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THE ECONOMETRIC ANALYSIS OF THE CONTRIBUTION OF THE CAPITAL INVESTED IN TOURISM AND OF THE TOURISM CONTRIBUTION TO GDP

Cristina BURGHELEA[1], Mariana VUŢĂ[2], Mihai VUŢĂ[3]

[1] Hyperion University, 169 Calea Călăraşi, Bucharest, E-mail: crystachy@yahoo.com
[2] Academy of Economic Studies, Bucharest, E-mail: mariavuta@yahoo.fr
[3] Hyperion University, 169 Calea Călăraşi, Bucharest, E-mail: mihaivuta2000@yahoo.com

Corresponding author: crystachy@yahoo.com

Abstract

For our country, tourism is an important sector. With the resources we train and we undertake interconnections with other branches of the national economy, signifies an important factor in sustainable development. For the existence of quality tourism it is essential to apply some concrete measures for sustainable development. The interest in tourism is justified in all countries by the economic idea that identifies a particular type of income, thus participating in the external balance of payments but also to create important jobs. The primary role of capital investment in tourism activity, entrepreneurial initiative, is logically regarded as sustainable economic solution to achieve a gross domestic product increase in the overall context of sustainable economic development. The increase in capacity of the activity of tourism will propagate an effect of increasing the income and the gross value added. The dissemination of the results shows in a comparative form the real levels of the direct contribution of tourism to the gross domestic product and the levels estimated on the basis of the linear regression equation as well as the series and the levels of the variable waste. The model developed discusses and supports the statistical arguments, the primary role of capital investment in tourism activity, the entrepreneurial initiative as consistent economic solution to secure an increase in gross domestic product in the overall context of sustainable economic development.

Key words: *gross domestic product, invested capital, sustainable development, tourism*

INTRODUCTION

The concept of *"sustainable development/ sustainability"* was born as a result of proposals made by global organizations in environmental protection, in the idea of changing the fundamentally life style of the population.

Analyzing the related literature, we can say that globally are developed over 100 definitions of sustainable development. Six of these are highlighted in the report "Our Common Future", where the full definition of sustainable development refers to the idea that there is a development that allows satisfying present needs without compromising the ability of future generations to meet their own needs [6].

Over time, the sustainability term has acquired multiple meanings. One of the reasons would be the interest of economists, ecologists, sociologists, architects, parliamentarians, local authorities or international organizations.

Regarding the contribution to achieve the targets imposed by the European Union, the branch of tourism shows a crescendo bringing and thus contributing to durability, a healthy economic sustainability but also increasing employment and to the socio-economic cohesion [13].

The most studies on sustainable tourism development are descriptive, based on qualitative and subjective data in their conclusions, without a rigorous methodology for assessing the sustainability aspects of eco-tourism [10]. The analyze carried out over time in this segment have led to a demonstration of the fact that an economic growth may not result only in the balance of the territorial space but also to the increase it. At the national level, land is primarily due to

the main documents used in the European community specific to tourism. In fact, these documents highlight plans and programs that use sustainable policies, equitable, sustainable tourism activity that creates a balance and a link between certain areas of the country. The connection with the environment does nothing but to strengthen the idea that the emergence of problems in this sector can create a unit in the development of certain areas.

If we refer to the idea of tourism planning we only notice that we are actually referring to a spatial overall and items that provide a certain identity data of stay, tourist circuit and the tourist flow and smooth operation of management resources, which are actually sights [5].

The phenomenon of sustainability that is both studied but especially inserted in the structures of tourism activity is understood mainly through the prism of the effective management of natural and anthropogenic resources [4]. Due to this idea of sustainable development in tourism, we can highlight internationally the inclusion of an area in some circuit efficiency programs that aim to improve the smooth running of the sector. Natural and anthropogenic environmental determinants are offering attractions necessary for the implementation of development plans for tourism industry [7]. A good management of tourism resources can lead to economic growth. A poor management of tourism product can converge to a decline in economic activity but the most serious the exhaustion of the values provided by this sector [8].

In this context, this research is focused on the effects of the tourism activity on sustainable development.

MATERIALS AND METHODS

In the present research we can identify statistics attesting to the role of business travel by contributions propagated on gross domestic product, which covers 10 European countries neighboring Romania, in the year 2013 *(data processed by the information provided by Eurostat)*.

Identifying and understanding the significance of statistical regularities that are formed between the amount of capital invested and its contribution to gross domestic product, increase revenue and the number of jobs, it presents an interest of knowledge of political and economic factors.

The methods of investigation that can provide scientific support to formulate viable conclusions with practical utility designed to give the necessary support basing any decisions on intervention and capital allocation, are statistical and econometric.

Therefore, information and data related to this research are processed via the shaping of econometric modeling, analysis, evaluation and comparison, having a high coefficient of synthetic truth. They may be used statistical techniques, but also mathematical techniques.

Their systematization was done through an extensive documentation, with a real applicative impact ensuring proper understanding of the discussed subject. The research was conducted by three figures and three tables. They allow easy identification of the conclusions to be drawn, which hold necessary arguments, identifying the relations of the approached concepts.

This research started from the vision of the methodological approach on sustainable tourism in order to identify the effects of tourism activities on sustainable development.

RESULTS AND DISCUSSIONS

The size and increase in capital invested in a branch of the national economy fosters economic growth result of the branch simultaneously with the increase in employment, falling unemployment and an increasingly greater contribution to gross domestic product [11].

Activity circumscribed tourism as an economic activity, creative of gross domestic product has joint development and other branches of the national economy is based on sustained investment policy and a stimulating legislation to ensure a favorable operating environment and development [4].

The direct contribution of tourism to gross domestic product according to capital invested in tourism.

The first role of capital investment in tourism

activity, entrepreneurial initiative, is logically regarded as sustainable economic solution to achieve a gross domestic product increase in the overall context of sustainable economic development. The increase in capacity of the activity of tourism will propagate an effect of income increase and gross value added [5].

Calculation and the graphical representation of the econometric indicators.

The mathematical expression of the correlation model of the direct contribution of capital invested in tourism on the GDP by simple linear regression equation is the least squares method. Thus, it is obtained the following form of the linear regression equation [2]: $\hat{y}_1 = -6.242788 + 7.460584 \cdot x$.

Table 1. Synoptic picture of indicators for assessing the viability of representation econometric model interdependence direct contribution of tourism to GDP depending on the capital invested in tourism

Dependent Variable: SER (y_1): The direct contribution of tourism to GDP (bln. USD)				
Method: Least Squares				
Included observations: 10				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
SER(x): Capital invested in tourism (billion $) „b”	7.460584	0.824127	9.052706	0.0000
C „a”	-6.242788	3.325025	-1.877516	0.0973
R-squared (The coefficient of determination)	0.911063	Mean dependent var		14.05000
R- The ratio of the correlation	0.954496			
Adjusted R-squared	0.899946	S.D. dependent var		24.55127
S.E. of regression: $\hat{\sigma}_{y_1,\hat{y}_1}$	7.765887	Akaike info criterion		7.114215
Sum squared resid	482.4720	Schwarz criterion		7.174732
Log likelihood	-33.57107	F-statistic		81.95149
Durbin-Watson stat	3.003469	Prob(F-statistic)		0.000018

Source: Processing personal data from 2013 provided by Eurostat

Unifactorial model parameter values that define linear direct contribution of tourism to the GDP capital invested in tourism are presented in a synoptic picture of the results, in Table 1.

Also, the "synoptic picture of econometric indicators representation" is at the core indicators econometric information necessary to conclude on the viability of the model (Table 1).

The results which indicate in a comparative form the real level of the direct contribution of tourism to the gross domestic product and the levels estimated on the basis of the linear regression equation as well as the series and the levels of residual variable are listed in Table 2.

The beach looming alternating residues of them in relation to the origin of the autocorrelation between variants not confirm the absence of residual variable, statistically quantified by Durbin-Watson coefficient [1].

Table 2. Series actual levels, the levels estimated on the dependent variable (the direct contribution of tourism to GDP) based on the capital invested in tourism and the series and the beach of the residual term *(data collected in 2013)*

Country	Actual levels of direct contribution of tourism to GDP (bln. USD) y_1	The estimated direct contribution of tourism to GDP $\hat{y}_1$	The series of residual levels	Residual Plot
1. Albania	0.60000	-5.49673	6.09673	| . | * . |
2. Austria	19.3000	21.3614	-2.06137	| . *| . |
3. Bulgaria	2.00000	-1.02038	3.02038	| . | * . |
4.The Czech Republic	5.60000	8.67838	-3.07838	| . * | . |
5. Croatia	6.10000	2.70991	3.39009	| . | * . |
6. Greece	14.2000	20.6153	-6.41531	| .* | . |
7. Italy	81.9000	74.3315	7.56848	| . | *. |
8. Romania	3.20000	19.8693	-16.6693	|* . | . |
9. Slovakia	2.20000	-1.02038	3.22038	| . | * . |
10. Hungary	5.40000	0.47174	4.92826	| . | * . |
Total	140.5000	140.5000	0.0000	

Source: www.eurostat.ro, Accessed in 2015 [14]

Graphical representation displayed in Figure 1 is able to certify the viewing position of the series of values related to the direct contribution of tourism to real and projected gross domestic product, and residues listed in Table 2.

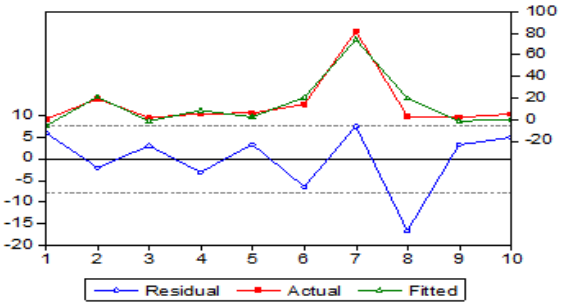

Fig. 1. Graphical presentation of residues *(residual)*, the actual levels *(current)* levels and estimated *(fitted)* for the direct contribution of tourism to GDP depending on the capital invested in tourism
Source: Processing personal data from 2013 provided by Eurostat

It is obvious that outlines a positive assessment on the spot near levels predicted from the equation compared with actual levels of direct contribution of tourism to gross domestic product [3], and the term residual values are positioned in an acceptable range defined by a mean error of the regression equation, with one exception that is allocated to Romania, ($\hat{\sigma}_{y_1,\hat{y}_1}$ = 7.765887).

Table 3. Synoptic picture of "White Heteroskedasticity Test"

White Heteroskedasticity Test:				
F-statistic	0.759247	Probability		0.503006
Obs*R-squared	1.782585	Probability		0.410125
Test Equation: Dependent Variable: RESID^2				
Method: Least Squares				
Included observations: 10				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-6.820640	52.13933	-0.130816	0.8996
SER02	37.82121	31.78138	1.190043	0.2728
SER02^2	-2.936838	2.795131	-1.050698	0.3283
R-squared	0.178259	Mean dependent var		48.24720
Adjusted *R*-squared	-0.056525	S.D. dependent var		82.53471
S.E. of regression	84.83527	Akaike info criterion		11.96262
Sum squared resid	50379.17	Schwarz criterion		12.05340
Log likelihood	-56.81312	F-statistic		0.759247
Durbin-Watson stat	2.040100	Prob(F-statistic)		0.503006

Source: Processing personal data from 2013 provided by Eurostat

In Table 2 and the graph presented in Fig. 2 is defined the indicator *"coefficient of irregularity/inequality of Thiel" (Th= 12.9832%)*, which by its size exceeds the limit of 5% provides information that is unsuitable for linear model developed perform calculations interpolation or extrapolation.

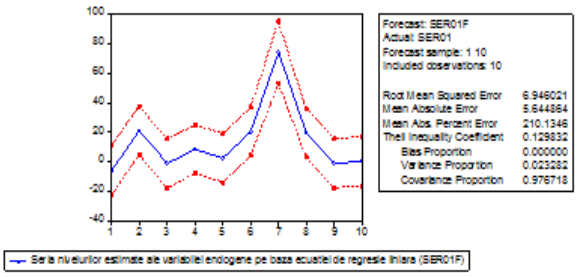

Fig. 2. Graphical representation of the series with the levels estimates of the direct contribution of tourism to the gross domestic product depending on the capital invested in tourism (SER01F = $\hat{y}_1$) and the limits which they fit into the conditions of estimation error of the average of the linear regression equation (on the basis of the law of the Student distribution with a bilateral arrangement of the threshold of significance of 5 % and 8 degrees of freedom)
Source: Processing personal data from 2013 provided by Eurostat

The histogram from Fig. 3 presents the statistical description of the series of the error term *(residual)* as well as the following indicators: mean, median, maximum, minimum, standard deviation *(standard deviation)*, the coefficient of asymmetry *(Skewness)*, kurtosis-flattening *(Kurtosis)*, Jarque-Bera statistical coefficient *(JB = 17 101)* and the related probability coefficient JB *(P = 0.000193%)* allowing to check the assumption of normality of the distribution of the residual variable.

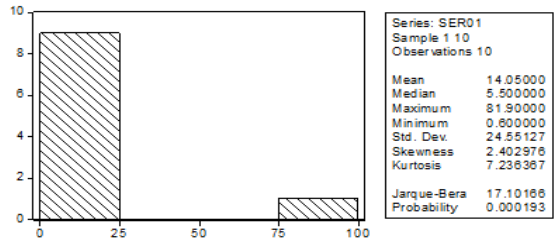

Fig. 3.Statistical description of the residual variable and test for normality of the distribution of the residual variable on Jarque-Bera statistical criterion
Source: Personal processing

It follows, then, that we have no reason to believe that the residual variable statistic is distributed asymptotically normal, Jarque-Bera statistical coefficient has a magnitude exceeding 0.9 evident affordable size.
In the case of the interdependence between

the direct contribution of tourism to the GDP and capital invested in tourism the hypothesis of heteroscedasticity the residual variable by applying *"White Test"*.

The synoptic picture of Table 3 provides the information necessary to perform this test on two criteria, *"Criterion F"* and *"Criterion* χ^2 *"*. Therefore it can be concluded that the residual variable is homoscedastic because F and calculated values *(statistical)* have sizes lower tabular values to a materiality threshold of 5% and thus rejecting the hypothesis of heteroscedasticity.

CONCLUSIONS

"Sustainability" means the property of a system which focuses on maintaining a certain state of the system in time [12].

Analysis of results displayed in the picture synopsis *(Table 1)* as well as on other testing and statistical calculations performed provides an opportunity to make the following conclusions:

- The econometric model of the direct contribution of tourism to gross domestic product according to capital invested in tourism is expressed through the linear regression

equation: $\hat{y}_1 = -6.242788 + 7.460584 \cdot x$;

- The size of the regression coefficient "b" allows us to specify that in the system of the 10 European countries included in the survey at the level of 2013, an increase of 1 billion USD of capital invested in tourism is causing an increase in the direct contribution of tourism the gross domestic product by 7.460584 bln. USD;
- The viability of the model is confirmed by the fact that the ratio of the correlation is statistically certified as being significantly different from zero, meaning *"Criterion F"* materiality in this case, it is very close to zero. The correlation between the variables studied system is significantly interrelated in statistical terms, and strong intensity, because the correlation has a size ratio very close to 1, $R_{y_1 x} = 0.954496$;
- The coefficient of determination shows that 91.11% of the variance of the endogenous variable - Y1 - *(direct contribution of tourism to gross domestic product)* is explained by the variation of exogenous - x - *(capital invested in tourism)* as a percentage difference hundred percent is the proportion of residual component or proportion of influence caused by other factors not considered in the analysis of the proposed correlation system;
-The capital invested in tourism is a significant variable correlation in the studied system, meaning *"Criterion t"* because the threshold for statistical significance testing of regression coefficient *"b"* is of a very small size, close to zero;
- The parameter *"a"* is not confirmed, in statistical terms, as different from zero, because materiality of testing exceeds the critical threshold of 5% *(9.73%)*. It is a conclusion that is influenced by the low number of observations underlying the development model;
- *"Coefficient Durbin-Watson statistic", DW = 3.003469*, has a size which is unacceptably at a long distance from the ideal value 2. It confirms the hypothesis of non-existence of autocorrelation between levels of the error term *(residual)*. Under these circumstances, it is considered that the parameters of the equation do not provide a good efficacy for extrapolation;
- The expression of the relative size of the standard error estimation of the linear regression equation in relation to the average value of the endogenous variable has a size of 55.27% and needs additional information support to invalidate the model in order to be used in the calculation of extrapolated values, because it is by 10% higher, the limit considered acceptable. It is obvious that this conclusion is correctly formulated because it has a statistical support by the size of the *"Coefficient of irregularity of Theil"*, which is located above the threshold of 5 % *(Th = Bonuses ranging 12.98%)*;
- The information relating to the test Jarque-Bera lay at the basis of the rejection of the hypothesis of layout of the values of the error according to the law of the normal distribution *(test of normality of the distribution of the residual variable in Fig. 4)*, because the

probability associated with the coefficient j-B is very small 0.0193 %. It is obvious that through this statistical finding the model developed shows vulnerability and alerts, at the same time that the number of observations is reduced. The visible discrepancy position of Italy expands the mathematical form of the model;

- The results shown in the instrument synopsis of the *"White Heteroskedasticity Test"*, provides the ability to conclude that the residual variable is homoscedastic and in these conditions are statistical premises to ensure the viability of the required model and may be carried out the following recognitions: The dispersion of error is constant; the application of the *„Criterion t"* for checking the parameters of the significance of the linear regression equation is fully conclusive, the econometric model attach the utmost importance to all non-discriminatory comments made by the residual variable.

The synthetic conclusion of the study of econometric modeling is based on the results of calculations and shows a regression equation linear [9], which imposes certain vulnerabilities to be considered as a model fully viable correlation between the direct contributions of tourism to gross domestic product according to capital invested in tourism.

The model developed brings into discussion and supports, with statistical arguments, the crucial role of investment of capital in the tourism activity, of entrepreneurial initiative that the economical solution is to obtain an increase in the gross domestic product in the general context of economic growth.

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