Influence of the Country's Information Development on Its Tourist Attractiveness

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Abstract. A number of studies have researched the effects of tourism on transportation system, hotel industry, economic efficiency and environment. This paper examines the influence of the information and communication technologies development on the inbound tourism intensity. The correlation and regression analysis has been used to identify the relationship between the Travel and Tourism Competitiveness Index, the Information and Communication Technology Development Index and International tourism arrivals. The results demonstrate that there is a close link between the countries' tourist attractiveness and the level of their information and communication development. However, it is not equal for different countries, which are grouped by the level of intensity of tourism arrivals, the level of the country's attractiveness and its information and communication technologies development. Besides, the country's information and communication technologies development has little effect on the inbound tourism intensity

Keywords: tourist attractiveness of a destination, information and communication development of a country, the travel and tourism competitiveness index, international tourism arrivals.

1 Introduction

The contemporary unification of the world society into a single information and communication network and the transformation of information technologies into the generative force of socio-economic development contributes to the close interconnection between countries, regions and societies of different nations. Most countries are actively using Internet space to shape the country's image (including tourist image). Mainly because it is one of the most important tools for creating an appropriate image of the country as a tourist destination that can greatly increase the intensity of the inbound tourism flow. In this regard, the study of the impact of the country's information and communication technologies development on the tourism and travel development is relevant and requires further theoretical and practical research.

2 Theoretical development and hypotheses formulation

Tourism development affects the development of a range of other areas of economic activity. Inbound and outbound tourism has bidirectional causality with air transportation (Syed Abdul Rehman Khan and other, 2017). Air transport and tourism are highly connected. Researches show that tourist-oriented airports may achieve higher efficiency levels than non-touristic ones (Xosé Luis Fernández, Pablo Coto-Millán, Benito Díaz-Medina, 2018).

The level of tourism development is estimated by the global index. The Travel & Tourism Competitiveness Index has been the subject of some methodological criticism, such as the arbitrary weighting of variables. There is an alternative methodology for calculating this index based on two points of reference to propose a new standardization. A synthetic index that measures the state of the pillar in the worst position, as well as other alternative indices, is calculated (Juan Ignacio Pulido-Fernández, Beatriz Rodríguez-Díaz, 2019).

Depending on how the variables are included in the underlying technology specification, the same tourism index can be oriented towards the assessment of either the private or the public sector's effectiveness (Walter Briec and other, 2018).

Trade openness, climate change and intensity of market competition increase tourism efficiency in China. Tourism efficiency improvement in China was mainly driven by technological improvement (Sami Chaabouni, 2019).

UNESCO's World Heritage inscription is considered to positively influence tourism demand. However, relevant econometric research has yielded inconsistent results. A sub-group analysis identifies different factors in developing vs. developed countries and cultural vs. natural WHS types. (Yang LanXue, Thomas E.Jones, 2019).

The expansion of tourism translates into an environmental deterioration of the destination (risk dimension) and, furthermore, it substantiates that there are specific variables connected to environmental sustainability (regulatory dimension) that contribute to greater tourism growth, so that the relationship between tourism and environmental sustainability is bidirectional (Juan Ignacio Pulido-Fernández, Pablo Juan Cárdenas-García, Juan Antonio Espinosa-Pulido 2019).

The studies suggest that the effect of growth rate of total foreign tourist arrivals on hotel equity return is asymmetric and state-dependent, conditional on the distributions of hotel equity return. The study further identified that GTA has a significant influence only on equity returns of hotels with a small size (Ming-Hsiang Chen, 2016).

The shift of our view on information technology in tourism research from a primarily a marketing-driven tool to a knowledge creation tool due to new technological conditions such as the smartphone, drone, wearables, new connectivity and big data is recognized. Some possible future research problems and challenges regarding our existing views of the relationship between information technology and tourism are studied (Zheng Xiang, 2018).

Not only ICTs empower consumers to identify, customise and purchase tourism products but they also support the globalisation of the industry by providing effective tools for suppliers to develop, manage, and distribute their offerings worldwide (Buhalis, 1998).

Buhalis (1998) stated that potential tourists have become moreindependent and sophisticated on using a wide range of tools to arrange for their trips (such as Expedia, Googleand Kayak, visitbritain.com), web 2.0portals, wayn and tripadvisor, kelkoo).

Information Search is a significant part of the purchase decision process and was revolutionised as a result of the Internet. ICTs not only reduce uncertainty and perceived risks but also enhance the quality of trips (Fodness &Murray, 1997).

The quality of the website, Digital Marketing, Social Networking, Multimedia, Mobile Technologies and Intelligent Environments are the main keys factors of ICT in Tourism (Elisabete Paulo Morais & other, 2016).

A Virtual Travel Community (VTC) makes it easier for people to obtain information, maintain connections, develop relationships, and eventually make travel-related decisions (Stepchenkova, Mills & Jiang, 2007).

Increasingly the impacts of ICTs are becoming clearer, as networking, dynamic interfaces with consumers and partners and the ability to re-develop the tourism product proactively and reactively are critical for the competitiveness of tourism organizations (Buhalis, D., & Law R., 2008).

The analysis of the mentioned resources has allowed hypothesizing the following:

Hypothesis 1. Information development of the society contributes to the improvement of the country's tourist attractiveness.

Hypothesis 2. The development of information and communication technologies in the countries across the globe positively influences the inbound tourism intensity.

3 Methods

The methods of multivariate statistical analysis, such as Descriptive Statistics, the multiple regression, the cluster analysis were used to study the influence of information and communication technologies on tourism. These statistical methods were implemented with the StatSoft's software package Statistica. This package is well balanced with the "power / convenience ratio", has a wide range of functional data analysis algorithms and has wide graphical capabilities for data visualization.

To carry out the research, the global indices and variables of tourism development were selected:

The Travel and Tourism Competitiveness Index (TTCI), which reflects the level of the country's attractiveness for both tourists and also investors and representatives of the tourism business. This index includes the characteristics of the following framework: Enabling Environment, Travel and Tourism Policy and Enabling Conditions, Tourism and Transport Infrastructure, Natural and Cultural Resources [12];

The Information and Communication Technologies Development Index (ICT) reflects the level of networked infrastructure and access to ICTs, the level of use of ICTs in the society and more efficient and effective ICT use [11].

International tourism arrivals (ITA) is one of the main indicators that reflects the effectiveness of all the measures adopted for the development of tourism in the country [3].

The objects of research are 80 countries of the world. The variables are the data for 2016. The countries without sufficient data were excluded from the database.

4 Results

In order to study the influence of the country's information and communication development on tourism development, the following algorithm of the research has been proposed:

Stage 1. Selection of the initial variables.

Stage 2. Research of the basic statistical characteristics of the selected variables.

Stage 3. Verification of the first hypothesis on the basis of the correlation-regression analysis methods.

Stage 4. Verification of the second hypothesis on the basis of the correlation-regression and cluster analysis methods for the whole array of initial data and within the scope of separate groups of countries, which are similar according to the level of tourism activity.

For implementation of the first stage of the algorithm, the following variables were selected: Travel and Tourism Competitiveness Index (TTCI), Information and Communication Technologies Development Index (ICT) and International Tourism Arrivals (ITA).

The descriptive statistics was used to process, systematize and provide quantitative description of the empirical data by means of the main statistical indicators. The implementation of the second stage of the study presupposed the calculation of the following characteristics: Mean, Median, Mode, Frequency of Mode, Minimum, Maximum, Variance, Standard Deviation, Coefficient of Variation, Skewness, Kurtosis, as well as histograming. The results of calculation are presented in Table.1.

Table 1. Descriptive Statistics

Variable	Descriptive Statistics											
	Valid N	Mean	Median	Mode	Freq. of Mode	Min	Max	Variance	Std. Dev.	Coef. Var.	Skewn.	Kurtos.
TTCI	80	4,13	4,125	3,910	3	3,09	5,43	0,36	0,60	14,542	0,2079	-0,7614
ICT	80	6,52	6,875	–	–	3,03	8,98	2,66	1,63	24,946	-0,4806	-0,7991
ITA	80	12684,2	5460,0	–	–	121,0	82600,0	316498734	17790,4	140,256	2,3697	5,6854

The results of the histograming of distribution for each of the studied variables are presented in Fig. 1 – 3.

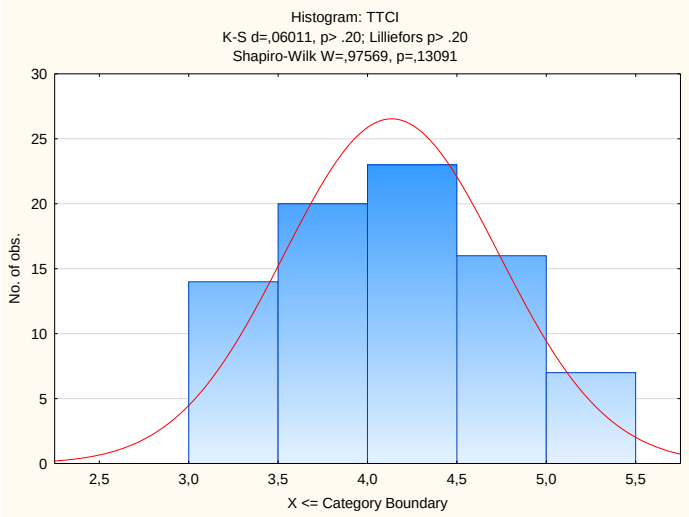

Fig. 1. TTCI variable distribution histogram

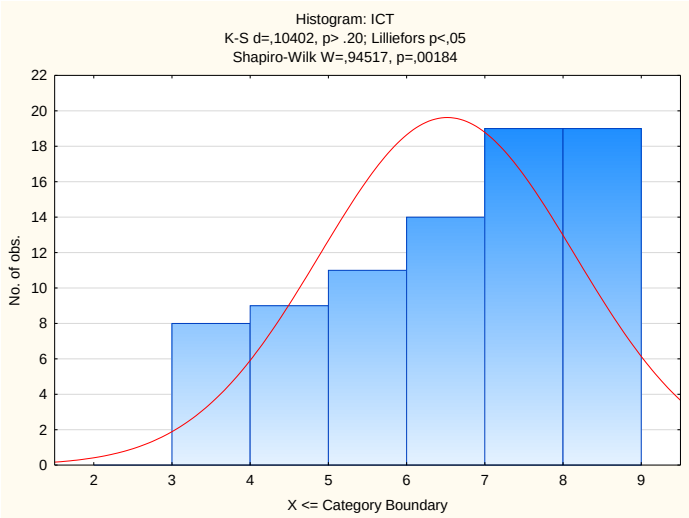

Fig. 2. ICT variable distribution histogram

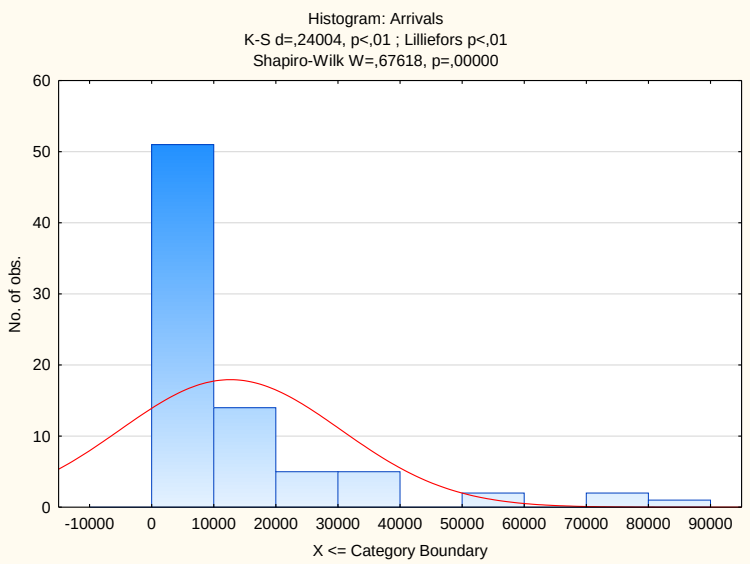

Fig. 3. ITA variable Distribution Histogram

According to the results of the analysis of the obtained statistical characteristics (see Table 1) and distribution histograms (see Figures 1-3), the following conclusions can be made:

- the TTCI variable has a distribution close to normal. This is evidenced by the proximity of the mean, mode and median, as well as small values of the skewness and kurtosis. This variable has the least value of the coefficient of variation (14,52);
- the ICT variable also has a distribution rather close to normal. Its average value is close to the median. But unlike the TTCI variable, it has a slightly larger range (from 3.03 to 8.98) and a larger coefficient of variation (24.95). It should be noted that almost half of the world's countries (38 out of 80) fall into the last two intervals with values of 7 to 8 and from 8 to 9. This means that a significant part of the countries in the considered group has a high level of development of information and communication technologies (ICT);
- the ITA variable is significantly different from the previous two. First of all, it has a completely different unit of measurement and dimension, therefore, during further research with the simultaneous use of the TTCI and ICT variables, the calculations will be made on the basis of the standardized data. Secondly, the distribution of this variable is quite distant from normal. This is evidenced by the large difference between the mean and the median (12 684.2 and 5 460.0 thousand persons respectively), as well as the statistical criteria of the Kolmohorov-Smirnov (K-S test), Shapiro-Wilk test and Lillifors test. For the distribution of this variable the right-side bias is characteristic (the skewness equals 2.37) and significant elevation (the kurtosis is equal to 5.69). In 2016, this variable was significant (from 121 to 82,600 people), more than 50 countries had the value of this variable up to 10,000 thousand people, in France

this value was more than 80,000, and in Spain and United States – it ranged from 70,000 to 80,000 thousand people.

The verification of the first hypothesis that the information development of the society contributes to the improvement of the country's tourist attractiveness was carried out during the implementation of the third stage of the study. A pair correlation coefficient between the TTCI and ICT variables was calculated according to the data from all 80 countries. In 2016 it was equal to 0.711 that indicates a fairly close direct linear relationship between these variables. The graphic representation of this connection is given in Fig. 4.

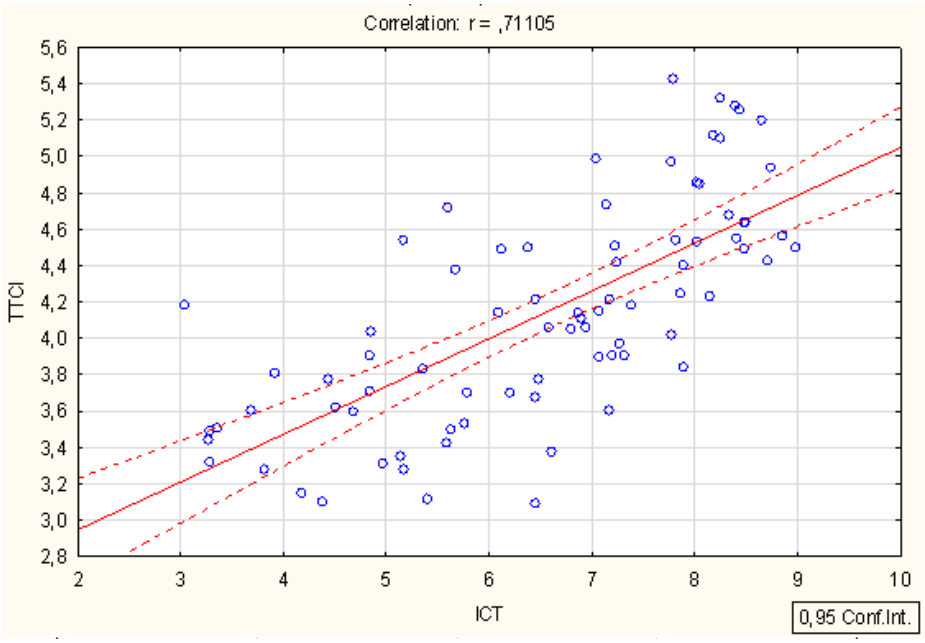

Fig. 4. Dispersion field (correlation field) between factors

The dispersion field proves a linear relationship between TTCI and ICT, therefore, we can accept the hypothesis 1 that the greater the information development of the country is, the better the tourism and travel sector is developed in this country. This allows putting forward the second hypothesis that the development of information and communication technologies in the countries of the world positively influences the intensity of inbound tourism.

Thus, the implementation *of the fourth stage* involves verification of the second hypothesis that involves the following sequence of steps:

Step 1. Determination of the pair correlation coefficients between the resulting ITA variable and factor variables of TTCI and ICT.

Step 2. Construction of the multiple regression based on the standardized data of the type:

$$\widehat{ITA}_{st} = a_1 \cdot TTCI_{st} + a_2 \cdot ICT_{st}, \quad (1)$$

where a_1 та a_2 are unknown parameters that are evaluated by the least squares method.

Step 3. Distribution of countries into homogeneous groups according to the ITA, TTCI and ICT variables on the bassis of the cluster analysis methods.

Step 4. Construction of the multiple regression (1) for each of the clusters.

Step 5. Making conclusions as to the hypothesis acceptance or rejection.

In the result of implementation *of the first step* the following values of the pair correlation coefficients have been received: $r_{ITA,TTCI} = 0{,}6574$; $r_{ITA,ICT} = 0{,}2734$. These values mean that there is a direct linear link of the moderate level between ITA and TTCI, but between ITA and ICT there is a direct but weak link.

The obtained values are not sufficient for accepting or rejecting the hypothesis 2. Therefore, during *the second step*, the following equation of multiple regression was constructed:

$$\widehat{ITA}_{st} = 0{,}9283 \cdot TTCI_{st} - 0{,}3915 \cdot ICT_{st}.$$

This regression equation is statistically significant in terms of Fisher's criterion (F = 40.32), and separate parameters according to Student's criterion ($t_{a_1} = 8.29$, $t_{a_2} = -3.47$). The coefficients of the multiple correlation (R = 0.713), the determination ($R^2 = 0.508$)) and the corrected determination coefficient ($R^2_{adj} = 0.489$) indicate a sufficient quality of the model. There is no autocorrelation of the errors in this model (the statistics of Darbine-Watson are approximately equal to 2, and the cyclic coefficient of autocorrelation is close to 0). Thus, this model can be used for analysis and forecasting.

We have analysed the problem under study according to this model. As can be seen from the obtained regression equation, compared with the pair correlation coefficients, there is a significant increase of the influence of TTCI on ITA (from 0.6574 to 0.9293), the simultaneous change of direction and the increase of the influence of ICT on ITA (from + 0.2734 to -0.3915). To answer the question whether these changes are only due to the multicollinearity that are present in the model, or in fact there is an inverse relationship between ICT and ITA, partial correlation coefficients have been calculated and their statistical significance checked. The results of calculations are given in Table 2.

Table 2. Results of correlation coefficients calculations

Variable	Variables currently in the Equation; DV: ITA						
	b* in	Partial Cor.	Semipart Cor.	Tolerance	R-square	t(77)	p-value
TTCI	0,936420	0,684528	0,658439	0,494413	0,505587	8,23980	0,000000
ICT	-0,392394	-0,366155	-0,275910	0,494413	0,505587	-3,45277	0,000905

As can be seen from Table 3, the value of the partial coefficients is: $r^{part}_{ITA,TTCI} = 0{,}6845$; $r^{part}_{ITA,ICT} = -0{,}3661$ and they are statistically significant according to the Student's criterion.

During the next, *third step*, using the cluster analysis methods**,** we obtain homogeneous groups of countries. The grouping of countries is based on the hierarchical method of full communication, which allows clearly divide the countries into two, three, or four clusters. The division into 2 clusters is not informative. If we divide countries into 4 clusters, then the last cluster will consist of only three countries (28, 69 and 77). Therefore, it is rational to divide countries into three clusters, which corresponds to the logical distribution of countries with high, medium and low intensity of foreign tourists' arrivals.

Based on the iterative method of clustering k-means, the following cluster results have been obtained. The first cluster includes 30 countries with the low inbound tourism activity (Cluster contains 30 cases). These countries are listed in Table 3.

Table 3. Members of Cluster Number 1 and Distances from Respective Cluster Center

Case No.	Country	Distance	Case No.	Country	Distance	Case No.	Country	Distance
C_1	Albania	0,2130	C_29	Georgia	0,370	C_56	Nicaragua	0,569
C_3	Armenia	0,3328	C_32	Guatemala	0,5336	C_58	Paraguay	0,448
C_6	Azerbaijan	0,5073	C_33	Honduras	0,5623	C_59	Peru	0,479
C_9	Bhutan	0,4266	C_36	India	0,961	C_60	Philippines	0,119
C_10	Bosnia and Herzegovina	0,4561	C_37	Iran, Islamic Rep,	0,287	C_63	Romania	0,626
C_13	Cambodia	0,5963	C_41	Jamaica	0,166	C_65	Serbia	0,649
C_17	Colombia	0,3328	C_44	Kyrgyz Republic	0,455	C_70	Sri Lanka	0,421
C_23	Dominican Republic	0,1642	C_51	Moldova	0,723	C_75	Ukraine	0,428
C_24	Ecuador	0,3597	C_52	Mongolia	0,244	C_79	Venezuela, RB	0,288
C_25	El Salvador	0,4453	C_53	Montenegro	0,585	C_80	Vietnam	0,348

Besides, these countries have a very low level of tourism potential (TTCI), information, and communication technologies development (ICTs). Under the current conditions of certain instability, Ukraine is referred to this group.

The second cluster includes 38 countries with an average level of inbound tourism activity (Cluster contains 38 cases) and is presented in Table 4.

Table 4. Members of Cluster Number 2 and Distances from Respective Cluster Center

Case No.	Country	Distance	Case No.	Country	Distance	Case No.	Country	Distance
C_2	Argentina	0,423260	C_26	Estonia	0,290589	C_54	Netherlands	0,475310
C_4	Australia	0,754292	C_27	Finland	0,226476	C_55	New Zealand	0,445570
C_7	Barbados	0,512315	C_31	Greece	0,553923	C_57	Norway	0,429661
C_8	Belgium	0,201288	C_34	Hungary	0,421589	C_61	Poland	0,441428
C_11	Brazil	0,549649	C_35	Iceland	0,558500	C_62	Portugal	0,418383
C_12	Bulgaria	0,333957	C_38	Ireland	0,227274	C_64	Russian Federation	0,575004
C_14	Canada	0,696993	C_39	Israel	0,536582	C_66	Singapore	0,521162
C_15	Chile	0,473804	C_43	Korea, Rep,	0,558807	C_67	Slovak Republic	0,483337
C_18	Costa Rica	0,474334	C_45	Latvia	0,449582	C_68	Slovenia	0,264168
C_19	Croatia	0,215706	C_46	Lithuania	0,496977	C_71	Sweden	0,347542
C_20	Cyprus	0,372457	C_47	Luxembourg	0,420123	C_72	Switzerland	0,694621
C_21	Czech Republic	0,226697	C_48	Malaysia	0,738362	C_78	Uruguay	0,753103
C_22	Denmark	0,402136	C_49	Malta	0,261468			

Countries in the cluster 2 are characterized by the highest level of tourism potential (TTCI) and the average level of ICT development.

The third cluster includes 12 countries with the highest level of inbound tourism activity (Cluster contains 12 cases). This claster is presented in Table 5.

Table 5. Members of Cluster Number 3and Distances from Respective Cluster Center

Case No.	Country	Distance	Case No.	Country	Distance
C_5	Austria	0,701654	C_50	Mexico	0,941073

C_16	China	0,727240	C_69	Spain	1,028845
C_28	France	1,230744	C_73	Thailand	0,926716
C_30	Germany	0,654982	C_74	Turkey	0,916710
C_40	Italy	0,171680	C_76	United Kingdom	0,678250
C_42	Japan	0,932930	C_77	United States	0,968470

Countries of the latter cluster are characterized by the highest level of tourism potential development (TTCI) and rather high level of ICT.

It should be noted that the received country grouping by the level of tourism activity is sustainable, since the hierarchical method of complete dependence and the k-medium method yielded identical results, except for the country number 78 (Uruguay) which, according to the first method, was reffered to the low-income countries development, and, according to the second method, it was reffered to countries with an average level of development. As the final result we accept the one that gives the k-medium method, since this method minimizes intragroup variance and maximizes the intergroup, thus providing higher-quality clusterization.

The average means of the variables, according to which the clusterization was carried out, are presented in Fig. 6

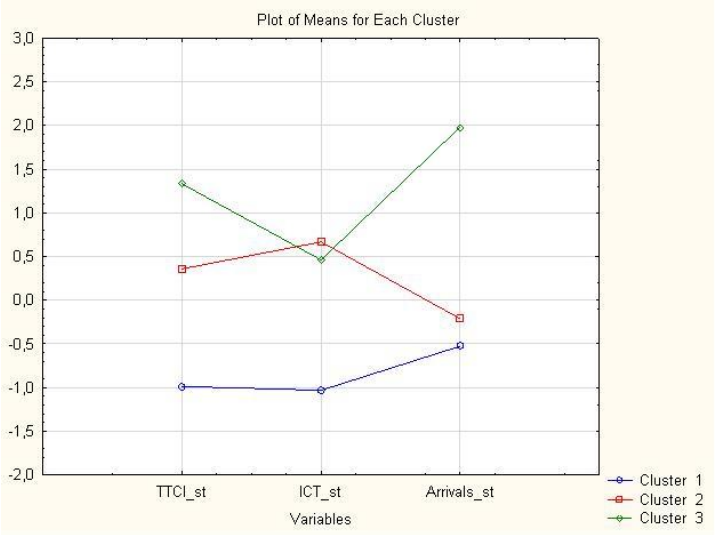

Fig. 6. Average means of TTCI, ICT and ITA variables by clusters

Analysis of the means given in Fig. 6, allows to draw the following conclusions. First, the cluster number 1 is formed by the countries with the lowest values of the TTCI, ICT and ITA variables. The second cluster consists of the countries with an average level of TTCI and ITA, but with the highest level of ICT. The third cluster includes the countries with the highest levels of TTCI and ITA with high (but not the highest) level of ICT. In addition, the countries of the second and third clusters are characterised by the inverse dependence between the ITA and ICT variables. This is

also confirmed by the calculation of the pair correlation coefficients between the variables for each cluster separately. The results of calculations are presented in the Table 6.

Table 6. Matrices of the pair correlation coefficients for each cluster

Claster 1				Claster 2			
Variable	TTCI	ICT	ITA	Variable	TTCI	ICT	ITA
TTCI	1	-0,0763	0,4156	TTCI	1	0,4883	0,3444
ICT	-0,0763	1	-0,1822	ICT	0,4883	1	-0,1534
ITA	0,4156	-0,1822	1	ITA	0,3444	-0,1534	1

Claster 3			
Variable	TTCI	ICT	ITA
TTCI	1	0,8328	0,3931
ICT	0,8328	1	0,1444
ITA	0,3931	0,1444	1

Let us analyze the means of the obtained coefficients in more detail.

Thus, cluster 1, in comparison with other clusters, is characterised by the strongest direct dependence between TTCI and ITA (0.4156) and the inverse dependence between ICT and ITA (-0.1822). Besides, the countries within this cluster have almost no dependence between TTCI and ICT (-0,0763), that is, for countries of this group we reject the hypothesis 1.

The absence of multicollinearity between the TTCI and IST factors enables to construct a two-factor regression model (1):

$$\widehat{ITA}_{st} = 0{,}4005 \cdot TTCI_{st} - 0{,}1511 \cdot ICT_{st}.$$

This regression equation is statistically significant in general according to Fisher's criterion (F = 3.395, *Significance F* = 0.048). According to Student's criterion, only the influence of the TTCI factor ($t_{a_1} = 2.37, p\_level = 0.025$) is statistically significant, whereas the influence of ICT is not statistically significant ($t_{a_2} = -0.889$). The coefficients of the multiple correlation (R = 0.442), the determination ($R^2 = 0.195$) and the corrected determination coefficient ($R^2_{adj} = 0.131$) indicate insufficient quality of the model. Thus, on the basis of the above stated, for the countries with the low level of tourism activity the hypothesis 2 is rejected.

Cluster 2 is characterised by a weak dependence between TTCI and ICT (0.4883), as well as between TTCI and ITA (0.3444). There is a weak inverse dependence between the ICT and ITA values (-0.1534), that is, for countries of this group we accept the hypothesis 1.

The lack of multicollinearity between the TTCI and ICT factors within the cluster 1 allows to construct a two-factor regression model (1):

$$\widehat{ITA}_{st} = 0{,}5506 \cdot TTCI_{st} - 0{,}4223 \cdot ICT_{st}.$$

This regression equation is statistically significant in terms of Fisher's criterion (F = 6.143, *Significance F* = 0.005). According to Student's criterion, the influence of both factors is statistically significant: i TTCI ($t_{a_1} = 3.339, p\_level = 0.002$), i ICT ($t_{a_2} = -2.56, p\_level = 0.015$). The coefficients of the multiple correlation (R = 0.504), the determination ($R^2 = 0.254$) and the corrected determination coefficient ($R^2_{adj} = 0.206$) indicate insufficient quality of the model. Thus, on the basis of the above stated, the hypothesis 2 for the countries with the average level of tourism activity is rejected.

Cluster 3 is characterised by a weak dependence between TTCI and ITA (0.33931), as well as by a very weak dependence between ICT and ITA (0.1444). There is a strong direct dependence between TTCI and ICT (0.8328), that is, for the countries of this group we accept the hypothesis 1.

The presence of strong multicollinearity between the factors of TTCI and ICT does not allow to construct a two-factor regression model (1).

Thus, on the basis of the aforementioned, the hypothesis 2 for the countries with the high level of tourism activity is rejected.

Let us analyze the means of the obtained coefficients in more detail.

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The presence of strong multicollinearity between the factors of TTCI and ICT does not allow to construct a two-factor regression model (1).

Thus, on the basis of the aforementioned, the hypothesis 2 for the countries with the high level of tourism activity is rejected.

5 Conclusion

Thus,

1) the tourist attractiveness of the country increases if there are developed information and communication technologies, because the quality of tourist information resources (including Internet resources), formation of the comfortable information environment, the mass use of platforms for travel services searching and comparing of their prices, the development of e-commerce in tourism in general contributes to the improvement of the tourism infrastructure;

2) there is no dependence of this type between tourism attractiveness and the development of information and communication technologies in the first group of countries, which is characterized by low TTCI, ICT and low intensity of tourist arrivals. There is a significant dependence in the 2nd group of countries. There is a strong direct dependence in the third group, characterised by the highest level of tourist arrivals and the highest level of tourist attractiveness. That is, the more the country is attractive for tourism, the stronger is the interdependence between the indicators of TTCI and ICT;

3) there is a weak inverse dependence between the countries' information and communication technologies development and the intensity of tourist arrivals. Moreover, this connection is not observed in any of the 3 distinct groups of countries. That is, it can be argued that the development of information and communication technologies almost does not affect the intensity of inbound tourism.

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