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The Role of Tourism Climate Index with the emphasis on climate is A case study in north of Iran (Gilan province)

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Abstract
Climate builds not only a resource for tourism as a driver but can be a limitation. Climate is usually described by air temperature and rain conditions and sometimes by the sunshine duration at a location. Nevertheless, these parameters are less representative for the spatial and temporal climate variability of a region and do not cover all the components of climate. In this research, due to the impact of climatic factors in tourism planning, determining tourism climate index (TCI) is of great concern. In this project, to assess the tourism climatic conditions using bioclimatic index (Tourism Climate Index), data from 10 synoptic stations of Gilan in a 10-year period (2012-2003) was collected and incomplete data through linear regression was rebuilt. In this system model, 7 parameters, the average monthly rainfall, average temperature, average relative humidity, maximum temperature, minimum relative, the mean daily sunshine duration and wind speed were evaluated. The aim of this study is to investigate the conditions of tourism climate in Gilan province based on TCI tourism climate and using the techniques of geographic information systems (GIS), they have mapped out and prepared the map of TCI for all months of the year. The results of this study showed that the optimal conditions in the region in terms of tourism climate are in May and the most difficult month in terms of tourism climate is in November which was the lowest TCI. In terms of geographical coverage, the ideal climatic conditions are more dominant in the North West (including the cities of Talesh, Astara, Anzali, Kiashahr, Roudsar).

Keywords: Index of TCI, tourism climate, geographic information systems (GIS), Gilan province

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Introduction

A new development of a climate tourism assessment is the Climate-Tourism-Information-Scheme, which includes the most relevant and reliable parameters and tourism-climatological factors (Matzarakis 2007, Lin and Matzarakis 2008). This specific quantification of climate can be carried out by using existing climate data set or regional modeling projections based on climate simulations for the present or future time periods (Matzarakis, 2006, 2010). The prepared and extracted information have to be presented in an easy acceptable and understandable way for tourism industry and local authorities in tourism and health planning and protection of infrastructure.

Climate and tourism are affected as the main components of a system in different ways to each other and in interaction with each other have raised a new argument as climatology of tourism (Hassanvand et al, 2011: 122). Climate and its seasonal effects play an important role in tourism activities at different levels (Saliqeh and Beheshti Javid, 2014: 250). As in many countries, weather and climate are considered as a valuable asset for tourism (Agnew and Palutikof, 2001: 41). Therefore, one of the factors that must be considered in the discussion of tourism is the climatic conditions (Ziaei and Bakhtiari, 2009: 83). Climate can be a factor in attracting tourism industry and plays a dominant role in choosing tourism locations (Gomez Martin, 2000). Because climatic characteristics associated with health and socio-political status in selected tourist sites and attract tourists are effective (Monferrand, 2002: 23). The reason is that a suitable climate can cause positive responses of tourists and they choose their travel plan and also destination due to climatic conditions and on the other hand, local conditions are designed for residence of tourists in the destination by climate (Mohammadi et al, 2008: 136).

Pleasant climate' has been defined in other studies as "slightly warm with clear skies or scattered clouds" (de Freitas et al, 2008:404) and 'slightly warm' has been defined as temperatures around 21 ℃ (Lise

and Tol, 2002). Of course, comfort and what is perceived as 'pleasant climate' go well beyond temperature and cloud cover to include humidity, precipitation, sunshine duration, and so forth. In addition to this psychological aspect of climate, rain, extreme temperatures, or the threat from an approaching storm can impede touristic activities or temporarily change the desirability of a destination. To integrate the various components of climate, indexes have been developed (Mieczkowski, 1985), for example, developed the tourism climate index (TCI), which is based on the notion of human comfort, as a weighted average of seven climatic variables to include various measures of temperature, humidity, precipitation, sunshine, and wind speed. The TCI ranges from -20 to 100 (ideal) (De Freitas et al, 2008) developed an index represented as thermal sensation, i.e., from very cold to very hot, that also includes several climatic variables; (Delgado Castro and Gálvez Soler, 2012) developed the mean historical climate for tourism (MHC) index, which is an adaptation of the TCI.

One of the required information of tourists for traveling is the climatic conditions and climate considerations are taken into account for most tourists to choose a tourist destination. In terms of tourism planning, climate is very important and tourists usually are in search of favorable climatic or comfort in which an individual does not have any sense of dissatisfaction and lack of thermal comfort and climate and this factor plays an important role in the decision for the tourism destination (Matzarakis, 2001: 26) so that the information of climatic comfort from those days when tourists visit places, it can be worthwhile for planners and they need climate information before, after and during visits to places. Therefore, determining more comfort index for tourism is very important (De Freitas, 2008). The welfare conditions are a set of the minimum temperature conditions that are appropriate for 80% of individuals, or in other words, a person in that situation does not feel hot and cold (Jahanbakhsh, 1998: 67).

Mieczkowski (1985) has described in order to study the status of tourism climate on the safety of tourists, with the emphasis on the importance of climate for tourism and then, he has mapped out tourism climatic index or so-called TCI of tourism climate in the world by combining these elements into a single index. Hu & Ritchie

(1992) consider climate as a key factor for the tourism industry and identification of important tourist destinations. Lohmann & Kaim (1999) also Scott & Lemieux (2009) consider climate as one of the main motivations of tourists in increasing demand for tourism in countries such as Germany, the UK and Canada. Gomez Martin (2005) consider climate as one factor of facilitating enjoyable and ideal tourism activities. Boniface and Cooper (1994) introduced climate as one of the most important factors in tourism development of the region.

In this regard, Gilan province enjoys an area of 14711 square kilometers of enormous environmental diversity (beaches, plains, foothills and mountains), and enjoys active coasts of the East and North and less active in the West with its sandy beaches, sand dunes and sea shells, sunbathe, stroll on the beaches and mountains, walking on the beach and mountains, water treatment and mineral waters, rivers, forests, caves and waterfalls, fishing and horseback riding, nature and wetlands etc. Gilan province can have maximum economic efficiency and the leisure and employment through recognizing the comfort of the human environment in its planning (Ramezani, 2009: 58). Tourism development of Gilan province is an important feature among capabilities of the other provinces so that success of many of the purposes of tourism of the province is due to humid climate. The level of climate changes and its consequences are also considered one of the most important concerns and restrictions of the development of tourism in this province. Therefore, because of the importance of tourism in the province of Gilan, this study discusses on the impact of climate on tourism of Gilan province.

Review of literature

Scientific review and documented climatic conditions and welfare of the people date back to the 50s and 60s. Despite the key role of climate as a matter of principle in the choice of tourist destination and its effects on the economy of the region, only a few studies have been performed on investigating its impact as a natural attraction of the area tourism demand (Freitas, 2003: 45). But in summary, the articles in this issue have been published in scientific journals abroad which are as follows:

Matzarakis (2001) mentions an article entitled weather and climate conditions for tourism in Greece where its climate conditions are different due to the large geographical differences between regions within Greece and its islands. According to studies of Lise and Tol, although many factors including the distance to the destination and aerial access affected tourism demand, climate and destination weather were among the key factors in determining the amount of tourists who had been entered, and with climate changes, tourism demand of the region was altered. Tourists often choose the regions to spend their holidays that they have a sense of comfort (Lise and Tol, 2002: 429).

Scott and Mcboyle (2004) studied the effects of climate change on tourism climate resources in North America using a modified version of TCI and the results showed that partly Los Angeles is only as the most favorable distribution of tourism climate during the year. Amelung and Viner (2006) test the study of the future of tourism climate index (TCI), future climate change scenarios for the Mediterranean area in their article titled Mediterranean tourism. The results show that in the summer, in the Mediterranean, the weather becomes very hot and in northern Europe, the weather become more favorable and more attractive. The results also indicate that in spring and autumn, weather conditions in most regions of the Mediterranean, especially Spain, Greece and Turkey will be more favorable and pleasant.

Jacqueline et al (2007) found that due to climate changes, tourist attraction in Britain and Ireland was towards the north and the flow of tourists would be towards the south in Germany because of warmer weather and the creation of favorable conditions in the inner regions of the country in comparison to coastal regions. Hein (2009) took action in a study to evaluate the comfort of tourism in Spain using tourism climate index (TCI) which their results suggest that the best time of comfort for tourism is in the summer in this country. Howard (2009) has determined climate changes and the future of tourism in the Caribbean, the right time for tourist activities in North America, the East and West Europe and the Pacific coast between May and August and in the Middle East, Asia and Africa between December and April. Also, the best time for tourist activities has specified in the

Caribbean between December and April (Yazdanpanah et al, 2013: 91). Hoffmann et al (2009) concluded there was no meaningful penetration of the vulnerability under the effects of climate change in an article entitled "determiners of adaptation to climate change on winter tourism: in economic analysis".

Scott & Lemieux (2010) prepared a brief history of climate services and climate applications in the area of tourism in an article titled "weather and climate information for tourism". Falk (2010) concluded that there was a significant and positive relationship days of Eid and holidays and demand for winter tourism in an article titled "analysis of a dynamic data from the depth of snow and winter tourism". Bank & Wiesner (2011) showed that the majority of operators were aware of the dangers of climate and reported valid weather appeared in an article entitled "determiners of how to use weather derivatives in winter tourism in Australia" by interviewing 61 officers of tele skiing. Cheng et al (2012) studied Hong Kong's thermal comfort using indices and physiological equivalent temperature and mean of vote predicted. This research investigated the effect of changing wind conditions and solar radiation on people in the feeling the temperature of people in the region (Mohammadi, Bakhtiar, 2013: 40).

In Iran, some studies have been done that we can mention the works including: Farajollah and Ahmadi (2010) that they discussed in a study using tourism climate indices (TCI) and Mieczkowski (1985) on the assessment of Iranian tourism climate. In this study, 15-year-old statistics for 144 synoptic stations (2004-1990) was calculated. By clustering obtained for this indicator, six tourism regions of the country were detected.

Movahedi et al (2012) discussed in a study to assess and analyze TCI in Loresatan province using climate index of TCI and the results of this study showed that in the cold months of the year, because of the arrival of rainfall systems and reducing the temperature conditions are unsuitable for tourism, especially in the northern regions of the province, but by beginning of the summer (mid-spring to early autumn), climatic conditions are very good. Yazdanpanah et al (2013) discussed to study climate conditions for tourism development by using TCI, in East Azarbaijan and the results showed that May, June, July, August and September were the best conditions in terms of

tourism climate and the months of December, January, February and March were the best conditions of the view. Baratian and Rezaei (2013) addressed the spatial analysis of TCI in Ilam province using the model of TCI and they were determined using Geographic Information System (GIS) for suitable zones so that the results showed that August had the lowest utility and September had the highest utility for tourism. Gandomkar (2014) studied spatial and temporal distribution of Tourism Climate Index in a research and the results of this study show that October in the province has the best conditions for the tourists and after that, there are the months of May and April, respectively and January, February, March, July, August and December are the worst months for the tourists.

Research objectives

The main objective of this research is to identify the potential and actual climatic comfort of Gilan province, to determine the scope of time and place in terms of climate and environmental comfort of tourism and to provide an environment for tourism development in order to help planners for more developing in Gilan.

Review of literature

Climate and weather have, however, not been integrated in the mainstream tourism demand literature. This omission is surprising because seasonality triggered by climatic conditions has been recognized in the literature as a major challenge for tourism destinations; and, seasonality is closely associated with climate and weather. Seasonality is a concept that is well studied and documented in the literature. It is de fi ned here as a pattern that repeats itself over fi xed intervals of time (Makridakis, Wheelwright, & McGee, 1983), and is revealed in recurring variations in natural phenomena, such as, climate (Butler, 2001).

Tourism Climate consists of three main components, which include: 1- thermal effects (air temperature, humidity, wind, solar radiation intensity of solar radiation and long-wave warmth and cold in the ground); 2- physical effects (dust annoying, continuous and torrential rainfall, humidity, air unpleasant and annoying and inconvenient) and 3- aesthetic effects (optimal radiation of the sun, the beautiful clouds and appropriate sunshine hours). These factors have been influencing the attitude and behavior of tourists and demand forecasting, planning

tourist facilities, time of travel and the use of weather attractiveness in tourism marketing tourism destination are overshadowed (Freitas, 2003: 54). Figure 1 shows the Weather-climate information for tourist decision-making.

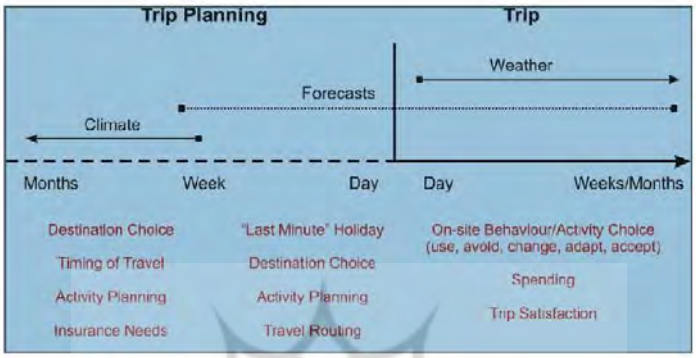

Figure1. Weather-climate information for tourist decision-making, Source: (Scott & Lemieux, 2009)

To assess the impact of weather on human and comfortable climate studies, many models and indicators have been developed in the second half of the twentieth century (Grigorieva &Matzarakis, 2010: 389). Climate index (TCI), which in 1985 was presented by Minkowski; in fact, it is a combination of climatic factors affecting the comfort of tourists. This index is then presented on tourism bioclimatic (Ziaei and Bakhtiari, 2009: 84). An index score than other indices is that the index uses in relation to tourism activities from all the important climatic variables, i.e. temperature, humidity, precipitation, wind and sunshine that control the collection of human body heat conditions (Yazdanpanah et al, 2013: 98). (TCI) can provide information on climatic conditions at different times of year and tourist can choose the time to travel there that enjoys desirable weather conditions (Saraf et al, 2010: 67). TCI is an index that systematically identifies the effect of climate on tourism and can determine tourism climate conditions of the areas with it (Movahhed et al, 2012: 9).

In general, what is important for tourists in the first stage, it is good air that it can continue its activities in open spaces. Table 1 shows favorable status of climate for tourism. Also in Table 2, some of the most important climate indicators are mentioned to assess the tourism climate along with their symbols:

Table1: favorable climate for tourism

Climatic characteristics	characteristics
The average temperature	13 to 20 ° C
Water temperature	17 cm
relative humidity	56% to 70%

Source: (Mohammadi, 1382: 52).

Table2. Some of the most important climate indicators to assess the tourism climate

Row	Index	Symbol	Climate variables needed
1	Effective temperature index	ET	**Dry temperature, wet temperature and wind speed**
2	Thermal sensation index of Geon	TS	**Horizontal solar radiation, wind speed, relative humidity and temperature**
3	humidity index – total humidity	THI	**Temperature and relative humidity**
4	Apparent temperature index	AT	**Drying temperature, water vapor pressure, wind speed, solar radiation**
5	Index of non-comfort	HU	**Temperature and water vapor pressure**
6	Partial pressure index	RSI	**Temperature and partial vapor pressure**
7	Comfort index of Steadman - Tom	THI	**Drying temperature and relative humidity**
8	Wind chill index	H	**Temperature and wind speed**
9	Cooling power index	CPI	**Temperature and wind speed**
10	Index of mean predicted	PMV	**Air temperature, air velocity, radiant temperature, relative humidity, wear resistance and physical activity level**
11	Physiological Equivalent Temperature Index	PET	**Temperature**
12	Tourism Climate Index	TCI	**The maximum daily temperature, minimum relative humidity, precipitation, total sunshine, wind speed, temperature**
13	Weather cooling Index	WCI	**Temperature and wind speed**
14	Tarjong index	-	**Temperature, humidity, wind, solar radiation and sunshine duration**
15	Air solid index	SB	**Temperature and wind speed**
16	Term hygrometric index	DI	**Drying temperature and dew point temperature**
17	Stress index	-	**Temperature, humidity and wind**
18	Oleg index	-	**Temperature and relative humidity**
19	Evans index	-	**Relative humidity minimum and maximum monthly, monthly minimum and maximum temperatures**
20	Bioclimatic index of average temperature	TEK	**Water vapor pressure and temperature**
21	Heat stress index	HIS	**Evaporation, water vapor pressure, wind speed**

Reference: (Zolfaqari, 2010; Karimi and Mahboubfar, 2011).

Research Methodology

In this research in order to assess the situation of tourism climate index and climate data TCI of ten stations in Gilan Province that these data are: the average daily temperature the average relative humidity, the average daily maximum temperature, the average daily minimum relative humidity, the average daily of total amount of rainfall, the average sunshine hours, the average daily wind speed were used. It should be noted that 6 stations were faced with a lack of statistical data that were used for the same data of a linear regression.

First, the database was developed by software Excel and average monthly index was calculated and in the next step, after the index TCI zoning, small amounts of GIS software were used, in GIS, first, layers related to the border and situation of Gilan were prepared and

according to TCI, Gilan months were performed in IDW interpolation method. Then, classification of maps was carried and finally, TCI zoning map for each month is separately obtained.

TCI method

Mieczkowski has calculated for the first time, with the presentation of tourism comfort of 453 weather stations in 1985 and extended its results during the twelve months. Tourism Climate Index (TCI) is provided in 1985 by Mieczkowski. Tourism Climate Index is an abbreviation for TCI. TCI is actually a combination of climatic factors affecting the welfare of tourists, that according to the seven factors in weather stations is calculated to determine the best time and place of entry for tourists. Relaxing index or ideal heat is a numerical parameter known as physiological feelings of an individual against temperature and humidity which man has the best compatibility at this temperature (Mieczkowski, 1985).

Phases of tourism climate index (TCI):

Equation 1: TCI=2{(4.CID)+CIA+(2.P)+(2.S)+W}

Climate elements required in calculating climate comfort of tourism:

1. Daily average of dry temperature and per month per ° C;
2. Daily average of relative air humidity in percent per month;
3. Daily average of maximum drying temperature per month in ° C;
4. Daily average of minimum relative humidity per month in percent;
5. The total amount of average daily rainfall in mm per month;
6. Daily average of sunshine hours per month;
7. Daily average of wind speed per month in kilometers per hour.

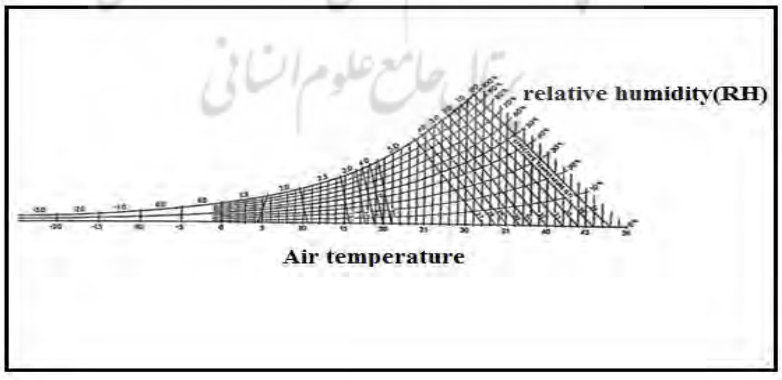

Figure2: monogram of comfort index, sources: (Mieczkowski, 1985)

The variables named can be obtained from the following formula according to their importance for tourism comfort:

Equation2: TCI=2{(4.CID) +CIA+ (2.P) + (2.S) +W

And then, they are ranked according to TCI and the best times and places for entrance of the tourist are determined. For example, tourism climate 90 to 100 includes ranking 9 that is ideal for many tourists (Table 3).

Table3: Qualitative values of tourist climate index TCI

Excellent	**Ideal**	**90 - 100**
	Excellent	80 - 89
very good	very good	70 - 79
	Good	60 - 69
Acceptable	Acceptable	50 - 59
	Borderline (negligible)	40 - 49
Undesirable	Undesirable	30 - 39
	Very undesirable	20 - 29
	Extremely undesirable	10 - 19
	Unbearable	Less than 9

Source: (Mieczkowski, 1985).

An introduction to the study area

The study area in this study is Gilan province where it is situated with an area of approximately 14,042 square kilometers in northern Iran and the geographical coordinates 33 '48 ° to 55 ° 36' east longitude and 32 '36 ° to 28' 38 ° north latitude. Because of the considerable influence in the creation of national tourism market and attract substantial foreign tourists, the province's ecotourism attractions such as the Caspian Sea coast, forests, rivers, waterfalls, caves and other attractions as well as historical, cultural and architectural monuments, the importance of the effects of climate change on tourism in this area is doubled. According to the census, Gilan province population is calculated 874.480.2 people (Gilan Statistical Yearbook, 2012).

Research findings

A. Quantitative and qualitative classification of TCI index in the stations studied

Table 4: Quantitative and qualitative classification of index of TCI in the stations studied

month / station	***January***	***February***	***March***	***April***	***May***	***July***	***June***	***August***	***September***	***October***	***November***	***December***
Talesh Quantitative	46	46	51	55	83	85	71	73	65	64	49	**48**

Poor and marginal	**48**	**Poor and marginal**	**40**	**Poor and marginal**	**40**	**Acceptable**	**46**	**Poor and marginal**	**41**
Poor and marginal	45	Poor and marginal	21	Poor and marginal	20	Very undesirable	43	Poor and marginal	44
Very good	66	Very good	66	Very good	65	Good	70	Very good	73
Poor and marginal	62	Poor and marginal	63	Poor and marginal	65	Good	46	Poor and marginal	67
Acceptable	72	Acceptable	62	Acceptable	59	Acceptable	58	Acceptable	69
Good	74	Good	64	Good	70	Good	61	Good	69
Very good	87	Very good	74	Very good	77	Very good	٧٨	Very good	81
Excellent	83	Excellent	82	Excellent	87	Excellent	86	Excellent	89
Acceptable	52	Acceptable	62	Acceptable	52	Acceptable	57	Acceptable	56
Acceptable	47	Acceptable	47	Acceptable	47	Poor and marginal	50	Acceptable	50
Poor and marginal	43	Poor and marginal	41	Poor and marginal	69	Good	47	Poor and marginal	41
Poor and marginal	56	Poor and marginal	45	Poor and marginal	35	undesirable	49	Poor and marginal	39
Qualitative	Quantitative	Qualitative	Quantitative	Qualitative	Quantitative	Qualitative	Quantitative	Qualitative	Quantitative
	Astara		Rasht		Anzali		Roodsar		Kiashahr

Poor and marginal	**51**	**Acceptable**	**45**	**Poor and marginal**	**44**	**Poor and marginal**	**51**	**Acceptable**
Poor and marginal	59	Acceptable	42	Poor and marginal	47	Poor and marginal	40	Poor and marginal
Very good	72	Very good	58	Very good	68	good	53	Acceptable
Poor and marginal	72	Very good	64	Acceptable	22	Very good	64	good
Acceptable	84	Excellent	78	good	64	good	83	Excellent
Good	84	Excellent	82	Excellent	70	Very good	90	Excellent
Very good	72	Very Excellent	88	Excellent	81	Excellent	92	Excellent
Excellent	70	Very good	72	Excellent	83	Excellent	84	Excellent
Acceptable	56	Acceptable	58	Acceptable	63	good	58	Acceptable
Acceptable	54	Acceptable	41	Poor and marginal	44	Poor and marginal	54	Poor and marginal
Poor and marginal	61	good	43	Poor and marginal	43	Poor and marginal	43	Poor and marginal
Poor and marginal	41	Poor and marginal	40	Poor and marginal	46	Poor and marginal	52	Acceptable
Qualitative	Quantitative	Qualitative	Quantitative	Qualitative	Quantitative	Qualitative	Quantitative	Qualitative
	Manjil		Masooleh		Lahijan		Deilaman	

Source: research findings, 2016.


Anzali Station
Coefficient(TCI)
Indicator(TCI)
100
80
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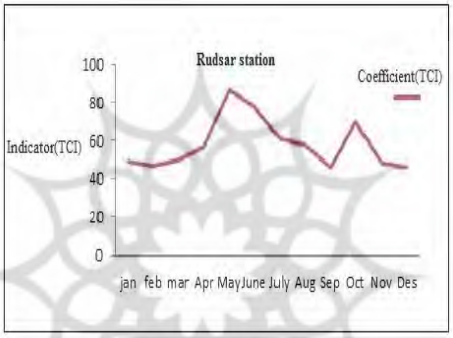
jan feb mar Apr May June July Aug Sep Oct Nov Des


Rudsar station
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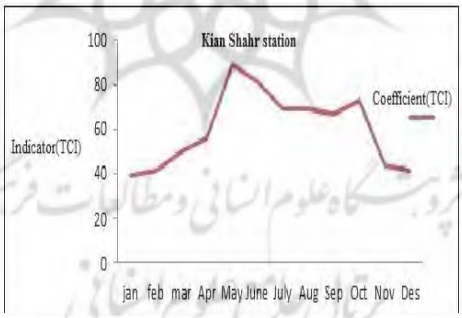
Kian Shahr station
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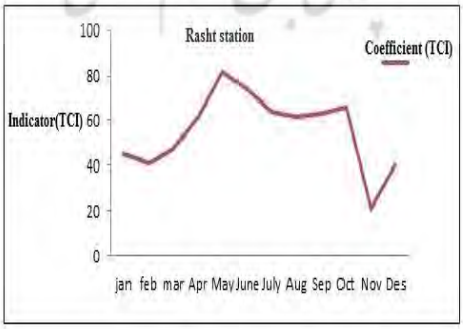
Rasht station
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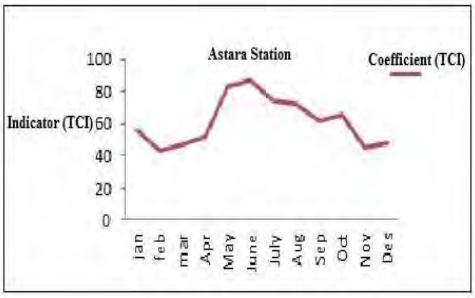
Astara Station
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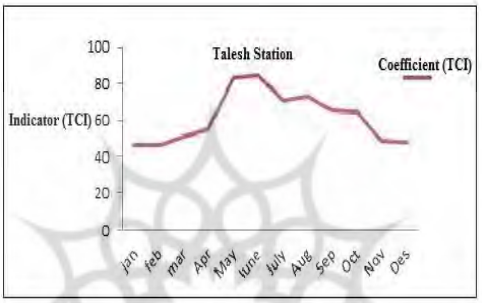
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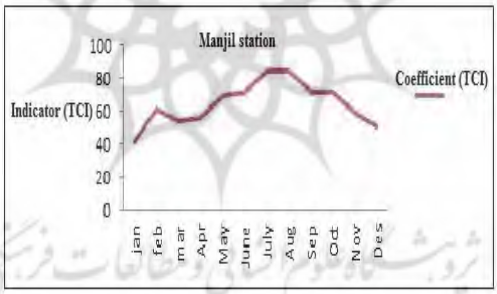
Manjil station
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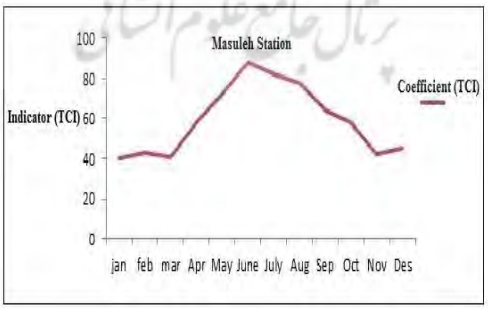
Masuleh Station
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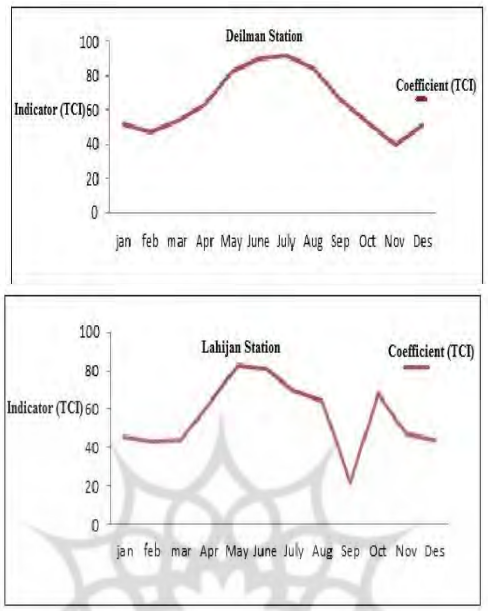

Figure 4: TCI graph of quantitative index for different months stations studied

B. Zoning values of TCI for different months in Gilan province

- *January*

In January, all stations of Gilan are in acceptable, marginal and poor and undesirable range but among the different stations, the lowest coefficient of TCI is in Anzali and Astara is the highest coefficient and ther are coefficients 35 and 52 and other TCI of stations are between these two stations. Referring to Figure 5, it can be seen that Northern Province of Gilan and part of the south show more favorable conditions for tourism climate in January. In other words, in comparison with other parts of Gilan, tourism climate of north and south in January is more acceptable and the central part of the province for tourism in this month is inappropriate.

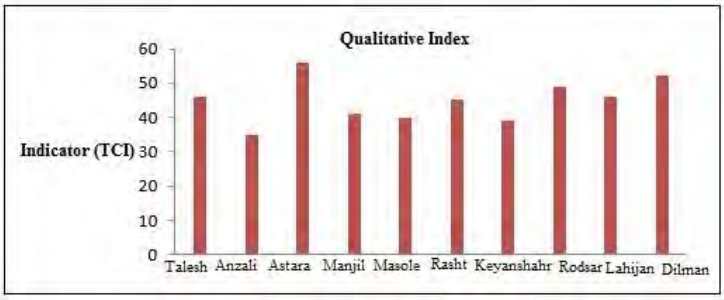

Figure5. Qualitative index charts of TCI for stations

- ***February***

According to Figure 7, it can be seen that most stations in February are at negligible marginal conditions for the province's tourism climate, apart from Manjil and Anzali station which are situated in good and acceptable range, among stations, the lowest coefficient TCI are commonly related to Rasht and Astara with coefficient 41and the most maximum is related to Manjil which the number 69 is calculated. Figure 8 shows the map of zoning tourism climate of Gilan province in February.

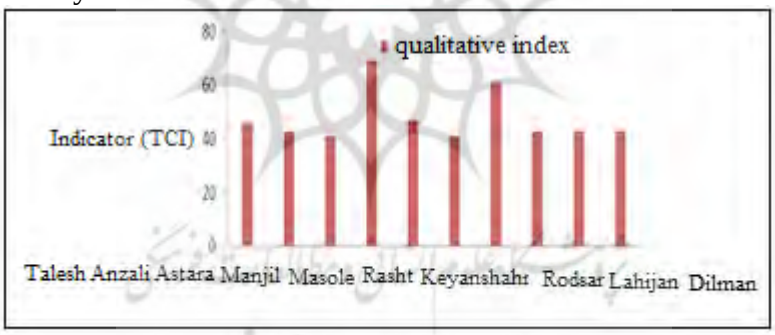

Figure7: qualitative index chart of TCI for stations

- ***March***

According to Figure 9, it can be seen that almost all stations are in a numerical range. The minimum index of TCI is for Roodsar station which the number is 41 and the maximum is 54 relating to Kiashahr station and the rest of the stations between the two stations are also their numerical range. Referring to Figure 10, related to March, it can be seen that Northern Province and most parts of the South in marginal conditions are poor and other parts of the province of Gilan

have acceptable conditions for tourists. Figure 10 also shows conditions of the map of zoning for climate Gilan Province in March.

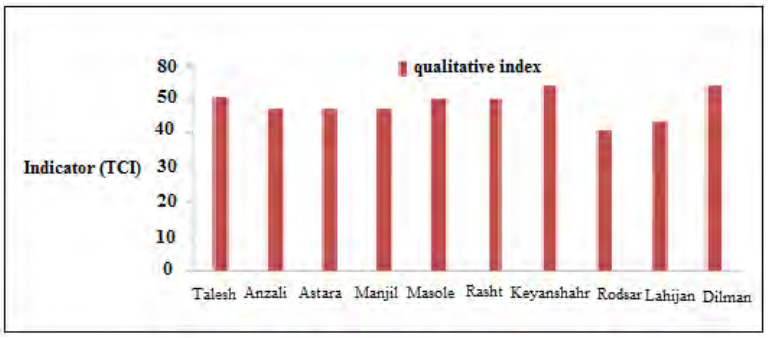

Figure9: qualitative index chart of TCI for station

- April

In April, all stations are within acceptable and good range. But among the different stations, the lowest coefficient of Anzali and Manjil are two stations where the number 52 and the most are related to Lahijan where the number 63 is calculated. If it is referred to Figure 11 related to April, it can be seen that all Gilan province are in good and acceptable conditions in terms of tourism climate. The northern part is in an acceptable condition and the southern part of the province is in good condition. Figure 12 also show climate conditions of Gilan Province's zoning map in April.

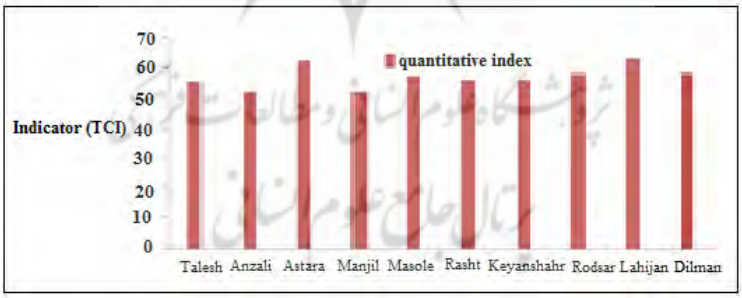

Figure 11: TCI graph of quantitative index for stations

- May

In terms of tourism, Gilan province is considered ideal in May which. If it is referred to Figure 13, it is seen that all stations are in excellent condition and very good but the most confident is related to Kiashahr where it is 89 and the minimum is related to Manjil calculated 70 and the rest of stations are situated between these two. According to

Figure 14, it is seen that all Guilan apart from a small portion of the southwest are ideal conditions for tourism climate.

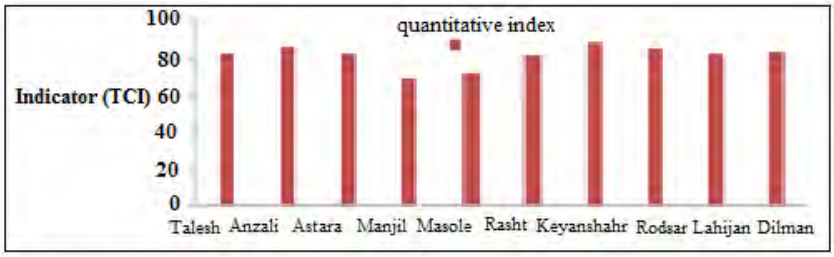

Figure 13: TCI graph of quantitative index for stations

- ***June***

June compared to May with slight differences has ideal conditions for the climate of Gilan Province. Referring to Figure 15, it is observed that the maximum coefficient of TCI, number 92 is calculated which is related to Deilaman and the minimum is related to Manjil that it is 72 and other stations are situated between these two numbers. In Figure 16, it is also observed that most of Gilan province is in ideal terms. In other words, most parts of northern and southern, eastern and western parts of the province include the above circumstances.

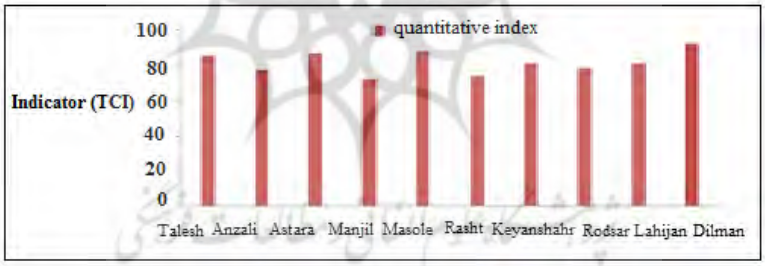

Figure 15: TCI graph of quantitative index for stations

- ***July***

In July, all the stations are in three good, very good and excellent ranges. Among stations, Deilaman dedicated the maximum of the coefficient of TCI by a factor of 82 and the minimum is related to Roodsar where the number 61 is calculated. Referring to Figure 17, it is seen that all Northern provinces, most of the central and western part of the province within the province are ideal for tourism climate. Figure 18 also shows conditions of the zoning map of climate in Gilan Province in July.

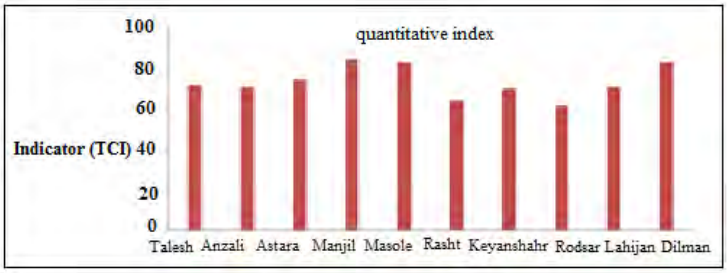

Figure 17: TCI graph of quantitative index for stations

- ***August***

In August, according to Figure 19, the majority of stations in the area are very good. However, most factors of TCI are related to Deilaman stations by the number 93 and the lowest is related to Roodsar by 58 and other stations are among these two factors. According to Figure 20, it is observed that most of Gilan in the range are very good. This range covers from northwest to southeast of Gilan shown in the corresponding map.

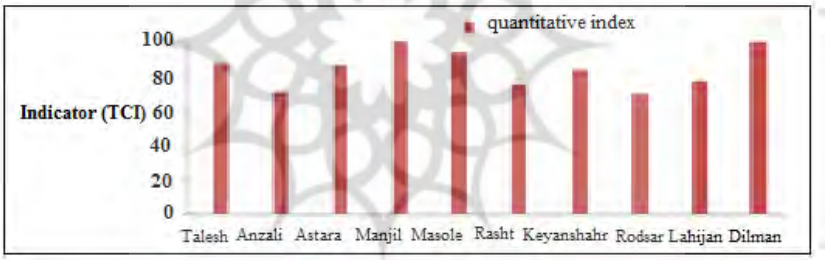

Figure 19: TCI graph of quantitative index for stations

- ***September***

In September, more than 2/3 stations of Gilan province are in good condition for tourism climate. Most factor of TCI is related to Mankil station and the lowest is related to Lahijan calculated 72 and 22, respectively and other stations are among these two factors. According to Figure 21, it is observed that North, West, South and the capital of Gilan province are in good area and conditions for tourism shown in Figure 22 and a small part of the province is in a very bad area.

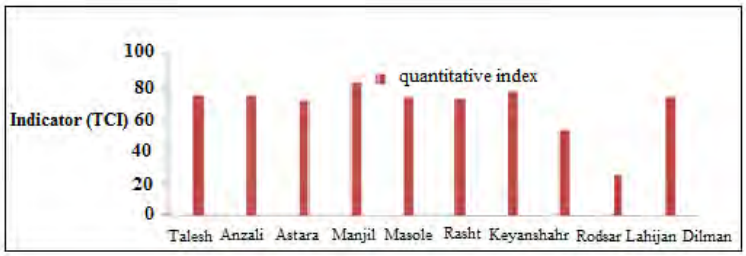

Figure 21: TCI graph of quantitative index for stations

- *October*

Referring to Figure 23, it can be seen that in October, half of the stations of Gilan province are in good condition to receive tourists. Among stations, Kiashahr with 73 is the most factors and Deilaman with 53 is the lowest factors of TCI. Referring to Figure 24, it is seen that except for East Gilan and small parts of the South and West Gilan, other stations in Gilan province have provided good conditions for tourism climate shown on the map.

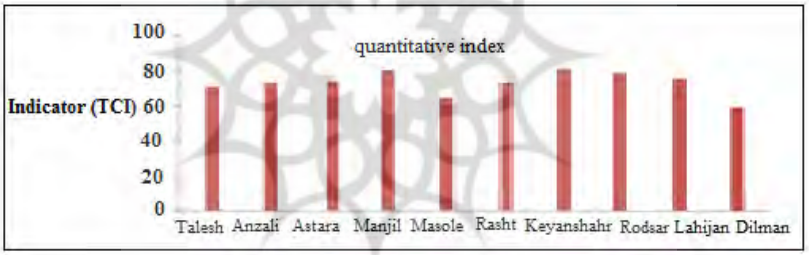

Figure 23: TCI graph of quantitative index for stations

- *November*

In November, more than two thirds stations of Gilan are in poor and marginal condition to receive tourists. However, if you refer to Figure 25, the lowest coefficient of TCI for Rasht station 22 is shown with quantitative index. If the maximum by a factor of 59 is related to the Manjil station, according to Figure 26, it is seen that most negligible marginal conditions for tourism climate in the province is in November and the northern, southern and eastern provinces are in poor and marginal conditions.

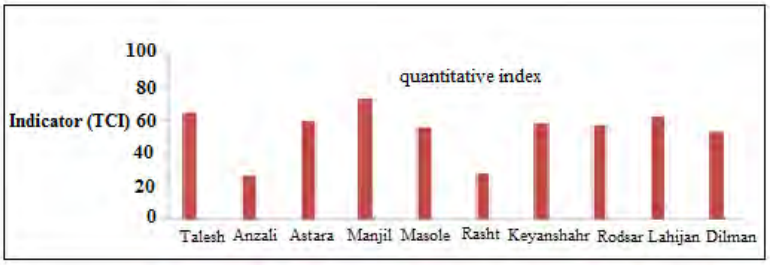

Figure 25: TCI graph of quantitative index for stations

- ***December***

According to Figure 27, most stations in December are in poor and marginal conditions. The minimum factor of TCI is related to Rasht station with 40 and the maximum is related to Deilaman and Manjil where the factor is calculated 51. The remaining factor is among these three stations. According to Figure 28, it can be seen that North and south of the province of Gilan are located within a small margin and central parts of the province are in poor and marginal conditions.

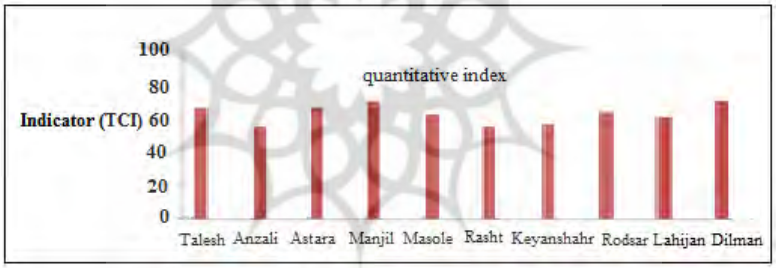

Figure 27: TCI graph of quantitative index for stations

Conclusion

According to a survey conducted on data from 10 stations of Gilan in different months, it can be concluded that Astara in January enjoys better situation than other stations, while the most undesirable station is in Anzali for tourism in this month. But in February, Anzali station is better than any other months of stations studied. In March, July, August, September and November, Manjil station has ideal conditions in comparison with other stations in the tourism climate. Kiashahr station in May and October in terms of favorable conditions for the reception of tourists is superior to other stations. Deilaman station in July and December has provided better conditions in terms of climate, tourism to other stations. Therefore, it can be concluded from the findings that the best station during the 12 months is the tourism

climate in Manjil station where mean of tourism climate is more than other stations and has more ideal conditions compared to other stations of the province. Also, the most difficult tourism climate among stations is Lahijan station dedicated the lowest average of TCI. Among the months, the best month for tourism climate of Gilan province which is equal to May is the month of May. This month in 80% of stations has been perfect condition to receive tourists among the findings made and in the rest of the station, it has the very good condition and also, the most difficult month in terms of tourism climate is November that including the lowest coefficient of average of TCI and in 80% of stations is in marginal and poor conditions.

According to the zoning maps in terms of tourism climate in the province which has been prepared from different months, it can be concluded that North West Gilan province has favorable conditions than other parts of the province of Gilan in terms of its tourism climate. North West province includes Astara, Kiashahr, Roodsar and Anzali. If the charts are referred to these stations, it can be seen that the highest rate of TCI in different months are related to these stations. Therefore, generally, it can be concluded from the research findings that Gilan province in the warm season, especially in the month of May are eligible to tourist activities and it is the best area for tourism in the North West Province.

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