Review the climatic welfare in Ramsar city by TCI method and validity of TCI calculator software

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Abstract. Climate of a zone is one of the most important effective factors on tourists absorbing or indeed, their weakening. Climate has important part of tourism capacity of a zone. In fact, climate and its variety are resources of tourism and tourists often attend to them during selection the place of residence. Review the climatic characteristics of each place, plays an special role in tourism planning for that place. The aim of present research is determination climatic welfare for tourism planning in Ramsar city in monthly scale. For determining the thermal condition of welfare in this coastal city in different months of a year, TCI index was applied as a base for research method. For this reason, average climatic data for 30 years and maximum temperature of the air , average of relative humidity, and average of minimum relative humidity and in addition, average of wind speed and average of sunny times in hour were prepared monthly in cynoptic platform of Ramsar and then by formula, table and diagrams for determining TCI index, climatic peace index was calculated for different months and finally by TCI calculator software its validity was reviewed and a diagram of climatic welfare in Ramsar for different months was drawn. The result of assessment this model during long statistical period indicated that Ramsar in none of the months in the year has undesirable condition. And in January, March; November and September in the worst climatic condition, it places in boundary of the welfare. In addition, this city in May and June means Ordibehesht and Khordad in Iran has the best condition for tourism. July, august and October are in good condition for tourism and September and February are also in acceptable limit.

Keywords: climatic welfare, Ramsar, climatic index, TCI, tourism

1. INTRODUCTION

Identifying potential of tourism in a place can have effective role for tourist absorbing . for this way, limitations, threats and climatic attractions identifying are so important. Weather condition has so effective role for creation the climatic welfare. During formation welfare condition for human from climatic view point, 4 elements: heat, humidity, wind and radiation have important role. Among them, temperature and humidity have more effects on human welfare and that's why the most models for measurement human welfare are based on these 2 elements. (Alijani, 1372). Nowadays, tourism industry is beyond an industry like a global and social dynamic phenomena has its special complexities. Phenomena with a hidden and complex mechanism which has various forms in different times and places. That's why have different effects on human societies. For this reason, identifying the best welfare index and scientific analyze this phenomena can provide trust frameworks for planning tourism industry. Its importance is increased when its analyzed related to climatic elements. Climate as a wealth can be effective on tourism industry (De Freitas 2003).

Climate with geographic place, topography, view, botanic and animalistic coverage and weather plays a role as one of the most important and basic local resources in tourism industry. It can be said that weather has characteristics of a natural and huge wealth which by affecting on local resources, controls quality and period of tourism, tourists health and even their personal experiences. (Zolfaghari, 1386)

In past, many scientists such as Aristotle, Menteschio, Hantington and etc recommended on certain effect of weather on human activities. The role of the weather in human activities is clear,

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even if it's seen far from compulsion opinions. Human adjusts results of his/her activities adopted with environment and weather and today; control them by studying atmosphere effect on life, health and welfare. (Ebrahim Zadeh et al 1388)

Among these elements temperature and humidity have more effects on humans welfare and health. Therefore the most models for human welfare measurement are based on these 2 elements (Mohammadi, 1385)

Human welfare is a set of conditions which is suitable for at least 80% of people based on temperature. In the other word, human feel neither heat nor cool in that conditions. Or it's a situation in which humans body doesn't need to try so much in order to protect itself against stability in its internal environment, and in which regular mechanisms for equilibriums and his/her main biological power are not under danger, because there is a mutual and continuous reaction between humans biological nature and environmental energies in which he/she is. (Khaledi, 1374)

Temperature welfare inherently is a mental respond or a state of mind in which a person is comfortable about temperature of the environment. While thermal welfare depends on cultural factors and condition may be affected by them. a persons feeling about thermal welfare is at first a result of exchanging the heat between body and environment.(Kasmaei, 1363)

In addition, temperature equilibrium between humans body and his/her surrounding is one of primary requirements for health and welfare. By this equilibrium in skin temperature, the air adjacent the body is stable or changes a little bite in despite of temperature changes.(Kasmaei, 1378)

Kasmaei (1363) concluded in a research that bioclimatic welfare makes human dependant on thermal equilibrium between his/her body and environment. This equilibrium depends on some factors such as: characteristics of air around us, personal physical activity, air temperature, relative humidity, wind and sunrise. Equilibrium in bioclimatic welfare is occurred when there is equilibrium between absorbed and repelled temperature between skin and environment and it leads to make temperature of human's body be stable in 37 ^{0}c.

So far many efforts were done for assessing climatic welfare in human habitats such as Mieczkowski"s efforts. Mieczkowski (1985) explained the role of some climatic elements such as temperature, relative humidity, sunrise, rainfall and wind on tourism by many studies for determining climatic state and tourism in related to tourists health and by recommending the importance of climate for tourism and then by merging these elements as an index , he computed index for climate of tourism or climate of tourism for 453 stations worldwide and drew a map of TCI climate state for tourism in the world.

Mazarkis (2008) studied so much and assessed the weather and absorbing the tourists.Faraj Zadeh and Ahmad Abadi (1388) by assessing and tracking the climate of tourism in Iran and by TCI index concluded that 6 climates for tourism in this country are recognizable. Also, Jahanbakhsh (1377) researched for valuation bioclimatic state in Tabriz, Khalili(1378) for 3D analyzing for heating and cooling in Iran and Zolfaghari and Moradi (1383) for determining thermal welfare in Kurdistan province.

2. METHODS AND MATERIALS

This research is descriptive-analytic one and in which for getting weather elements of long term statistical period, statistical data of Ramsar cynoptical platform was applied. After classifying data by Excell software, renewing and harmonizing required data of climatic elements were done and then by formula, tables and diagrams for determining TCI index , climatic welfare indexes for different months were computed and finally by TCI calculator software their validity were reviewed.

Review the climatic welfare in Ramsar city by TCI method and validity of TCI calculator software

Studied method is tourism climatic index (TCI) which was imagined as a composition scale by Mieczkowski (1985) and identify more suitable climatic elements for computing favorite tourism condition for average of tourists. TCI index developed by Mieczkowski (1985) is based on several previous researches related to climate and vacation and in particular tourists activities.

Tourist climate reviews the relation the quality of the climate in a region and tourists and passenger's welfare and satisfaction. In this regard, tourism climate index assesses climatic elements against quality of tourists experience about tourism. Totally this index says that if composition of different climatic elements is suitable for passengers and tourists and even native people in a period or not.

This method was invented by Mieczkowski in 1985 for climate assessment for tourism activities. In this method, different climatic elements in a region are reviewed and based on model, different coefficients are obtained and finally score of every month or given period is computed by following formula:

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

CID=daily thermal welfare index includes monthly average temperature and average relative humidity

CIA=nightly thermal welfare index includes monthly average temperature and relative humidity

P= monthly rainfall in mm

S= daily sunrise in hour

W= wind speed in km/h

Summary of calculating tourism climate index in a month or in a period is:

1) We extract average statistics of considered climate indexes.

2) There is a table or a diagram for calculating coefficient of every element which are extracted by them.

3) Now we substitute obtained coefficients in formula of tourism climate and compute them.

4) Obtained number in final table indicates the quality of tourism climate and its characteristics.

Tables and diagrams for determining required TCI are following page.
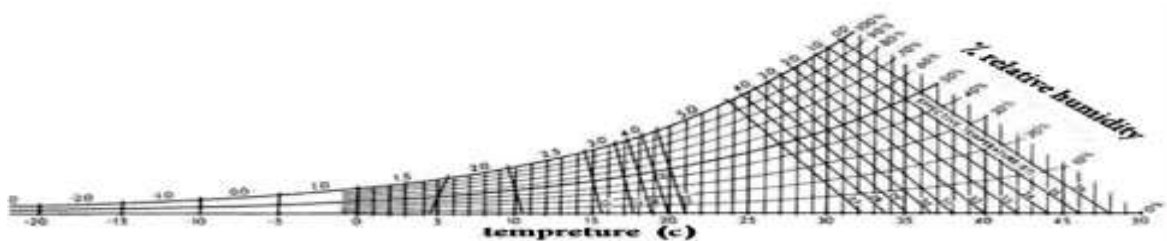
Figure 1. A diagram for determining thermal index.

Table 1. To determine rainfall index.

0	0/5	1	1/5	2	2/5	3	3/5	4	4/5	5	index
150 and more	135 - 149.9	120 - 134.9	105 - 119.9	90 - 104.9	75 - 89.9	60 - 74.9	45 - 59.9	30 - 44.9	15 - 29.9	0 - 14.9	Monthly rainfall

index	Average sunrise time in hour
5	10 hours and more
4.5	9.59-9
4	8.59−8
3.5	7.59−7
3	6.59−6
2.5	5.59 −5
2	4.59 −4

Table 3. To determine wind index for TCI assessment

Wind speed Km/hr	Normal system	Commercial wind system	Desert climate system
Less than 2.88	5	2	2
2.88−5.75	4.5	2.5	1.5
2.76−9.03	4	3	1
9.04−12.23	3.5	4	0.5
12.24−19.79	3	5	0
19.80−24.29	2.5	4	0
24/30−28/79	2	3	0
28/80− 38/52	1	2	0

We want to review performance of TCI calculator software, briefly. By this software amount of obtained indexes and final amount of TCI are assessed.This micro software is a simple and low volume program which prepared for determining tourism climate index TCI and by which calculations of these indexes are done in shortest time as possible. This program was drawn by Hassan Orouji and Mohammad Alizadeh, who are students in tourism programming in Tehran University. Following is its total view.
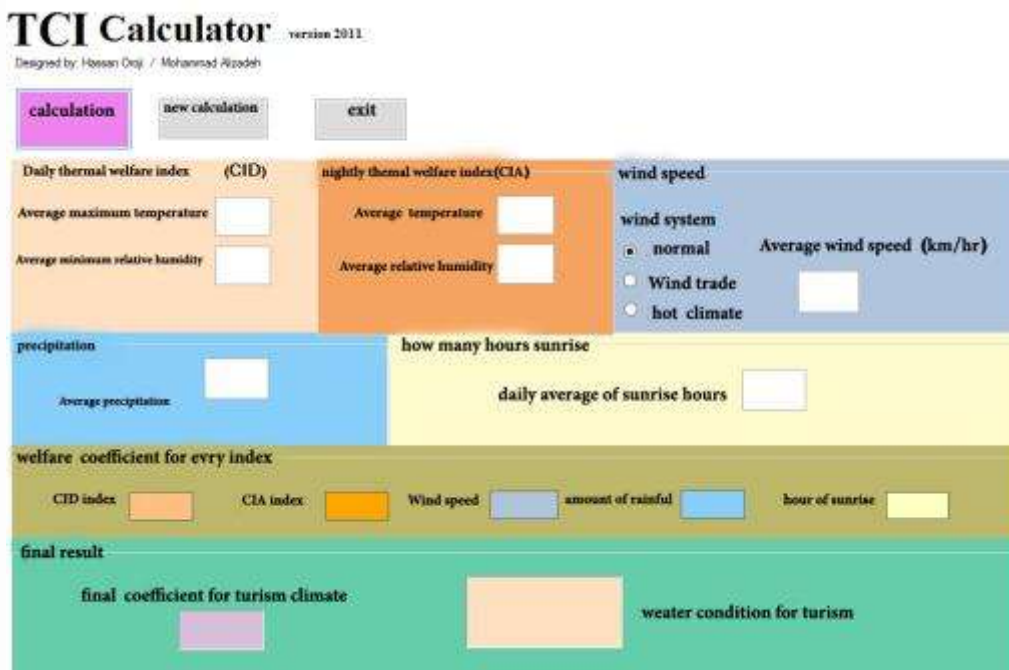

Figure 2. Total view of TCI calculator software.

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Before beginning this program average of required data for index calculation should be prepared and enter them in program that suitable outputs are obtained. This program has different parts and charts. 5 first charts are for 5 total indexes in this method in which requested data should be entered. In daily thermal welfare index, its coefficient should be obtained. In total this is done by Achra diagram that is boring and time consumed. But in this program coefficient is obtained easily, only by entering the average of maximum temperature and minimum relative humidity in related place of the program. And it's also true for nightly thermal welfare index and coefficient can be calculated easily by entering required data. For Wind, sunrise and rainfall indexes, coefficients are also provided by entering required data. This program is portable and doesn't need to install and we can use it only by clicking it.

Geographic position of studied region

Ramsar city has 729.8 km2 widths which is 3.07% of total area of the province. It has 2 towns, one division, 4 villages and 143 small towns with residents and 63 ones without residents. This city is between 36 degree and 32 minutes and 36 degree to 59 minutes of northern width and 50 degree and 20 minutes to 50 degree and 47 minutes of eastern length from Greenwich meridian. Center of Ramsar is in 36 degree and 52 minutes of northern width and 50 degree and 40 minutes of eastern length from Greenwich meridian. Ramsar is neighbor with Qazvin province from south, Caspian sea from north, Tonakabon from east and Guilan province from west. Safaroud is one of important rivers of Ramsar city which comes from Javaherdeh highnesses and Jannat Roudbar ones and make surrounding villages satiated and after passing through Ramsar , falls in the sea.

Figure 3. Ramsar position in north part of Iran.

Table 4. Average statistics of 30 years meteorology required for determining welfare in Ramsar cynoptic platform. **Resource**: main office of meteorology for Chaharmahal Bakhtiyari province)

	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
Maximum temperature(^{0}c)	10.9	10.6	11.9	16.4	21.4	25.9	28.6	28.8	25.8	21.8	17.3	13
Average of temperature(^{0}c)	7.4	7.3	9.1	13.3	18.2	22.6	25.2	25.4	22.7	18.4	13.7	9.8
Average humidity (%)	84	85	87	86	84	81	79	81	84	85	84	84
Minimum humidity (%)	71	72	76	75	74	69	67	69	73	73	72	71
Average rainfall(mm)	78	73	85	53	46	58	38	65	161	260	177	109
Sunrise(hour)	3.53	3.23	3.07	4.00	5.53	6.33	6.30	5.63	4.20	3.97	3.70	3.27
Wind speed (km/hr)	5.54	6.12	7.02	6.84	6.48	6.3	6.48	6.12	5.94	5.54	5.00	5.18

3. RESULTS AND DISCUSSION

As it said earlier, after determining the amount of required indexes by following formula for different months, TCI index is computed as:

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

Table 5. Data for computing TCI index (resource: writer's findings).

	jan	feb	mars	apr	may	jun	jul	aug	sep	oct	nov	dec
CID	2.5	2.5	2.5	3	2.5	4	4	3	4	5	3	2.5
CIA	2	2	2	2.5	3.5	5	4	4	5	4	2.5	2
W normal	4.5	4	4	4	4	4	4	4	4	4.5	4.5	4.5
R	2.5	3	2.5	3.5	4	4	4	3	0	0	0	1.5
S	1.5	1.5	1.5	2	5	3	3	2.5	2	1.5	1.5	1.5
TCI	49	50	48	59	80	76	68	62	58	63	44	45
Climatic welfare	Trivial margin	acceptable	Trivial margin	acceptable	excellent	Very good	good	good	acceptable	good	Trivial margin	Trivial margin

Table 6. Descriptive value of numbers for TCI.

Score of TCI	Descriptive of TCI	Total group
100 تا 90	ideal	excellent
89 تا 80	excellent	
79 تا 70	Very good	Very good
69 تا 60	good	
59 تا 50	acceptable	acceptable
49 تا 40	Trivial limit	
39 تا 30	undesirable	undesirable
29تا20	So undesirable	
19 تا 10	Infinitely undesirable	
Less than 9	No tolerable	

Figure 4. Welfare climate Chart in ramsar months (source: researcher result)

4. CONCLUSION AND OFFERS

Identifying the ecological and environmental powers can be helpful effectively in tourism. Because north of Iran in particular Ramsar has high tourism capacity, in present paper climatic welfare of this city was reviewed. That's why TCI method was applied. Result of this model in long term statistical period indicated that Ramsar in none of months of year has undesirable state. So that in January, march, November and September in the worst climatic condition it's in welfare border. In addition this city in June and May has the best condition for tourism. July, august and October are also good period for tourism. And February and September are in acceptable limit. As it's mentioned, may have the best condition for tourism in Ramsar. Climatic welfare index in this month is 80 and its assessment is excellent. In Jun and early summer there is suitable condition for tourism. In the other hand, assessment the index of climatic welfare in winter indicated that Ramsar is suitable for tourism even in this season and however welfare state is not so suitable, but it doesn't have undesirable state. For optimum usage of attractions of Ramsar and tourism development and planning attending to climatic welfare of this city is important. That's why programmers and managers can try to tourism growth by respect to welfare in different months for facilities preparing and more services to tourists and this problem needs to more attention and importance by programmers toward strategies for increasing tourist's absorption and identifying tourism potential of this city.

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