The emergence of environmental factors as catalysts for tourism demand: a case study on Romania

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Abstract

The paper assesses the role of social, economic and especially environmental factors in determining general, as well as ecotourism demand in Romania. In order to provide in-depth insights, we utilize a two-step approach: cross-sectional analysis for 2013 and a fixed-effect panel analysis for the 2000-2013 timespan (employing a total of 22 explanatory variables). Each of these methods was applied considering the counties of Romania. The main results show that, over the last 15 years, social and economic factors have contributed to the evolution of tourism demand more than aspects related to the environment. However, the emerging trend observed in 2013 shows a significantly stronger impact of ecological determinants on both general, as well as ecotourism demand. In order to encourage the attractiveness of the tourism sector, local and regional authorities should channel their policies in a balanced manner towards all of the three components of an integrated and sustainable system.

Keywords: cross-section analysis, ecotourism, environmental determinants, panel data analysis, Romania, sustainable tourism, tourism demand

Introduction

Tourism contributes significantly to the economy's GDP and it is one of the most rapidly growing sectors in the world, especially when referring to the developed countries. Tourism came into the global spotlight as a significant economic activity since the second half of the 20th century (Huybers and Bennett, 2003; Kadir and Sibel, 2014), while in Romania it is still struggling to improve its attractiveness for national and international travellers and become a relevant option that can compete with other European destinations (Surugiu et al., 2011). Although Romania does provide a diverse array of touristic attractions (e.g. mountainous areas, seaside, cultural, religious and historical

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landmarks, urban centres with a dynamic nightlife), Romania's tourism sector traversed various ups and downs after the '90s. The demand for these kinds of services has been affected by various economic, as well as non-economic, factors (of social, political, technological or of environmental nature). Whether they have an inhibiting effect or a stimulating one, the various factors that influence tourism demand have nurtured the development of three main trends in the Romanian tourism industry: sustainable tourism, ecotourism and cultural tourism. While the responsibility of harnessing and stimulating the country's tourism potential falls onto policy makers, it is the duty of academics to research and offer valuable policy recommendations with regard to the determinant factors of such tourism activities.

The aim of the paper is to assess whether the determinant factors of tourism demand (TD) in an Eastern European country, such as Romania, support a sustainable, long-term development of the sector. Specifically, we seek to gauge the strength and relevance (if any) of the environmental dimension in attracting tourism consumers (aside from the social and economic aspects).

The paper is structured as follows: section 1 includes a short review of the existing literature and some thoughts on sustainability in the tourism sector; section 2 presents the data collection and the analysis approach; section 3 includes the results of the analysis and some discussions; the conclusions are in the final section.

1. Emerging trends and determinants of tourism

The literature to date that looks into the tourism demand (TD) and its determinant factors is very broad, revealing significant efforts from various fields of study to quantify and forecast it – for an extensive literature review see Surugiu et al. (2011). As explanatory variables, most of the existing works focus on: price variables (Hanafiah and Harun, 2010; Kadir et al., 2013; Leitão, 2009) cost variables, generated mainly by distances and transportation (Leitão, 2009; Muhammad and Andrews, 2008; Zhang, 2015), income variables, such as the income level of the tourist or of the tourist's country of origin (Kadir and Sibel, 2014; Leitão, 2015), international trade flows (Leitão, 2010; Zhang, 2015), exchange rate (Hanafiah and Harun, 2010; Leitão, 2009) and others. As one can easily notice, the majority of the determinant factors are of economic nature. Nevertheless, there are also important works that reveal the influence of non-economic factors on TD, such as infrastructure capacity with regard to roads (Phakdisoth and Kim, 2007), accommodation (Seetanah, 2006) or accessibility (Aranburu et al., 2016; Kadir and Sibel, 2014), population and migration (Seetaram, 2012; Zhang 2015), or social conflict and terrorism (Kadir et al., 2013).

Unfortunately, there are very few studies that look into the environmental determinants of TD which we hypothesised that are growing in importance, especially in the tourism sector of an economy aspiring towards sustainability. Among others, Zeng et al. (2011) focus on various natural resources (landscape, green space, ecological infrastructure, biodiversity) to study the determinants of sustainable development of coastal ecotourism. A specific example of how forested areas affect the trip-taking behaviour of recreation service consumers is provided by Bartczak et al. (2012) for the case of Poland. A recent study of Islam (2015) focuses on the negative outputs in the environment (including air and water pollution, soil erosion, oil spills, disposal of wastes etc.) to determine the factors affecting and/or influencing tourism. As the environment became a growing concern in connection to the tourism sector (as a motivational factor for TD, as well as a qualitative result of tourism), a new concept emerged in the early '90s – 'sustainable tourism' (Zamfir and Corbos, 2015).

With regard to the econometric methods used to assess the determinant factors of TD, the existing portfolio is very diverse as suggested by Surugiu et al. (2011): simple or multivariate regressions (Allen and Yap, 2009), panel or pool data analysis using the co integration procedure (Seetanah 2006), gravity models (Leitão, 2010), trends extrapolations, data mining and neural network model (Law and Au, 1999).

Finally, one aspect that has been discussed over the last few years is that, while tourists tend to express favorable attitudes towards green tourism and eco-friendly hotels, they are not necessarily willing to visit such establishments (Line and Hanks, 2016). The reasons for this apparent contradiction can be related to comfort or financial aspects. Regardless of motivations, recent studies suggest that using declared preference for environmental and eco-friendly tourism practices may not constitute an adequate proxy for estimating the actual green TD (Baker et al., 2014; Line and Hanks, 2016).

Traditionally, research in the area of sustainable development has generally focused on the set of three generally accepted dimensions ('economic', 'environmental' and 'social'). More recently, there is a preference demonstrated by numerous studies for a four dimensional approach in the assessment of sustainability (adding 'culture' to the three traditional components mentioned previously). Furthermore, when looking at research concerned with the sustainability of tourism, Agyeiwaah et al. (2017) identifies the four dimensions (classified as "core") as well as three others: 'political', 'management/institutional' and 'technology', considered to be "peripheral".

The role of the environmental component in sustainability research has generally been emphasised above the others, as ecological issues at a global level have played a key role in the scientific and political debates that have given rise to the concept of sustainable development at the end of the 1980's. However, as argued by Huybers T, Bennett J (2003), Agyeiwaah et al. (2017) and Mathew

(2017), tourism sustainability needs to be considered from a holistic perspective, encompassing all the relevant aspects mentioned above. The end goal of tourism activities needs to be the nurturing of harmonious development along each of the three/four core dimensions, ultimately leading to a better quality of life for both tourism consumers and the communities providing the service.

2. Methods and data

Our quantitative analysis seeks to assess the relationships that exist between TD and various environmental, social and economic (ESE) indicators. Based on the literature review presented in the previous section, as well as on the researcher's intuition regarding the Romanian tourism sector, we have generated three hypotheses:

- **H_1**: The environmental component has a higher impact on tourism demand compared to the social and economic components.
- **H_2**: Environmental factors are more relevant to ecological tourism demand, rather than to overall tourism demand.
- **H_3**: Environmental, social and economic components have a higher combined impact on tourism demand than if analysed individually.

In order to verify these hypotheses, our analysis must take into consideration a spread of the ESE determinants of TD. We also seek to identify a means of separating travel that is ecologically motivated from the overall/general tourism.

2.1. Data selection

Considering that this study focuses on tourism in Romania, the sections used in the analysis are the administrative divisions of the country. The cross-sections include 39 of the 41 counties of Romania. We have excluded two outliers: Ilfov-Bucharest, because business travel is the predominant form of tourism in this area, and Constanţa, because tourism is overwhelmingly motivated by the presence of the Black Sea.

In order to identify the relevant ESE variables at a county level, the Tempo database provided by the Romanian National Institute of Statistics was used (Institutul National de Statistica, 2016). For most variables, the period of the analysis refers to annual data from 2000 to 2013. This time frame was chosen mainly due to availability and reliability issues. Annual data was preferred to avoid seasonality problems.

The choice of variables and the analysis itself were complemented by several case study visits by the authors within the urban and suburban areas of Cotnari, Vatra Dornei and Piatra Neamţ. These locations were chosen based on recommendations made by representatives of regional business support entities (e.g. Regional Development Agency, chambers of commerce, NGOs etc.) regarding areas which bring together businesses that benefit from a high quality of natural resources. The case study visits included meetings with entrepreneurs, business representatives and local officials and the onsite discussions confirmed that the three locations do rely on environmental quality in order to nurture socio-economic development: Cotnari is known for offering wine tourism services, Vatra Dornei provides various nature related entertainment services for a diverse array of tourists, while Piatra Neamţ fosters the establishment of partnerships and natural tourism development projects, being the meeting place for various stakeholders in Neamț county. The case study visits mentioned above were conducted as part of the DEVEUROMD project funded through a research grant provided by the Romanian National Authority for Scientific Research and Innovation (42/BM/2016).

A. Tourism and ecotourism demand

In most survey based studies on environmental preference of tourists, the stated intentions to purchase leisure services are assessed. While the survey approach does allow for a more in-depth understanding of motivations and causal factors, the reliability of stated preferences is limited, especially in the case of ecological preference studies, where a socially desirable response may be provided.

The dependant variable of 'tourism demand' has been defined as the number of overnight stays by tourists within one county over the course of one year (*nightsall*). This indicator shows the observed behaviour of tourism consumers, rather than their stated intentions.

As mentioned previously, overall demand does not discriminate between tourists on the basis of their travel motivation (e.g. business or work, visiting family, hiking). In order to identify the more environmentally motivated trips, we have selected only those overnight stays which occurred in establishments predominantly located in natural surroundings: villas, cabins, guest houses, camping areas, holiday villages and bungalows. The resulting variable (*nightseco*) provides a proxy image of the demand for lodging in natural surroundings in Romania (which we have associated with a form of 'ecotourism' demand).

B. Determinants of tourism demand

Based on the data available, 18 potential environmental determinants were identified, along with 2 social and 2 economic determinants (see Table 1). A higher number of environmental components have been considered due to the exploratory nature of this study. For consistency purposes, most of the data was collected from the National Institute of Statistics (Institutul National de Statistica, 2016). The data regarding parks was collected from the official websites, while the data regarding mineral water springs is provided by Feru (2012). The presence of commercial mineral water springs within the county was chosen as a proxy indicator of water quality – a highly relevant natural public good, as confirmed by recent research developed within a Horizon 2020 Project (Provide, 2017).

Table 1. A general view of the variables used in the analysis

Category	Coding	Definition
forest diversity	*divers*	Diversity of forest landscape, calculated as $\mathbf{1} - \sum \boldsymbol{S_i^2}$, where *S* = the share of forest areas covered by meadows, hardwood and coniferous trees respectively
use of fertilizers	*fertizs*	Share of county surface treated with fertilizers (%)
	fertizq	Average quantity of fertilizers used in the county (tonnes/ha)
	fertiz	Use of fertilizers, calculated as ***fertizs*** **x** $\boldsymbol{R_q}$, where R_q is a normalized rating for the total quantity of fertilizers used in a county relative to all other counties
use of pesticides	*fungis*	Share of county surface treated with fungicides (%)
	fungiq	Average quantity of fungicides used in the county (tonnes/ha)
	herbis	Share of county surface treated with herbicides (%)
	herbiq	Average quantity of herbicides used in the county (tonnes/ha)
	insectis	Share of county surface treated with insecticides (%)
	insectiq	Average quantity of insecticides used in the county (tonnes/ha)
	pest	Use of pesticides, calculated as $\sum \boldsymbol{s_i} \times \boldsymbol{R_i}$, where s_i is the 'share of surface' variable (*fungis, herbis, insectis*) and R_i is the normalized rating for the quantity of the corresponding pesticide used in a county relative to all other counties
natural landscape surface	*forest*	Share of county surface covered by forests and forest vegetation (%)
	trees	Share of county surface covered by forests (%)
	green	Share of county surface with green vegetation (forests, orchards, pastures etc.) (%)
	natural	Share of county surface with a natural landscape (forests, waters, pastures) (%)
natural parks	*parksall**	Total surface of national and natural parks within the county borders (ha)
	*parksbig**	Total surface of national parks within the county borders (ha)
water quality	*minwater**	Presence of commercial mineral water springs within the county (0/1 dummy)
social	*rural*	Share of county population living in rural areas (%)
	young	Share of county population below 35 years old (%)
economic	*GDP*	GDP at the county level (million lei)
	roads	Total length of modern or modernized roads in the county (km)

** - variables used only in the cross-sectional analysis*

All variables from the environmental, social and economic categories were chosen based on principles suggested in existing sustainability research (Cloquell-Ballester et al., 2006; Morrison-Saunders et al., 2015). Availability of data is a key factor that was taken into consideration by the cited researches, as well as ourselves.

2.2. Analysis approach

The collected data has been analysed in two different ways. First, an OLS linear multiple regression analysis was used in order to provide a cross-sectional assessment of the relationship observed in 2013. The data was analysed using the SPSS statistical software. Second, a panel data analysis with fixed effects was used to verify the consistency of the relationship across the 2000-2013 time span, while accounting for the differences between counties. The data was processed using the EViews econometric software and the recommendations in the User Guide of the program (QMS 2010).

3. Results and discussion

3.1. Cross-section identification of trends in tourism demand

The first phase of our analysis looks at the situation in 2013 (the latest year for which a full data-set could be compiled). This cross-section assessment is meant to identify the emerging trends with regard to the determinants of TD in Romania. A Spearman correlation analysis was performed in order to illustrate the relationship between the two demand variables and the proposed determinants.

Table 2a. Correlations of tourism demand with environmental determinant factors

		divers	*fertiz*	*fertizq*	*fertizs*	*pest*	*fungiq*	*fungis*	*herbiq*	*herbis*	*insectiq*	*insectis*	*forest*	*trees*	*green*	*natural*	*parksall*	*parksbig*	*minwater*
N-all	S_{rho}	.51	-.06	-.12	-.11	-.26	-.26	-.31	-.13	-.24	-.28	-.30	.48	.53	.48	.45	.23	.23	.58
	p	*.00*	*.72*	*.47*	*.49*	*.11*	*.12*	*.05*	*.40*	*.14*	*.08*	*.06*	*.00*	*.00*	*.00*	*.00*	*.16*	*.16*	*.00*
N-eco	S_{rho}	.60	-.22	-.28	-.30	-.40	-.40	-.45	-.30	-.40	-.38	-.45	.60	.63	.62	.60	.30	.37	.51
	p	*.00*	*.19*	*.08*	*.06*	*.01*	*.03*	*.00*	*.06*	*.01*	*.02*	*.00*	*.00*	*.00*	*.00*	*.00*	*.07*	*.02*	*.00*
Sign[1]		+	-	-	-	-	+/-	-	-	-	+/-	+/-	+	+	+	+	+	+	+

Notes: N-all = '*nightsall*'; N-eco = '*nightseco*'; [1] = expected sign of the correlation; S_{rho} = Spearman's rho

As seen in Table 2a, *nightsall* is correlated with several environmental determinants, and the sign of the Spearman coefficient is consistent with the theoretical expectations. In the case of *nightseco*, significant correlations of varying intensity can be observed with nearly all the environmental determinants. This provides evidence to support hypothesis H_2 and suggests that ecologically motivated tourism may have been successfully captured through the proposed approach (through the *nightseco* variable).

The presence of natural parks is less relevant for overall tourism (including business travellers). The use of most pesticides, as well as fertilizers is more difficult to be directly observed (their

presence being felt nonetheless in an indirect way through the effects on the surrounding environment) and thus has, at most, a limited impact on TD. However, landscape and water quality show significant correlations with all types of TD.

Table 2b. Correlations of tourism demand with socio-economic determinant factors

		rural	*young*	*GDP*	*roads*
nightsall	Spearman's rho	-.54	-.09	.65	.57
	p	*.00*	*.59*	*.00*	*.00*
nightseco	Spearman's rho	-.47	-.01	.56	.54
	p	*.00*	*.96*	*.00*	*.00*
Expected sign of the correlation		+/-	+/-	+	+

With regard to the socio-economic determinants, *GDP*, *roads* and *rural* show medium to strong correlations with TD (see Table 2b). The strength is lower in the case of ecotourism, for which other factors (including environmental) may be more relevant.

An OLS regression was performed for both TD variables. In order to generate the best possible models from all existing combinations of the 22 predictor variables, the *Backwards* method was used, as described by Field (2009). This type of stepwise regression starts by including all relevant predictors in an initial model after which the ones that do not meet the significance threshold for the t-test are successively removed and the model is computed again. The process is halted when all predictors have been eliminated or a suitable model has been identified.

$$Nights_i = c + Environmental_i + Social_i + Economic_i + \varepsilon_i \quad (1)$$

Where *Nights* is the dependent variable (*nightsall* or *nightseco*), *Environment*, *Social* and *Economic* represent the ESE independent predictor variables, *i* is the cross-section unit (county), *c* is the constant and *ε* is the error term that captures unobserved factors that change according to county and tend to affect the dependent variable.

Three models were generated for each TD variable (see Table 3 and Equation 1): A1 and B1 include the environmental determinants, A2 and B2 the social and economic predictors, while models A3 and B3 provide a combined view of all three dimensions. In the case of A3 and B3, some predictors from the previous models, which did not meet the 10% probability threshold for A3 and B3, have been, nonetheless, included using the traditional *Forced entry* regression method (Field 2009).

Table 3. Cross-section regression models for 2013 data

Variable	***Nightsall***			***Nightseco***		
	Model A1	Model A2	Model A3	Model B1	Model B2	Model B3
Constant	15616	491131	163648	-14189	153249*	-8865
	(.167)	(1.623)	(.564)	(-.518)	(1.721)	(-.228)
divers	747126***		589653**	214555***		108872
	(2.775)		(2.328)	(2.712)		(1.226)
minwater	365973***		245203**	86616***		75410**
	(3.773)		(2.514)	(3.039)		(2.519)
herbiq						-203906*
						(-1.702)
rural		-829274*	-502448		-270739*	
		(-1.686)	(-1.124)		(-1.870)	
GDP		30.648***	16.537**		5.066**	5.669**
		(2.896)	(2.130)		(2.076)	(2.502)
No.	39	39	39	39	39	39
R^2	.401	.363	.526	.337	.292	.453
F-stat.	12.065	10.239	9.440	9.153	7.415	7.036
Prob.	.000	.000	.000	.000	.002	.000
D.-W.	2.563	1.764	2.297	2.391	1.768	2.200

significant at the: *10% level; **5% level; ***1% probability level

By looking at the R^2 value of each model, we find evidence to support both H_1 and H_3, but not H_2. For both general, as well as ecological TD, the explanatory power of the environmental determinant models (A1 and B1) is higher than that of the socio-economic determinant models (A2 and B2). In addition, the combined ESE predictor model has an R^2 well above that of either one of the two previous models. These results suggest that, in 2013, the demand for tourism was primarily determined by environmental factors, rather than social or economic ones. This means that tourists are aware of environmental issues and have an increased preference for travelling to areas where they can be more connected to the natural environment. This is an encouraging trend, which promotes a sustainable outlook for the tourism sector in Romania.

3.2. Panel data analysis on determinants of tourism demand

As we have seen in the previous section, variables referring to the environment, besides social and economic factors, tend to encourage tourism in Romania's counties in 2013. But could this be generalized for a longer period of time? Has the environment always been a determinant factor of tourism (besides socio-economic determinants) in Romania?

Such questions can be answered by means of a panel data analysis. Prior to performing it, we have investigated the correlations between the TD variables (*nightsall* and *nightseco*) and the full set of ESE predictors mentioned above (using the Spearman's rho coefficient). Table 4 illustrates the results of the analysis.

Table 4. Correlations of tourism demand with determinant factors

		environmental															social		economic	
		divers	*fertiz*	*fertizq*	*fertizs*	*pest*	*fungiq*	*fungis*	*herbiq*	*herbis*	*insectiq*	*insectis*	*forest*	*green*	*natural*	*trees*	*rural*	*young*	*GDP*	*roads*
N-all	S_{rho}	.51	-.07	-.13	-.15	-.24	-.06	-.23	-.16	-.20	-.24	-.27	.50	.51	.48	.53	-.50	-.01	.39	.42
	p	*.00*	*.13*	*.00*	*.00*	*.00*	*.18*	*.00*	*.00*	*.00*	*.00*	*.00*	*.00*	*.00*	*.00*	*.00*	*.00*	*.80*	*.00*	*.00*
N-eco	S_{rho}	.44	-.07	-.21	-.21	-.33	-.11	-.31	-.21	-.27	-.35	-.38	.53	.55	.52	.54	-.45	-.18	.54	.50
	p	*.00*	*.13*	*.00*	*.00*	*.00*	*.01*	*.00*	*.00*	*.00*	*.00*	*.00*	*.00*	*.00*	*.00*	*.00*	*.00*	*.00*	*.00*	*.00*
Sign[1]		+	-	-	-	-	+/-	-	-	-	+/-	+/-	+	+	+	+	+/-	+/-	+	+

Notes: N-all = 'nightsall'; N-eco = 'nightseco'; [1] = expected sign of the correlation; S_{rho}= Spearman's rho

As seen in Table 4, almost all of the predictors are correlated with both dependants at a level of significance of 1% (with some exceptions). The direction of all the correlations fits with the generally accepted theories (e.g. reflected in the 'expected sign' row). The strength of the relationships varies between weak (with variables describing the harmful effects on the environment of fertilizers and pesticides), to medium (with socio-economic variables) and strong (especially with variables that reflect positive environmental aspects – diversity and quality of the natural landscape). Another important issue worth mentioning is the fact that the *forest*, *green*, *natural* and *trees* variables are strongly correlated with each other, so they will not be used jointly in the panel data analysis.

Economic variables are often found to be non-stationary. For this reason, in general, regression models that use non-stationary variables give potentially fatal issues of spurious results. This is why we have strong reasons to verify if stationarity occurs. Unit root tests were performed for each variable, considering the following methodologies: Levin, Lin and Chu, Im, Pesaran and Shin W-stat, ADF - Fisher Chi-square, as well as PP - Fisher Chi-square (for a 10% significance level). The majority of tests showed that most of the variables were non-stationary at level and stationary at first difference. Also, the data was checked for serial correlation and heteroscedasticity in order to ensure the most reliable results. Therefore, to avoid spurious results, the variables in first difference were used in the panel data analysis. This is further supported by the fact that, when using the variables in absolute values, the very low values of the Durbin-Watson statistic indicate positive autocorrelation of residuals. Thus, the resulting generic model is illustrated in Equation 2.

$$\Delta Nights_{it} = c + \Delta Environment_{it} + \Delta Social_{it} + \Delta Economic_{it} + \alpha_i + \varepsilon_{it} \quad (2)$$

where Δ is the first difference, *i* is the cross-section unit (county), *t* denotes the time period (2001-2013), *c* is the constant, *Nights* is the dependent variable (*nightsall* or *nightseco*), *Environment*, *Social* and *Economic* represent the three dimensions of the independent variables, α_i captures the fixed effect of

the county (this value is fixed over time) and ε_{it} is the error term that captures unobserved factors that change over time and county and tend to affect the dependent variable.

With regard to the model estimation, a pooled OLS model cannot be used given that such an approach neglects the cross-section and time series nature of the data. Therefore, given that we need to control for county specific individual effects, the model must take the form of a panel data regression with *fixed-effects* or *random-effects*. A decision between the two types of model was taken after performing the Hausman-test (QMS 2010), which indicated a fixed-effect model to be the appropriate type of model. The most revealing models for each of the two dependent variables were selected by applying an adaptive version of the *Backward* technique (see section 3.1) and *Forced entry*, where necessary (see similar approaches in the cross-section analysis).

Three models were produced for each TD variable (see Table 5): C1 and D1 include the environmental determinants, C2 and D2 the social and economic predictors and models C3 and D3 provide a combined view of all the three dimensions. When looking at the models that use *nightsall* as the dependent variable, no significant explanatory factors of environmental nature could be identified, leaving the model only with one constant and county fixed effects (model C1). When looking at the socio-economic dimension, the county's GDP has a strong and significant impact, positively influencing the number of visitor stays (model C2); although the *rural* component is not significant, it comes very close to the threshold of 10% significance and has the expected sign (as seen in the 'static' models in section 3.1). When adding all the ESE variables in the same model, and after applying the *Backward* technique, the explanatory power (R^2) and significance (Prob.) of the model increases, resulting in a strong influence of the GDP and a weak influence of the *natural* (model C3). The main conclusion of these models is that the socio-economic dimension has an important impact on TD (*nightsall*) while the environmental components are not clearly motivating the tourists to visit a county.

Table 5. Fixed-effect models for tourism demand in Romania's counties (2000-2013)

Variable		***Nightsall***			***Nightseco***	
	Model C1	Model C2	Model C3	Model D1	Model D2	Model D3
Constant	3396.26	-7147.62**	-7402.35**	3007.93***	-7050.73**	-8134.07***
	(1.601)	(-2.248)	(-2.329)	(3.771)	(-3.507)	(-4.037)
herbiq				-9127.27		
				(-1.113)		
forest				309679***		371246***
				(2.664)		(3.339)
natural			376274*			
			(1.635)			
rural		-208650	-198535			
		(-.681)	(-.650)			
young					-792946***	-908164***
					(-2.886)	(-3.314)

Variable		***Nightsall***			***Nightseco***	
	Model C1	Model C2	Model C3	Model D1	Model D2	Model D3
GDP		13.97***	14.04***		6.435***	6.385***
		(4.343)	(4.371)		(5.545)	(5.561)
roads					29.325	33.708*
					(1.477)	(1.713)
No.	507	507	507	498	507	507
R^2	**.007**	**.114**	**.119**	**.130**	**.181**	**.210**
F-stat.	1.038	1.504	1.536	1.706	2.499	2.944
Prob.	.410	.027	.021	.006	.000	.000
D.-W.	1.825	1.837	1.830	1.948	2.025	2.005

significant at the: *10% level; **5% level; ***1% probability level
fixed effects were applied for county level data

When looking at the number of overnight stays of people who are more likely to practice ecotourism (*nightseco*), we found that the socio-economic dimension still plays an important role: the R^2 of model D1 (environmental dimension) is smaller than the R^2 of model D2 (socio-economic dimension). In model D1, only *forest* remains statistically significant, reflecting the fact that that the environment has some influence on *nightseco*; it also bears the expected sign (positive influence). The quantity of herbicides (*herbiq*) tends to influence the number of 'eco-nights' negatively, but the significance level is above the 10% threshold. The second model (D2) reveals that both a social (*young*) as well as an economic (*GDP*) variable tend to influence TD (negative and positive signs respectively); the infrastructure tends to positively influence the number of 'eco-nights', with an associated significance level slightly above 10%. After including all the ESE explanatory variables in the model and after eliminating those which are not statistically significant, we were left with model D3 (with an R^2 that is higher than those of its predecessors). This shows that components referring to all of the three dimensions have an important influence on the *nightseco*: the environment (*forest*), the socio (*young*) and economic (*GDP* and *roads*) aspects. In conclusion, although we used the *nightseco* indicator as a proxy for ecotourism, the socio-economic dimension remains the main game maker of the model while the environmental component (approximated through multiple indicators) has a weak influence contributing insignificantly to the R^2 of the model (a difference of only .029 between the R^2s of models D2 and D3). We are nevertheless cautious with regard to the influence of the *young*, given that, in Romania, in the last two decades, a stable trend in the aging of the population has been observed.

Although the inclusion of the environment among the determinant factors of TD creates a somewhat higher explanatory power for the model (thus supporting H_3), the results of the panel analysis contradict hypothesis H_1, showing that, over the 2000-2013 time span, the social and economic factors had a stronger contribution to the development of TD (compared to environmental factors) in Romania.

In addition, by examining the effect size of models C1 and D1, we find evidence to support H_2 – given that a statistically significant environmental component model for *nightsall* cannot be generated with the existing data, while in the case of *nightseco*, a statistically significant model with an R^2 of .13 is identified. These results also support our proposed method of separating ecotourism demand from overall tourism demand through the *nightseco* variable (also confirmed by the correlation analysis).

Overall, when employing the cross-section regression models for 2013 data, evidence on the R^2 value of each model inclined to support both H_1 (the demand for tourism was primarily determined by environmental factors, rather than social or economic ones) as well as H_3 (the combined explanation power of the environmental, social and economic components impact grater the tourism demand than if analysed individually). Nonetheless, it looks like H_2 cannot be supported given that, for the ecological tourism demand, as oppose to the overall tourism demand, environmental related factors are not as relevant as expected. When using the fixed-effect models for tourism demand in Romania's counties (2000-2013), H_1 can be clearly rejected, based on the fact that the social and economic factors, as opposed to the environmental factors, had a stronger contribution to the development of TD within 2000-2013. Nonetheless, H_2 and H_3 can be supported and, moreover, provides evidence to support the proposed method of using the *nightseco* variable as a form of measuring ecotourism demand.

Conclusions

The study has sought to assess whether the determinant factors of tourism demand in an Eastern European country, such as Romania, support a sustainable, long-term development of the sector. Special attention has been given to observing the role played by the environmental factors (e.g. landscape quality and diversity, water quality, use of pesticides) in catalysing or discouraging tourism demand across the various counties of Romania.

The analysis looks at the relationship between social, economic and environmental factors and the number of overnight stays in tourism establishments. One of the original contributions of the work is that the assessment is performed both from a stationary cross-sectional perspective (looking at the year 2013), as well as through a panel data analysis (for the 2000-2013 time span). An additional component of added value is represented by the proposed method of extracting eco-tourism demand from the overall tourism service consumption (through the *nightseco* variable). The analysis was complemented by several case study visits by the authors within the urban and suburban areas of

Cotnari, Vatra Dornei and Piatra Neamţ, the visits being conducted as part of the DEVEUROMD project funded through a research grant provided by the Romanian National Authority for Scientific Research and Innovation (42/BM/2016).

Our results show that, while social and economic factors have had a stronger impact than environmental components on tourism demand over the last 15 years, the emerging trend (observed in 2013) shows that environmental determinants are becoming significantly more relevant to tourists. These results confirm the existing trend of promoting and developing sustainable tourism and rural ecotourism across Romania. It is, however, noteworthy that neither the social, economic, nor ecological dimension can decisively explain the trend of tourism demand by itself. A satisfactory prediction model can only be generated by looking at a synthesized 'socio-eco-enviro' approach. The motivational factors of consumers cannot be clearly split along the three familiar dimensions, but must be assessed in a unified sustainability approach.

In order to encourage the attractiveness of tourism, local and regional authorities should channel their policies in a balanced manner towards all the three components of an integrated and sustainable system. Some possible directions could include: development of transportation and accommodation infrastructure, regulations that encourage employment in the tourism sector, governance mechanisms that promote the provision of public goods. By neglecting one dimension, the sector itself could be progressively pushed backwards in time, fostering volatility in the demand for such services.

Acknowledgement: This work was supported by a grant of the Romanian National Authority for Scientific Research and Innovation, CCCDI – UEFISCDI, project number 42/BM/2016 (DEVEUROMD).

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