfall and temperature” climatic variations, the effects of these changes on everyday lives of this area’s residents and how the insurance companies are influenced by the damages caused by floods and storms etc., were identified and optimum results were obtained. It was determined in this research, using the correlation method and SPSS software, that there is an optimum relationship in this field. Any type of changes in climatic conditions can provide an appropriate situation for unexpected accidents. So that, this area has a colder climatic condition and more precipitation and it can be approximately expressed that amount of the damages will be greater in this area and on the contrary, it has warm weather and lower temperature and the accidents are also far less. This is observed in most statistical functions of insurance companies like car insurance and third party car insurance. Climate is considered as one of the basic elements of human life and its preservation becomes more important every day by world’s development. Climatic variation is one of the most complicated problems that humankind faces in present and future. Due to ignoring the rules of nature and unfamiliarity with related environmental issues, the human being is considered as one of the main factors of these variations.

Key word: Recognition, Climatic Elements, Insurance Losses, Rasht County

INTRODUCTION

Climatology is a science that attempts to describe the nature of climate in different places and its continuity with elements of natural environmental and human activities. Climatology is the scientific study of climate, namely description and display of the climates, analysis of the factors and differences between the climates and application of climatic information to solve social problems. In this type of insurance, commitment matter of the insurer is a particular object, convertible into cash. The property insurance is a contract for compensation of the losses and damages incurred to a particular object and maximum liability of the insurer is the maximum amount of the insurance policy (Mohammadi, 2007). Different property insurances are frequently increasing some examples of which are: insurance multiplicity, meaning that there are multiple insurances for one object and this does not necessarily indicate the insurance contract but if this condition exists, the insurance multiplicity will be in contrast with compensation (Karimi, 2011: 39). Karke Abadi and Molaei (2011) have studied the role of geographical factors in the road accidents of Semnan County. He has concluded in his article that in Semnan County, using results of the maps, it was concluded that Shahroud-Sabzevar

axis has the highest rate of accidents with 33 percents based on human factor. In field of the role of climate in road accidents of this county, the rainfall, snowing, frost and wind factors were studied and it was found that Shahroud-Sabzevar and Semnan-Damghan axes have great climatic hazards and this is one of the reasons for high accident rates in these axes. Semnan-Damghan axis and vice versa, in range of Ahovan col, is also topographically in the critical axis. Generally, it can be said that spacial distribution of black spots and the accidents has not been equal in terms of human factors and other factors in axis of the province and distribution of the accidents is different with some of the geographical factors in the studied axes. Afshari Azad (2008), in an article titled *Study of the Effects of Climatic Elements on Rasht-Anzali Road Accidents*, expressed that it was found from the above research that most of the accidents have happened in the main axis, Pooshesh factory, Khomam beltway, Chaparkhane, Taleb Abad towards Anzali as the black spots in terms of spacial distribution. Also, the comparisons carried out before and after the Rasht-Anzali axis had become dual-banded, show 17 percents increase of accidents after becoming dual-banded which is due to increase in number of the vehicles. Also, in sunny days, most of the accidents belong to the time before the main axis was dual-banded. Yaghoub Zade and Amiri

(2008), have studied a conceptual model for management of the traffic black spots, using GIS the results of which show that the accidents and human casualties are the consequences of unbalanced development of transportation. Number of the accidents of the county is very high; so that, an average of 2140 accidents have happened daily in the county in 2005 and this rate is growing with an annual rate of about 8 to 10 percents. This article attempts to present a conceptual model for applying in GIS with a descriptive-analytical approach, using the library studies. To do so, considering the carried out works in America, 3 coefficient types are presented for homogenizing the different accidents. Mousavi Fouladi, in his article titled *The Role of Climatic Elements in Safety Reduction of Land Transportation Network of Semnan-Sari Studied Axis* have expressed that the climatic factors and elements have very important roles in land transportation and being aware of these factors and elements can significantly help the transportation safety for reduction of the accidents, financial and life losses. Among the different factors affecting the accidents, climatic phenomena like the slippery ice and fog, increase the road accidents. This research studies the probability of critical conditions and slipperiness of the interval between the stations with a length of 200 kilometres, by determining and describing N different climatic conditions matrix and statistical analysis of 4 weather stations. In the study process of monthly statistics of temperature, precipitation and humidity, after classification, categorization and homogenization, the matrix of different environmental conditions was used for determination of climatic conditions of each studied month. After calculation, the probability of each climatic condition during the 8 year statistical period in the studied stations was interpreted. The most important achievement of this fact is classification of the road safety in terms of slipperiness and icing in warm and cold months of the year. Study of the old climate of the earth and drawing a correct image of its development process seems to be difficult but awareness about the reason of climatic variations and a logical inference of the impact of effective factors on its emergence is more complicated. Maybe that's why no theory has been so far presented that can justify these phenomena strictly and comprehensively but each of the existing theories expresses one part of this problem. Pressure system of the atmosphere includes vast areas. Among these systems, the high pressure ones are called Anti-cyclone and the low pressure ones are called Cyclone (Kaviani & Alijani, 2004). Wind is an

airflow that moves from high pressure centre toward low pressure centre and in direction of pressure gradient. The more the pressure gradient (pressure difference) between the two points is, the air flow will be also more. Pressure difference among two points is called pressure gradient or Barometric Gradient. Intensity and spread of the wind has a direct relation with the gradient amount (Jafarpour, 2002).

Guilan Province has the required background for movement of the air and the wind due to proximity to the sea and land on one hand and adjacency with coastal plains and mountains on the other hand, together with green fields and dense forests, therefore, the winds of Guilan Province should be studied under two categories of general and local winds (Ganji, 2005).

Individuals who live in the same societies should follow the provisions, laws and regulations of that society and do not act contrary to the regulations. Now, if the person commits an unlawful act, either intentionally or due to recklessness and negligence, he is responsible for it and will be punished and if he causes financial or life losses to another human, he is obliged to compensate for it. Therefore, the trespasser may face two types of responsibilities one of which is civil liability. By virtue of a provision of budget law of 1935, the Iranian government was allowed to allocate twenty million rials to establishment of an Iranian insurance company (Iran Insurance:24). Thus, Iran Insurance Company was established on 6th November 1935, with a capital of 20 million rials and it started working by signing the reinsurance contract. The insurance law was provided with 36 articles and it was enacted on 26th April 1937 (Gholam Hosein Jabbari, booklet 5:12).

Esmaeel Ayati (PhD), a prominent professor of Ferdowsi University of Mashhad, in seminar of *The Accidents and their Evaluation* expressed that he considered the accidents as multi- reason issues. The accidents are made by a non-linear and very complicated combination of these factors and the effects of their combinations and they are complicated to deal with. He counted 3 major factors that cause accidents: human factor, rout factor (street, road), vehicle factor (automobile, motorcycle)(Ayati, a Seminar of Ferdowsi University of Mashhad:31). According to results obtained from the research carried out on 1997-2007, among the climatic factors, sunny day has a major role in the accidents so that, 2323 accidents have occurred in sunny days, 1376 in cloudy days and 797 in rainy days during 1997-

2006 and generally, the ratio of sunny days has been more than other elements (Ayati, 1998).

The studies and researches carried out in different counties show that about 1 to 3 percents of the gross national product is wasted in road accidents which is a significant number. According to the global accident statistics, over 220 thousands of people get annually killed and 7 millions get disabled and wounded in accidents. The researches show that there is a close relation between climatic and road

conditions and the accidents occurred in this axis (Bazzazan, 1998). Therefore, according to statistics of the accidents in one part of Rasht axis, the climatic conditions of these accidents have been reported to be more important by Rasht station on March, April, December and January during 2007-2008, in terms of frequency of accidents. Study of the climatic factors show that precipitation phenomena has caused the accidents (Bazzazan, 1991).

MATERIALS AND METHODS

In this research, after collecting the data from the synoptic station of Guilan Province, the meteorological elements affecting creation of the accidents have been applied (2005-2014). Collection, organization and categorization of the required data for data analysis were done using appropriate statistical methods and SPSS

statistical software. Also, in this descriptive-analytical research, the desired climatic elements causing insurance losses were identified and studied using the statistical method, considering the data available in weather stations. The information processing and drawing the tables and charts will be done using Excel software and the maps will be drawn using Arc GIS software.

Table1. Geographical Location of the Studied Area

Station Type	Longitude	Latitude	Altitude meters	Establishment year	Name of the station
synoptic	۴۹° ۳۷' ۰۰"	۳۷° ۱۹' ۰۰"	-8/6	1950	Rasht

RESULTS

Nowadays, access to data and information in field of insurance on one hand, provides the possibility to study and survey the economic and social condition and on the other hand, it is used as a valuable guide for the planners, authorities and executives. Considering the importance of the statistics of Iran Insurance Company, the required information and statistics are adjusted in a way to be responsive to receiving the premium and paying the compensation and they are presented here.

Precipitation and sunshine hour show the selected station. Following image implies the precipitation amount and sunshine hour in Rasht station. As it is observed in the image, it can be seen in precipitation distribution and sunshine hour in the statistical period that in years 2005, 2006, 2007 and 2008, precipitation shows the highest frequency and the sunshine hour has the highest percentage in some of the years. Also, in rest of the years the precipitation frequency and sunshine hour have been presented less than the mentioned years.

Table2. Precipitation and Sunshine Hour in Rasht Station during the Statistical Period 2004-2013

Sunshine hour T	Precipitation mm	Year
435/2	495/54	2004
440/9	665/14	2005
575/8	688/86	2006
443/6	368/14	2007
389/5	514/37	2008
495/3	311/72	2009
556/5	341/81	2010
489/4	627/4	2011
518/6	380/51	2012
487/9	622/55	2013

As observed in table3, considering the amount of precipitation and sunshine hour, car insurance has compensated for the losses incurred to the individuals. The following table has been extracted from chart3 which shows that the payments of car insurance losses have been done in the time with the highest precipitation of the year and the highest payments have been during the years 2004, 2005, 2011, and 2012. The losses had the highest percentages on years 2011 and 2012. It is clear that as the time passes, amount of the losses increase by increase of population. The

compensation amount of car insurance has been presented based on the maximum and minimum sunshine hours in table3 from which diagram3 has been extracted and shows the payments done in minimum sunshine hours and the highest payments have been on 2004, 2009, 2011 and 2012. But years 2011 and 2012 had the highest payment frequencies in minimum sunshine hours. Lots of travellers entered the province during this period and there was a higher population density due to the good climate.

Table3. Compensated Amount of Car Insurance Based on Precipitation and Sunshine Hour in Rasht County during Statistical Period of 2004-2013 (the Amounts are in Rials)

Car insurance damage in precipitation (rials)	Car insurance damage in sunshine hour (rials)	Year
6/351/151/254	6/937/481/411	2004
5/645/927/697	5/392/183/251	2005
5/765/941/218	6/466/972/322	2006
176/454/648	4/044/536/402	2007
3/406/089/768	2/846/777/458	2008
4/977/137/987	4/011/486/300	2009
2/850/471/916	5/971/136/260	2010
7/195/556/178	7/007/033/710	2011
7/191/069/263	6/890/126/315	2012
5/560/623/173	5/929/342/126	2013

As observed in table4, compensation amount of the third party car insurance for precipitation and sunshine hour was extracted from chart and table4 related to compensation of third party car insurance. According to the chart, the payments done during years 2011, 2012 and 2013 have been in maximum precipitation. This process shows that by increase of population, the compensation in maximum and minimum

precipitation is increased and in some cases decreased slightly, but this trend has been upward after the year 2008. Compensations of the third party insurance have the highest percentages in years 2004, 2005 and 2013 based on maximum and minimum sunshine hours of the third party insurance compensation also, number of the people who have received the compensation implies this fact.

Table4. Compensated Amount of Third Party Insurance Based on Precipitation and Sunshine Hours in Rasht County during the Statistical Period of 2004-2013 (The Amounts are in Rials)

Third party damage in precipitation (rials)	Third party damage in sunshine hour (rials)	Year
5/654/105/221	3/293/661/212	2004
29/237/772/409	13/176/211/374	2005
34/072/014/435	26/893/972/674	2006
154/986/106/487	20/427/310/720	2007
34/289/000/370	12/210/085/870	2008
41/386/911/970	28/990/605/290	2009
219/230/712/213	34/276/917/972	2010
67/759/092/481	69/166/035/428	2011
74/610/592/239	60/705/682/621	2012
87/964/396/367	53/755/047/972	2013

As observed in table5, the compensation amount of fire insurance was extracted from table and chart5 related to compensation of fire insurance. Considering the payment chart, most of the

payments have been done during 2007 to 2013 which shows it has been ascending by population increase.

Table5. Compensated Amount of Fire Insurance in Rasht County during the Statistical Period of 2004-2013 (Amounts are in Rials)

Fire losses (Rials)	Fire premium (Rials)	Year
10/235/570	3/327/974	2004
10/447/157	9/227/057	2005
5/516/161	208/866/342	2006
8/047/036	30/307/792	2007
10/248/219	32/949/900	2008
10/010/119	41/246/110	2009
8/379/841	44/311/116	2010
14/476/923	44/211/609	2011
13/104/195	27/962/252	2012
30/881/706	69/467/121	2013

A heavy snow with an average height of 1.6 m (equal to 380 millimetres of precipitation) in Rasht City and the surrounding areas caused severe damages to urban infrastructures such as water and gas networks, electricity and telecommunication masts on January 2005. The urban and suburban roads were closed for 10 days and all urban activities were disrupted and ceilings of many houses and residential and non-residential buildings, estimated about 1100 cases, were collapsed due to heavy weight of the snow. The crisis had 10 casualties and it was repeated again 3 years later which indicates the importance of this issue. The snow fall on

December 2007 in a broad level caused great concerns in the province level especially for the authorities and relevant officials. In this crisis, height of the snow reached up to 135 cm in Rasht and 203cm in Bandar-e-Anzali. Volume and height of the snow in other plain and mountainous areas was relatively high as well. Also, this was repeated again 6 years later on December 2013 and a heavy snow swept the Guilan Province plain. With arrival of this system, mostly all of the main entry routes of Rasht were closed for approximately 4 days and the urban commutation was difficult.

CONCLUSION

Considering the specific climatic condition of the studied area, the roads are covered with bumps due to the heavy rainfall. Extensive repairs are needed for standardization of the urban roads that are usually performed by the municipality and these repairs should be done when there are more sunshine hours as possible, but lack of coordination between the municipality and the service firms and organizations for repairing the roads and sidewalks, sometimes causes the diggings to be repeated several times. In order to reduce the repair costs and further exploitations especially in second half of the year, when we have less sunshine hours, the municipalities can coordinate with other organizations such as Guilan Regional Electric Company, Guilan telecommunication company, Guilan Water and Waste Water Corp, Ministry of Roads and Urban Development, so that, the probable diggings will not be repeated. Considering these issues, the road repairs can be

done at nights and in this case the repairs will be done more rapidly due to decrease of car traffic and less energy will be consumed. Paying attention to this issue will both reduce the traffic and decrease the accidents and insurance losses. If ceilings of the houses are made of galvanized iron, less use of the forest woods leads to maintenance of these great national assets and this itself, in addition to preserving the climatic factors of the area and the environment, will also reduce the floods which annually harm the insurance companies badly. It also prevents the subsequent damages such as the losses caused by the weight of snow on ceilings of residential and commercial houses, fire and spread of the fire to nearby houses. This is where the insurance companies benefit from a multidimensional reduction in losses. Also, decrease of insurance premium increases the number of policy holders due to low price of insurance premium of the residential and commercial houses that will be beneficial for people, insurance companies and finally the national interests. Pavements of the roads are

also important in decrease of accidents, especially during the precipitation when the roads are slippery. This becomes more important in winters and generally rainy seasons, due to the slippery surfaces. One of the strategies proposed for reduction of the danger of driving on slippery surfaces worldwide is to use porous asphalt which has been suggested as a new type of surface layer for roads. Paying attention to manufacturing technology of this asphalt type is important since it is believed that effectiveness of porous asphalt in decrease of accidents such as rapid depletion of water from the road surface, reduction of hydroplaning, increase of car safety and friction coefficient between the tire and asphalt pavement will be preserved in a desirable level which is quite sensible and appropriate for the climatic condition of this area. One of the internal experiences in area of field studies of using porous asphalt goes back to performance of an experimental piece on 2010 in north of Iran, in west of Sari City (10 km from Ghaemshahr to Sari with a length of 1500m and with of 11m) in separate four-lane form. Considering the conducted research, as mentioned in the results, climatic parameters and meteorological elements have major roles in the losses and effects of these factors (good weather, rainy weather and bad weather) on increase of accidents and amount of damages have been recorded to be more than twice.

REFERENCES

- A Collection of car Insurance and Third party Insurance Instructions "Technical Council of Iran Insurance Studies", p24.
- Ayati E. A Seminar on Iranian Road Accidents. Ferdowsi University of Mashhad, p31. 1992.
- Ayati E. Calculation of the Costs of Road Accidents in Iran. Road Maintenance and Provincial Coordination Deputy, Administration of privacy Protection of the Iranian Roads. 1998.
- Bazzazan M. Road Maintenance, an Important Duty in Preservation and Safety of County's Roads and the Silk Road, Second Year, 1998: No.9 & 10, March.
- Bazzazan M. Winter Road Maintenance. Transportation Quarterly, First Year, 1991:No.2, Winter.
- Guilan Office of Governor White Crisis, Overview of Snowfall Accident of January 2005 and December 2007 in Guilan Province. 2008.
- Jabbari, GH (PhD). Insurance Principles. Tehran University, College of Economy, Booklet, p 12.
- Karimi A. Problems of third Party Insurance: Some Proposed Solutions, Insurance Industry Quarterly, 2009: p14.
- Karimi A. Third Party Insurance: Problems and Solutions, Message of Iran Insurance, 2005: pp39 & 45.
- Kaviani M, Alijani B. Principles of Meteorology. Samt Publications.2004.
- Mohammadi H. Applied Meteorology. Tehran University Press.2003.
- Naeemi A. Climatic Study in Accidents. MA Thesis of Natural Geography. Rasht Islamic Azad University. 2004.
- Sakaran O, Saebi M, Shirazi M. Research Methods of Management. Public Management Training Center. 2011.