Sustainable Tourism in Romania: Integrating Economic, Social and Environmental Dimensions

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Abstract. *Tourism and sustainable development are two interlinked areas, as tourism in its traditional form can bring significant economic and social benefits, but can also have a negative impact on the environment and local communities. Due to global changes that have occurred in recent years, such as population growth, accelerated urbanisation, climate change and threats to biodiversity, research in tourism and sustainable development is becoming essential to create a more responsible and balanced approach to these activities. In this paper we have focused on presenting the evolution of tourism over the period 1992-2021 and testing linear multiple regression analyses to establish the nature and extent of relationships between tourism, economic, social and environmental indicators, thereby demonstrating the impact of tourism on sustainable development. The econometric applications carried out in this work - a combined model for studying the intention of tourists to return to a tourist destination, a regression model taking into account spatial elements for evaluating the defining characteristics of accommodation units in Romanian tourism and a growth optimisation model taking into account the influence of the environment - allow the quantification of different categories of impact generated by tourism activities.*

Keywords: tourism, environment, sustainable development, climate change

Introduction

Tourism is one of the world's most representative sectors in terms of its contribution to the cultural, economic and social development of a region. In 2022, tourism's contribution to global GDP was 7.6% and generated 296 million jobs. Tourism development is a key tool for development as it generates income, creates new jobs for the local community and stimulates new economic activities such as construction, trade, etc.

The net occupancy rate of tourist accommodation capacity expresses the degree of occupancy of tourist accommodation units by tourists in a given period of time. It is determined by relating the total number of nights spent in these establishments to the total tourist accommodation capacity available in that period (Gruescu et al., 2010; Gruescu et al., 2011). The social efficiency

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of the net accommodation capacity utilisation coefficient (NACU) can be assessed through the total number of tourist arrivals, reflecting the level of benefits that the population obtains from tourism activities. CUC responds to the environmental dimension of development by being influenced both by the average length of stay - an increase in the average length of stay leads to a reduction in transport pollution - and by the number of tourists.

In seeking a balance between supply and demand, CUC helps mitigate seasonality. Therefore, the use of the net tourist accommodation capacity utilization (NTAC) index as an aggregate indicator of the tourism phenomenon can be justified by its importance in assessing the economic, social and environmental efficiency of tourism activity.

In this study we aim to analyse the empirical relationship between the net tourist accommodation capacity utilization ratio and economic growth, inflation rate, life expectancy at birth and school enrolment rate in Romania. In addition, the study also includes an analysis of the empirical relationship between tourism sector development, economic growth and the amount of greenhouse gas emissions at the country level.

The research novelty lies in applying advanced economic and statistical models to analyze the relationships between tourism, economic, social, and environmental indicators from 1992 to 2021. This involves an integrated and comprehensive approach to understanding the impact of tourism on sustainable development. Among these models are a combined model for studying tourists' intention to return to a tourist destination, a regression model considering spatial elements to assess the defining characteristics of accommodation units in Romanian tourism, and a growth optimization model considering environmental influence.

The practical implications of the study results are significant for the tourism industry and sustainable development policy. By quantifying various categories of impact generated by tourist activities, a deeper understanding of how tourism can contribute to or affect sustainable development can be developed.

Literature review

A particularly important aspect of current research in tourism and sustainable development focuses on understanding the environmental impacts of tourism. As a response of the tourism community to the global challenges of the Millennium Development Goals set by the United Nations, "a set of global criteria on sustainable tourism has been adopted, aiming at effective sustainability planning, maximizing social and economic benefits for the local community, enhancing cultural heritage, maximizing environmental benefits and reducing negative environmental impacts" (Marin-Pantelescu et al., 2019). Although concerns about the environmental impact of tourism have frequently been directed, either implicitly or explicitly, at the phenomenon of mass tourism, being a value-laden label attached to a particular type of tourism or tourist, certainly neither embraces the diversity and breadth of tourism nor reveals the extent to which it is interconnected with other social, economic and political systems (Sharpley, 2009).

Particular attention has been paid in tourism studies to the real and perceived socio-economic contributions of tourism to destination communities. Inbound tourism has a profound impact on a society, and in addition to its positive effects, it can interfere with the social and economic well-being of residents in tourism destinations (Jordan et al., 2019).

Tourism has direct, indirect and induced impacts on a destination economy and society (Khan et al., 1990; Ionescu et al., 2018; Bădîrcea et al., 2021), and the social and economic costs and benefits of these impacts vary across the board (Mayer, 2014). However, most research efforts have focused on assessing the economic costs and benefits of tourism (Lindberg, Johnson, 1997), with costs and benefits discussed only at a conceptual level. In addition, researchers exploring the economic impacts of tourism have recently begun to conduct analyses of the societal costs and benefits of tourism to destination communities (Torre, Scarborough, 2017).

Although research on tourism and climate change emerged during the 1990s, most studies have been published in the last decade. However, most of this research has been conducted in the last two decades and has been largely concentrated in the global north, particularly Europe and North America (Saarinen et al., 2022). Key criteria for sustainable tourism have addressed tourism's economic, environmental and social responsibility, its responsibility to tourists, and global justice and equity (Pope et al., 2019).

Methodology

Based on the regression equation, two models were estimated in the regression analysis of the Romanian data. The two models consist of the combined time series cross-section estimation, which combines data from both cross-sectional effects of the independent variables on occupancy and the time series effect within units. Finally, the Least Squares (LS) regression method is applied.

However, grouped time series estimation using the Simple Least Squares Method may cause temporal autoregressive problems, multicollinearity and spatial heterogeneity to some extent. In this research, two steps were followed: testing multiple linear regression models and choosing and explaining the statistical-mathematical relationship and influence between variables.

The econometric models presented here have gone through all phases of specification, parameterization, testing and decision. Thus, Augmented Dickey Fuller and Phillips Perron tests for stationarity of the data series were used, parameter estimation was performed using the Least Squares Method, aiming, at the end, to obtain high values of the determination ratio (R2 = the percentage by which the influence of significant factors is explained and adjusted R2 confirms the corrected value of R2).

The research period is 1992-2021 and the data series used are:

1. **Tourism indicators**: net capacity utilisation rate (coefficient) (expressed as a percentage), number of tourist arrivals from Romania, average stay;
2. **Economic indicators**: rate of increase or decrease of Gross Domestic Product per capita (%), inflation rate (%);
3. **Social indicators**: school enrolment rate (school-age population), life expectancy at birth (years);
4. **Environmental indicators**: greenhouse gas emissions (thousand tonnes).

We compiled information from various sources, including data provided by the National Institute of Statistics for the capacity utilization ratio (net capacity utilization indicator), statistics on tourist arrivals and overnight stays, data on access to education, the annual inflation rate, as well as indicators provided by the World Bank on GDP per capita growth/decline and life expectancy at birth.

Several scenarios were tested in order to identify a viable regression model, using tourism indicators as endogenous variables and other indicators - economic, social and environmental (ecological) - as exogenous variables. The dependent variables that were taken into account were: CUC (Net Capacity Utilization Index), number of tourist arrivals and average stay, and as independent variables - growth or decline rate of Gross Domestic Product per capita, annual inflation rate, schooling rate, life expectancy at birth, greenhouse gas emissions (Table 1).

Table 1. Regression equations and notations used for variables

*d_cuc = b(1) + b(2) * gdp_place + b(3) * d_expectation2 + b(4) * r_inf + b(5) * d_sco*		
Indicator	**Data series name**	**Notation in the regression equation**
Net capacity utilisation rate	CUC	d_cuc
GDP/place	gdp_loc	gdp_loc
Life expectancy at birth	hope_n	d_hope2
Inflation rate	r_inf	r_inf
Enrolment rate	schooling	d_shco
*d_cuc = b(1) + b(2) * d_emissions + b(3) * gdp_place + b(4) * d_expectation2*		
Indicator	**Data series name**	**Notation in the regression equation**
Net capacity utilisation rate	CUC	d_cuc
Greenhouse gas emissions	gas_emissions	d_emissions
GDP/place	gdp_loc	gdp_loc
Life expectancy at birth	hope_n	d_hope2

Source: by the author.

The original econometric models in the form of regression equations were interpreted in the final stage, based on statistical-mathematical and economic methods.

The research hypotheses are:

- The relationship between tourist accommodation capacity utilization and economic indicators.
- The contribution of tourism to development in Romania.
- Strategic directions for promoting sustainable tourism.
- The empirical relationship between tourism sector development, economic growth, and greenhouse gas emissions.

Results and discussions

The first proposed analysis model uses five variables: a dependent variable - the net tourist accommodation capacity utilisation (**NTAC**) index and four independent variables: the GDP/local growth rate (**gdp_local**), the inflation rate (**r_inf**), life expectancy at birth (**expectancy_n**) and the school enrolment rate (**schooling**).

Augmented Dickey-Fuller and Phillips Perron tests were used to test the stationarity of the five variables.

The ADF test showed that the t-statistic values are greater than the critical value for 1%, 5% and 10% for the housing capacity utilization index, life expectancy at birth and schooling rate, and the associated probabilities exceed the value for 5%. Thus, the null hypothesis is accepted and the series have a unit root (they are non-stationary). For the variables gdp_place and r_inf, the t-statistic values are smaller than the associated critical values, the probability is less than 5% and, due to the small number of observations, it follows that the series are stationary.

The non-stationary series were stationary, making the difference twice in the case of the expectation_n indicator, then tested in the same way, and the series thus generated were named d_cuc, d_sco, d_expectation2.

The PP test produced results similar to the ADF test, with the variables pib_loc and r_inf being stationary. The non-stationary series were stationary, then tested in the same way, and the series thus generated were named d_cuc, d_sco and d_sperance.

Since the data were stationary at the first difference, a VECM model with 5 variables, shown above, will be formed. The data series are logarithmised for variance and adjusted annually. To check whether the selected VECM model provides the best representation of the time series, we tested for autocorrelation of residuals, non-normality, ARCH effects and parameter instability.

The econometric model 1 parameterized as multiple regression is as follows:

D(CUC) = C(1)*(CUC(-1) - 0.0150704017801*PIB_LOC(-1) - 0.00156452621461*R_INF(-1) + 0.555522483918*SCHOOLING(-1) + 0.41083877654*HOPE_N(-1) - 7.53803229258) + C(2)*D(CUC(-1)) + C(3)*D(CUC(-2)) + C(4)*D(PIB_LOC(-1)) + C(5)*D(PIB_LOC(-2)) + C(6)*D(R_INF(-1)) + C(7)*D(R_INF(-2)) + C(8)*D(ENROLMENT(-1)) + C(9)*D(ENROLMENT(-2)) + C(10)*D(HOPE_N(-1)) + C(11)*D(HOPE_N(-2)) + C(12)

The parameters of the regression equation were estimated by the Least Squares Method.

Table 2. Parameters of regression equation 1

Dependent variable: CUC **Least Squares Method** **Period: 1995 2021** **Number of observations included in the model: 27, after adjustments**				
Variables	Coefficient	Estimation of the mean coefficient error	t-Statistic	Probability (significance threshold)
C(1)	-1.359339	0.627936	-2.164772	0.0469
C(2)	0.389486	0.498364	0.781528	0.0467
C(3)	-0.448565	0.356717	-1.257481	0.2278
C(4)	-0.007622	0.009322	-0.817617	0.4264
C(5)	-0.001325	0.005509	-0.240532	0.8132
C(6)	-0.000817	0.000714	-1.144220	0.2705
C(7)	-0.000675	0.000576	-1.171012	0.2599
C(8)	1.328743	0.996925	1.332842	0.2025
C(9)	0.442739	0.986709	0.448703	0.6601
C(10)	-0.646590	3.817663	-0.169368	0.8678
C(11)	0.505985	3.808924	0.132842	0.8961
C(12)	-0.040546	0.027636	-1.467136	0.1630
The coefficient of determination R^2	0.513406	Mean of the dependent variable		-0.18807
R^2 adjusted	0.156570	Estimation of the root mean square deviation of the dependent variable		0.103128
Estimation of the standard error of the trend equation (regression)	0.094711	Akaike criterion		-1.574866
Sum of squares of residuals	0.134533	Schwarz criterion		-0.998938
F-statistic	1.438773	Hannan-Quinn criterion		-1.403612
Prob (F-statistic)	0.251789	Durbin-Watson statistical coefficient		1.922249

Source: author processing based on data from Eviews software.

The t-student values for the parameters are calculated in the t-Statistic column. If the probability is less than 0.05, the null hypothesis is rejected. These parameters of the variables differ greatly from 0. Statistical analysis shows that:

- the null hypothesis is rejected and the alternative hypothesis is accepted for C(1) and C(2) because the probability value is less than 0.05 and the coefficients are different from 0;
- the probabilities for the other coefficients have values greater than 0.5 and, due to the small number of observations, the null hypothesis can be rejected, admitting the alternative hypothesis, because the coefficients of this variable are different from 0.

The long-run coefficient C(1) is negative and significant and shows long-run causality between the independent variables and the dependent variable cuc. It has a negative sign when it indicates the ability to return to equilibrium. The positive sign signifies displacement from equilibrium.

The short-run coefficients C(2) and C(3) refer to the increase in the *cuc* variable which will lead to a 0.38% increase in this variable or a 0.44% decrease. Coefficients C(4) and C(5) are the coefficients of the variable *gdp_place*. A 1% increase in this variable will lead to a 0.007% or 0.001% decrease in the *cuc* variable respectively. The coefficients C(6) and C(7) are the coefficients of the variable *r_inf*. According to the data in the table, a percentage increase in *r_inf* will lead to a 0.0008% decrease in the *cuc* variable. C(8) and C(9), the coefficients of the *schooling* variable have a positive impact on *cuc*, increasing this variable will lead to an increase in *cuc* of 1.39% and 0.44% respectively. The coefficients of the variable *expectancy_n* are C(10) and C(11). An increase in life expectancy at birth will lead to a 0.50% increase in *cuc* and a 0.04% decrease in *cuc.*

In terms of probability, only C(1) and C(2) are significant as they have probability less than 5%. The probabilities for C(3) - C(12) are greater than 0.05, but the coefficients are different from 0, so the alternative hypothesis is accepted. For the proposed model, the F-statistic has a value of 1.438773 with a probability of 0.251789. As this probability is higher than the significance level, according to this test it follows that at least one coefficient in the regression is statistically significant and it is accepted that overall the multiple linear regression model is valid.

According to the Durbin-Watson statistic, if the values are in the range 0-2 points, it indicates a positive self-assessment of errors. Thus, the proposed model whose DW=1.92 passes the tests of error autocorrelation and according to Jarque-Berra, the tests of normality of the error distribution.

The influence of significant factors is explained using the Determination Ratio, in our case R2=51%. In other words, 51% of the variation in CUC is explained by the variation in the variables gdp_place, r_inf, expectation_n and schooling. We use R-adjusted to counteract the mechanical increase in R2 due to the number of variables in the regression, its value of 15% confirms the validity of the model.

Finally, a positive development of GDP/capita and of the inflation rate (in the sense of its increase) does not benefit tourism by increasing employment. Also, increasing performance in terms of the social dimension of sustainable development (school enrolment and life expectancy) generates positive effects in tourism. As the econometric modelling results are negative in terms of GDP/place and inflation rates, Romania needs to adopt a number of strategies to increase occupancy in accommodation establishments. Thus, increasing the quality and expansion of tourism infrastructure, including the development of tourist facilities and attractions, can attract more tourists and increase occupancy. The government can allocate resources for upgrading and building roads, airports, hotels, cultural and recreational facilities, as well as promoting tourist destinations abroad. A stable economy and controlled inflation can also contribute to an environment conducive to tourism growth. Government policies should aim at maintaining macroeconomic stability, controlling inflation and ensuring a favourable business environment.

Econometric model 1 provides a special link between the development of tourism activity and the development of society as a whole. The social indicators analysed that express the increase in quality of life (life expectancy and schooling rate), in our case, have a strong impact on tourism, in particular on the capacity utilisation ratio, acting in a positive way.

The second proposed **regression model** links the housing capacity utilisation coefficient with three indicators of sustainable development, namely: **GDP/capita** growth rate (**gdp_place**) - economic indicator, life expectancy at birth (**expectancy_n**) - social indicator and greenhouse gas emissions (**emissions_gas**) - environmental indicator.

The two tests (ADF and PP) were used to test stationarity for the four variables.

According to the results of the ADF Test, the t-Statistic value is greater than the critical value for the variable gas_emissions and the associated probability is greater than 5%. Thus, the null hypothesis is accepted and the series has a unit root - it is nonstationary. The series was stationarized by differencing, then the generated series was retested. Finally, due to the small number of observations, the series is accepted as stationary.

We used the Philips Perron test for testing the stationarity of the emission_gas variable. According to this test, the t-statistic is smaller than the t-critical for 5% and 10%, and the associated probability is less than 5%. Thus, because of the small number of observations, the series is accepted as stationary.

The homoscedastic nature of the model supports its viability. A similar conclusion is drawn if the *Theil's Coefficient of Irregularity or Inequality* is calculated, for which a maximum allowed value of 5% is considered.

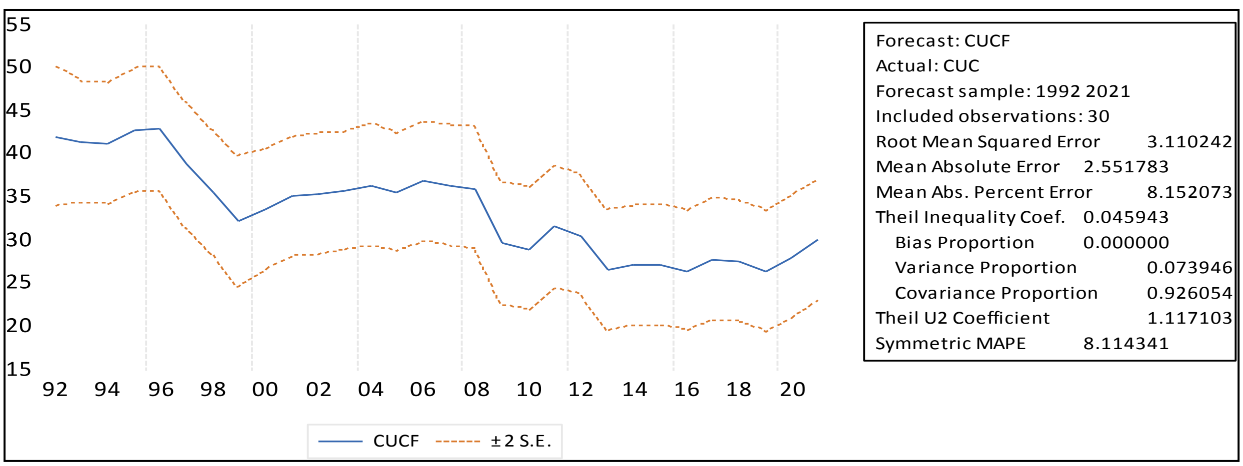

Figure 1. Graphical representation of the series of estimated levels of tourist accommodation unit capacity utilization as a function of GDP, greenhouse gas emissions and life expectancy at birth and the bounds that fit them given two estimates of the mean error of the regression equation

Source: author's own processing using Eviews software.

The logarithms of the variables are cointegrated, then the Vector Error Correction model estimation follows.

Also for this model, the autocorrelation of residuals, non-normality, ARCH effects and parameter instability were tested to check whether the selected model provides the best representation of the time series.

The econometric model 2 parameterized as multiple regression is as follows:

D(CUC) = C(1)*(CUC(-1) + 0.0405202536396*PIB_LOC(-1) - 1.01060439767*EMISSIONS_GAS(-1) - 0.42744906402*EXPECTATION_N(-1) + 10.1172726387) + C(2)*D(CUC(-1)) + C(3)*D(CUC(-2)) + C(4)*D(CUC(-3)) + C(5)*D(PIB_LOC(-1)) + C(6)*D(PIB_LOC(-2)) + C(7)*D(PIB_LOC(-3)) + C(8)*D(GAS_EMISSIONS(-1)) + C(9)*D(GAS_EMISSIONS(-2)) + C(10)*D(GAS_EMISSIONS(-3)) + C(11)*D(HOPE_N(-1)) + C(12)*D(HOPE_N(-2)) + C(13)*D(HOPE_N(-3)) + C(14)

The least squares method was used to estimate the parameters of the regression equation.

Table 3. Parameters of regression equation 2

Dependent variable: CUC **Least Squares Method** **Period: 1996 2021** **Number of observations included in the model: 26, after adjustments**				
Variables	Coefficient	Estimation of the mean coefficient error	t-Statistic	Probability (significance threshold)
C(1)	-1.013641	0.252084	-4.021052	0.0017
C(2)	0.794845	0.356086	2.232172	0.0454
C(3)	-0.592343	0.571614	1.036264	0.3205
C(4)	2.579953	0.598318	4.312008	0.0010
C(5)	0.032210	0.007953	4.050076	0.0016
C(6)	0.011693	0.006122	1.909918	0.0803
C(7)	-0.001576	0.004088	-0.385414	0.7067
C(8)	0.739636	0.484194	1.527562	0.1525
C(9)	0.301643	0.437543	0.689403	0.5037
C(10)	- 0.415488	0.402380	-1.032557	0.3222
C(11)	5.964486	6.709547	0.888955	0.3915
C(12)	2.972791	4.332252	0.686200	0.5056
C(13)	-7.695509	4.442086	-1.732409	0.1088
C(14)	0.058703	0.029598	1.983368	0.0707
The coefficient of determination R^2	0.735308	Mean of the dependent variable		-0.020657
R^2 adjusted	0.448558	Estimation of the root mean square deviation of the dependent variable		0.104712
Estimation of the standard error of the trend equation (regression)	0,077758	Akaike criterion		-1.966689
Sum of squares of residuals	0.072556	Schwarz criterion		-1.289252
F-statistic	2.564285	Hannan-Quinn criterion		-1.771612
Prob (F-statistic)	0.056451	Durbin-Watson statistical coefficient		2.049699

Source: author processing based on data from Eviews software.

The t-student values for the parameters are calculated in the t-Statistic column. If the probability is less than 0.05, the null hypothesis is rejected. These parameters of the variables differ greatly from 0. Statistical analysis shows:

- The probability for C(1), C(4) and C(5) is less than 0.05. Thus, the null hypothesis is rejected and the alternative hypothesis is accepted because the coefficients of this variable are different from 0.
- The probabilities for the other coefficients have values greater than 0.05, the coefficients are different from 0.

For the proposed model, the F-statistic has a value of 2.564285 and a probability of 0.056451, equal to the significance level, it follows that at least one coefficient in the regression is statistically significant.

In terms of autocorrelation of errors, the model passes the test according to Durbin-Watson (DW=2.04), the errors are normally distributed according to Jarque-Bera (Skewness=0.382486 and Kurtosis=2.658725) and White (F-statistic=1.39 and attached probability=25%).

The influence of significant factors is explained by the Determination Ratio (R2 = 73%). In other words, 73% of the variation of cuc is explained by the variation of the variables emissions_gas, gdp_place and expectation_n. The mechanical increase of R2 due to multiple variables in the regression is counteracted and the adjusted R-value of 44% is used, which confirms the validity of the model.

Like the first model, the long-run coefficient C(1) is negative and significant and shows long-run causality between the independent variables and the dependent variable.

The short-run coefficients C(2), C(3) and C(4) refer to the growth of the *cuc* variable. For a 1% increase in the variable, *cuc* increases by 0.794845% and 2.579953% respectively or decreases by -0.592343% if the other variables remain constant. If *gdp_local* increases by 1%, *CUC* will increase by 0.032210% respectively 0.011693% or decrease by 0.001576% if the other variables remain constant. If the *gas_emissions* variable increases by 1%, the *CUC* will increase by 0.739636% and 0.301643% respectively or decrease by 0.415488% if the other variables remain constant. A 1% increase in the *expectation_n* variable will generate a 5.964486% increase or a 2.972791% increase or a 7.695509% decrease in *cuc*. It is already known that the positive evolution of GDP per capita and life expectancy benefits tourism, but this model also confirms the complicated relationship that this sector has with the environment. In conclusion, the increase in greenhouse gas emissions contributes to CUC growth, because socio-economic activity producing polluting emissions generates economic growth, which represents an increase in the size of tourism in the short and medium term. Looking ahead, increasing greenhouse gas emissions may have a negative impact on the tourism industry through climate change and its side effects. In view of this, Romania needs to take a number of initiatives to adopt sustainable tourism and reduce gas emissions in order to create favourable conditions for the development of responsible tourism.

Conclusion

The empirical research carried out within the framework of the work led to the identification of developments and trends in the development of sustainable tourism and revealed - based on the application of statistical-econometric methods and models - the contribution of tourism to development in Romania, as a basis for the strategic directions of promoting sustainable tourism at national level. Thus, we aimed to analyze the empirical relationship between the net tourist accommodation capacity utilization coefficient and economic growth, inflation rate, life expectancy at birth and schooling rate in Romania. In addition, we also included in the study the analysis of the empirical relationship between the development of the tourism sector, economic growth and the amount of greenhouse gas emissions at the country level.

The conclusions drawn from these analyses can be summarised as follows. A positive development of GDP/capita and of the inflation rate (in the sense of its increase) does not benefit tourism by increasing employment. Also, increasing performance in terms of the social dimension of sustainable development (school enrolment and life expectancy) generates positive effects in tourism. *Econometric model 1* provides a particular link between the development of tourism activity and the development of society as a whole. The social indicators analysed which express the increase in quality of life (life expectancy and schooling rate), in our case, have a strong impact on tourism, in particular on the capacity utilisation ratio, acting positively. In the long term, this indicates an increase in the population that will use tourism services, and the increase in the schooling rate generates people's desire for knowledge, thus increasing tourism demand. Increased greenhouse gas emissions lead to an increase in the net capacity utilisation rate, as socio-economic activity generating polluting emissions leads to economic growth, which means an increase in the volume of tourism in the short and medium term.

Regression model 2 in this research shows the direct link between tourism activity and gross domestic product per capita, life expectancy at birth and greenhouse gas emissions, using carefully selected indicators from a range of economic, social and environmental development indicators. Thus, GDP/place expresses a country's economic growth, with positive effects on both the macro-economic level and the population. Increases in this indicator can lead to additional income, which can be used in the tertiary sector, including tourism. The social indicator, life expectancy at birth, is of particular importance in this econometric model. Over time, due to increased economic activity and tourism, gas emissions have also increased. Thus, gas emissions need to be reduced for sustainable development, but without reducing quality of life.

Within the present work there are also some ***limitations of the research.*** There are difficulties in obtaining relevant data, especially those concerning the impact of tourism on the environment and local communities. Other limitations of the research may be determined by geographical and cultural variability - sustainable solutions are not universal and need to be tailored to the geographical and cultural specificity of each tourism destination, political and economic implications - tourism being influenced by strong political and economic interests may create limitations in the objectivity of the research and affect proposed approaches to sustainable development, disparities in resources and capacities and the impact of the Covid-19 pandemic - the coronavirus pandemic has brought significant changes in terms of reshaping the tourism industry, which may affect the results of the analysis of pre-pandemic data.

The development of sustainable tourism in Romania is an essential step towards a green future that ensures environmental protection, local community involvement and sustainable growth of the tourism sector. By promoting responsible tourism, preserving the environment, developing green infrastructure and involving local communities, Romania can become a sustainable and attractive tourist destination, making the most of its natural and cultural potential.

References

Bădîrcea, R. M., Manta, A. G., Florea, N. M., Puiu, S., Manta, L. F., & Doran, M. D. (2021). Connecting Blue Economy and Economic Growth to Climate Change: Evidence from European Union Countries. *Energies*, 14(15), 4600.

Gruescu, R., Pîrvu, G., Pîrvu, R., Tobă, D., Axinte, G., Budică, B. (2011). *Diagnostic analysis of the state of entrepreneurship in tourism in order to develop medium and long-term sustainable development strategies*. Craiova: Editura Universitaria.

Gruescu, R., Axinte, G. (2010). *Tourism destination competitiveness - analysis and strategies.* Craiova: Sitech Publishing House

Ionescu, G. H., Firoiu, D., Pîrvu, R., Bădîrcea, R., & Drăgan, C. (2018) Implementation of integrated management systems and corporate social responsibility initiatives-a Romanian hospitality industry perspective. *Sustainability*, 10(10), 3684.

Jordan, E.J., Moran, C., Godwyll. J.M. (2019). Does tourism really cause stress? A natural experiment using ArcGIS Survey123, *Current Issues on Tourism*, Vol.24, Issue 1.

Khan, H., Seng, C.F., Cheong, W., K., 1990. Tourism multiplier effects on Singapore. Annals of Tourism Research, Vol.17, Issue 3, pp.408-418.

Lindberg, K., Johnson, R.L. (1997) The economic values of tourism's social impacts. *Annals of Tourism Research*, Vol.24, Issue 1, pages 90-116.

Mayer, M. (2014) Can nature-based tourism benefits compensate for the costs of national parks? A study of the Bavarian Forest National Park. Germany *Journal of Sustainable Tourism*, 22.4: 561-583.

Marin-Pantelescu, A., Tăchiciu, L., Căpușneanu, S., Topor, D.I. (2019) Role of Tour Operators and Travel Agencies in Promoting Sustainable Tourism. *Amfiteatru Economic,* 21(52), pp. 654-669, 2019.

Pope, J., Wessels, J.A., Douglas, A., Hughes, M., Morrison-Saunders, A. (2019). The potential contribution of environmental impact assessment (EIA) to responsible tourism: The case of the Kruger National Park. *Tourism Management Perspectives*, Volume 32, 100557, ISSN 2211-9736.

Saarinen, J., Fitchett, J., Hoogendoorn, G. (2022). *Climate change and tourism in southern Africa*. Routledge.

Sharpley, R. (2009) *Tourism, development and the environment: Beyond sustainability?* London: Earthscan.

Torre, A., Scarborough, H. (2017) Reconsidering the estimation of the economic impact of cultural tourism. *Tourism Management*, 59: 621-629.

Appendix

Table 1. Data series used in the econometric analysis

Period	Net capacity utilisation rate (%)	GDP/inhabitant (%)	Inflation rate (%)	Life expectancy at birth (years)	Enrolment rate (%)	Greenhouse gas emissions (tonnes)
1992	46,7	-8,8	210,4	69,8	60	182449
1993	43,1	1,5	256,1	69,6	60	172330
1994	43,7	3,9	136,7	69,5	61,6	169074
1995	45	6,2	32,3	69,5	64	175289
1996	40,7	3,9	38,8	69,1	64,7	177853
1997	37,7	-4,8	154,8	69	65,1	164462
1998	36,1	-2	59,1	69,8	66,3	146797
1999	34,5	-0,4	45,8	70,5	67,3	129732
2000	35,2	2,5	45,7	71,1	68,9	134098
2001	34,9	5,2	34,5	71,1	70,6	139046
2002	34	5,7	22,5	71	72,9	139722
2003	34,6	2,3	15,3	71,3	73,18	144244
2004	34,3	10,4	11,9	71,6	72,7	141245
2005	33,4	4,7	9	71,9	74,43	141338
2006	33,6	8	6,6	72,1	76,66	144801
2007	36	7,2	4,8	72,6	81,1	142828
2008	35	9,3	7,9	72,6	85,9	139836
2009	28,4	-5,5	5,6	73,3	86,5	119941
2010	25,2	-3,9	6,1	73,5	88,3	115823
2011	26,3	4,5	5,8	74,5	83,9	121538
2012	25,9	1,9	3,3	74,2	82,9	118789
2013	25,1	0,3	4	75	82,6	100415
2014	26,1	4,1	1,1	75	73,6	100518
2015	28,7	3,2	-0,6	75,4	72,4	101555
2016	30,5	2,9	-1,5	75	72	98365
2017	30,9	8,2	1,3	75,3	72,2	100821
2018	32,2	6	4,6	75,3	72,1	101266
2019	33,9	3,9	3,8	75,6	72,3	96839
2020	22,8	-3,7	2,6	74	71,8	110900
2021	26,3	5,1	5,1	72,9	71,9	115090

Source: National Institute of Statistics and World Bank.