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FORECASTING THE NUMBER OF SPORT TOURISM ARRIVALS IN SOUTHWEST BULGARIA

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ABSTRACT

This paper presents an application of some forecasting methods concerning sport tourism arrivals in Southwest Bulgaria: linear trend forecasting, double exponential forecasting (Holt's method), triple exponential forecasting (the Holt-Winters Method), and the ARIMA method. A specially designed model for estimating the weight coefficient needed for determining the size of the sport tourism's sector in the time series of the available data and in the forecast values is presented. In order to test the forecasting methods and produce forecasts up to the year 2030, a time series and past period predictions have been constructed based on statistical records since 1964. Several major problems in the application of the exponential smoothing methods for the purpose of the long-run forecasting and the needs of the sport tourism subsector of Bulgaria tourism industry are addressed. These problems include (a) finding a suitable general indicator, (b) calculating short-term and long-term forecasts, (c) comparing the results of the forecast techniques on the basis of the errors in the forecasts, (d) estimating the size of the sport tourism in Southwest Bulgaria in certain terms so that the forecast(s) of the above-mentioned general indicator could be particularized especially for examined sub-sector and region. The results from the different forecasting methods and techniques are presented and conclusions are drawn regarding the reliability of the forecasts.

Keywords: sport tourism, forecasting, economic cycles.

Objectives

Over the past 15 years, the Bulgarian tourism industry experienced positive growth followed by the negative impacts of the world financial and economic crisis and the Russian-Ukrainian conflict of 2014. Bulgaria, however, succeeded in achieving positive

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results in certain subsectors of its tourism industry, such as the sports industry, and has recently lined up in the top three suppliers of sport services in Europe alongside France and Romania.

Fluctuations in the international tourism markets still provoke hesitations in the investment decisions of a significant number of the investors in the Bulgarian tourism industry (i. e., banks, investment funds, and holding companies). Furthermore, a significant decrease in the number of the Russian and Ukrainian tourists in 2014 led to a 30 to 50% decrease in the occupancy rate of the Bulgarian Black Sea summer hotels. The fear that this decrease may spread to the winter and sport subsectors of the Bulgarian tourism industry has brought additional uncertainty to the investors' decisions. This uncertainty and fear of negative outcomes could be diminished to some extent if there were convincing and comparatively accurate long-term forecasts for what will happen in the coming 10 to 15 or 16 years especially regarding the best performing sub-sectors of the Bulgarian tourism, such as sport tourism.

The task of creating a forecast model for the long-term development of the tourism industry in Bulgaria has to address five major problems: (a) finding a suitable general indicator; (b) selecting a suitable forecasting method; (c) calculating short-run and long-run forecasts; (d) comparing the results of the forecast techniques on the basis of the errors in the forecasts; and (e) estimating the size of sport tourism in Southwest Bulgaria in certain terms so that the forecast(s) of the above-mentioned general indicators could be particularized, especially for the regarded sub-sector and region.

Methodology and Main Results

With regard to the first problem of regarding the difficulties in finding a general suitable indicator to make the forecast, the existing data lack reliability and sustainability concerning the separate types of indicators for tourism demand, especially time. Most of the existing indicators are inconsistent in time and lack enough data, which would allow the building of sufficiently long time series (Dimitrov, 2010; Stankova, 2010). The sole indicator that would allow a comparatively long and sustainable time series is the "number of foreign visitors with recreation and holiday aims," which continues to be recorded by both the former State Tourism Agency (now Bulgaria's Ministry of Tourism) and the Bulgarian National Statistical Institute as a part of the "number of the foreign citizens visiting Bulgaria with tourism aims." Taking into account the annual data available for the indicator "number of foreign visitors with recreation and holiday aims," one can build a time series of 50 time periods (Graphic 1) from 1964 to the last year of recorded value, 2014.

A more detailed visual review of the regarded time series, on the basis of the fluctuations maxima and minima, shows that there are several types of cycles inherent in the time series: (a) the Kitchin cycles of 3 to 5 years (Kitchin, 1923), (b) the Juglar cycles of 7 to 11 years (Juglar, 1862), (c) the Labrus Cycles of 10 to 12 years (Kuzyk & Yakovets, 2006), and (d) the Kuznets cycles of 15 to 25 years (Kuznets, 1930). This finding can be further used in the process of selecting the proper forecasting technique.

The third problem of calculating short-run and long-run forecasts by each of the above mentioned forecasting methods, taking into account the inherent in the times series cycles, is achieved with the use of the mathematical notations (which does not

concern the present paper). The results of these calculations are presented in Tables 1 and 2 and in Graphics 3 and 4. Some additional clarifications follows.

Graphic 1: Number of foreign visitors in Bulgaria with recreation and holiday aims for the time period 1964 – 2015 (in thousands)

Source: Dimitrov & Stoyanova (2014), based on data provided by the Bulgarian National Statistical Institute (2014a) (2014b) and the Ministry of Tourism (2014)

First, the Holt method was tested in two variations: (a) a variation of the smoothing constants, $\alpha = \beta = 0.30$, following one of the recommendations of the World Tourism Organization (UNTWO) for this method; (b) a variation of the best-fit model, achieved through the use of the Statistical Package for the Social Sciences (SPSS® 18.0) software package.

Second, both SPSS® and STATISTCA® software packages have many limitations regarding the number of the time periods in cycles for which the forecast calculation can be made. Regarding the time series, best-fit calculation models could be achieved through the STATISTICA® only to forecast the presence of 3, 4, 6 and 8-year cycles in the use of the Holt-Winters method of the multiplicative and additive seasonality. Additionally, SPSS® allows the Holt-Winters method to be applied only for cycles of 12 time periods. This imposed the construction of additional MS Excel calculation tables, where forecast models were tested for the same type of cycles, as well as for the cycles with the length of 12, 20, and 24 years. Here, the set of smoothing constants used for making the necessary calculations was $\alpha = 0.2$, $\beta = 0.4$, and $\gamma = 0.6$.

Table 1. Results for the forecasting calculations of the number of foreign visitors with recreation and holiday aims by the use of the various forecasting methods achieved through SPSS® and STATISTICA® (best-fit models)

Year	Linear Trend	Holt (Best-fit model)	ARIMA	Holt-Winters(different number of period in the cycles, p),Best-fit models									
				Multyplicative seasonality (cyclicity)					Aditive seasonality (cyclicity)				
				A, M p=3	A, M p=4	A, M p=6	A, M p=8	A, M p=12	A, A p=3	A, A p=4	A, A p=6	A, A p=8	A, A p=12
2015	4341	4607	4768	4534	4570	4632	4317	4694	4565	4581	5415	4379	4456
2016	4416	4681	4769	4538	4579	4521	4636	4382	4629	4645	5525	4540	4491
2017	4490	4755	5043	4803	4911	4882	5067	5718	4798	4863	5551	4832	4945
2018	4564	4829	5160	4799	4876	4876	5173	5719	4830	4875	5500	4982	5047
2019	4638	4903	5277	4799	4910	5117	5331	5459	4895	4924	5486	5192	5035
2020	4712	4977	5396	5073	4914	5040	5422	5183	5063	4988	5795	5257	5071
2021	4786	5051	5516	5065	5263	5142	5347	5173	5096	5205	5925	5340	4988
2022	4860	5125	5638	5059	5219	5010	5183	4988	5160	5217	4977	5204	4937
2023	4934	5199	5760	5344	5251	5400	4926	5260	5329	5267	5286	5052	5120
2024	5008	5273	5884	5330	5248	5385	5279	5183	5361	5331	5415	5212	5216
2025	5082	5347	6009	5320	5615	5641	5757	5418	5426	5548	5525	5504	5443
2026	5156	5421	6135	5614	5563	5548	5866	5480	5594	5560	5551	5654	5422
2027	5230	5495	6262	5595	5591	5652	6033	5473	5627	5609	5500	5864	5346
2028	5304	5569	6391	5581	5583	5498	6125	5099	5691	5674	5486	5929	5381
2029	5378	5643	6520	5885	5968	5918	6029	6641	5860	5891	5795	6012	5835
2030	5452	5717	6651	5861	5907	5894	5834	6631	5892	5903	5925	5876	5937

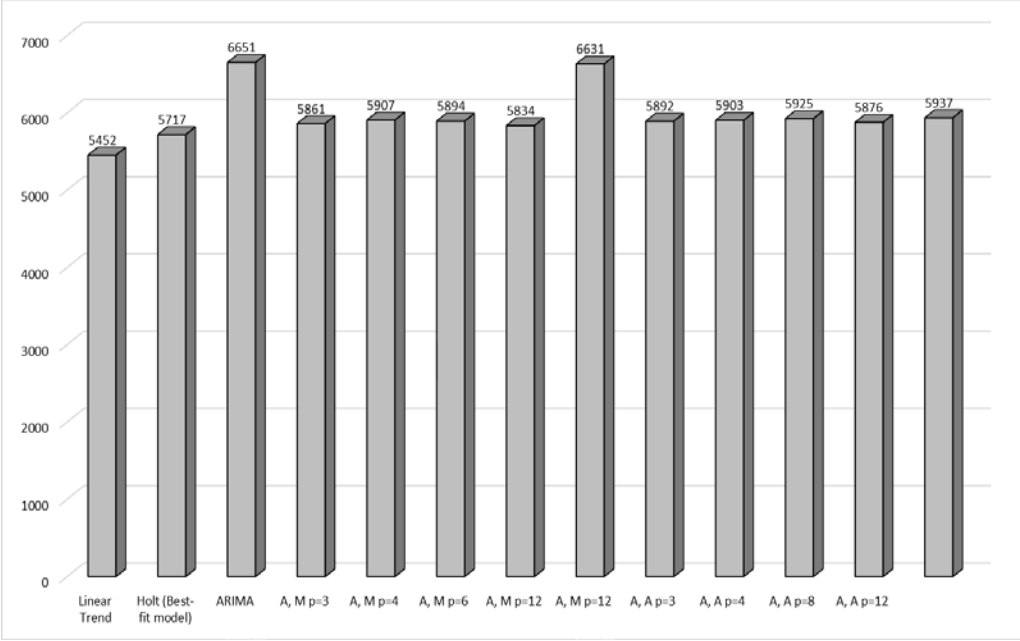
Source: Dimitrov & Stoyanova (2014) based on data provided by the Bulgarian National Statistical Institute (2014a) (2014b) and the Ministry of Tourism (2014)

Table 2. Results for the forecasting calculations of the number of foreign visitors with recreation and holiday aims by the use the Holt-Winters method in multiplicative and additive seasonality versions with α = 0.2, β = 0.4 and γ = 0.6

Year	Holt-Winters(different number of period in the cycles, p), α=0,2 β=0,4 γ=0,6															
	Multyplicative seasonality (cyclicity)								Aditive seasonality (cyclicity)							
	A, M p=3	A, M p=4	A, M p=6	A, M p=8	A, M p=10	A, M p=12	A, M p=20	A, M p=24	A, A p=3	A, A p=4	A, A p=6	A, A p=8	A, A p=10	A, A p=12	A, A p=20	A, A p=24
2015	**4534**	**4503**	**4632**	**3860**	**4789**	**4020**	**5173**	**2731**	**4565**	**4492**	**4480**	**4050**	**4729**	**4214**	**4174**	**3580**
2016	**4538**	**4713**	**4521**	**3886**	**4380**	**3753**	**4390**	**2364**	**4629**	**4724**	**4467**	**4294**	**4562**	**4324**	**3947**	**3505**
2017	**4803**	**4664**	**4882**	**3967**	**4695**	**4679**	**4804**	**4608**	**4798**	**4666**	**4776**	**4094**	**4683**	**4704**	**4079**	**4331**
2018	**4799**	**4605**	**4876**	**4335**	**5215**	**4907**	**4625**	**5372**	**4830**	**4599**	**4905**	**4407**	**4885**	**4860**	**3955**	**4499**
2019	**4799**	**4639**	**5117**	**4683**	**5164**	**4804**	**4934**	**5888**	**4895**	**4628**	**5016**	**4690**	**4790**	**4781**	**4083**	**4577**
2020	**5073**	**4855**	**5040**	**4875**	**4819**	**4819**	**5329**	**5232**	**5063**	**4860**	**5042**	**4816**	**4801**	**4911**	**4276**	**4357**
2021	**5065**	**4803**	**5142**	**5059**	**4891**	**4421**	**5973**	**5965**	**5096**	**4802**	**4990**	**4984**	**4713**	**4501**	**4517**	**4497**
2022	**5059**	**4742**	**5010**	**4685**	**4677**	**4373**	**6133**	**6009**	**5160**	**4735**	**4977**	**4744**	**4612**	**4592**	**4661**	**4381**
2023	**5344**	**4775**	**5400**	**4074**	**5083**	**4633**	**6875**	**6635**	**5329**	**4764**	**5286**	**4373**	**5129**	**4770**	**4944**	**4517**
2024	**5330**	**4997**	**5385**	**4100**	**5392**	**4797**	**4660**	**7399**	**5361**	**4996**	**5415**	**4617**	**5376**	**4965**	**5347**	**4718**
2025	**5320**	**4942**	**5641**	**4184**	**5681**	**5170**	**4672**	**8577**	**5426**	**4937**	**5525**	**4417**	**5574**	**5242**	**5475**	**4969**
2026	**5614**	**4878**	**5548**	**4570**	**5181**	**4928**	**4438**	**9112**	**5594**	**4870**	**5551**	**4730**	**5407**	**5054**	**5499**	**5121**
2027	**5595**	**4912**	**5652**	**4904**	**5538**	**4468**	**4471**	**10580**	**5627**	**4899**	**5500**	**5013**	**5527**	**4886**	**5472**	**5413**
2028	**5580**	**5138**	**5498**	**5136**	**6135**	**4167**	**4894**	**12135**	**5691**	**5131**	**5486**	**5139**	**5729**	**4997**	**5798**	**5652**
2029	**5885**	**5081**	**5918**	**5329**	**6058**	**5191**	**4496**	**13288**	**5860**	**5073**	**5795**	**5307**	**5634**	**5376**	**5349**	**5685**
2030	**5861**	**5014**	**5894**	**4933**	**5640**	**5438**	**4342**	**13694**	**5892**	**5006**	**5925**	**5067**	**5645**	**5532**	**5434**	**5820**

Source: Dimitrov & Stoyanova (2014), based on data provided by the Bulgarian National Statistical Institute (2014a) (2014b) and the Ministry of Tourism (2014)

Graphic 2 Forecast values of the number of foreign visitors with recreation and holidays aim in Bulgaria for the year 2030 achieved by the use of the various forecasting methods achieved through SPSS® and STATISTICA® (best-fit models)

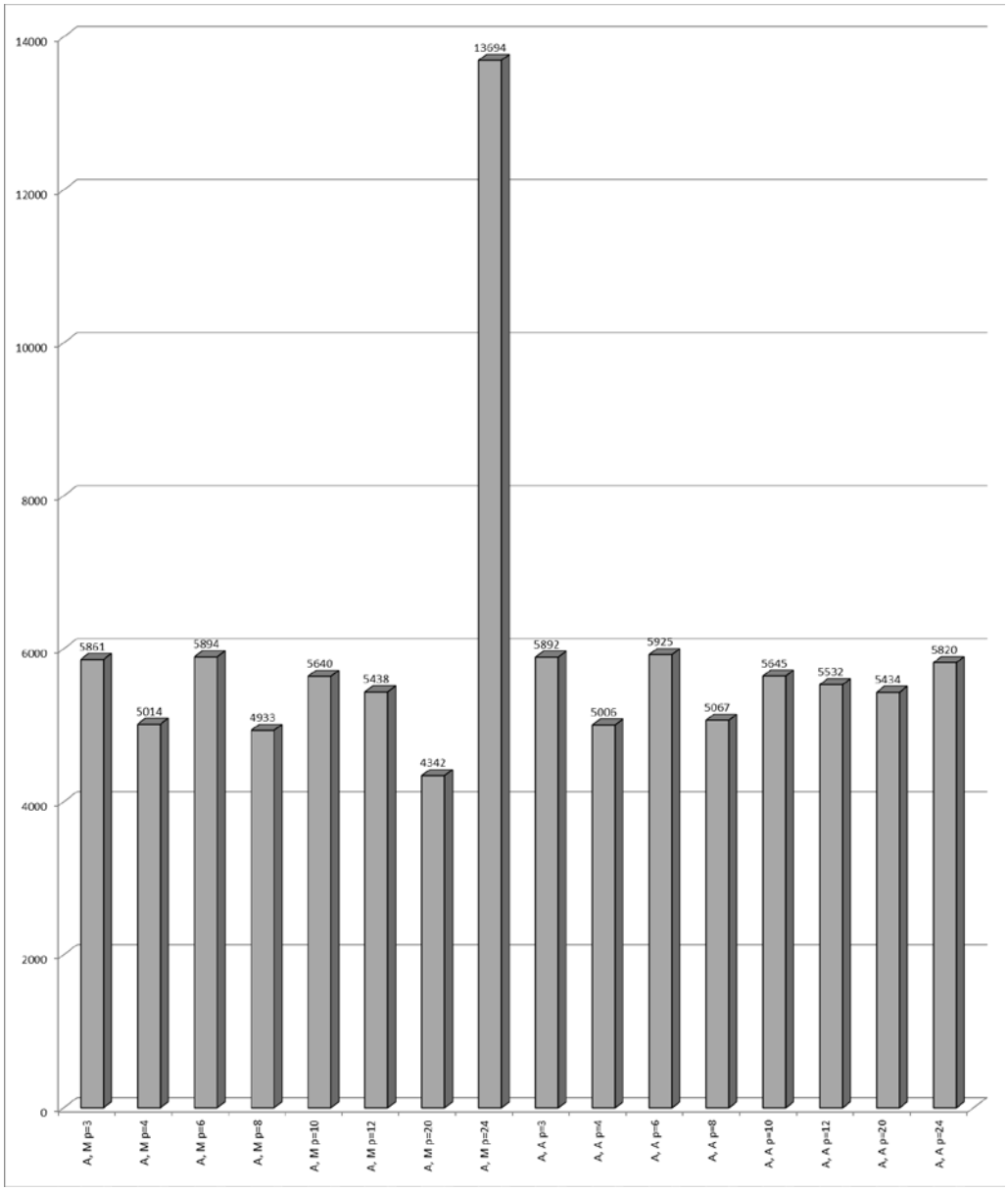


Source: Dimitrov, P. & M. Stoyanova (2014), based on data provided by the Bulgarian National Statistical Institute (2014a) (2014b) and the Ministry of Tourism (2014)

Based on the results in Table 2 and 3, as well as on Graphics 2, 3, and 4, one can outline three major types of forecasts for the number of foreign visitors with recreation and holiday aims for 2030 as follows:

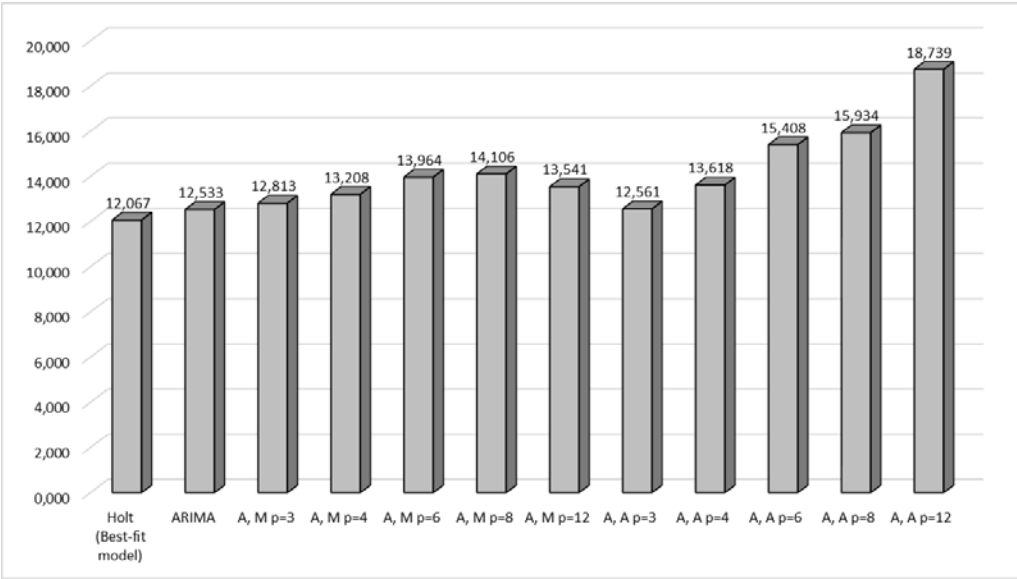
- The forecast with the lowest value (the most pessimistic forecast) calculated by the Holt-Winters exponential smoothing method for multiplicative seasonality and the presence of 20-year cycles was 4,321,000 foreign visitors;
- The forecast with the lowest mean (calculated with SPSS®) absolute percentage of error (MAPE=12.067) calculated by the Holt method was 5,717,000 foreign visitors;
- The most optimistic forecast (the forecast with the highest value) calculated by the Holt-Winters method in the presence of multiple seasonality and cycles of 24 time periods was 13,694,000 foreign visitors.

Graphic 3 Forecast values of the number of foreign visitors with recreation and holidays aim in Bulgaria for the year 2030 achieved by the Holt-Winters method in multiplicative and additive seasonality versions with α = 0.2, β = 0.4 and γ = 0.6



Source: Dimitrov & Stoyanova (2014), based on data provided by the Bulgarian National Statistical Institute (2014a) (2014b) and the Ministry of Tourism (2014)

Graphic 4 Values of the MAPE for the various applied forecasting methods



Source: Dimitrov & Stoyanova (2014), based on data provided by the Bulgarian National Statistical Institute (2014a) (2014b) and the Ministry of Tourism (2014)

After calculating the forecast values by the use of the different applied methods, a comparison of the forecast techniques results was made on the basis of their errors. The criterion that was applied was the indicator "Mean Absolute Percentage of Error" (MAPE) which compared the forecasts for the past values with the actually recorded values in the time series. The values of the MAPE for all of the regarded forecasting methods are provided in Graphic 4.

All these forecasts, as well as the forecasts presented in Tables 1 and 2 and in Graphics 3 and 4, have one major disadvantage: they are produced for the general indicator "number of foreign visitors in Bulgaria with recreation and holiday aims." This means that they refer to the Bulgarian tourism industry as a whole and not to the sub-sector of sport tourism and, more specifically, the part that belongs to the region of Southwest Bulgaria, or the so-called "Yugozapaden" (BG41) region, according to the Eurostat Agency NUTS 2 regions' classification. In order to overcome this disadvantage and solve the problem of (v) "Estimating the size of the sport tourism in Southwest Bulgaria in certain terms, so that the forecast(s) of the above-mentioned general indicator could be particularized especially in regards to these particular sub-sector and region of the country," a certain modification was needed.

The use of a weight coefficient, or a set of wait coefficients, can indicate the share of the foreign visitors with the intention of engaging in sport tourism in the Southwest Bulgaria (the Yugozapaden region). For the needs of the present study, a set of two coefficients was employed: one to indicate the share of the sport tourism in Bulgaria's overall tourism, and the second to indicate the share of the tourism in Southwest Bulgaria. This can be expressed through the following simple equation:

$$F^{st}_{t+m} = K_{yur} K_{st} \left(F_{t+m} \right), \quad (1)$$

Where:

F^{st}_{T+m} is the forecast for time period "T+1" for the number of foreign visitors with sport tourism aims;

K_{st} is the coefficient of the share of foreign visitors with sport tourism aims;

K*yur* is the coefficient for share of the tourism in the region of Southwest Bulgaria, or the "Yougozapaden" region;

and F_{T+m} is the forecast for the general indication of m periods ahead in the future.

Neither the Bulgarian National Statistical Institute (NSI), nor the Bulgarian Ministry of Tourism, nor any other Bulgarian government institution keeps a regular statistical record of the number of foreign visitors with sport tourism aims. However, there are several surveys on foreign visitors conducted by the market research companies "NOEMA," MBMD, and the "Sinesta" Consortium in Bulgaria, as well as by the tourism association BUBSPA (2012), the company "Holiday Planet" (2013), as well as by some university researchers such as Kazandzhieva (2014) and Stoyanova (2015). These surveys, though based on samples of approximately 3000 foreign citizens visiting Bulgaria, provide enough data for calculating an average value of the Kst (the coefficient of the foreign visitors with sport tourism aims) (see Table 3).

Table 3 Kst average calculation model

	Summer 2007	Summer 2008	Winter 2008	Summer 2009	Winter 2009	Spring 2010	
Golf tourism	1,900%			2,600%		3,000%	
Horse riding	1,400%						
Yachting	1,100%						
Hunting	4,000%	2,900%		1,400%	8,400%	4,000%	
Active sports				8,100%			Kts - % average
Fishing				5,500%		5,000%	
Skiing and snowboarding			73,200%		71,900%		
Extreme winter sports			20,200%		16,900%		
Visiting a sport event					0,700%		
Adventure tourism						11,000%	
Total annual values	8,400%	2,900%	93,400%	17,600%	97,900%	23,000%	40,533%

Source: Dimitrov, Daleva, & Stoyanova (2016), based on data provided by the Bulgarian National Statistical Institute (2014a) (2014b) and the Ministry of Tourism (2014)

As for the calculation of the coefficient indicating the share of the tourism in the South-West Bulgaria, a simpler approach can be taken. The Bulgarian National Statistical Institute keeps data on the receipts received from foreign visitors for their night stays in the separate regions of the country. For 2015, the volume of receipts from foreign visitors for night stays in the South-West Bulgaria (the Yugozapaden region) was 125,749,764 BGN (64,294,833.39 Euro), and the volume of the total receipts from the foreign visitors' night stays for the whole country was 728 046 828 BGN (or 372,345,332.17 Euro). Thus, just by simple division of this two figures produces a coefficient of 0.1727 or 17.27%, which can be considered as "K_{yur}" coefficient for the tourism share in the region of South-West Bulgaria, or the Yougozapaden region.

Having calculated the values of K_{st} and K_{yur} using equation (1), as well as the data in Chart 1 and 2 and Table 1, the forecasts of the foreign visitors' number with sport tourism aims to Bulgaria for 2030 can easily be made. An even simpler way to do some of the necessary calculations is to multiply the already presented pessimistic, most optimistic, and lowest MAPE level forecasts for the general indicator "number of foreign visitors with recreation and holiday aims" by the decimal value of K_{st} and K_{yur} (i.e. 0.40533 and 0.1727) as follows:

- The pessimistic forecast for 2030 (the forecast with the lowest value) – calculated by the linear trend equation method:

F^{st}_{T+m} = 0.40533 x 0.1727 x 4 321 000 = 302,472.12 foreign visitors with sport aims;

- The forecast (calculated by the use of SPSS) with the lowest mean absolute percentage of error (MAPE) calculated by use of the Holt best-fit model:

F^{st}_{T+m} = 0.40533 x 0.1727x 5 717 000 = 400,192.81 foreign visitors with sport aims;

- The most optimistic forecast (the forecast with highest value) calculated by the method of the one-parameter double exponential smoothing with $\alpha=\beta=0.30$:

F^{st}_{T+m} = 0.40533 x 0.1727 x 13,694,000 = 958,586.72 foreign visitors.

Conclusions

The pessimistic, most optimistic, and lowest MAPE level forecasts for the number of foreign visitors in Bulgaria with the objective of engaging in sport tourism, suggest that 2030 will vary roughly between 302,000 and 958,000. Thus, the steady growth of the Bulgarian sport tourism industry will continue with the presence of certain fluctuations which however will not endanger the positive long-term investment decisions in this subsector.

Although they have many shortcoming, the forecasting methods presented in this paper could be applied to other countries, which have unsteady and insufficient statistical records on sport tourism. The main precondition for using this forecasting technology is to have a sustainable time series of a general tourism indicator such as "number of foreign visitors" and at least some clue about the size and impact of cultural tourism on this very same indicator. This clue could be produced out of a market research or as a by-product of another type of economic study.

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