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ДЪЛГОСРОЧНО ПРОГНОЗИРАНЕ НА ПРИХОДИТЕ ОТ ТУРИЗЪМ ЗА НУЖДИТЕ НА БЪЛГАРСКИТЕ ОБЩИНИ

LONG-RUN FORECASTING OF ECOTOURISM RECEIPTS FOR THE NEEDS OF THE BULGARIAN MUNICIPALITIES

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Abstract: Most of the Bulgarian rural and mountainous municipalities need to back up their investment decision in tourism infrastructure by preliminary analysis and forecasts. The present paper regards a specific set of some major problems in the application of exponential smoothing methods for the purpose of the long-run forecasting of the ecotourism receipts (ecotourism revenues) for the needs of the mountainous municipality of Stambolovo, Bulgaria, located near to the border with Greece and Turkey. This specific set of problems comprises: (i) the problem of determining the time series pattern; or the so-called "forecast profile"; (ii) the selection of a suitable forecasting method; (iii) calculating of short-run and long-run forecasts; and (iv) the comparison of the results of the forecast techniques on the basis of the errors in the forecasts. A specially designed model for estimation of the weight coefficient needed for determining the size of the rural tourism and ecotourism sectors of this very same municipality is being presented.

Key words: Long-run forecasting, exponential smoothing, ecotourism, ecotourism receipts

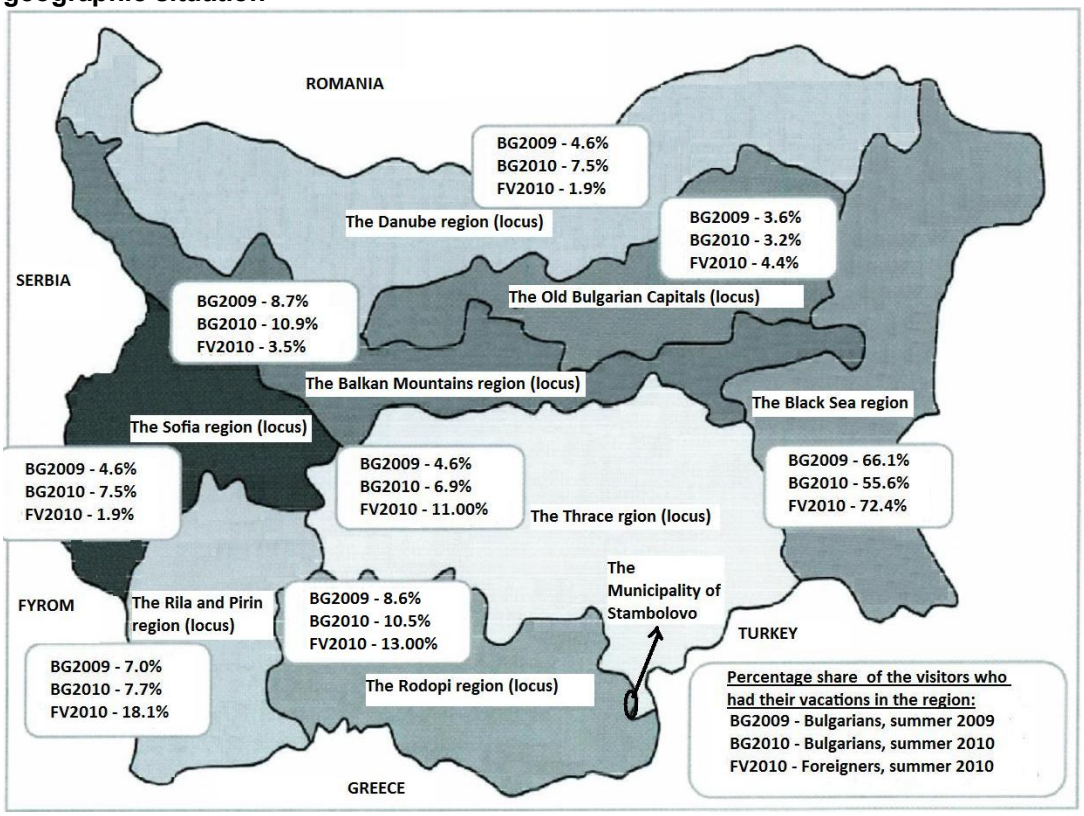
1. INTRODUCTION

Most of the Bulgarian rural municipalities located in the border regions with Greece and Turkey are facing the necessity to develop its tourism potential as a main and sometimes the only economic alternative to their feeble agricultural sectors. The investment decisions of the municipalities in this regard often need to be backed up by preliminary analysis and forecasts. This is especially valid for the business plans which have to be prepared by the municipalities for acquiring EU and central government funding for the construction of tourism information centres, hiking pathways and other tourism infrastructure (Asvestas, 2012).

The municipality of Stambolovo, Bulgaria is one of the numerous municipalities in the country struggling to provide alternative to the agriculture source of employment for its population. The municipality of Stambolovo is located in the Haskovo region of Bulgaria and it has a territory of 277 sq. km. It is entirely situated in the most South-Eastern part of the Rodopi Mountains and is some 22 km away from the regional centre of Haskovo. The municipality is also a part of the "Rodopi" tourism region (or the "Rodopi" tourism locus according to the Bulgarian Tourism Act), which was visited in 2009 by 8.6% and in 2010 by 10.5% of all the Bulgarians who had their summer vacation within the country. In 2010 the tourism region, to which the municipality of Stambolovo belongs, was visited by 13% of all the foreign tourists who visited Bulgaria in the summer tourism season (Graphic 1).

In the meantime, in 2011 the municipality of Stambolovo incidentally recorded 3184 night stays in the hotel accommodation structures on its territory. And if it is assumed that the average number of the tourists' stay comprises two nights, mainly due to weekend trips undertaken to the municipality, one can estimate the average number of the tourism arrivals in the municipality of Stambolovo at some 1592 arrivals.

Graphic 1: The tourism regions of Bulgaria and the municipality of Stambolovo's geographic situation



Source: Dimitrov, P. (2012), modification based on the data and map prepared by the Ministry of Economy, Energy and Tourism of the Republic of Bulgaria

Further to this, based on the sample surveys conducted by the former Bulgarian State Tourism Agency (presently part of the Ministry of Economy, Energy and Tourism), as well as by the Ministry of Economy, Energy and Tourism, it can be pointed out that the share of the Bulgarian and foreign tourists practicing ecotourism varies between 4.2 and 18.3% (2008) with a solid trend of increase with the exception of the first two years of the World financial and economic crisis (Graphic 2).

The findings about the possible share of the tourism industry of the municipality of Stambolovo and the ecotourism as a whole, however does not provide enough grounds for an objective forecasting for its development. The building up of forecast model, especially with the use of the exponential smoothing methods needs a more sophisticated and multistage approach with a certain number of clearly set objectives.

2. OBJECTIVES

The task of creating an exponential smoothing forecast model for the long-run development of the tourism industry in terms of the ecotourism receipts in a small micro-destination, such as the municipality of Stambolovo, Bulgaria, meets with solving of several major problems:

(i) Finding of a suitable general indicator, on the basis of which to build the long-run forecasts (the forecast for periods longer than 5 years);

(ii) Determining the time series pattern, or the so-called "forecast profile"(Gardner,

1987:174-175) (Hyndman, Koehler, Ord and Snyder, 2008:11:23) and the quality of the data in the pattern, on the basis of which to select the suitable forecasting exponential smoothing model.

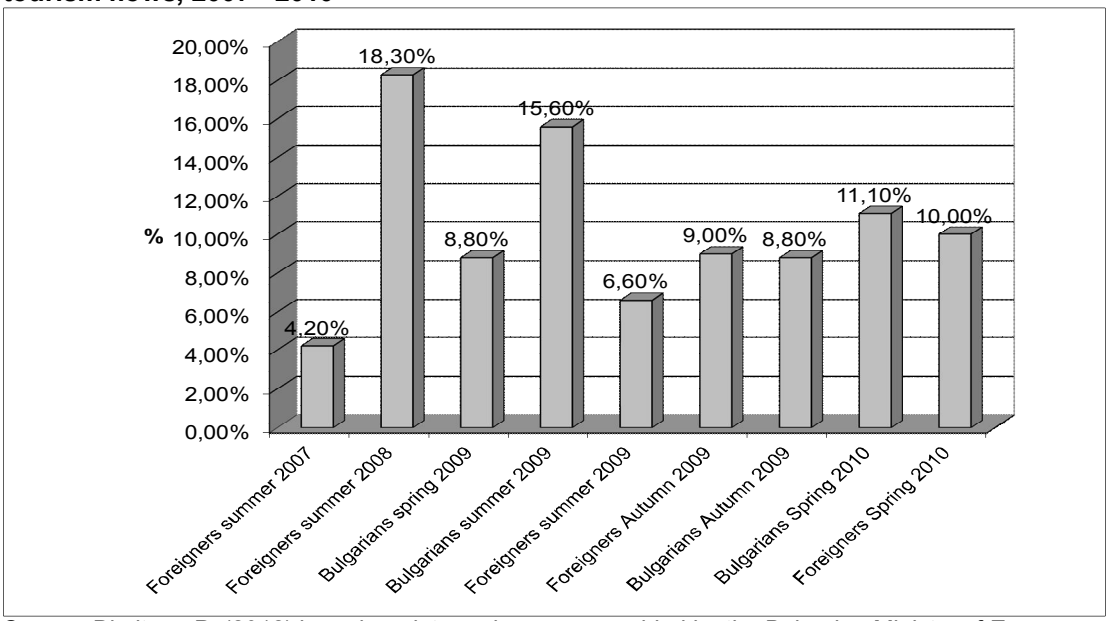
(iii) Selecting and using of suitable forecasting techniques;

(iv) Calculating of long-run forecasts for the value of the above-mentioned general indicator (up to the year 2023);

(v) Comparing the results of the forecast techniques (the forecast models) on the basis of the errors in the forecasts.

(vi) Estimating the size of the ecotourism sector of the Municipality of Stambolovo, Bulgaria in certain terms, so that the forecast(s) of the above-mentioned general indicator could be particularized especially for the needs of the municipality.

Graphic 2: Share of the tourists practicing ecotourism in the Bulgarian and foreign tourism flows, 2007 - 2010



Source: Dimitrov, P. (2012) based on data and surveys provided by the Bulgarian Ministry of Economy, Energy and Tourism, http://www.mi.government.bg/bg/themes-c263.html

3. METHODOLOGY AND MAIN RESULTS

With regards to the **first problem** set in the previous point of the present paper, the difficulties in finding of a general suitable indicator, on the basis of which to make the forecast, come mainly from the reliability and the sustainability of the existing data for the separate types of indicators for tourism demand, especially in terms of time.

A greater part of the existing indicators are inconsistent in time and they lack enough data which would allow the building of sufficiently long time series (Dimitrov, 2010) (Stankova, 2010) (Filipova, 2010) (Pencheva, 2010).

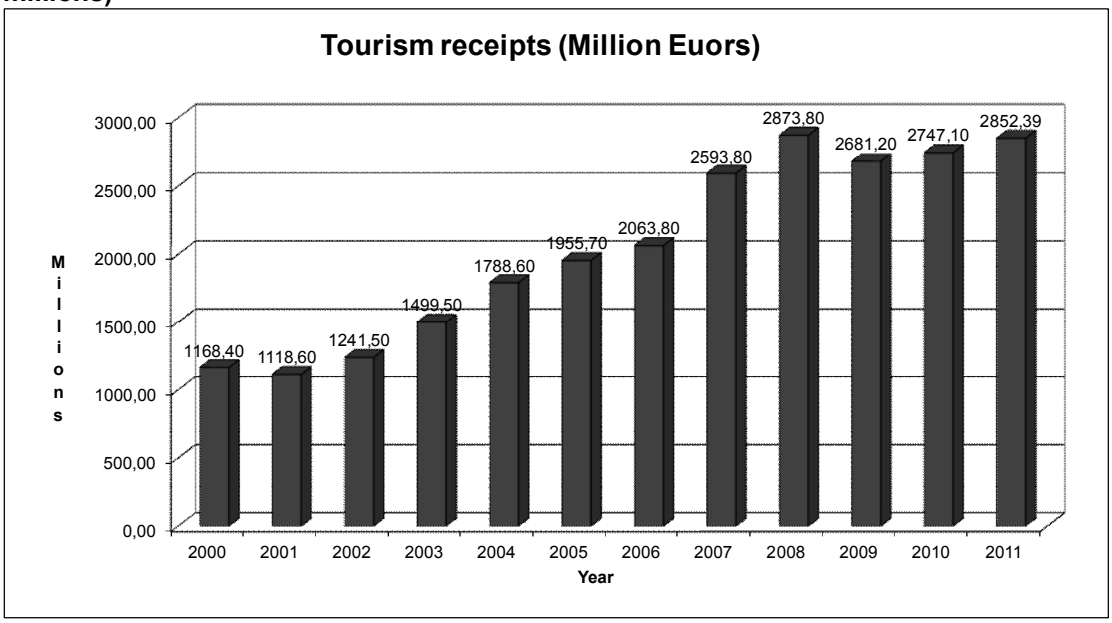
Here one could refer to certain indicators such as the “number of the tourism arrivals” or the “volume of the tourism receipts”, which was calculated for different periods of time in different currencies – non-denominated Bulgarian leva, US dollars, German marks and Euros. In the end of 1990s the Republic of Bulgaria adopted the UNWTO definition of these very same indicators and continued

collecting statistical data up the scope of these definitions.

Taking into account the annual data available for the indicator "volume of the tourism receipts", one can build a time series of 12 time periods (Graphic 3) – from 2000 to the last year with recorded value 2011.

The second problem of determining the times series pattern, or the so-called times series' "forecast profile" is usually solved by the comparing the times series in regard with a pre-set classification of exponential smoothing methods or the derived form them forecast profiles in terms of development curves. As Hyndman, Koehler, Ord and Snyder point out (Hyndman et al., 2008:11-12), this classification of smoothing methods originated with Pegles' taxonomy (Pegles, 1969:311-315).

Graphic 3: Volume of tourism receipts in Bulgaria for the time period 2000 – 2011 (in millions)



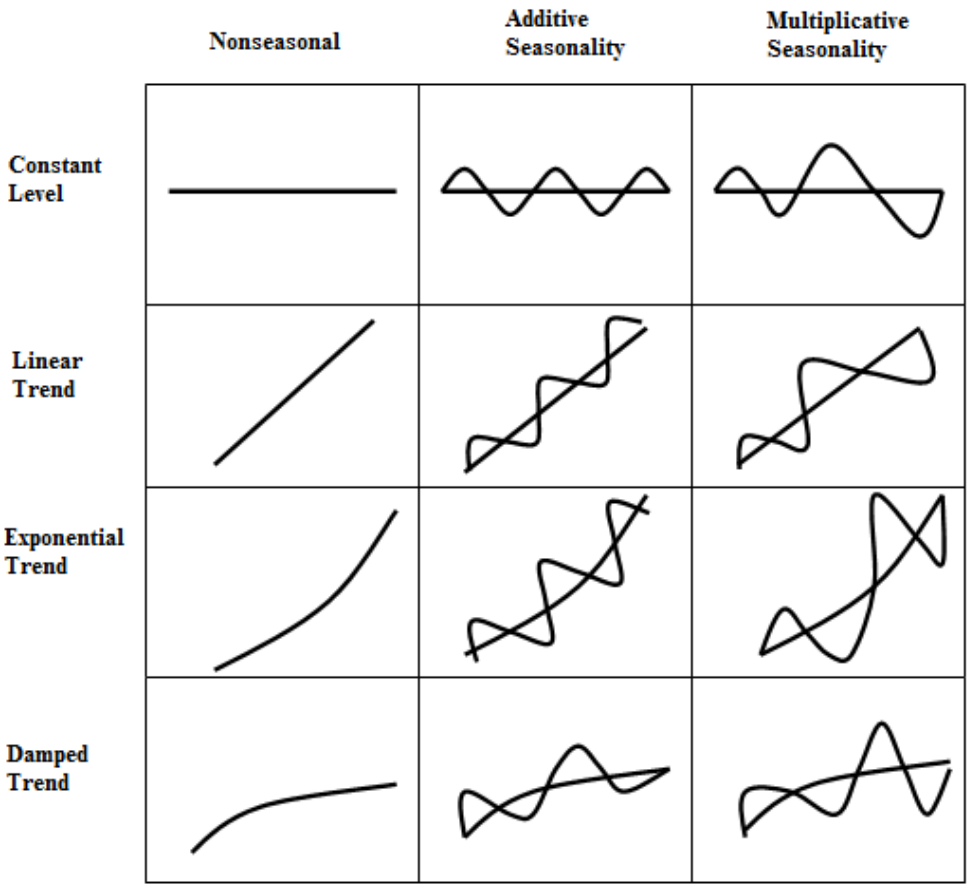
Source: Dimitrov, P., 2012, based on data provided by the Bulgarian National Statistical Institute (2011 a) (2011 b) and the Ministry of Economy, Energy and Tourism (2011)

Table 1: Classification of forecasting methods

Trend component	**Seasonal component**		
	N (None)	**A** (Additive)	**M** (Multiplicative)
N (None)	**N,N**	**N,A**	**N,M**
A (Additive)	**A,N**	**A,A**	**A,M**
A_d (Additive damped)	**A_d,N**	**A_d,A**	**A_d,M**
M (Multiplicative)	**M,N**	**M,A**	**M,M**
M_d (Multiplicative damped)	**M_d,N**	**M_d,A**	**M_d,M**

Source: Hyndman et al. (2008), p.12

Graphic 4: Forecast profiles from Exponential Smoothing Models by Gardner (1987)



This was later extended by Gardner (Gardner, 1985:1-28) and modified by Hyndman et al. (2002, 2008) and extended by Taylor (Taylor, 2003:715-725) giving a classification set of fifteen models (Table 1).

A simple visual comparison of the times series of the volume of tourism receipts for the time period 2000 – 2011 with the Gardner's classification shows out that these particular time series comes into the "linear trend, non-seasonal" profile. Of course with the help of more sophisticated statistical analysis, such as the linear trend estimation by the use of the least squares method and etc., it can be also proved that these very same time series comes into the "A,N" variation of a Taylor's patterns of forecasting methods that requires the presence of a trend but with no seasonal components.

The finding that the time series of the **of the volume of tourism receipts for the time period 2000 – 2011**correspond to the "linear trend, non-seasonal" profile and require the "A,N" variation of exponential forecasting methods makes **the third problem, the one of selecting and using of a suitable forecasting exponential smoothing method** much more predetermined and easier to solve. As both Gardner and Hyndman et al. point out this profile corresponds to the method of **double exponential smoothing** in the presence of a linear trend, known as **the**

Holt's method. The mathematical notation of this method is as follows:

- The smoothing of **the level (the base) – "L"**:

(1) $$L_t = \alpha Y_t + (1-\alpha)(L_{t-1} + T_{t-1})$$
$$0 \le \alpha \le 1$$

- The smoothing of **the trend – "T"**:

(2) $$T_t = \beta(L_t - L_{t-1}) + (1-\beta)T_{t-1}$$
$$0 \le \beta \le 1$$

- The achieving of **the final forecast "F_{t+m}" for "t+m" periods ahead in the future:**

(3) $$F_{t+m} = L_t + mT_t \text{ ,}$$

Where:
„α" and „β" are the smoothing constants for the level and the trend respectfully which could take values between 0 and 1.

In this situation, it would be useful if the selected method for forecasting through exponential smoothing – the method of the double exponential smoothing (the Holt's method) is tested in different values of the smoothing constants „α" and „β" in order to minimize the forecast error. One of the criteria for this minimizing could be the mean absolute percentage of error (MAPE). For the purpose of visualization of the results from the different forecast methods for past and future periods, as well as the extent of achieved error (in comparison of the forecast values with the actually observed ones for the past periods of time), these results are presented in table and graphic form in Table 2and Graphic 5. As it is obvious from the table and the both graphics, the existing statistical software products could be used for defining of an optimal best-fit forecast model, i.e. for defining of the optimal values of the smoothing constants (used for calculations in column VI of Table 2 and for plotting the black dotted forecast curve in Graphic 5). Of course, the inherent capacities of the statistical software products in this regard should not be overestimated and over-praised.

Table 2, Graphic 5 and 6 provide also a solution for the third and the fourth problems set for solving in the present paper, i.e. **iii "Calculating of long-run forecasts for the value of the above-mentioned general indicator (up to the year 2023)"; and iv "Comparing the results of the forecast techniques (the forecast models) on the basis of the errors in the forecasts"**.

Based on the results in Table 2 and Graphic 5, one can outline **two major types of forecasts** for the number of the foreign visitors with recreation and holiday aims **for 2022**, as follows:

- A pessimistic forecast (the forecast with the lowest value) – calculated by the method of the one-parameter double exponential smoothing with α=β=0.10: **4 234 000 000 Euros tourism receipts**;

- An optimistic forecast (the forecast with highest value) – calculated by the method of the one-parameter double exponential smoothing with α=β=0.30: **5 105 000 000 Euros tourism receipts**.

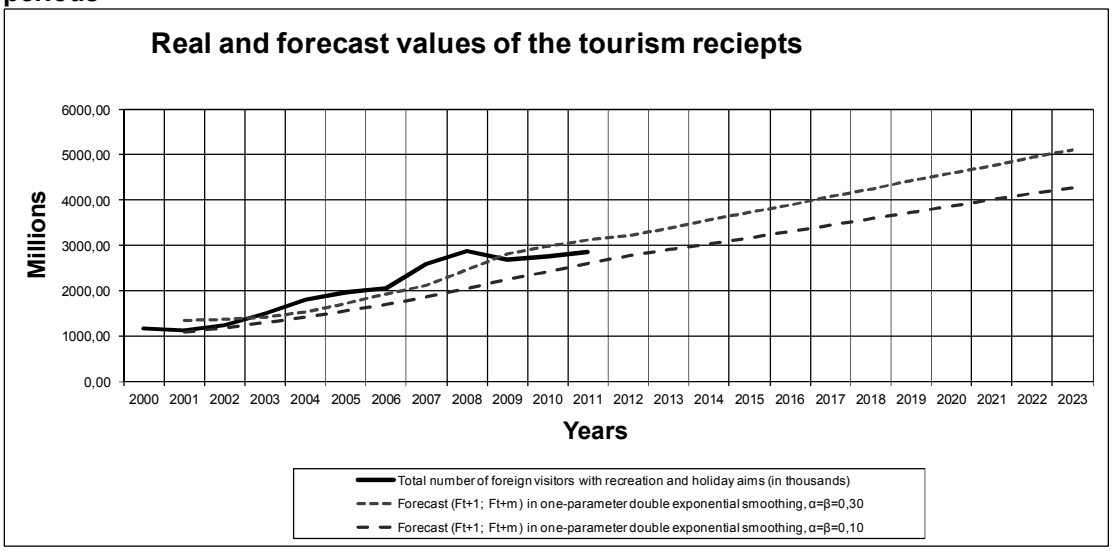
All these forecasts, as well as the forecasts presented in Table 2 and Graphic 5, have one major disadvantage – they are produced for the general indicator "volume of tourism receipts", which means that it refers to the whole of Bulgarian tourism industry and not to the sub-sector of ecotourism and the part of which belong to the small rural and mountainous municipality of Stambolovo. In order to overcome this disadvantage and solve **problem (v) "estimating the size of the ecotourism sector of the Municipality of Stambolovo, so that the forecast(s) of the general indicator could be particularized especially for the needs of the municipality"**, a certain modification is needed.

Table 2: Calculating of long-run forecasts – through three variations of the double exponential smoothing (the Holt's method)

		Level initilization (L0=Y1)	Trend initilization (T0=Y2-Y1)				
		1119	123				
Year number of foreign visitors	Total number of foreign visitors with recreation and holiday aims (in thousands)	The Level (L) in one-parameter double exponential smoothening, α=0,30	The Trend (T) in one-parameter double exponential smoothing, α=β=0,30	Forecast (Ft+1; Ft+m) in one-parameter double exponential smoothing, α=β=0,30	The Level (L) in one-parameter double exponential smoothening, α=β=0,10	The Trend (T) in one-parameter double exponential smoothing, α=β=0,10	Forecast (Ft+1; Ft+m) in one-parameter double exponential smoothing, α=β=0,10
2000	1168,40						
2001	1118,60	1220	116	1336	986	97	1083
2002	1241,50	1271	97	1367	1087	98	1184
2003	1499,50	1330	85	1415	1190	98	1288
2004	1788,60	1440	93	1533	1310	100	1410
2005	1955,70	1610	116	1726	1448	104	1552
2006	2063,80	1795	137	1932	1592	108	1701
2007	2593,80	1971	149	2120	1737	112	1849
2008	2873,80	2262	191	2453	1923	119	2042
2009	2681,20	2579	229	2808	2126	128	2253
2010	2747,10	2770	218	2988	2296	132	2428
2011	2852,39	2916	196	3112	2460	135	2595
2012		3034	173	3206	2621	138	2758
2013				3379			2896
2014				3552			3034
2015				3724			3171
2016				3897			3309
2017				4070			3446
2018				4242			3584
2019				4415			3722
2020				4587			3859
2021				4760			3997
2022				4933			4135
2023				5105			4272

Source: Dimitrov, P., 2012, based on data provided by the Bulgarian National Statistical Institute (2011 a) (2011 b) and the Ministry of Economy, Energy and Tourism (2011)

Graphic 5: Plotting of the results from the forecast methods for past and future time periods



Source: Dimitrov, P., 2012, based on data provided by the Bulgarian National Statistical Institute (2011 a) (2011 b) and the Ministry of Economy, Energy and Tourism (2011)

One way of doing so is by the use of a weight coefficient which shall indicate the share of the foreign visitors with intention to practice ecotourism in the municipality of Stambolovo. Or, as it has been mentioned in the initial part of this paper, an estimation of the sizes of the Bulgarian spa and wellness tourism is needed to make the above general indicator more particularized (task v). Thus, equation (3) can be modified into equation (4), as follows:

$$(4) \quad F_{t+m}^{et} = K_{lm} K_{et} \left(L_t + mT_t \right),$$

Where:

K_{et} is the coefficient of the share of foreign visitors with ecotourism aims (Table 3).

K_{lm} is the coefficient of the share of foreign visitors with aims to practice and experience tourism at the local tourism receiving market of the municipality of Stambolovo (Table 4).

Neither the Bulgarian National Statistical Institute (NSI), nor the Bulgarian Ministry of Economy, Energy and Tourism, nor any other Bulgarian government institution keeps a regular statistical record of the foreign visitors with ecotourism tourism aims. However, as it was already pointed in Graphic 2, there are six consequent surveys on the foreign visitors in both the winter and conducted by the different market research companies in Bulgaria. These six surveys, though based on samples of approximately 3000 foreign citizens visiting Bulgaria, provide two sets of important figures: (i) a percentage shares of the foreign visitors practicing ecotourism activities in the months of the winter tourism season and (ii) a percentage share of the foreign visitor practicing spa and wellness activities in the months of the summer tourism season. Based on these two sets of figures, a model for calculating the K_{et} (the coefficient of the share of foreign visitors with ecotourism aims) can be built (Table 3).

Table 3: K_{et} calculation model

Ecotourism, agregate percentage shares:							Average % share of the observed periods - Ket
Calculation periods / Tourism subtype	2007 year	2008 year	2009 year			2010 year	
	Summer 2007	Summer 2008	Winter 2009	Summer 2009	Autumn 2009	Spring 2010	
Ecotourism	4,20	18,30	10,30	6,60	9,00	10,00	
Total:	**4,20**	**18,30**	**10,30**	**6,60**	**9,00**	**10,00**	
Annual average:	**4,20**	**18,30**			**8,63**	**10,00**	**10,28**

Source: Dimitrov, P., 2012, Data by the Bulgarian Ministry of Economy, Energy and Tourism (2011)

The model (Table 4) for calculating the coefficient of the share of foreign visitors with aims to practice and experience tourism at the local tourism receiving market of the municipality of Stambolovo (K_{lm}) is based on the data provided for: (i) the last observed percentage value of the foreign visitors in the region in regard to their overall number (i.e. the size of the market segment of the region, Graphic 1) (ii) The last recorded non-rounded value in the time series of the number of the foreign visitors with recreation and holiday aims (Graphic 3); and (iii) the last recorded value of the tourism arrivals in the municipality of Stambolovo, as pointed in the beginning of the present paper.

Table 4: The model for calculating the coefficient of the share of foreign visitors with aims to practice and experience tourism at the local tourism receiving market of the municipality of Stambolovo (K_{lm})

The last observed percentage value of the foreign visitors in the Rodopi region in regard to their overall number (i.e the size of the market segment of the region)	The last recorded non-rounded value in the time serries of the number of the foreign visitors with recreationa and holiday aims	The number of the foreign visitiors with recreation and holiday aims who visited the Rodopi region (I x II)	The last recorded value of the tourism arrivals in the municipality of Stambolovo	The % value of Klm for the municipality of Stambolovo (III/IV)
I	II	III	4	5
13,00%	4484248	582952	1592	0,27%

Source: Dimitrov, P., 2012, Data by the Bulgarian Ministry of Economy, Energy and Tourism (2011) and the municipality of Stambolovo

The models, presented in Table 4 and 5, have of course many weak points. The first consideration in this regard is the fact that the coefficient K_{et} is calculated on the assumption that it will remain constant in value throughout all the forecast periods. The only reason for accepting of such a rough assumption is the scarcity of statistical records on which to build a separate model for the development of the coefficient in the course of time. The second week point is that the coefficient K_{et} is calculated on the basis of data received from sample surveys, which on the other hand are conducted by different companies and thus there are: (i) probability errors in the data collected; and (ii) some, though not quite big, differences in the size of the samples and in the methodologies of surveys. The third week point comes in the fact that due to the already mentioned lack of previous data only four consequent years

have been used for the calculation of the coefficient K_{et}. Despite all these weak points, the model for calculating of K_{et} helps to overcome the entire lack of regular statistic data for the ecotourism in Bulgaria. As for the model for calculating the coefficient K_{lm}, it is quite a simplified way for acquiring the share of foreign visitors with aims to practice and experience tourism at the municipality of Stambolovo by multiplication and extrapolation of the existing data.

Having calculated the values of K_{et} and K_{lm} and using equation (4), as well as the data in Graphic 3 and 5 and Table 2, the forecasts of the volume of the ecotourism receipts to Bulgaria for 2022 can be easily made. An even simpler way to do some of the necessary calculations is to multiply the already presented pessimistic and optimistic forecasts for the general indicator "number of foreign visitors with recreation and holiday aims" by the decimal value of K_{et}, i.e. 0.1028 and the decimal value of K_{lm}, i.e. 0.0027 respectfully, as follows:

- The pessimistic forecast for 2023 (the forecast with the lowest value) calculated by the method of the one-parameter double exponential smoothing with α=β=0.10:

F^{et}_{T+22} = 0.1028 x 0.0027 x 4 234 000 000 = 1 175 189.04 Euros receipts from ecotourism aims;

- The most optimistic forecast (the forecast with highest value) – calculated by the method of the one-parameter double exponential smoothing with α=β=0.30:

F^{et}_{T+22} = 0.1028 x 0.0027 x 5 105 000 000 = 1 416 943.8 receipts from ecotourism.

4. CONCLUSIONS

The presented pessimistic and optimistic and lowest MAPE level forecasts for the volume of the ecotourism receipts in the municipality of Stambolovo suggest that by 2023 it will vary roughly between 1 175 189.04 and 1 416 943.8 Euros. The management of the municipality, however, believes that these forecasts for quite low level of tourism receipts can be overcome by using EU funds for building of a local tourism information centre, which could also assist the local tourism industry in preparing and planning of its advertising and promotion campaigns.

The presented in the paper forecasting technology, though having many shortcomings, could be applied also for municipalities and other regional units in other countries, which have unsteady and insufficient statistical records on their ecotourism. The main precondition for using this forecasting technology is to have a sustainable time series of a general tourism indicator such as "volume of the tourism receipts" and at least some clue about both the size of the ecotourism as a part of this very same indicator and the size of the incoming in the municipality tourism cash flows.

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