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## Article

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## ECONOMETRIC MODELS IN ROMANIAN TOURISM UNDER THE IMPACT OF SUSTAINABLE DEVELOPMENT

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### Abstract

After the year 1989 Romanian tourism has grown chaotic and failed to have any link to the concept and sustainable development principles. Sustainability, in general, and the tourism sustainability, especially, combine different aspects – economic, social, environmental etc. in a harmonious way. In the paper the authors have proposed to test multiple linear regression models, in order to, finally demonstrate the impact of sustainable development on tourism activity. Following analyses have established links between nature, size of the tourism, economic, social and ecological indicators, thus demonstrating the impact of sustainable development on tourism also. The authors propose two original econometric models of dependence between the index of net using the tourist accommodation capacity in operation and indicators expressing the quality of life and sustainable development.

**Keywords:** sustainable development, quality of life, tourism indicators, econometric model, multiple linear regression

**JEL Classification:** Q01, L83, C32

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### Introduction

Sustainable development is a goal of the society recently appeared in the long history of mankind. The term sustainable development appears as a necessity in the context of unprecedented industrial development of the last two centuries. Regarded tourism as an industry has a more recent history, but particularly invasive in relation to the environment and society. After the research began in the 60s of last century, 1987 is the year when appears the concept of sustainable development.

Research performed in the last decades has shown that there are various causes for climate changes, forest clearances, uncontrolled exploitation of water resources, and the increase of greenhouse gas emissions. Tourism, which has a complex relationship with the

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environment, is both a negative factor and a vector of profoundly ecological policies and strategies.

CUC (Capacity Utilization Coefficient) is an economic efficiency indicator due to the interest of accommodation services suppliers to maximize their profit, by increasing the number of booked accommodation units / rooms. With respect to accommodation units, TAC represents the occupancy rate in a determined period of time (usually one year), being calculated as a ratio between effectively used capacity (nights spent as multiplying the arrivals by average stay) and the maximum accommodation capacity (operating capacity quantified as the result between existing capacity and the number of functioning days) and the results are expressed in percentages.

The CUC social efficiency can be expressed through the total number of tourists' arrivals, which is the degree in which the population enjoys the benefits of tourism. The CUC answers the ecologic dimension of development since it depends on the average stay – its increase determining the decrease of the pollution degree caused by transportation, as well as on the number of tourists – as the balance between demand and offer mitigates the issue of seasonality.

The choice of CUC as an aggregate indicator of tourism dimension is explainable due to its importance in the analysis of tourism activity efficiency from the economic, social and ecological perspectives.

The brief content of the article sections is the following: an introductory chapter, a second part dedicated to studying the specific literature, a third part presenting the methodology used by the authors, and a fourth part describing the research results, containing the analysis and necessary explanations. Finally, the article emphasizes the conclusions, limitations and possible further research directions.

## **1. Literature review**

Sustainable development is defined as a guarantee of the present needs without compromising the next generations' capacities of satisfying their own needs (Brundtland Commission, 1987). Within the European Union, of which Romania has become a member in 2007, there is a permanent preoccupation for sustainable development: approaching the concept (European Union, 1998), elaborating an integrated strategy (European Commission, 1999) and adopting the Sustainable Development of the European Union Strategy (European Commission, 2001).

The quantification of sustainable development is one of the constant preoccupations of the organizations and researchers specialised in this field. The complexity of this phenomenon is rooted in the large number of indicators that make up the aspects of life: economic, social, ecological indicators as well as linkage indicators of human capital, the environment and economic.

In a study performed by "The Macaulay Institute", White et al (2006) have offered examples of sets of indicators proposed by various national and international organisations. The United Nations has proposed a set of 58 indicators, on 15 themes and 38 subthemes, focussed on four components of sustainable development: social, environmental, economic and institutional. In its sustainable development strategy, the European Union monitors

10 general themes: social-economic development, sustainable consumption and production, social inclusion, demographic changes, public health, climate changes and energy, sustainable transport, natural resources, global partnership and governance.

Křupka et al (2011) have analysed the de sustainable development indicators from the “Society, Human, Health” and “Stable and Safe Society” axes from the Czech Republic Sustainable Development Strategy.

Based on the expert discussions, we defined a set of “safety” region indicators (six basic and three super-structural indicators): Number of beds; Accessibility of health care; Number of places in the social care facilities; Number of preschool facilities; Number of offences, from the disclosed cases; Number of households connected to the Internet; Number of accidents, injuries and death; Number of completely built flats; Number of cultural, sport and other facilities. (Křupka et al, 2011)

Ivanovic et al (2009) have defined the main characteristics of efficient sustainable development indicators: their relevance in relation to the proposed objective, the extent to which the public understands them, the accuracy of information and access to statistics.

In the document dating from 1999, the European Union showed integrated strategy of environmental politics and sustainable development through the document known as European Spatial Development Perspective (ESPD) and it defined three groups of target aims (Ivanovic et al, 2009):

- Economic competence and sustainable economics.
- Cohesion of the society and spatial equality (levelled intergeneration development).
- Protection of natural resources and natural environment (water and biodiversity above all).

Light and Dumbraveanu (1999) have analysed the development of tourism in Romania throughout 1989 - 1997.

Gonzalez and Moral (1996) have performed a quantitative study, by analysing the evolution of international tourism.

Blake et al (2008) have studied the effects of tourism on the poverty rate and the way in which the tourism industry influences the economy of a country, respectively certain sectors of it.

Dolnicar, Yanamandram, Cliff (2012) have studied the role of vacations and tourism in general on consumer satisfaction and quality of life. They propose that vacations should become a distinct field in the methodology related to measuring the quality of life. McCabe, Johnson (2013) extended the debates, by demonstrating the contribution of tourism to the enhancement in the quality of life.

The level of CUC measures the way in which the material resources are exploited. Concurrently, it also suggests the tourists' possibilities of finding accommodations that coincide with their requirements (regarding the comfort level, the price); from this perspective, the indicator allows for the characterisation of social efficiency provided by hotel services. Its role is even more complex, seeing as its scale is the pre-requisite for attaining the other indicators of tourism activity. (Minciu, 2004)

The average duration of the stay represents the average number of tourists' days of stay in a certain area (country, resort etc.); it is the result of the ratio between the number of nights spent and the number of tourists (Minciu, 2004).

The number of tourists is unanimously recognised as one of the most representative and important indicators of tourist traffic (Minciu, 2004).

"There are few economic phenomena that significantly depend on a sole factor. The more frequent situation is that in which the level of the economic phenomenon is the result of several important factors added to the role of lesser-known, presumably insignificant factors" (Pecican, 2006).

"Within the multiple model for variable dependent regression, designated with Y, it is explained by a set of explained variables or regressors" (Andrei, Bourbonnais, 2008).

Song, Witt and Jensen (2003) have evaluated some linear regression models used for the tourism demand estimations. On the same subject, Croes and Vanegas Sr. (2005) have analysed econometric models that explain the flows in international tourism.

According to Sinclair and Stabler (1997), the advantages of the use of single equations model are three-fold (Croes, Vanegas Sr., 2005):

- it provides useful information through the estimation of elasticities (which could be useful information regarding the marginal utility and total revenues of a destination);
- the elasticity value can be calculated over time, thus providing information about the adjustment time period required for any countervailing policy to have effects;
- the elasticity can be estimated for different products and profiles of customers.

Kulendran and Witt (2001) have criticized the use of estimates based on the regression models, characterising them as mediocre and unadjusted to the current economic transformations.

Thrane and Farstad (2011) have used non-linear models to explain the relationship between tourism expenses and the average stay. The results show that the generally positive length of stay– expenditures relationship becomes weaker for trips of longer duration. That is, length of stay has a diminishing positive effect on personal tourism expenditures.

(Thrane and Farstad, 2011)

## **2. Research methodology**

The research approached two stages: 1) testing linear multiple regression models; 2) choosing and explaining the statistical-mathematical relationship and the influences between the variables.

Original econometric models exposed here have rigorously passed through itemized stages, parameters system, testing and decision (emphasizing validation). Thus, the stationary character of data series had been tested by using the Dickey Fuller test. The estimate of the parameters used the least squares method, pursuing in final models, the achievement of high values of determination ratio ( $R^2$  shows the percentage that explains the influence of significant factors, while  $R^2$  adjusted represents the corrected value of  $R^2$ , a possible

increase can be caused sometimes by the number of variables in the model). The main tests used in the model were t-student (with the null hypothesis H0: the coefficients are not significantly different to 0 and the alternative hypothesis H1: the coefficients are significantly different to 0, the F test (verifies whether at least one coefficient is significantly different to 0, null hypothesis H0: all coefficients are not significantly different to 0, H1: there is at least one coefficient different to 0, the Durbin-Watson test is used for correlation of the model error, the Jarque-Bera test is used, for testing whether the errors of the model follows or not a normal distribution and the White test for testing the homoscedasticity or heteroscedasticity of economic model.

For the 1990-2012 period the following data series have been used (according to Appendix 1): tourism indicators – Capacity Utilization Coefficient (CUC, occupancy rate, expressed as a percentage, %), number of tourist arrivals in Romania, the average stay (nights spent/arrivals); economic indicators – GDP per capita increase/decrease rate (%), real wage indexes (%), annual inflation rate (%); social indicators - crime rate (number of registered and solved crimes per 100,000 inhabitants), schooling rate (school enrolment rate of the school-aged population), life expectancy upon birth (years); ecological indicators: the gas emissions (greenhouse gas, thousand tons), alternative and nuclear energy (percentage from the total used energy), protected areas (terrestrial and marine, % percentage of total).

The data has been collected by the authors from sources as: the National Statistics Institute (insse.ro) - CUC, tourists' arrivals, nights spent, the real wage indexes, school enrolment rate, crime rate, the annual rate of inflation or World Bank (data.worldbank.org) - GDP per capita increase/decrease rate, life expectancy upon birth; World Database on Protected Areas (www.wdpa.org): percentage of protected areas; National Bank of Romania (bnr.ro): annual inflation rate.

In order to identify a viable regression model, several scenarios have been tested, with tourism indicators as the endogenous variables and economic, social and ecological indicators as the exogenous variables. The main stages were: choosing the dependent variable and the independent variables, testing the data series stationary system, their stationarization, the estimation of parameters, testing the model hypotheses and the interpretation of results.

The dependent variables which were taken into consideration: CUC, the number of arrivals and average stay, and independent variables were - GDP per capita increase/decrease rate, real wage indexes, annual inflation rate, crime rate, and schooling rate, life expectancy upon birth, gas emissions, the alternative energy and the protected areas. (Table no.1)

**Table no.1: Regression equations and lettering used for the variables**

$d\_tcc = c(1) + c(2)*d\_gdp + c(3)*d\_expectancy2 + c(4)*r\_crime + c(5)*d\_school$		
Indicator	Data series denomination	Lettering in the regression equation
CUC	Tcc	d_tcc
GDP/inhabitant	GDP_inhab	d_GDP
Life expectancy upon birth	expectancy_n	d_expectancy2
Inflation rate	r_inf	r_inf
Schooling rate	schooling	d_school;

$d\_tcc = c(1) + c(2)*d\_emissions + c(3)*d\_gdp + c(4)*d\_expectancy2$		
Indicator	Data series denomination	Lettering in the regression equation
CUC	Tcc	d_tcc
Greenhouse gas emissions	gas_emissions	d_emissions
GDP/inhabitant	gdp_inhab	d_gdp
Life expectancy upon birth	expectancy_n	d_expectancy2

Source: performed by the authors

In the last stage, the regression equations obtained from the original econometric models and economic perspectives were interpreted, based on statistical, mathematical and economic methods.

### 3. Results and comments

The first regression model proposed associates five variables, a dependent one: Capacity Utilization Coefficient (CUC) and four independent ones: two economic indicators - GDP/inhabitant increase rate (gdp\_inhab) and inflation rate (r\_inf), respectively two social indicators - life expectancy upon birth (expectancy\_n) and schooling rate (schooling).

In order to test the stationarity, we have used the Dickey-Fuller test for all five variables. (Table no. 2)

**Table no. 2: Testing stationarity - Dickey-Fuller test  
(CUC, gdp\_inhab, expectancy\_n, schooling, r\_inf)**

Variable		CUC	gdp_inhab	expectancy_n	schooling	r_inf
t-Statistic		-2.761734	-2.406174	1.765107	-2.399491	-3.124145
p-Value		0.2254	0.1520	0.9994	0.1543	0.0427
Test critical values	1% level	-4.498307	-3.788030	-3.788030	-3.808546	-3.857386
	5% level	-3.658446	-3.012363	-3.012363	-3.020686	-3.040391
	10% level	-3.268973	-2.646119	-2.646119	-2.650413	-2.660551

Source: elaborated by the authors on the basis of the test results ran in the EVIEWS software

For the CUC, gdp\_inhab, expectancy\_n and schooling variables, the values of t-statistic are higher than the critical value for 1%, 5% and 10%, and the associated probabilities (p-value) are higher than 5%, therefore the null hypothesis is accepted – the series have a unitary root (are non-stationary). For the gdp\_inhab variable, t-statistic is lower than t-critic for 5% and 10%, with the associated probability smaller than 5%, but due to the small number of observations, we accept that the series is stationary.

Non-stationary series have been stationarized by making the difference, in the case of the expectancy\_n variable twice (second-order integration), and then they were tested in the same manner (the newly-generated series were called d\_tcc, d\_gdp, d\_schol, respectively d\_expectancy2). (Table no. 3)

**Table no. 3: Testing stationarity - Dickey-Fuller test  
(d\_tcc, d\_gdp, d\_expectancy2, d\_schol)**

Variable		d_tcc	d_gdp	d_expectancy2	d_schol
t-Statistic		-4.774287	-4.671823	-5.626546	-4.017753
p-Value		0.0014	0.0016	0.0002	0.0064
Test critical values	1% level	-3.831511	-3.808546	-3.831511	-3.808546
	5% level	-3.029970	-3.020686	-3.029970	-3.020686
	10% level	-2.655194	-2.650413	-2.655194	-2.650413

Source: elaborated by the authors on the basis of the test results ran in the EVIEWS software

For each one of the variables tested, t-statistic is smaller than t-critical, p-value associated <0.05, therefore the null hypothesis is rejected and the alternative hypothesis is accepted, thus the series do not have unitary roots, and they are consequently stationary.

The multiple linear regressions which specify the econometric final model will have the following form:

$$d\_tcc = c(1) + c(2)*d\_gdp + c(3)*d\_expectancy2 + c(4)*r\_inf + c(5)*d\_schol$$

By using the least squares method we have estimated the parameters of the regression equation. (Table no. 4)

**Table no. 4: Parameters of the regression equation 1**

Dependent Variable: d_tcc				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.048526	0.014663	-3.309344	0.0048
d_gdp	0.006563	0.001971	3.329426	0.0046
d_expectancy2	3.671668	1.768632	2.075994	0.0555
r_inf	-0.000233	0.000136	-1.711681	0.1075
d_schol	2.025488	0.617162	3.281940	0.0050
R-squared	0.620585	Mean dependent var		-0.029552
Adjusted R-squared	0.519408	S.D. dependent var		0.061070
S.E. of regression	0.042336	Akaike info criterion		-3.274021
Sum squared resid	0.026886	Schwarz criterion		-3.025087
Log likelihood	37.74021	F-statistic		6.133643
Durbin-Watson stat	2.130415	Prob(F-statistic)		0.003942

Source: elaborated on the basis of the EVIEWS software

The values of t-student for the parameters are calculated in the t-Statistic column. If the value Prob. <0.05, the null hypothesis is rejected: the variables parameters differ significantly from 0.



By analysing T statistics we observe the following:

- Probabilities for  $d\_gdp$  and  $d\_schol$  are  $<0.05$ , therefore the null hypothesis is rejected, the alternative hypothesis is accepted, the coefficients are significantly different from 0
- Probability for  $d\_expectancy2$  has the value of 0.55, and for  $r\_inf$  it is 0.10, fitting into the area of indecision, due to the small number of observations the null hypothesis can be rejected, thus accepting the alternative hypothesis, their coefficients being significantly different from 0.

F-statistics for the proposed model  $F = 6.133643$  with a probability of 0.003942 consequently, is accepted that the overall multiple linear regression model studied is valid. The model passes the tests of self-correlation of errors according to the Durbin – Watson ( $DW=2.13$ ), to normal distribution of errors, according to Jarque-Bera (Skewness=0.01; Kurtosis=2.51) and homoscedasticity according to White (F statistic=1.83, the associated probability is 26%).

The economic model as parameter multiple regression is the following:

$$d\_tcc = -0.04852626244 + 0.006562849147*d\_gdp + 3.671668126*d\_expectancy2 - 0.0002328175624*r\_inf + 2.025487769*d\_schol$$

The determination ratio ( $R^2 = 62\%$ ) shows the percentage that explains the influence of significant factors. In other words, 62% of the  $d\_tcc$  variation is explained by the variation of  $d\_gdp$ ,  $r\_inf$ ,  $d\_expectancy2$ ,  $d\_schol$ . In order to stymie the mechanical increase of  $R^2$  caused by the number of variables in the regression, R-adjusted is used, its 52% value, confirming the validity of the model.

For a 1% increase of  $d\_gdp$ ,  $d\_tcc$  increases by 0.006563%, provided that the other variables remain constant. For a 1% increase of  $r\_inf$ ,  $d\_tcc$  decreases by 0.000233%, provided that the other variables remain constant. For a 1% increase of  $d\_expectancy2$ ,  $d\_tcc$  increases by 3.671668%, provided that the other variables remain constant. For a 1% increase of  $d\_schol$ ,  $d\_tcc$  increases by 2.025488%, provided that the other variables remain constant. Thus, a positive evolution of GDP per capita (Meaning higher increasing rate) and of the inflation rate (meaning its diminishing) provides benefits to tourism, by enhancing the occupancy rate. Moreover, the improvement of results concerning social dimension of sustainable development (life expectancy, schooling) generates positive effects for tourism.

The econometric model 1 suggests an important connection between touristic activity development and the society overall. Increased life expectancy expresses service development in general and healthcare in particular. In the long term it causes an increase in population, which by default will use the services of interest, including specific health tourism. Spa tourism can be considered a form of tourism that helps increase another social indicator characterizing specific quality of life and life expectancy.

Increasing enrolment rates generates desire for knowledge of the population, leading to increased tourist demand it.

The second regression model proposed associates the CUC with three indicators of sustainable development: economic - GDP/inhabitant increase rate ( $gdp\_inhab$ ), social - life

expectancy upon birth (expectancy\_n), ecologic –greenhouse gas emissions (gas\_emissions).

In order to test stationarity, the Dickey-Fuller test was used for all the four variables; the results and stationarization for three of them have been presented in detail in the previous model. (Table no. 5)

**Table no. 5: Testing stationarity – Dickey-Fuller test (gas\_emissions, d\_emissions)**

Variable		gas_emissions	d_emissions
t-Statistic		-1.987430	-3.538720
p-Value		0.2891	0.0176
Test critical values	1% level	-3.857386	-3.808546
	5% level	-3.040391	-3.020686
	10% level	-2.660551	-2.650413

Source: elaborated by the authors on the basis of the test results ran in the EVIEWS software

For the gas\_emissions variable, the t-statistic value is higher than the critical value, and the associated probability is higher than 5%, therefore the null hypothesis is accepted – the series has a unitary root (is non-stationary). The series has been stationarized through differentiation and the newly-generated series (d\_emissions) was tested again. Since t-statistic is smaller than t-critical for 5% and 10%, with the associated probability smaller than 5%, due to the small number of observations, we accept that the series is stationary.

The multiple linear regressions which specify the econometric final model will have the following form:

$$d\_tcc = c(1) + c(2)*d\_emissions + c(3)*d\_gdp + c(4)*d\_expectancy2$$

By using the least squares method the parameters of the regression equation have been estimated. (Table no. 6)

**Table no. 6: Parameters of the regression equation 2**

Dependent Variable: d_tcc				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.018973	0.011204	-1.693379	0.1098
d_emissions	0.659958	0.191730	3.442128	0.0033
d_gdp	0.004041	0.002063	1.959193	0.0678
d_expectancy2	4.414847	1.881138	2.346902	0.0321
R-squared	0.564381	Mean dependent var		-0.029552
Adjusted R-squared	0.482702	S.D. dependent var		0.061070
S.E. of regression	0.043923	Akaike info criterion		-3.235882
Sum squared resid	0.030868	Schwarz criterion		-3.036735
Log likelihood	36.35882	F-statistic		6.909774
Durbin-Watson stat	2.080571	Prob(F-statistic)		0.003387

Source: elaborated on the basis of the EVIEWS software

The t-student values for the parameters are calculated in the t-Statistic column. If the Prob. value  $< 0.05$ , then the null hypothesis is rejected: the parameters of the variables differ significantly from 0.

Through the T statistics analysis we observe:

- The probabilities for  $d\_emissions$  and  $d\_expectancy2$  are  $< 0.05$ , therefore the null hypothesis is rejected and the alternative hypothesis is accepted, the coefficients being significantly different from 0.
- The probability for  $d\_gdp$  has a value ranging between 0.05 and 0.10, consequently in the area of indecision, and due to the small number of observations the null hypothesis can be rejected, consequently the alternative hypothesis is accepted, the coefficient being significantly different from 0.

F-statistic for the proposed model,  $F = 6.909774$  with a probability of 0.003387. Consequently, it is accepted the fact that the overall multiple linear regression model that has been studied is valid.

The model passes the tests of self-correlation of errors according to the Durbin – Watson ( $DW=2.13$ ), to normal distribution of errors, according to Jarque-Bera (Skewness=0.01; Kurtosis=2.51) and homoscedasticity according to White (F statistic=1.83, the associated probability is 26%).

The economic model as parameter multiple regression is the following:

$$d\_tcc = - 0.01897346072 + 0.6599584833*d\_emissions + 0.00404104794*d\_gdp + 4.414847077*d\_expectancy2$$

The determination ratio ( $R^2 = 56\%$ ) shows the percentage that explains the influence of the significant factors. In other words, 56% of the  $d\_tcc$  variation is explained by the variation of  $d\_emissions$ ,  $d\_gdp$ ,  $d\_expectancy2$ . In order to stymie the mechanical increase of  $R^2$  caused by the number of variables in the regression, R-adjusted is used, its 48% value confirming the validity of the model.

For a 1% increase of  $d\_emissions$ ,  $d\_tcc$  increases by 0.66%, provided that the other variables remain constant. For a 1% increase of  $d\_gdp$ ,  $d\_tcc$  decreases by 0.004%, provided that the other variables remain constant. For a 1% increase of  $d\_expectancy2$ ,  $d\_tcc$  increases by 4.41%, provided that the other variables remain constant. If a positive evolution of GDP and life expectancy are obviously beneficial for tourism, the model also corroborates the “complicated” relation between this industry and environment: gas emission increasing with greenhouse effect contributes to increasing CUC. The explanation consists in the fact that social-economic activity generating polluting emissions induces the increasing of economy and the result, long and medium term is the expansion of tourism.

From the multitude of indicators that express the economic, social and ecological model two of this paper shows the direct link between tourism activity and GDP per capita, life expectancy at birth and the emission of greenhouse gases.

GDP per capita of a country's economic development, its growth having positive effects both at macro and at the population level. The growth of this indicator can determine the additional revenue is going according to Engel's theory, to the tertiary sector, which includes tourism.

Model 2 confirms the importance of social indicator - life expectancy at birth - which was explained by the authors and the Model 1. Over time, emissions have increased because of a growth of economic activity and hence the interest. In order to achieve sustainable development it is necessary to reduce greenhouse gas emissions, without reducing the quality of life. The statistics of the last two decades confirm attention environmental issues, seeing a slow reduction of gas emissions Romania.

### **Conclusions**

Results confirm the impact of the work sustainable development through all its dimensions, the tourist activity in Romania. In this respect, strategies, makers of our country must take into account all facets of sustainability - economic, social and environmental - to achieve their medium and long term objectives. Tourism, long considered "national priority" can develop harmoniously only provided that all principles of sustainable development.

The first econometric model confirms the regulation of tourism in society, touristic activity being the result of raising the standard of living and implicitly of life quality from economic and social perspective. The second model enlarges tourism depending upon social-economic factors together with ecologic dimension of sustainable development. All in all, the results of this research validate through acknowledged econometric methods the opinions according to which tourism and sustainable development have a privileged position together.

In close connection to the further research directions, there are also subjective limitations, which the authors have faced, concerning the indicators' typology, number or form of expression. For the future it is necessary the expansion of research by adding qualitative variables. Next step can be represented by testing the models and, implicitly, performing a comparative analysis with countries that are at the same level of social-economic development as Romania.

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## Appendix 1.

Table no. A1: Data series used in economic analysis

YEARS	CUC	GDP/per capita (evolution rate, %)	Inflation rate (%)	Life expectancy at birth (years)	Schooling rate (%)	Emissions of greenhouse gasses (tones)
1990	57.84	-5.76	5.1	69.74	63.5	253333
1991	49.78	-12.14	170.2	69.78	59.9	205927
1992	46.67	-8.01	210.4	69.78	60.0	179673
1993	43.12	1.64	256.1	69.56	60.0	175479
1994	43.74	4.12	136.7	69.50	61.6	173033
1995	45.03	7.37	32.3	69.45	64.0	181254
1996	40.71	4.30	38.8	69.10	64.7	183424
1997	37.69	-5.83	154.8	69.00	65.1	169925
1998	36.08	-4.59	59.1	69.80	66.3	153370
1999	34.46	-1.04	45.8	70.51	67.3	136197
2000	35.15	2.23	45.7	71.16	68.9	140520
2001	34.92	7.18	34.5	71.16	70.6	143112
2002	34.04	6.68	22.5	71.00	72.9	147166
2003	34.56	5.49	15.3	71.30	74.2	153058
2004	34.20	8.68	11.9	71.59	74.9	150703
2005	33.41	4.41	9.0	71.87	76.0	148889
2006	33.61	8.13	6.6	72.16	77.3	152792
2007	36.04	6.20	4.8	72.56	79.7	150245
2008	35.01	8.09	7.9	72.56	79.6	146668
2009	28.35	-6.43	5.6	73.30	78.7	123382
2010	25.15	-1.45	6.1	73.45	77.6	121355
2011	26.27	2.70	5.8	74.51	76.0	119328
2012	25.85	-	3.3	74.26	-	-

Source: Powered by authors using data from : [www.insse.ro](http://www.insse.ro) and [data.worldbank.org](http://data.worldbank.org)