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COMPARISON OF THE HOLIDAY CLIMATE INDEX (HCI) AND THE TOURISM CLIMATE INDEX (TCI) IN TBILISI

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Summary: A comparative analysis of data on the monthly values of Tourism Climate Index (TCI) and Holiday Climate Index (HCI) in Tbilisi is presented. Period of observation – 1956-2015. Average monthly values of HCI for the entire observation period varied from 62.0 (“Good”, January) to 83.8 (“Excellent”, May). As in the case with the TCI, according to the HCI, the bioclimatic conditions in Tbilisi are favorable for resort and tourist purposes all year round. Comparison of the values and categories of the Tourism Climate Index and Holiday Climate Index shows that the intra-annual variation of both indices is similar and has a bimodal form. However, given that the TCI is calculated for the so-called “average tourist” (regardless of gender, age, physical condition), the values and categories of this index is lower than the HCI values and categories.

Key words: Holiday Climate Index, Tourism Climate Index, bioclimate.

Introduction

Weather and climate are two factors that in many respects influence on tourism development. Many climate indices for tourism have been applied in past research [1]. The most widely known and applied index is the Tourism Climate Index (TCI) proposed by Mieczkowski [2]. This index is combination of seven factors and parameters. TCI is used in many countries of world. In south Caucasus countries, monthly value of TCI be calculated in Georgia, first for Tbilisi [3], then for many other locations of Caucasus (Armenia, Azerbaijan, North Caucasus etc.) [4-9].

Despite the TCI’s wide application, it has been subject to substantial critiques [10]. The four key deficiencies of the TCI include: (1) the subjective rating and weighting system of climatic variables; (2) it neglects the possibility of an overriding influence of physical climatic parameters (e.g., rain, wind); (3) the low temporal resolution of climate data (i.e., monthly data) has limited relevance for tourist decision-making; and (4) it neglects the varying climatic requirements of major tourism segments and destination types (i.e., beach, urban, winter sports tourism).

To overcome the above noted limitations of the TCI, a Holiday Climate Index (HCI) was developed to more accurately assess the climatic suitability of destinations for tourism. The word ‘holiday’ was chosen to better reflect what the index was designed for (*i.e.*, leisure tourism), since tourism is much broader by definition (“Tourism is a social, cultural and economic phenomenon which entails the movement of people to countries or places outside their usual environment for personal or business/professional purposes” [10].

Results of comparison of the holiday climate index and the tourism climate index in Tbilisi are presented below.

Material and methods

The HCI uses five climatic variables related to the three facets essential to tourism (table 1): thermal comfort (TC), aesthetic (A), and physical (P) facet. The five climatic variables used for the HCI input are maximum air temperature and relative humidity (TC), cloud cover (A), precipitation and wind (P) [12]. The HCI score is calculated according to the following formula: $\mathbf{HCI = 4 \cdot T + 2 \cdot A + 3 \cdot R_d + 1 \cdot W.}$ In tables 1-3 components of Holiday Climate Index, HCI’s rating scheme and HCI’s category are presented.

Table 1. Components of Holiday Climate Index (HCI)

Facet	Climatic Variable	Index Weighting (%)
Thermal Comfort (TC)	Dry-bulb Temperature (°C): Maximum Temperature (°C)	40%
	Relative Humidity (%): Mean RH	
Aesthetic (A)	Cloud Cover (%)	20%
Physical (P)	Amount of Rain (mm)	30%
	Wind Speed (km/h)	10%

Table 2. HCI's Rating Scheme

Rating	T - Effective Temperature (°C) [2]	A - Daily Cloud Cover (%)	R_d - Daily Precipitation (mm)	W - Wind Speed (km/h)
10	23÷25	11÷20	0	1÷9
9	20÷22; 26	1÷10; 21÷30	<3	10÷19
8	27÷28	0; 31÷40	3÷5.99	0; 20÷29
7	18÷19; 29÷30	41÷50		
6	15÷17; 31÷32	51÷60		30÷39
5	11÷14; 33÷34	61÷70	6÷8.99	
4	7÷10; 35÷36	71÷80		
3	0÷6	81÷90		40÷49
2	-5÷-1; 37÷39	90÷99	9÷12	
1	<-5	100		
0	>39		>12	50÷70
-1			>25	
-10				>70

Table 3. HCI's Category

HCI Score	Category	HCI Score	Category
90÷100	Ideal	40÷49	Marginal
80÷89	Excellent	30÷39	Unfavorable
70÷79	Very Good	20÷29	Very Unfavorable
60÷69	Good	10÷19	Extremely Unfavorable
50÷59	Acceptable	9÷-9; -10÷-20	Impossible

For the monthly mean values of HCI calculation data of National Environmental Agency of Georgia from 1956 to 2015 were used.

Results and discussion

The results in tables 4-6 and fig. 1-2 are presented. Tables 4 and 5 present data on the statistical characteristics of monthly and seasonal values of HCI. Comparative analysis of HCI and TCI data, as well as their categories, in fig. 1, 2 and in table 6 are presented.

Table 4. Statistical characteristics of HCI in Tbilisi during the cold season (1956-2015)

Parameter	Jan	Feb	Mar	Oct	Nov	Dec	Cold	Year
Mean	62.0	62.5	66.7	82.8	68.6	64.0	67.8	72.5
Min	55.0	53.0	59.0	67.0	59.0	55.0	63.0	69.8
Max	67.0	72.0	77.0	94.0	80.0	71.0	72.3	75.8
St Dev	3.4	4.3	4.0	6.1	4.0	3.5	2.2	1.3
σ_m	0.44	0.56	0.52	0.79	0.52	0.45	0.28	0.17
Cv (%)	5.5	6.8	6.0	7.3	5.8	5.4	3.2	1.8

Table 5. Statistical characteristics of HCI in Tbilisi during the warm season (1956-2015)

Parameter	Apr	May	Jun	Jul	Aug	Sep	Warm	Year
Mean	76.8	83.8	76.5	71.8	72.6	82.0	77.2	72.5
Min	65.0	67.0	65.0	67.0	64.0	74.0	72.2	69.8
Max	89.0	90.0	85.0	77.0	79.0	91.0	81.5	75.8
St Dev	7.31	3.97	4.49	2.83	3.41	3.64	2.03	1.31
σm	0.95	0.52	0.58	0.37	0.44	0.47	0.26	0.17
Cv (%)	9.5	4.7	5.9	3.9	4.7	4.4	2.6	1.8

In the period from 1956 to 2015 (tables 4-5) monthly values of HCI changed from 53.0 ("Acceptable", February) to 94 ("Ideal", October). Average monthly values of HCI for the entire observation period (tables 4-5, fig. 1) varied from 62.0 ("Good", January) to 83.8 ("Excellent", May). As in the case with the TCI [3], according to the HCI, the bioclimatic conditions in Tbilisi are favorable for resort and tourist purposes all year round.

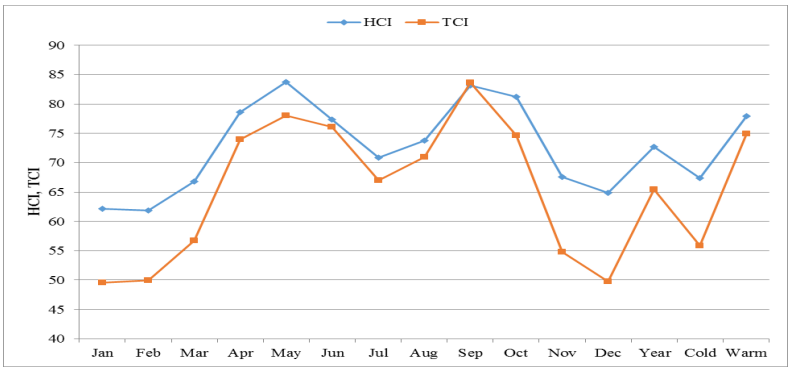

Fig. 1. Monthly and Seasonal Values of HCI and TCI in Tbilisi.

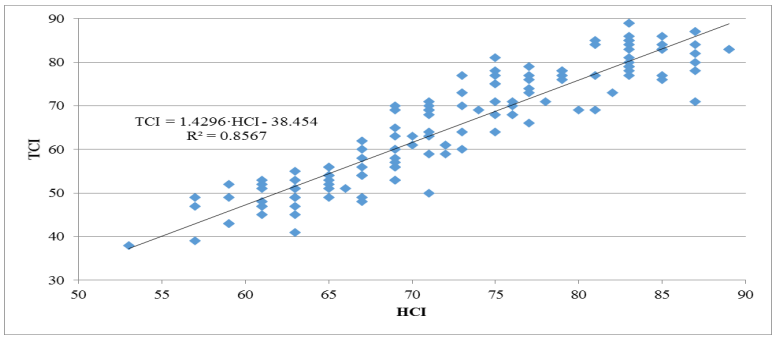

Fig. 2. Linear Correlation and Regression Between Monthly Values of HCI and TCI in Tbilisi.

Table 6. Categories of monthly and seasonal values of HCI and TCI in Tbilisi

Month	HCI	TCI	Month	HCI	TCI	Month/ Season	HCI	TCI
Jan	Good	Marginal	***Jun***	Very good	Excellent	***Nov***	Good	Acceptable
Feb	Good	Marginal	***Jul***	Very good	Very good	***Dec***	Good	Marginal
Mar	Good	Acceptable	***Aug***	Very good	Very good	***Year***	Very good	Good
Apr	Very	Good	***Sep***	Excellent	Excellent	***Cold***	Good	Acceptable
May	Excellen	Very good	***Oct***	Excellent	Very good	***Warm***	Very good	Very Good

Comparison of the values and categories of the Tourism Climate Index [3] and Holiday Climate Index (fig. 1, table 6) shows that the intra-annual variation of both indices is similar and has a bimodal form.

However, given that the TCI is calculated for the so-called "average tourist" (regardless of gender, age, physical condition), the value and category of this index is lower than the HCI values and categories. In general, HCI more adequately determines the bioclimatic state of the environment for the development of various types of tourism than TCI.

Note also that there is a direct correlation with a high degree of reliability between the monthly values of TCI and HCI (fig. 2).

Conclusion

In the future, we plan to continue similar studies for other regions of Georgia (mapping the territory of Georgia by HCI values, studying their long-term trends, statistical forecasting of HCI variability due to climate change).

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