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# Evaluating the Time Distribution of Tourism Climate of Kerman Using TCI Model

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**Abstract**: Studying and identifying the constraints and threatening risks of atmosphere as well as awareness of the gravities and the potential in geographical during climate features in different seasons is very important in tourism planning. Tourism Climate Index (TCI) as a useful indicator in the field of tourism integrates the different parameters of climate and presents them in the form of an index that easily is interpretable by tourists. The goal of this study is offering tourism monthly calendar and also accordance of time-local of attracting the tourist using the TCI. In order to study climate Index in Kerman, first, the monthly recorded data of seven required climate parameters was gathered from synoptic stations of Kerman in the period of 60 years (1951-2010 AD) and after analyzing and processing and preparing the database, obtain the rank of each components of the CID, CIA and ultimately TCI's value is calculated separately for months. The results of this study indicate that during a year May has the highest Tourism Climate priority in Kerman with the ideal descriptive features and after September and October with the same described features. The lowest priority is related to months of December and then January and February. In other words, spring and fall in Kerman, Tourism Climate have high priority in spite of summer and winter which have low priority of tourism climate.
**Keywords:** Climate, Tourism, Kerman city, TCI model

## Introduction

In general, climate and weather conditions play an important role in drawing the lines of tourism future and consider as the preparation main topics in the local and regional scale. Based on the multi-features climate the receiving tourists in different areas throughout the year are the underlying of increasing the tourism potential. Climate can be as a local indicator for the attractiveness of the region as well as is effective on the activities of cyclical, structural and functional and on comfort of tourists (Mohammadi et al., 2008: 133).

The terms of human comfort conditions or comfort zone is a set of conditions that in terms of temperature and moisture conditions, at least 80% of those randomly selected people and those who placed in the conditions, have a subjective judgment of comfort mode (Kasmaee, 1993: 50)

Since a lot of efforts have done in the field of empirical indicators to assess the human thermal comfort that has been used in the global different scales to local (Farajzadeh and Ahmad Abadi, 2010).

## Statement of the Problem and the Need for Research

Tourism is considered as one of the main sectors of the global economy and it is strongly influenced by climate and environmental conditions. The impact of climatic factors on the satisfaction of tourists is caused to increase the sensitivity and importance of it in the proper position selection for the staying of tourists. Therefore, having a clear view of the climatic and bioclimatic comfort in the tourists' geographical zone will have an important role in the management and planning of tourist and also increasing the zone tourism demand. It is clear that trip and departure to areas and tourist destinations with bad climatic conditions can bring serious threats and problems for tourists (heat stress, air pollution, the effects of ultraviolet radiation, etc.) in this regard, awareness of the spatiotemporal distribution can protect the tourists from the risks arising from the mentioned issues. In this regard, according to the impact and importance of climate on tourism demand and to pursue the efforts to assess the situation and the climatic characteristics of different geographic regions and also determining the proper climatic conditions to attract

the tourists have taken place diverse research globally and in Iran. Some have paid attention to the assessment and classification of bioclimatic region and a group have evaluated the study of climate change on tourism. A group also has evaluated and analyzed biological and comfort climatic. Another part of the study is related to the investigation of tourist climate conditions in different regions of the country from the comfort aspect. These studies examine the climate conditions for limited areas of the country on the basis of various indicators of bioclimatic such as effective temperature indicator, surface temperature indicators, Evans method, temperature indicator of physiological and also climatic comfort index (TCI) and ultimately have provided a tourist calendar for the region that can be used by tourists and planners and managers (Hasanvand et al., 2011: 123).

The advantage of this indicator compared to other method is: considering all effective climate aspects on tourism such as thermal and physiological aspects, combination of index from the aspects of climatology, tourism and bioclimatic, low complexity in terms of calculations, possibility to estimate the index value for months and later periods of tourism and its applicability to the users of tourism sector that users may not have much information of the climatology sciences. Using this index, the most appropriate time in terms of climate comfortable for tourists is determined (Ziaee and Bakhtiari, 2008).

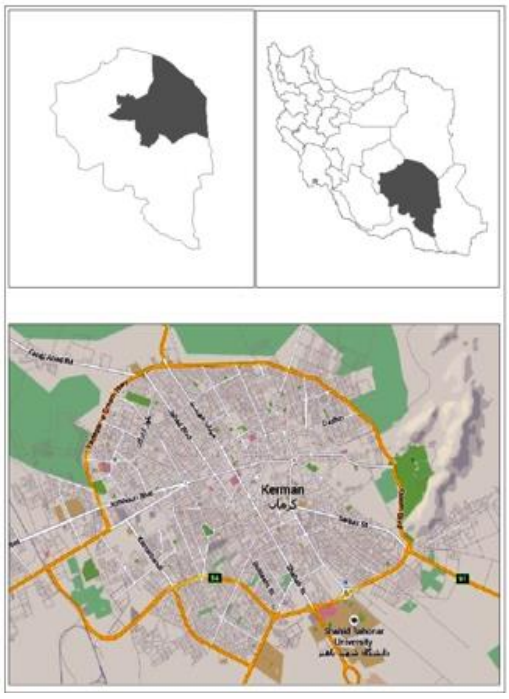
## Research Objectives

The most important objectives of this study are:
Tourism Climate Index measuring of Kerman
A monthly calendar providing of Tourism
Accordance of time-local of attracting tourists with the Tourism Climate Index

## Area of Study

Kerman is one of Iran's metropolis and Kerman province (the second largest province in Iran) is located in the east south of the country. According to the 2011 census, the city's population was 534,441 people. Kerman's huge population due to nonofficial of informal settlements from the government and use of the marginalization from amenities and mismatch of funding with actual population reach to 712,000 people.

Kerman is one of the five historical cities of Iran. Kerman area is 13,000 hectares and due to the urban area and population of Kerman, the city is classified as metropolitan areas of Iran. Kerman in terms of industrial, political, scientific, cultural is the most important city in the southeast of the country. Kerman at 1756 meters height above the sea level is considered as the third center of high and brushed Province of Iran and this is caused to relative moderation of Kerman weather in summer.




Map 1. The study area

## Background of Research

In Iran has done some research in this field. Including: Mohammadi (2008) determined the range of climatic comfort of Marivan by using the indicators of effective temperature and the collective stress and concluded that May is the best month to travel to this city in terms of weather situation. (Mohammadi, 2008: 84) Ziaee et al. (2009). With a review of tourism climate indicator in the Kish Island concluded that the island has winter picnic for the comfort of tourists and March, December, January and February have the best conditions for attracting tourists. (Ziaee, 2009) Farajzadeh et al (2009) in a research in the west North of Iran, using TCI indicator concluded that Mako, Ahar, Ardabil, Tekab, Urmia, Khoy have summer picnic and Ardabil has the best conditions for attracting tourists in summer. Hasanvand and colleagues (2010) with the study of Lorestan comfort climate by using TCI indicator concluded that April has the best condition for attracting the tourist in summer. (Hasanvand et al., 2011: 141).

Astani and colleagues (2011) in the study of TCI index for lagoon of Shirinsu concluded that the months of June and September have the best climate conditions for tourism. (Astani, 2011: 47). Ataiy and colleagues (2012), using the TCI, pmv, Pet and Chill study the human climate of Isfahan Province and has introduced May and September as the best time in terms of climate condition of tourism. (Ataiy, 2012: 79). Maureen et al (2001) study the effects of climate on international tourism and found that the specific and different conditions of climatic in urban areas, coastal and mountainous have different effects on attracting the tourism, and these effects should be considered ((Maureen, 2001). Daniel Scott & Geoff McBoyle in 2001 in a study found that due to the climate change process in the world until 2050 and 2080, the Tourism Climate Index condition for most of Canada area will be better than the current situation (Gandomkar, 2010: 101). Jacqueline et al. (2007) concluded that in the coming years in Britain and Ireland tourism attractions will move slowly to northwards and in Germany due to warmer weather and creating the favorable conditions in the inner regions to coastal area, the tourism flows will be to the south. (Jacqueline, 2007: 169). Perry in 2001 in a study, investigated the status of tourism climate in hot and dry climates, especially in the Mediterranean region, and concluded that the worst condition in the region for tourists occurs when the wave of warm air come to this region and must reduce its risks by anticipating the occurrence of such a situation and informing the required warnings (Gandomkar, 2010: 101). Mieczkowski (1985) in tourist indicator field has done some researches with inclusion of seven elements in order to assess the appropriateness of climate for tourists. Many researchers, such as Scott (2004), Morgan (2004) Amlang and Weiner (2006) using TCI have done some studies on climate field of tourism (Ismaili et al., 2011: 2)

## Methods

### Analysis Method of TCI Indicator

Tourist climate investigates the quality relationship of climate in a region in relation to the welfare of commuters and tourists of a region. Meanwhile TCI indicator evaluates the climatic elements against tourists' tourism experience quality. Overall, the index suggests that at one point in time, incorporating of climate various elements is appropriate or not for travelers and tourists or natives of a region. The method in 1985 was invented by Mieczkowski to assess the climate for tourism activities. In this way the different elements of climate for a regional climate is studied and depending on the model, has taken different coefficients and finally the points of each month or time step that we considered, is calculated.

Mieczkowski at first expressed 12 variables of climate in relation to this issue, which then fell to 7 variables.

### Variables included

The average of maximum temperature
The average of temperature
The average of minimum relative humidity;
The average of relative humidity
The total of monthly precipitation
The average of sunshine
The average of wind speed

In addition, by combining a number of factors reduced to 5 indicators. The following are the indicators and their impact on tourism as:

Table 1. Effective indicators in Climate of Tourism

| Sub indicator | Variable of monthly climate | The impact on tourism | Rated in Model |
|---|---|---|---|
| CID | The average of daily maximum temperature and average of minimum relative humidity | Show thermal comfort when tourists have the maximum activity | 40 |
| CIA | The average of daily temperature and average of relative humidity | Show thermal comfort during the hours of a day that also included sleeping time | 10 |
| p | Total precipitation | It reveals the negative reflects on holiday fun | 20 |
| s | Total sunshine | For Tourism is assessed positive and on one hand because of the risk of sunburn and discomfort in the hot days has negative influences | 20 |
| w | Average of wind speed | Its effect depends on the temperature element (cooling effect of the wind in hot climates is positive while the cooling effect of the wind in cold climates is negative.) | 10 |

To calculate the TCI indicator should calculate the 5 components of the Index and then put in the formula.

Ultimate and main formula to calculate the tourist region is as follows

TCI=2[(4*CID)+CIA+(2*P)+(2*S)+W]=?

CID indicator: daily comfort index has two components, maximum temperature and minimum relative humidity. It means that the combination of these two elements calculate daily comfort index for us. First of all, it should be noted that all the above-mentioned 5 components, get a coefficient between 0 and 5 which zero means bad condition and to 5 will be the ideal conditions. As previously mentioned, the final index of tourism climate is between 0 and 100 that obtain from the sum of the coefficients of the 5 components. Each of the 5 indicators or component contains a part of the final coefficient that in the meantime, daily comfort index with 40 points from 100 points has the largest share and has the utmost importance in the region of tourist climate. This means that if the initial coefficient of index is 5, in the final formula of the tourism climate get the coefficient 40 (in the final formula of initial coefficient of daily comfort multiple in 4). To estimate each of the mentioned indicators, we use the special scale of it. In order to calculate and estimate the daily comfort index, we use thermal comfort assessment charts. In fact, this graph consists of two axes. The horizontal axis is related to temperature and vertical axis is related to the relative humidity. The intersection is minimum relative humidity and maximum temperature is the indication of indicators rating.

CIA is the indicator of boarding comfort with combining two elements of average of temperature and average of relative humidity. In fact in the TCI indicator has the lowest rating (coefficient 10) to obtain the boarding comfort coefficient use the figure of moisture comfort. The intersection of average relative humidity and temperature, the indicator primary coefficient calculates.

P or precipitation shows the monthly precipitation index. Precipitation in tourism climate is seen as a negative factor. So the low precipitation is considered a benefit for tourism climate. So the coefficient 5 is ideals and toward zero is discontent. To calculate the coefficient of precipitation, we use the table below. The considering month precipitation will be extracted and when place in each range of tables, take its coefficient. The final coefficient of precipitation is 20.

Table 2. Ranking of Precipitation Indicator

| Total monthly precipitation | Rating of precipitation |
|---|---|
| 14.9 to 0 | 5 |
| 29.9 to 15 | 4.5 |
| 44.9 to 30 | 4 |
| 59.9 to 45 | 3.5 |
| 74.9 to 60 | 3 |
| 89.9 to 75 | 2.5 |
| 104.9 to 90 | 2 |
| 119.9 to 105 | 1.5 |
| 134.9 to 120 | 1 |
| 149.9 to 135 | 0.5 |
| 150 or more | 0 |

S or sunshine shows the level of sunshine in a region or station. It is assessed totally positive, but the risk of sunburn and hot days will be mentioned as a negative factor. Totally from 5 to zero goes forward discontent. To calculate the primary coefficient of sunshine, we use the table below. It should be noted that the numbers in the table shows the sundial in terms of day and if not achieve to the statistics of daily sunshine hours, should divide statistics of monthly sunshine hours on the number of days in a month and then put numbers in table and obtain the primary coefficient of sunshine. The final coefficient of sunshine is 20.

Table 3. Ranking the indicator of sunshine

| Total monthly Sunshine | Rating of sunshine |
|---|---|
| 10 hour or more | 5 |
| 9.95 to 9 | 4.5 |
| 8.95 to 8 | 4 |
| 7.95 to 7 | 3.5 |
| 6.95 to 6 | 3 |
| 5.95 to 5 | 2.5 |
| 4.95 to 4 | 2 |
| 3.95 to 3 | 1.5 |
| 2.95 to 2 | 1 |
| 1.95 to 1 | 0.5 |
| Less than one hour | 0 |

W or wind calculates the wind indicator for tourism climate. Wind in tourism climate is a positive indicator and from zero toward 5 is ideal. Wind as an important factor in tourism plays a positive role. How to estimate wind rating is different in different climates. For normal system, the average of maximum air temperature should be between 15 and 24 ° C. Elyse system of temperature is between 24 and 33 and the hot air temperature is above 33 degrees. After determining, system will be in the wind scale, it should be noted that before doing the work, convert wind to kilometers an hour. In fact, the data that is recorded at the meteorological organization is NAT and should be converted to kilometers an hour. For this purpose, the number 1.8 in wind speed is multiplied in NAT to convert km an hour. The scale is presented in the table below. It should be noted that on the basis of the temperature level, determine the type of system and then extract the final coefficient from the same system.

Table 4. Ranking the wind speed indicator

| Warm climate system | Elyse system | normal system | wind speed in km / h |
|---|---|---|---|
| 2 | 2 | 5 | Less than 2.88 |
| 1.5 | 2.5 | 4.5 | 5.75 to 2.88 |
| 0.5 | 3 | 4 | 9.03 to 5.76 |
| 0 | 4 | 3.5 | 12.23 to 9.04 |
| 0 | 5 | 3 | 19.79 to 12.24 |
| 0 | 4 | 2.5 | 24.29 to 19.80 |
| 0 | 3 | 2 | 28.79 to 24.30 |
| 0 | 2 | 1 | 38.52 to 28.80 |
| 0 | 0 | 0 | More than 38.52 |

Point: Due to the effect of the wind at low temperatures, points of wind in the months that average of maximum air temperature is lower than 15 ° C and the average of wind speed is more than 8 kilometers an hour, we use the cooling chart but it should be noted that any two conditions must be met for example, if the average of maximum temperature is less than 15, but the average of wind speed is less than 8 km per hour we use the normal system.

Finally, after obtaining the primary coefficient of each indicator, the coefficients placed in the final formula of tourism climate index, and the last indicator is calculated:

TCI=2[(4*CID)+CIA+(2*P)+(2*S)+W]=?

After calculating the final formula, obtained the value between 0 to100 for indicator that the amount is reflected the quality of the region's tourism climate. The final result is determined from the following table. Match the final obtained value with the table and ultimately will be determine the quality of a region's tourism climate. As you can see in the following table. Point 100 is the ideal conditions and toward the lower values added on the level of dissatisfaction and unfavorable of climatic conditions for tourists.

Table 5. Ranking the final value of indicators

| Descriptive value of TCI | TCI rating |
|---|---|
| Ideal | 100 to 90 |
| Excellent | 90 to 80 |
| very good | 79 to 70 |
| Good | 69 to 60 |
| acceptable | 59 to 50 |
| Low - margin | 49 to 40 |
| Inappropriate | 39 to 30 |
| Very poor | 29 to 20 |
| Extremely unpleasant | 19 to 10 |
| Other | 0 to 9 |

## The Research Method

In order to study comfort climate indicator in Kerman first, seven required climate parameters was extracted monthly from synoptic stations in Kerman in period of 60 years (1951-2010 AD) and the necessary turning on the basis of TCI model is applied in data and then after analyze and process of them and prepare the database, obtained the ranking of each components of the of CID, CIA, calculated the numerical value of TCI separately for months in the application of TCI calculator and eventually is shown in Excel software the chart of climate for each month. Below are listed the steps of the research.

**Create a database**

In order to investigate the study, seven parameters data that mentioned above, related to the synoptic station of Kerman, from Meteorological Organization site in period of mentioned 60-year is extracted.

Table 6. Monthly value of each indicator in Kerman

| | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| The maximum temperature | 12.2 | 14.9 | 19 | 24.4 | 30.1 | 35 | 35.8 | 34.4 | 31.5 | 26.1 | 19.6 | 14.4 |
| The average temperature | 4.6 | 7.3 | 11.4 | 16.4 | 21.2 | 25.6 | 26.8 | 24.6 | 21.1 | 15.9 | 10 | 5.9 |
| The average relative humidity | 53 | 46 | 41 | 34 | 26 | 19 | 19 | 20 | 21 | 28 | 37 | 48 |
| Minimum relative humidity | 32 | 26 | 23 | 19 | 14 | 11 | 12 | 12 | 12 | 16 | 21 | 28 |
| sundial | 198.4 | 200 | 223.5 | 237.5 | 298 | 323.6 | 339.1 | 337.5 | 310.3 | 283.9 | 241.9 | 206.4 |
| Precipitation | 28.8 | 25.2 | 23.1 | 18.7 | 10.8 | 1.1 | 1.4 | 0.5 | 0.3 | 1.5 | 5.6 | 21 |
| wind speed | 4.7 | 6.6 | 7.9 | 7.7 | 7.1 | 6.9 | 7.4 | 6.7 | 5.6 | 4.5 | 3.7 | 4 |

Obtaining the coefficient of CID (daily thermal comfort indicator) and CIA (boarding comfort index) using software of TCI calculator:

To calculate the CID (daily thermal comfort indicator), use two parameters of the average maximum temperature and average minimum relative humidity. Also to calculate CIA, we use two parameters of the average temperature and average relative humidity. Therefore, monthly data of this parameter is defined in the TCI calculator software in the related part that the results of the software calculation are in the table below.

Table 7. Calculate the CID and the CIA

| | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| The maximum temperature | 12.2 | 14.9 | 19 | 24.4 | 30.1 | 35 | 35.8 | 34.4 | 31.5 | 26.1 | 19.6 | 14.4 |
| The average of minimum relative humidity | 32 | 26 | 23 | 19 | 14 | 11 | 12 | 12 | 12 | 16 | 21 | 28 |
| CID | 2.5 | 2.5 | 4 | 5 | 5 | 3 | 3 | 3 | 4 | 5 | 4 | 2.5 |
| CIA | 1.5 | 2 | 2.5 | 3 | 5 | 5 | 5 | 5 | 5 | 3 | 2 | 2 |

**Calculate the precipitation coefficient**

Using Table 2 (ranking table of precipitation indicator), can calculate the monthly precipitation coefficient in Kerman to achieve a comfortable climate.

Table 8. Calculate the precipitation indicator coefficient in Kerman

| | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| precipitation | 28.8 | 25.2 | 23.1 | 18.7 | 10.8 | 1.1 | 1.4 | 0.5 | 0.3 | 1.5 | 5.6 | 21 |
| precipitation coefficient | 4.5 | 4.5 | 4.5 | 4.5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4.5 |

**Calculate the sundial coefficient**

To calculate the coefficient of sunshine should first calculate average of daily sunshine. So divide the monthly sunshine on 30, to be determined the daily sunshine. Now you can calculate the sundial coefficient using Table 3.

Table 9. Calculate the sundial coefficient in Kerman

| | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Monthly sundial | 198.4 | 200 | 223.5 | 237.5 | 298 | 323.6 | 339.1 | 337.5 | 310.3 | 283.9 | 241.9 | 206.4 |
| The average of daily sunshine | 6.6 | 6.66 | 7.4 | 7.9 | 9.93 | 10.78 | 11.3 | 11.25 | 10.34 | 9.46 | 8.06 | 6.88 |
| daily sunshine coefficient | 3 | 3 | 3.5 | 3.5 | 4.5 | 5 | 5 | 5 | 5 | 4.5 | 4 | 3 |

**Calculate the wind coefficient**

As mentioned above, the Meteorological Agency data related to wind speed is defined with NAT unit. To calculate the wind coefficient first must convert the wind speed in mph. And then wind system should also be specified. For this must use monthly maximum temperature parameter. So if monthly maximum temperature is 14 to 24 degrees, the normal system is 24 to 33 Elyse system and more than 33 degrees of climate system will be warm. The following table coefficient of wind speed and type of system is specified, concurrently can determine the wind coefficient using Table 3.

Table 10. Calculate the wind speed coefficient in Kerman

| | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wind speed in knots | 4.7 | 6.6 | 7.9 | 7.7 | 7.1 | 6.9 | 7.4 | 6.7 | 5.6 | 4.5 | 3.7 | 4 |
| Wind speed K / h | 8.46 | 11.88 | 14.22 | 13.86 | 12.78 | 12.42 | 13.32 | 12.06 | 10.08 | 8.1 | 6.66 | 6.6 |
| The maximum temperature | 12.2 | 14.9 | 19 | 24.4 | 30.1 | 35 | 35.8 | 34.4 | 31.5 | 26.1 | 19.6 | 14.4 |
| Wind system | Normal | Normal | Normal | Elyse | Elyse | Hot climate | Hot climate | Hot climate | Elyse | Elyse | Normal | Normal |
| Wind speed coefficient | 3 | 3.5 | 3 | 5 | 5 | 0 | 0 | 0 | 4 | 3 | 4 | 4 |

**Calculate the final coefficient**

In this study, the final coefficient calculation is done through software TCI calculator. But based on the given description in the section above, to obtain the final coefficient, can use the following formula. Table 5 show the final number of Kerman tourism comfort climate as monthly.

TCI=2[(4*CID)+CIA+(2*P)+(2*S)+W]=?

Table11. The final number of Kerman tourism comfort climate monthly

| | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TCI rating | 57 | 58 | 75 | 88 | 98 | 74 | 74 | 74 | 90 | 90 | 80 | 62 |
| TCI descriptive value | Acceptable | Acceptable | Very Good | Excellent | Ideal | Very Good | Very Good | Very Good | Ideal | Ideal | Very Good | Good |

**Conclusions**

Studying and identifying the constraints and threatening risks of atmosphere as well as awareness of the gravities and the potential in geographical and climate features in different seasons is very important in order to accommodate them in the tourism planning. TCI as a useful indicator in the field of tourism integrates the different parameters of climate and presents in the form of an index that easily is interpretable by tourists. Furthermore, the index is widely applicable. According to the conducted studies in this study and according to Table 10 and Figure 1 of Kerman Tourism comfort climate as Monthly can understand that May (May) has the highest Tourism Climate priority of Kerman with the ideal descriptive features and after it, months of September and October are with the same descriptive features. The lowest priority is related to the month of December and then January (January) and February. Spring and fall seasons of Tourism Climate of Kerman have a high priority and summer and winter seasons have the lower priority from tourism comfortable climate. Chart 1 shows the monthly tourism comfort climate of Kerman.

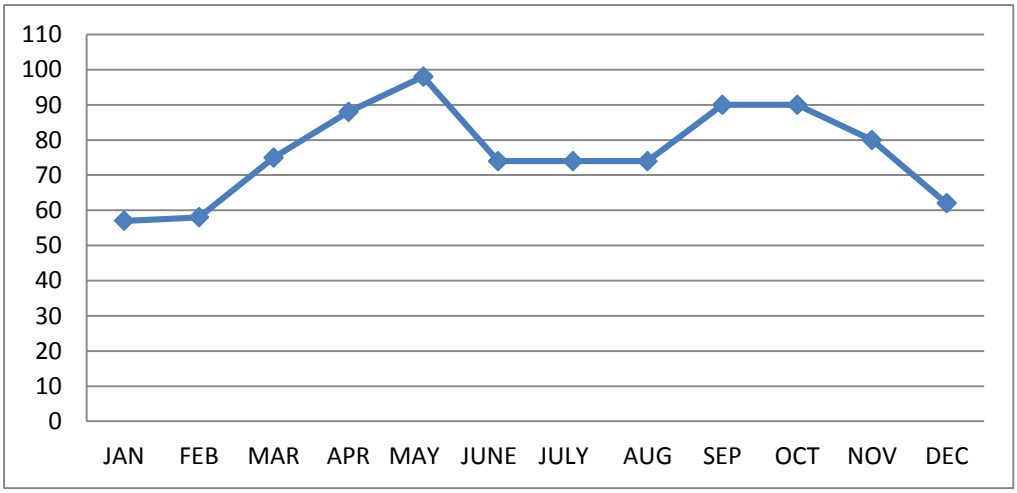



Figure 1. Monthly tourism comfort climate of Kerman

**References**

Amelung, B., And D. Viner, 2006, Mediterranean tourism: Exploring the Future with the TourismClimate Index, Journal of Sustainable Tourism 14:349–366.

Astani, S.Cheraghy, and Maryam Hesampour (2011), estimate and analysis of the Tourism Climate Indicator of Shirinsu lagoon using GIS and the TCI, Talab Quarterly, Issue 9.

Atai, e. Hashemi Nasab, SA. (2012), a comparative assessment of human bioclimatic of Isfahan using TCI, pmv, Pet and Chill, Journal of Urban and Regional Research and Studies, No. 4, University of Isfahan.

Gandomkar, Amir, (2010), estimation and analysis of the Tourism Climate Indicator in the city of Semirom Using TCI TCI, Geography Quarterly Issue 8.

Hasanvand, Abbas, Soleimani Tabar Maryam, 2011, Spatial interpretation of climatic comfort of Lorestan province based on TCI indicator, the journal of specialized spatial planning, the first year, the first issue, Summer 139.

Ismail, R., Gandomkar, Amir Habibi Tukhandan, M. (2011), Assessment of Climate in major tourist cities using the Physiological Equivalent Temperature Index, the study of physical geography, No. 75.

Jacqueline M. Hamilton Æ Richard S. J. Tol (2007): The Impact of Climate Change on Tourism in Germany, the UK and Ireland: a Simulation Study, Reg Environ Change (2007)7:161–172.

Kasmaee, M. (1999). Climate and architecture, Baztab Publishing,first printing. Mohammadi, Hussein, S., A., (2008), bioclimatic indicators affecting on human comfort assessment case study in Qom, Journal of Ecology, year 34, No. 47.

Maureen Agnew,Jean p.Palutikof(2001),climate information for tourism in Greece,first proceeding of the first international workshop on climate , tourism and recreation.

Mieczkowski, Z., 1985, the Tourism Climate Index: A Method for Evaluating World Climates for Tourism, the Canadian Geographer 29: 220-235.

Mohammadi, Hossein Ranjbar, Fairuz, 2008, an analysis of the relationship between climate and tourism, Tourism Studies, No. 10.

Morgan, R, Gatell, E., junyet, R., Micallet, A., ozhanScott D, Johnes B and Mac Boyle G,2004, Climate, Tourism and Recreatio:bibliography. Univercity of Waterloo anada.World Tourist, 183-208.

Scott, D., G. McBoyle, and M. Schwartzentruber, 2004, Climate Change and the Distribution of Climatic Resources for Tourism in North America, Climate Research7:105–117.

Ziaee, Mahmoud and Bakhtiari Arshin, (2009), TCI of Kish Island, Persian Gulf Proceedings of the Fifth Conference.