Statistical and Land Planning Study of Tourist Arrivals in Greece during 2005-2016

Dimitra Alexiou

Abstract—During the last 10 years, in spite of the economic crisis, the number of tourists arriving in Greece has increased, particularly during the tourist season from April to October. In this paper, the number of annual tourist arrivals is studied to explore their preferences with regard to the month of travel, the selected destinations, as well the amount of money spent. The collected data are processed with statistical methods, yielding numerical and graphical results. From the computation of statistical parameters and the forecasting with exponential smoothing, useful conclusions are arrived at that can be used by the Greek tourism authorities, as well as by tourist organizations, for planning purposes for the coming years. The results of this paper and the computed forecast can also be used for decision making by private tourist enterprises that are investing in Greece. With regard to the statistical methods, the method of Simple Exponential Smoothing of time series of data is employed. The search for a best forecast for 2017 and 2018 provides the value of the smoothing coefficient. For all statistical computations and graphics Microsoft Excel is used.

Keywords—Tourism, statistical methods, exponential smoothing, land spatial planning, economy, Microsoft Excel.

I. INTRODUCTION

FOR reason of holiday, the purpose of tourism consists of the activities of people visiting and staying for a short time in diverse destinations that differ from their permanent place of residence. Tourism is a large scale global phenomenon, which has been prevalent since the 1950s. From its birth until today, tourism has changed its form and continues to evolve. For this reason, it is noted that the concept of tourism is quite difficult to formulate precisely because there is a plethora of definitions used to analyze it. Tourism stems from the temporary transfer of persons or groups to various tourist destinations (within a country or abroad) but also their stay in it. It is through tourism that people have the opportunity to visit and explore other areas in order to escape from their daily routine.

II. STATISTICS OF TOURIST ARRIVALS

Greece is one of the most popular holiday destinations, since it offers many kinds of activities throughout the year. It is one of the first tourist destinations because of its natural beauty, rich cultural heritage of archaeological sites, and special geographical location. Its selection is also a result of the desire for tourists to avoid other Mediterranean regions

Dimitra Alexiou (Assistant Professor) is with the School of Spatial Planning and Development Faculty of Engineering, Aristotle University of Thessaloniki, 54124 Thessaloniki (phone: +302310995934, e-mail: dimitraalexiou@plandevel.auth.gr).

with political conflict and security issues. Even in its period of economic crisis, which began in 2008, tourism in Greece was not negatively affected. On the contrary, there was an increase in arrivals particularly after the year 2012 [3]. Today, the economy of Greece is strongly impacted by tourism, an important source of revenue for the country. The development of tourism in specific Greek islands has had international appeal. This trend will continue to extend the number of future tourist arrivals from countries with large populations, in spite of far distances of their home countries. The economy of Greece is largely based on tourism, yielding benefits such as a decrease in unemployment, as new job positions are created in various service sectors, as well as in agricultural production and the building industry.

For the above reasons, the study of collected data with statistical methods can help decision makers to organize and plan for the future of development of tourist establishments with respect to locations and their particular usage.

TABLE I
NUMBER OF TOURIST ARRIVALS IN GREECE DURING 2005-2017

Year	Arrivals	Change	% of Change
2005	14388		
2006	15226	838	0.055
2007	16125	899	0.056
2008	15939	-186	-0.012
2009	14915	-1024	-0.069
2010	15006	91	0.006
2011	16427	421	0.003
2012	15517	-1910	-0.123
2013	17919	2402	0.134
2014	22033	4114	0.187
2015	23599	1566	0.066
2016	27500	3905	0.142
2017	**30500	3000	0.098

The arrivals of tourists in Greece, before the impact of the financial crisis, during the years 2005-2008, and the beginning the economic crisis, approximately 2010-2011, share a similar value with an arithmetic mean of **15,443** arrivals. However, during the period of 2013 and 2016, a continuous increase is observed with an arithmetic mean of **22,763** (see Table I) [6]. These figures show the statistical method which can be used to forecast possible future numbers of arrivals. The result reflects that Greece will maintain its competitive position among Mediterranean countries. The reasons for the increase of arrivals in the later years has been the climate and the excellent weather conditions in all regions of the country, the attractiveness of the destinations, particularly the beauty of the

Greek islands, the archaeological sites and their history, the customs and hospitality of the people and the significant adjustment in the pricing of tourist services.

Fig. 1 was constructed from the values of Table I, with the arrivals of each year and the computed change and percentage (%) of change from the previous year.
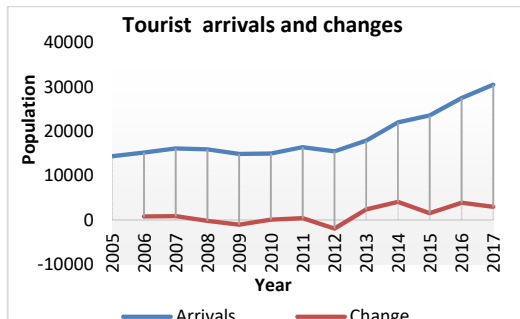

Fig. 1 Graph of Tourist Arrivals

III. STATISTICAL METHODS AND STATISTICS OF ARRIVALS AND FORECAST METHOD

In this paper, the following statistical methods have been used:
1. Table construction and graph presentation of data.
2. Line and bar graph of the data using MS Excel.
3. Computation of arithmetic mean and standard deviation with the formulas [1]:
   Arithmetic mean: $Xmean = \sum x_i / n$
   Standard deviation: $s = \sqrt{[(\sum x_i - Xmean)^2)/(n-1)]}$
4. Simple Exponential smoothing for the forecast of 'next year' arrivals and choice of the exponential parameter **α.**

Using the method of simple exponential smoothing [5], the forecasts of future values of the time series are computed as the weighted mean value of the time series values. The data used is the number of tourist arrivals at a given time period (year) t. Each value of the time series is Y_t, while the forecasted value of the time series for the next period is $\hat{Y}_{t+1}$ and is computed by the method of the Simple Exponential Smoothing with the formula.

$$\hat{Y}_{t+1} = \alpha Y_t + (1-\alpha) \hat{Y}_t \text{ for } t = 2,3,4, T$$

$\hat{Y}_t$ and $\hat{Y}_{t+1}$ are the forecast values and Y_t is the observed value in years t and t+1, while α is the exponential smoothing parameter, evaluated by trial and investigation from the minimum possible value of Mean Standard Error (MSE).

The formula for the Mean Standard Error (MSE) is:

$$MSE = \sum (Y_t - \hat{Y}_t)^2 / n$$

where n is the number of years for which the forecast is computed.

Applying the above theory, the results of the Simple exponential smoothing method with value of parameter **α = 0.9** are given in Table II and their graphical presentation given in Figs. 2 and 3.

TABLE II
TOURIST ARRIVALS, FORECAST AND MSE FOR 2006-2018

t	Year	Arrivals Y	(**)α = 0.9 FORECAST
1	2005	14388	
2	2006	15226	14388
3	2007	16165	15142.2
4	2008	15939	16062.72
5	2009	14915	15951.37
6	2010	15006	15018.64
7	2011	16427	15007.26
8	2012	15517	16285.03
9	2013	17919	16880.8
10	2014	22033	17815.18
11	2015	23599	21611.22
12	2016	27500	23400.22
13	2017	**30500**	27090.02
14	**2018**		**29709.01**

MSE =. (**) Forecast with Exponential smoothing method

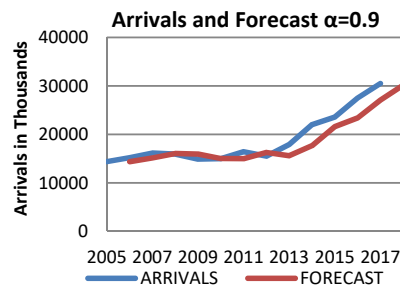If the forecast values are moved backwards one year, the results are very close to the obtained values:

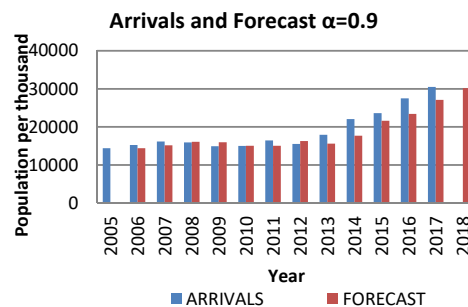Fig. 2 Line Graph of Tourist Arrivals and Forecast 2005-2017

Fig. 3 Bar Chart of Tourist Arrivals

IV. STATISTICS OF ARRIVALS CONCERNING THE CONTINENT OF ORIGIN

It is a fact that the country of origin of tourists is important, because according to the economic situation of each country, visitors spend money on their choice of tourist destinations. The following table is indicative of the continents of origin of tourists coming to Greece (see Table III, and graphs in Figs. 4 and 5).

184

TABLE III
TOURIST ARRIVALS TO THE CONTINENT OF ORIGIN 2008-2015

CONTINENT/ YEAR	2008	2009	2010	2011	2012	2013	2014	2015
EUROPE	14474	13601	13275	14651	13851	15778	19477	20715
ASIA	385	372	870	883	937	1213	1412	1515
AFRICA	58	39	44	38	37	39	49	62
AMERICA	849	729	691	720	559	754	890	1095
OCEANIA	160	161	126	135	133	143	205	212

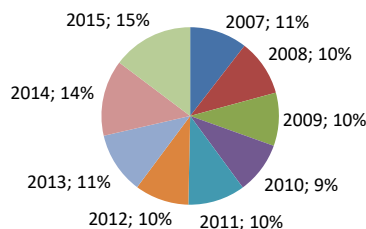Tourist arrivals from Europe
2007-2015

Fig. 4 Percentage of Tourist Arrivals

V. STATISTICS OF ARRIVALS CONCERNING THE COUNTRY OF ORIGIN

Many tables of the number of tourist arrivals have been published according to the following classification:

a) Continent and country of origin
b) Method of travel (Air, Sea, Train, Car)
c) Nights spent in different establishments
d) Expenditures during their stay
e) Regions and places of preference.

For this paper, the data presented in the publications of [2], [3] are used. In Table IV, the tourist arrivals for the years 2010 and 2014 are presented.

TABLE IV
COUNTRIES OF ORIGIN (HATZIDAKIS [5]) YEAR 2010 AND 2014

Country	2010	2014	Country	2010	2014	Country	2010	2014
Germany	2038	2459	UK	1802	2089	Bulgaria	664	1534
France	868	1463	Russia	451	1250	Italy	843	1117
Serbia	706	985	Turkey	561	976	Netherlands	528	657
USA	498	591	Poland	402	588	Romania	257	543
Albania	242	488	Cyprus	574	448	Belgium	339	409
Switzerland	274	377	Czech Rep.	294	347	Sweden	281	337
Austria	338	285	Norway	187	246	Denmark	240	240
Israel	197	197	Australia	108	183	Finland	206	166
Canada	113	145	Spain	155	136	Other	1830	3767

The total number of arrivals for the year 2010 is 15006 and for the year 2014 it is 22033. The respective change from the previous year is 0.6% for 2010 and 23% for 2014.

The above numbers show the tremendous increase of arrivals and the prospect of continuity in this respect in the coming years.

The percentage of arrivals of tourists from European countries is given in Fig. 6. Visitors from Germany, United Kingdom, Bulgaria and France hold first, second and third positions, respectively, reflecting a continuous increase of arrivals, while Italy is constant without such an increase.

TABLE V
FIRST EIGHT COUNTRIES OF ORIGIN (SEE [5]) 2008-2015

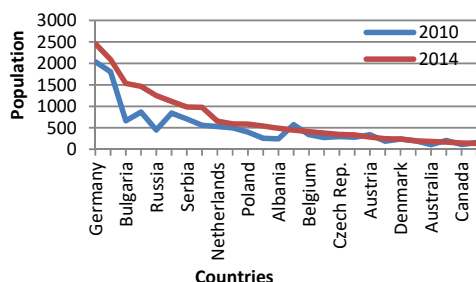| Country	2007	2008	2009	2010	2011	2012	2013	2014
Germany	2712	2469	2364	2038	2240	2108	2267	2459
UK	2509	2278	2112	1802	1758	1920	1846	2089
Italy	1252	1099	935	843	938	848	964	1117
France	991	910	962	868	1149	977	1152	1463
Bulgaria	701	623	657	664	686	599	691	1934
Serbia	553	686	498	706	692	620	778	
Netherlands	738	756	651	528	560	478	580	
USA	617	612	531	498	484	373	466	

Fig. 5 Country Origin of Tourist Arrivals 2010-2014

Concerning continents, the number of arrivals from Europe is very different in respect to all other continents. Table V shows the observed values during the years 2008-2015 [1].

From Table II, it is observed that tourism in Greece comes predominantly from Europe and especially from the EU-28 countries. Also, Asian and American countries choose Greece as a tourist destination, in spite of the fact that there is a difference of currencies. The numbers of tourists from

Oceania are smaller in number due to their geographical location, while the low numbers from Africa is due to low economic levels of their respective countries (Fig. 2).
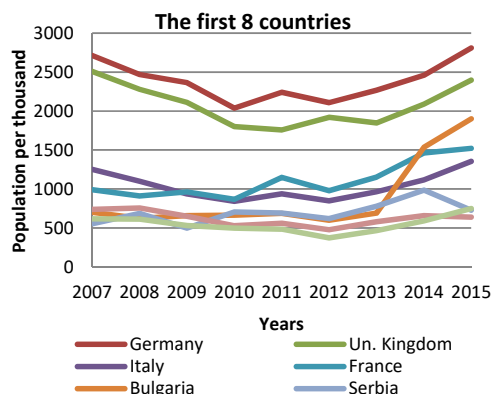
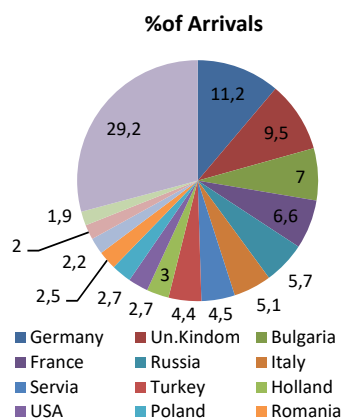

Fig. 6 Countries of Origin of Tourists 2007-2015

Fig. 7 Tourist Arrivals from European Countries 2014

VI. Statistics of Destination and Preference of Tourists

The Hellenic Statistical Authority (ELSTAT), the Greek Tourist Organization (EOT), the National Bank of Greece (NBoG), the Greek Tourism Confederation (SETE), the Organizations of Greek 13 Regions and the Institute of tourism research and forecasts (ITEP), annually collect and publish much statistical data [8].

Data for 2016 [7] shows that most tourists spent their holidays in places next to beaches on the coast of the mainland, the islands of the South Aegean, the Ionian Islands, Crete and the region of Attica where archaeological sites and nearby islands can fulfill the desires of every visitor. The Central Macedonian region (Table VI) is preferred, because beyond its beautiful islands and beaches, it is near to neighboring countries and is easily accessible by car from many European countries.

TABLE VI
PERCENTAGE OF NIGHTS SPENT (2013) AND ARRIVALS (2016)

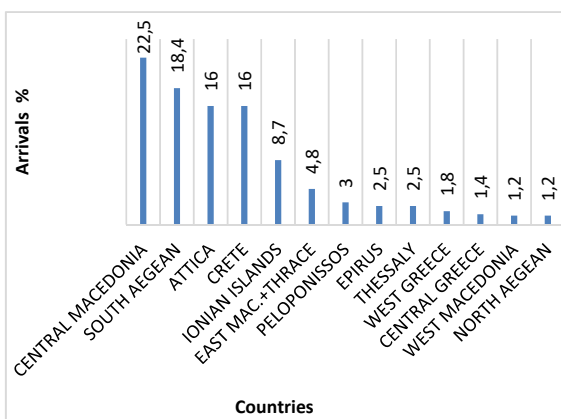| REGIONS	2013%	2016%
CENTRAL MACEDONIA	10.7	22.5
SOUTH AEGEAN	24.7	18.4
ATTICA	9.2	16
CRETE	28.7	16
IONIAN ISLANDS	11.0	8.7
EAST MACEDONIA +THRACE	2.4	4.8
PELOPONISSOS	3.2	3
EPIRUS	1.2	2.5
THESSALY	2.6	2.5
WEST GREECE	2.1	1.8
CENTRAL GREECE	1.7	1.4
WEST MACEDONIA	0.5	1.2
NORTH AEGEAN	2.1	1.2

Fig. 8 Percentage of Tourist Arrivals (2016) by region

The five regions hosting tourist arrivals are Attica, which includes Athens, Central Macedonia, including Thessaloniki, the Ionian Islands, including the island of Corfu, and the South Aegean which mainly includes the islands of Rhodes, Mykonos and Santorini. Frequently, these islands are a holiday destination for the same people. Furthermore important international events regarding fashion trends and symposium gatherings are performed so to attract many persons in order to combine their participation at these meetings concurrently with vacations.

VII. Conclusion

Tourism is one of the main economic industries in Greece. Greece is an island country with a Mediterranean climate and temperatures suitable for swimming and sun bathing from a period beginning at the start of April until the end of October. The computed forecast method presented here can be utilized by government authorities and private businesses in order to develop the necessary strategies to take advantage of the increase of tourist arrivals, and not only with regard to those from traditional European countries. In particular, marketing efforts should be guided for very large countries, such as USA, Russia and China. Relations with these countries should develop and dictate the terms of collaboration and economic

exchange.

Government decisions will develop the tourism industry and, therefore, the economy must be a continuous concern with respect to land planning, for all regions of the country, to make use of the natural resources and facilities for several types of tourism. Airports, ship ports, marinas, and ski resorts must organize and equip themselves with the best facilities in order to satisfy the ever increasing arrivals of tourists.

The country's tourism is ranked high among European destinations and should be maintained and improved annually.

Last but not least, it is meaningful to take advantage of the special forms of tourism for a specific purpose, such as in the mountain mainland regions.

REFERENCES

[1] Number of inbound travelers in Greece by country of origin ('000 of travelers), 2005-2013. Source SETE, based on data provided by the Bank of Greece, April 2014.
[2] Hatzidakis_2008-2015-touristiki kinisi.pdf.
[3] Hatzidakis_Analisi_Touristikis_kinisis_2001-2010.pdf.
[4] Ec.europa.eu/.../statistics.../Tourism_statistics_-_intra-EU_tourism_flows–30/06/2017
[5] Albright, S. C., Wiston, W. L., and Zappe, C. (1999) Data Analysis & Decision Making with Microsoft Excel, Duxbury Press, USA.
[6] Trends of tourist inbounds to Greece 2008-2015. Source ELSTAT.
[7] The five regions of Greece with the higher tourist figures in 2016. International Symposium on Hospitality and Tourism 23rd-27th October 2017.
[8] Greek Tourism developments – Prospects Synopsis. INSETE ISSUE 1, July 2016.

Dimitra Alexiou is Assistant Professor at the School of Land Planning and Development Engineering of the Faculty of Engineering of the Aristotelian University of Thessaloniki.

Her research and teaching interests concern Applied Mathematics, Statistics, and Graph theory related to Networks in Spatial Planning. Her research has been published in major academic journals.