SHORT-RUN FORECASTING OF ARRIVALS AND REVENUE FLOWS IN BULGARIAN TOURISM INDUSTRY

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Abstract: At the present seven years the Bulgarian tourism industry has reached a stage not just of a positive growth but also of a true bubbling. And this provides not only opportunities but also threats to the development of the Bulgaria's tourism companies. An economic myopia at this stage of development could later be paid at a very high price by the Bulgarian tourism sector. Therefore, the necessity of the modern tourism industry to perform more flexibly to the surrounding business environment in both national and global scale makes the situation survey and analysis useful and practical survival tools. The present papers focus on the opportunities provided by the short-run forecasting of arrivals the revenues earned by the Bulgarian tourism industry. It also regards the methodology that should be used to make the forecasting of the tourism situation indicators more accurate and precise, and the results more understandable by the Management of the tourism companies. The main short-run forecasting techniques, which are applied, include (i) the naïve (simple) forecasting; (ii) the moving average; and (iii) the exponential smoothing. Two consequent forecasts, using these techniques, of the arrivals and revenues being presented: one for 2007 and one for 2008. Thus real error estimations are being calculated and opportunities for improvement of the forecasting models are provided.

Key words: *Short-run forecasting, Forecasting techniques, Tourism Industry, Tourism arrivals, Tourism Revenues*

At the present seven years the Bulgarian tourism industry has reached a stage not just of a positive growth but also of a true bubbling. And this provides not only opportunities but also threats to the development of the Bulgaria's tourism companies. A rigidness at this stage of development could later be paid at a very high price by the Bulgarian tourism sector. Therefore, The necessity of the modern tourism industry to perform more flexibly to the surrounding business environment in both national and global scale makes the short-run situation survey and analysis useful and practical survival tools.

Table. 1. Foreign Citizens' Arrivals by aim of visit[1]

Year	**2000***	**2001**	**2002***	**2003***	**2004***	**2005***	**2006***	**2006/2007**
								% Change
TOTAL	**4922118**	**5103797**	**5562917**	**6240932**	**6981597**	**7282455**	**7499117**	**+2.98%**
TOURISM	**2785079**	**3185684**	**3433276**	**4047863**	**4629854**	**4837150**	**5158117**	**+6.64%**
- Holliday & relaxation	2354052	2755717	2992590	3531567	4010326	4090421	4364557	+6.70%
- Visiting friends	35487	25571	23998	28656	40467	48898	62927	+28.69%
- Business	177933	183988	180138	215760	271857	340039	331845	-2.41%
- Other	217607	220408	236550	271880	307204	357792	398788	+11.46%
Transit	**2137039**	**1918113**	**2129641**	**2193069**	**2351743**	**2445305**	**2341000**	**-4.27%**
Number of travels abroad of the Bulgarian citizens								
TOTAL	**2336738**	**2730473**	**3188384**	**3403402**	**3881693**	**4234866**	**4180357**	-1.29%

*excluding the children registered in their parents' passports

[1] Source: Bulgarian State Agency of Tourism, "Tourism Policy" Directorate (January – December 2006 data online report).

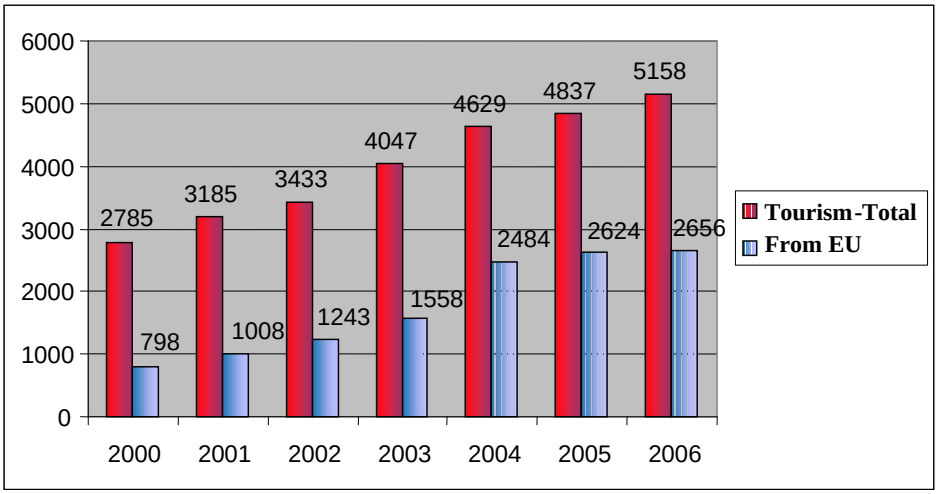


Chart 1. Number of Foreign Visitors, who have declared "Tourism" as a Main Aim of Their Visit – In Total and from EU (in thousands) for the period 2000 – 2006

The main issue in the short-run surveys is the one of forecasting the main indicators describing the situation on the tourism market(s), i.e. the size of the disposable income available for tourism consumption; the number of the tourism arrivals in a certain destination; the price of the tourism products; the volume of the sale, regarded both as main and additional services provided and etc. The forecasting of these vary same tourism market variables can be performed by the use of several forecasting models, several forecasting methods, i.e. the naïve method, the moving average and the exponential smoothing.Before revealing the nature of each of the above-mentioned forecasting models or methods, some words need to be said on process of forecasting itself.

Forecasting procedures involve extending the past experience into the future. The assumption, as John Hanke and Arthur Reitsch state [6, p.698], is that the condition that generate the historical data are indistinguishable from the conditions of the future, except for those variables explicitly recognized by the forecasting model. To the extent that the assumption is not met, a forecast will inaccurate unless is modified by the judgment of the forecaster.

Recognition that forecasting techniques operate on data generated by historical events leads to the identification of the following steps in the forecasting process:

1. Data collection and reduction;
2. Model building;
3. Model evaluation;
4. The forecast elaboration.

Often the most challenging part of the forecasting process is obtaining the proper data and making sure they are correct. If the data are not appropriate or are incorrect, the forecast will be inaccurate.

Model building means finding the appropriate model to use with the collected data. The simpler the model, the better the chances that the forecasting process will gain acceptance by tourism companies' managers who must make decisions. Often a balance must be struck between a sophisticated forecasting approach that offers more accuracy and a simple approach that is easily understood by a tourism company's decision makers.

The naïve forecasting methods: The easiest methods for forecasting a time series variable concerning the tourism markets are the so-called naïve methods. They are intuitively appealing and are widely used by the managers in the tourism industry, especially in USA [6, p.701], either consciously or subconsciously. The simplest naïve method uses the value for the current period as the forecast for the next period. Equation 6 expresses this simple model.

(1) $$F_{T+1} = Y_T,$$

where:
F_{T+1} is the forecast for time period "T + 1";
Y_T is the Y value for time period "T".

The problem with this simple model is that it does not take trend or seasonality of the data into consideration. However, if the data have a trend, a naïve model can be that takes into consideration the increase or decrease from one period to another. Also, if the data are seasonal, just like the situation in the tourism industry, a model can be developed the forecasts, for example, this year's tourist arrivals for June as the June arrivals from last year.

If a tourism company has been in business less than three years, the large amounts of data required for advanced forecasting models are not available. Naïve models are frequently used in situations where a new tourism business has not had time to develop a useful historic data.

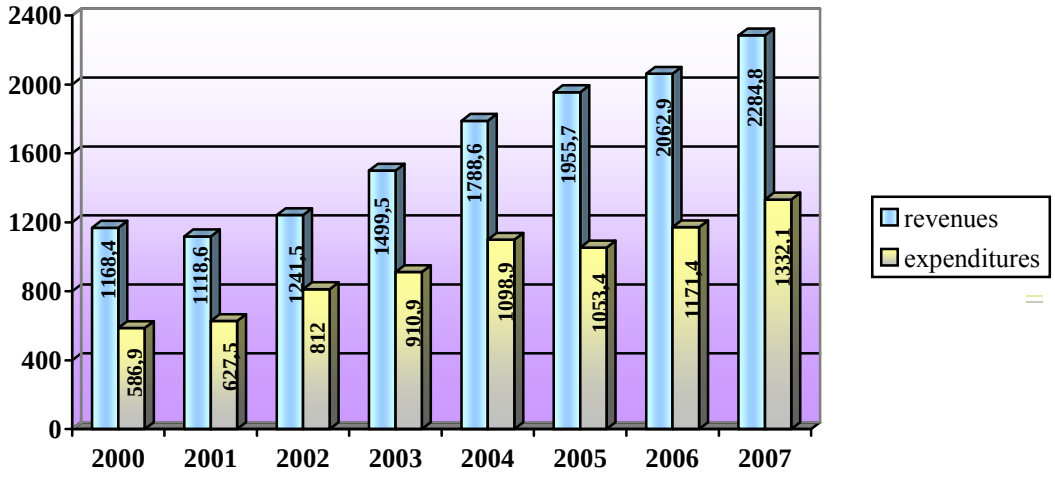
The moving average model uses the averages of several past time period as the forecast for the next period. In practice, the analyst must decide how many past periods to average. A trial-and-error process is often used to find the number of periods that would be best in minimizing the error; this process amount to comparing the model's predictions against the known values of the recent periods. The term *moving average* implies that as each new observation becomes available, a new mean is computed by dropping the oldest value used in the average and adding the newest one. This new mean is the forecast for the next period. Equation 7 is used to compute moving average forecasts.

(2) $$F_{T+1} = \frac{(Y_T + Y_{T-1} + Y_{T-2} + ... + Y_{T-m+1})}{m},$$

where:
F_{T+1} is the forecast for time period "T+1";
Y_T is Y value for time period "T";
m is the number of terms in the moving average.

Exponential smoothing: The disadvantage of the moving average process is that, regardless of how many time periods are used, every value is assumed to contribute equally to the forecast. In most actual situations, this is not a realistic assumption. Rather the forecast should usually rely most heavily on the most recent value, on the value before that, and so on.

The exponential smoothing technique uses a weighted average of past time series to arrive at a smoothed forecast.



The data for the revenues and the expenditures of international tourism in the current account of the balance of payment for the period 2001 – 2007 were revised in 2007 by the Bulgarian National Bank (BNB)

Chart 2. International Tourism in Bulgaria – Balance of payments (in Million Euros)[2]

Exponential smoothing is so named because the weights attached to past time periods in forming the forecast decline exponentially. That is, the weights decrease rapidly at first and then less and less and so as the time period becomes older. The weight attached to a particular value approaches, but never quite reaches, zero. This method generates accurate forecasts for many time series variables, recognizing the decreasing impact of past times periods as they fade further in the past. The weights are "A" for the most recent observation, "A(1-A)" for the next most recent, $A(1-A)^2$ for the next and so forth. An exponential smoothing forecast is formulated using Equation 3.

(3) $$F_{T+1} = AY_T + (1-A)F_T \text{ ,}$$

where:

F_{T+1} is the forecast for time period "T+1";

Y_T is Y value for time period "T";

A is the smoothing constant, a value between 0 and 1;

F_T is the average experience of the series smoothed to period "T", or forecast value for period "T".

Equation 8 calls for combining two values in preparing the forecast: the most recent value for the time series "Y_T", and the average experience of the series smoothed to period "T", "F_T". The forecast is a weighted average of these two values. The smoothing constant "A" is the weight attached to the most recent observation in the series. When "A" is close to 1, the new forecast will be greatly affected by the most recent observation. When "A" is close to 0, the new forecast will be very similar to the old one.

[2] Source: Bulgarian State Agency on Tourism, 2007

The smoothing constant “A”, is the key to the use of exponential smoothing. If forecasts need to be stable and random variations smoothed, a small “A” is required. If a rapid response to a real change in the pattern of observation is desired, a larger value of “A” is appropriate. Most exponential computer packages, such as “Matlab”, “SPSS”, “E-Views” and etc., find the optimal smoothing constant by minimizing the sum of square errors:

(4) $$SSE = \sum e_T^2 \ .$$

So, by using the two of the above-revealed forecasting techniques, namely the moving average and the exponential smoothing, an attempt will be made to forecast the number of the foreign tourists visiting Bulgaria for 2007. For this purpose, the time series, presented in Table 1 and Chart 1,is to be used.

The results of the forecasts are presented in Table 2.

Table 2. Forecasts of number of foreign tourists visiting Bulgaria annually for 2007

Variable / Year	Number of tourists	Number of terms ("m") in the MA	Exponential smoothing constant "A"
2000	**2785079**		
2001	**3185684**		
2002	**3433276**		
2003	**4047863**		
2004	**4629854**		
2005	**4837150**		
2006	**5158117**		
Summation	**28077023**		
Time series average	**4011003**		
Moving Average Forecast 2007	**4875040**	3	n.a.
Exponential Smoothening Forecast (1): 2007	**4871339**	n.a.	0,75
Exponential Smoothening Forecast (2): 2007	**4986050**	n.a.	0,85
Exponential Smoothening Forecast (2): 2007	**5100761**	n.a.	0,95

The moving average forecast for 2007 is 4875040 thousand foreign tourists, which if true shall lead to a strong decrease in number of tourist expected to come in Bulgaria, quite unlikely as result for this year.

As for the exponential smoothing model one can see that, when the smoothing constant “A” moves closer to 1, the exponential smoothing forecast shows a possible slight decrease or standstill in the number of the foreign tourists that are expected to come in Bulgaria for 2007 to **5100761** thousands. This is due mainly to the fact that the rate of increase in the number of the foreign tourists is steadily falling for the last three years.

Similarly, by using the moving average and the exponential smoothing, a forecast can be made for the volume of the revenues expected by the Bulgarian tourism industry in 2007. For this purpose, the time series, presented in Chart 2, is to be used. The results are shown in Table 3.

Table 3. Forecasts for tourism revenues in Bulgaria for 2007

Variable / Year	Tourism revenues (in Million Euros)	Number of terms ("m") in the MA	Exponential smoothing constant "A"
2000	**1168,4**		
2001	**1118,6**		
2002	**1241,5**		
2003	**1499,5**		
2004	**1788,6**		
2005	**1954,8**		
2006	**2061,4**		
Summation	**10832,8**		
Time series average	**1548**		
Moving Average Forecast 2007	**1935**	**3**	n.a.
Exponential Smoothening Forecast (1): 2007	**1933**	n.a.	**0,75**
Exponential Smoothening Forecast (2): 2007	**1984**	n.a.	**0,85**
Exponential Smoothening Forecast (2): 2007	**2036**	n.a.	**0,95**

As it becomes obvious from Table 3, the forecast as per the moving average model for 2007 is 1 935 million euros, which, if true, could lead to a quite strong decline in the volume of tourism revenues in Bulgaria. And this is quite unlikely to happen for the year 2007.

As for the exponential smoothing model one can see that, when the smoothing constant "A" moves closer to 1, the exponential smoothing forecast shows a possible slight decrease or standstill in the volume of the tourism revenues in Bulgaria for 2007 to **2036 million Euros**. This is due mainly to the fact that the rate of increase in the volume of revenues earned by the Bulgarian tourism revenues is steadily falling for the last three years, as well.

Table 4. Forecasts of number of foreign tourists visiting Bulgaria annually for 2008

Variable / Year	Number of tourists	Number of terms ("m") in the MA	Exponential smoothing constant "A"
2000	**2785079**		
2001	**3185684**		
2002	**3433276**		
2003	**4047863**		
2004	**4629854**		
2005	**4837150**		
2006	**5158117**		
2007	**5151283**		
Summation	**33228306**		
Time series average	**4746901**		

Moving Average Forecast 2008	**5048850**	3	n.a.
Exponential Smoothing Forecast (1): 2008	**5050187**	n.a.	0,75
Exponential Smoothing Forecast (2): 2008	**5090626**	n.a.	0,85
Exponential Smoothing Forecast (2): 2008	**5131064**	n.a.	0,95

Similarly, the forecasting techniques of the moving average and the exponential smoothening in its three sub-cases may be applied when we have the real values for 2007 for both the tourism arrivals and the tourism revenues (Table 4 and Table 5) in order to receive forecasted values for year 2008.

Table 5. Forecasts for tourism revenues in Bulgaria for 2008

Variable / Year	Tourism Revenues (in million Euros)	Number of periods ("m") in the moving average	Smoothing exponential constant "A"
2000	**1168,4**		
2001	**1118,6**		
2002	**1241,5**		
2003	**1499,5**		
2004	**1788,6**		
2005	**1954,8**		
2006	**2061,4**		
2007	**2284,8**		
Sumation	**13117,6**		
Average for the time series	**1640**		
Moving average forecast - 2008	**2100**	3	n.a.
Exponential Smoothing Forecast (1): 2008	**2124**	n.a.	0,75
Exponential Smoothing Forecast (2): 2008	**2188**	n.a.	0,85
Exponential Smoothing Forecast (3): 2008	**2253**	n.a.	0,95

This consequent application of the forecasting models can also serve as a comparison for estimating the error in the forecasts (Table 6).

As it can be seen from the comparison Table 6, the smallest error “e” occurs in the case of the exponential smoothening forecasting, when an smoothening constant of “0.95” is

applied. And this observation is valid for both the "Tourism arrivals" and the "Tourism revenues" variables.

Table 6. Forecasting techniques error comparison

	Number of tourists (Forecasted values)	Number of tourists (Real value):	Extent of error observed "e":
Moving Average Forecast 2007	4875040	5151283	**-276243**
Exponential Smoothening Forecast (1): 2007, A=0.75	4871339	5151283	**-279944**
Exponential Smoothening Forecast (2): 2007, A=0.85	4986050	5151283	**-165233**
Exponential Smoothening Forecast (2): 2007, A=0.95	5100761	5151283	**-50522**
	Tourism Revenues (in million Euros – forecasted values)	**Tourism Revenues (in million Euros – real values)**	**Extent of error observed "e":**
Moving Average Forecast 2007	1935	2284,8	**-349,8**
Exponential Smoothening Forecast (1): 2007, A=0.75	1933	2284,8	**-351,8**
Exponential Smoothening Forecast (2): 2007, A=0.85	1984	2284,8	**-300,8**
Exponential Smoothening Forecast (2): 2007, A=0.95	2036	2284,8	**-248,8**

However, the regarded forecasting by the use of the method of the exponential smoothening needs several of its important characteristics to be pointed out. First, this method is quite often prone to present forecasts with a certain decrease in the final, forecast value, on condition that initial and the median-located values of the time series are neither extremely high, and/or do not exceed significantly the most recent values of the time series. Second, the method is suitable for applying when a particular tourism market has reached a stage of "maturity". And at present there is a whore range of marks that the Bulgarian tourism market has reached such a stage.

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