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MEASUREMENT OF TOURISM MARKET PERFORMANCE IN EU COUNTRIES: RESULTS OF PROMETHEE - GAIA APPROACH

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Abstract

Tourism is one of leading economic activities in the EU, which significantly contributes to economic development. In order to achieve a sustainable, responsive and high-quality tourism development, it is necessary to plan a strategy that will efficiently use and intensify the processes of tourism development in the EU. The variations in the types and needs of the tourists and the tourist industry impose a multi-dimensional approach to the study of the tourism market. This paper implements a simple methodology for measuring the performance of the EU tourism market using an integrated model for ranking-PROMETHEE model. Based on the eight criteria defined in relation to the performance of the tourist market, the ranking of the 28 EU countries will be carried out. The results of the model will point to the evaluation of the tourism market performance and will define the recommendations and strategies for the tourism market development in relation to the countries that have the best rank.

Key Words: *tourism, performance, EU countries, PROMETHEE - GAIA*
JEL classification: Z32, Z38

Introduction

Due to the impact of economic, social and political globalization processes tourism has become one of the leading industries in many countries. Today, tourism has grown from one small activity to an activity that is crucial for the economic growth and development of a country. If

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we look at the statistics of the World Tourism Organization, we will notice that the dynamics of tourism changed and increased rapidly between 2005 and 2016. In 2016, the arrivals of international tourists amounted to 1235 million, compared to 809 million in 2005. All this led to the total tourism revenues of 1102 billion euro in 2016. According to UNWTO's long-term forecast, international tourist arrivals worldwide are expected to increase by 3.3% a year between 2010 and 2030 and to reach 1.8 billion by 2030 (UNWTO, 2017).

Europe is one of the leading tourist destinations. In order to achieve a sustainable, responsive and high-quality tourism development, it is necessary to plan a strategy that will efficiently use and intensify the processes of tourism development in the EU. However, the tourist product is not just one product, it is a complex package of goods and services that tourists buy. The variations in the types and needs of the tourists and the tourist industry impose a multi-dimensional approach to the study of the tourism market.

The aim of this paper is to present a PROMETHEE based differential multi-criteria approach for objective measurement and assessment of tourism performance at EU level presented by country. The paper is organized as follows: Section 1 describes literature about tourism in EU. Section 2 briefly summarizes a description of applied PROMETHEE method of eight indicators for 28 countries in a 4-year period, while a discussion of the study's results is contained within Section 3. Section 4 draws some conclusions and recommendations on the research presented.

Literature review

Tourism is undoubtedly one of the important economic activities. In addition to the economic ones, tourism provides social, cultural and political benefits for a tourism oriented country. A number of authors pointed out that tourism is one of the important economic activities of all countries in the world (Ardahaey, 2011; Hagiú & Tanascovici, 2012; Zsarnoczky, 2017; Sofronov, 2017, Milićević & Petrović, 2017 etc.)

Many authors highlighted the European Union as an important tourist destination. For example, author Zsarnoczky, (2017) stated that the European Union is currently the world's leading destination and is aimed at maintain its position. The EU is a good example of using new technologies, innovations and new tourist trends. Also, author Mićović

(2017) pointed out that the EU is gradually developing the legislation, procedures, methods and everything that can encourage greater involvement of capital in tourism in order to create a common tourist market.

Numerous empirical studies on international tourism have been undertaken to explain the impact of tourism and to assess tourism performance. For example authors Santana et al. (2016) investigated the impact of the Economic and Monetary Union on international tourism flows across a set of 37 developed countries. This sample comprises 31 European countries and six non-European OECD countries during the period 1995–2012. They explored potential tourism gains for new members and possible entrants of adopting the euro. Authors Barros et al. (2011) analyzed the competitiveness of French destinations based on their accommodation possibilities, natural resources and historical monuments. Results showed that there are several drivers of efficiency for French tourism: sea, sun, Theme Parks, Monuments, Museums, Ski Resorts and Natural Parks as long attractions which can increase the tourists' length of stay.

Results of the author Zurub et al. (2010) showed that tourism is the main economic activity in most EU developed economies. In case of these countries, tourism is not only a basic activity, but also an activity that affects economic growth, as it drives the productivity of other sectors, the creation of infrastructure and accelerates the reproduction cycle.

Empirical evidence about ranking countries considering tourism performance is also important for our paper. Nowadays, sustainable tourism is a relevant topic. Environmental protection is one of the basic and fundamental European values (Voza et al., 2016). Also, authors Bradic et al. (2017) stated that international tourism policy should aim at improving existing infrastructure, extending the season, and promoting alternative forms of tourism, such as eco tourism, health tourism in line with positive ecological performance. Bearing that in mind, authors Anastasijević et al. (2017) applied Promethee method with an aim to determine the tourism sustainability progress in European countries in the period of 2004-2014. According to numerous parameters of sustainable tourism, they concluded that some countries such as Czech Republic, Germany, Hungary and Sweden, have enhanced their sustainability performance concerning all themes. Sustainable tourism in its basic sense implies an economic branch that minimizes the impact on the

environment and local culture (Pavlović et al., 2009). Also, authors Michailidis & Chatzitheodoridis employed Promethee method to evaluate and rank three tourism destinations in Greece. Promethee method applied on tourism market in Greece also use author Andreopoulou et al (2014). They assess internet and e-marketing adoption for the sustainability of rural tourism enterprises. The same methodology was used by the author Kovačić (2010) for selecting the location of a nautical tourism port. This paper applies a similar methodology as the author Ranjan et al. (2016) who used PROMETHEE to quantify the tourism potential of 29 Indian states.

PROMETHEE-GAIA method and data

Methodology

Given that the issue of tourism market performance falls within multi – criteria analysis domain, a set of criteria needs to be reduced to a single criterion in order to properly compare data. Such a possibility is provided by PROMETHEE & GAIA methodology, developed by the Canadian company *Visual Decision* by Brans and Mareschal (Brans et al, 1986). PROMETHEE introduces a MCDM (Multiple-criterion decision-making) methodology based on the analysis of criteria and alternatives so that one alternative is better than the other and so the best alternative is the most appropriate choice according to the given criteria.

PROMETHEE method starts with the following decision (evaluation) matrix (Ranjan et al., 2016):

$$\begin{bmatrix} g_1(a_1) & g_2(a_1) & \dots & g_j(a_1) & \dots & g_n(a_1) \\ g_1(a_2) & g_2(a_2) & \dots & g_j(a_2) & \dots & g_n(a_2) \\ \dots & \dots & \dots & \dots & \dots & \dots \\ g_1(a_i) & g_2(a_i) & \dots & g_j(a_i) & \dots & g_n(a_i) \\ \dots & \dots & \dots & \dots & \dots & \dots \\ g_1(a_m) & g_2(a_m) & \dots & g_j(a_m) & \dots & g_n(a_m) \end{bmatrix} \quad (1)$$

where $g_j(a_i)$ shows the performance of i^{th} alternative on j^{th} criterion, m is the number of alternatives and n is the number of criteria.

The usage of PROMETHEE method requires defining the appropriate preference function and assigning the weight criteria to each input variable. In this method it is possible to choose one out of six forms of the

preference function (Usual, U-shape; V-shape; Level, Linear, Gaussian) where each form could be described with two thresholds (Q and P). The indifference threshold (Q) represents the largest deviation which the decision-maker considers not to be important, while the preference threshold (P) represents the smallest deviation that is considered to be crucial for the decision making. The P value should not be smaller than Q. The Gaussian threshold (s) is representing the average value of P and Q thresholds (Brans,1982; Brans et al., 1984; Brans and Vincke, 1985; Obradović et al., 2012).

Ranking using preferences is the most commonly used method in making multi-criteria decisions. For each alternative (country), the alternative value is expressed in preferences, which have a positive and negative flow. Based on the calculated preference, the net flow of preference that synthesizes all indicators is calculated, and, based on that, the given alternative (country) is ranked (Despotović & Durkalić, 2017).

The net outranking flow for each alternative can be obtained using the following equation:

$$\varphi(a) = \varphi^+(a) - \varphi^-(a) \quad (2)$$

where $\varphi(a)$ is the net preference flow for each alternative. The value of the net flow of preferences ranges from -1 to 1, where the best ranked alternative will have the largest positive net preference flow, and the worst ranked alternative has the largest negative net flow of preference. The higher the value of $\varphi(a)$ means the better alternative.

Dataset

As an adequate method for solving multi-criteria problems, the PROMETHEE GAIA methodology aims to rank the final set of alternatives (in this case, countries) based on criteria to be maximized or minimized. In the case of this paper, there are eight criteria. Based on tourism performance indicators, with data from Eurostat, WB, World Factbook and literature review, this survey will use the following data to measure tourism market performance:

1. Number of foreign tourists, nights
2. Number of domestic tourists, nights
3. Number of hotels
4. Pollution
5. Population density
6. Rail lines

7. Cost of living
8. Number of airports

Indicators are calculated using the available statistical data of the relevant organizations and institutions, and all data sources are used to obtain the mentioned 8 indicators. The obtained statistical data will be used in the next step of the analysis – ranking of data and ranking of individual countries. The *Visual Promethee* program will be used for data ranking.

In this paper, the alternatives are the members of EU. Ranking will be done according to average data collected from 2012-2015, because the data for that years are available for all countries.

Table 1: *Data for performance evaluation of 28 EU states in tourism*

Indicator	Symbol	Source
Number of foreign tourists, nights	IT	Eurostat: Number, 1 night or over, outbound ¹
Number of domestic tourists, nights	DT	Eurostat: Number, 1 night or over, domestic ²
Number of hotels	H	Eurostat: Hotels and similar accommodation ³
Pollution	AP	World bank: PM2.5 air pollution, annual exposure (micrograms per cubic meter) ⁴
Population density	PD	World bank: Population density (people per sq. km of land area) ⁵
Rail lines	RL	World bank: Rail lines (total route-km) ⁶
Cost of living	CPL	Eurostat: Comparative price levels ⁷
Number of airports	NA	World Factbook: No airports ⁸

¹ http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=tour_dem_tntot&lang=en
² http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=tour_dem_tntot&lang=en
³ http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=tour_cap_nat&lang=en
⁴ <https://data.worldbank.org/indicator/EN.ATM.PM25.MC.M3>
⁵ <https://data.worldbank.org/indicator/EN.POP.DNST>
⁶ <https://data.worldbank.org/indicator/IS.RRS.TOTL.KM?page=6>
⁷ <http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tec00120>
⁸ <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2053rank.html>

Source: *Authors calculation*

According to the given parameters, EU countries are ranked on the basis of the mentioned tourism indicators, analyzed in the previous text. The weight coefficients assigned to the criteria are equal, i.e. 12,5%, in order to avoid a subjective assessment of the significance of each of the indicators. Also, depending on the purpose of the preference function, some criteria will be minimized, while some criteria will be maximized. The weights of the indicators are shown in Table 2.

Table 2: *Distribution of weights of tourism indicators*

Criterion label	Name of the criterion	Weight coefficient	Direction of preference
IT	Number of foreign tourists	0,125	max.
DT	Number of domestic tourists	0,125	max.
H	Number of hotels	0,125	max.
AP	Pollution	0,125	min.
PD	Population density	0,125	min.
RL	Rail lines	0,125	max.
CPL	Cost of living	0,125	min.
NA	Number of airports	0,125	max.

Source: *Authors calculation*

In table 2, eight criteria with their name, labels, weight coefficients and direction of preference are shown. Logically, the criteria such as pollution, population density and cost of living should be minimized, when other five criteria (number of foreign tourists, number of domestic tourists, number of hotels, rail lines and number of airports) should be maximized.

Results and discussions

In order to arrive to the results of the final rank of alternative with the given criteria, it is necessary to present the data set output. Output in this case will be presented in the form of descriptive statistics.

Table 3: *Descriptive statistics*

	IT	DT	H	AP	PD	RL	CPL	NA
Minimum	67708,25	2811,33	153,00	5,71	17,93	0,00	48,40	1,00
Maximum	15406000,00	25566393,50	39634,00	27,01	1329,74	33428,75	137,13	539,00
Average	1896007,66	4655536,23	7223,43	15,32	175,79	7559,59	89,87	113,25
Standard Dev.	3364622,66	6601778,87	11121,91	5,11	245,33	8619,27	24,88	140,00

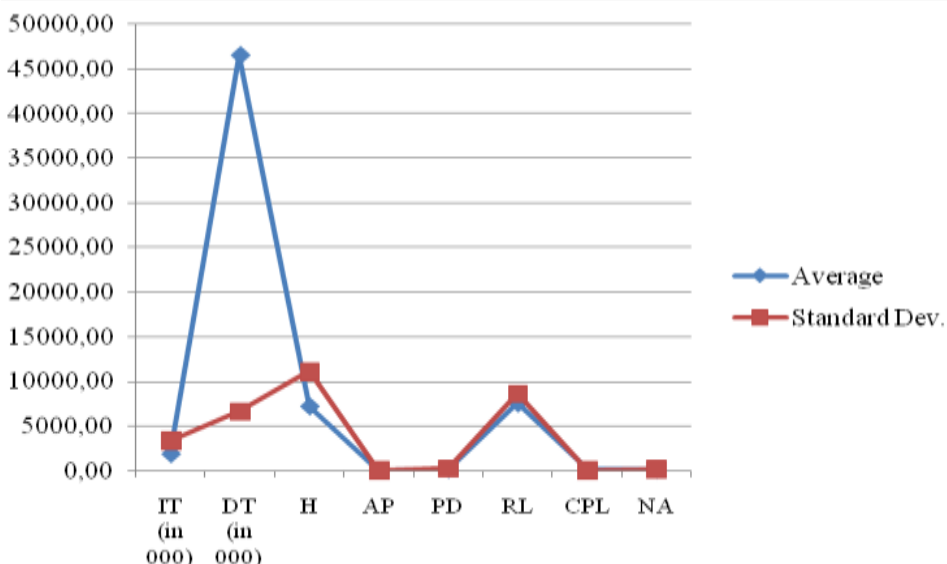
Source: *Authors calculation*

As shown in Table 3, the lowest number of international tourists by night for the EU28 in the 2012-2015 was 67708 nights. This lowest parameter was achieved in Malta. As for domestic tourists, the lowest inflow of foreign tourists was recorded in Luxembourg with 2811 nights. When it comes to the number of hotels and similar types of accommodation, Malta has the lowest number of accommodation capacities, as the smallest observed country. In addition to these parameters, Malta records

minimum values both in terms of rail lines (which are missing) and number of airports (only 1). As for air quality, Sweden has the lowest air pollution value, while Finland has the lowest population density (17.93 per sq. Km).

If we look at the maximum values, in some parameters, they differ significantly from the minimum values. Thus, for example, the largest number of overnight stays in foreign tourism was recorded by United Kingdom (15406000), while France is the top in terms of domestic tourism (25566393 nights). In addition, United Kingdom has the largest number of hotels from all observed countries (39634). Germany is leading in terms of rail lines (33428,75 km) and number of airports (539). Bulgaria is the worst in air quality with as much as 27,01 micrograms per cubic meter. As a small country, Malta has the highest population density (1329,74 per sq. km). The cost of living is the highest in Denmark, according to the comparative price levels.

Figure 1: Average and standard deviation of selected criteria



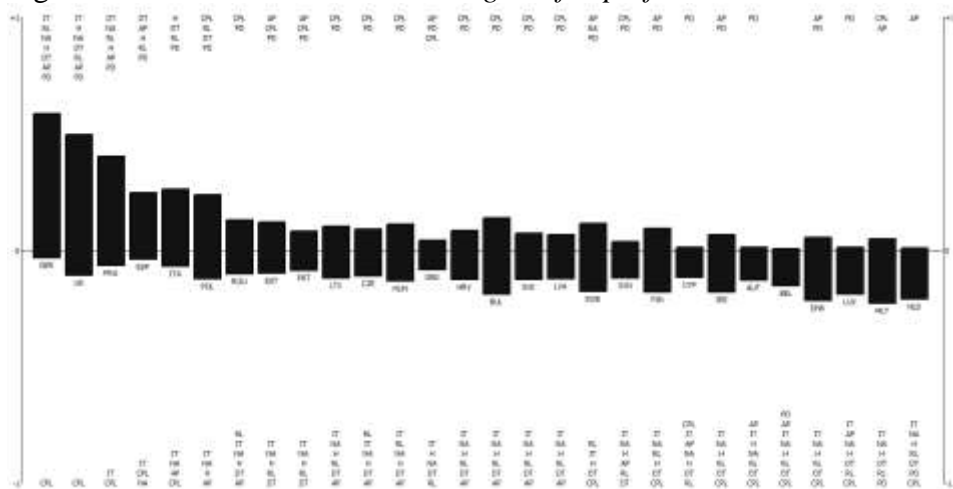
Source: Authors calculation

In addition to the basic parameters (minimum and maximum values), it is useful to display the average values, as well as deviations from the average values of the given parameters. Figure 1 shows the average values of the selected 8 indicators, as well as their standard deviations. It can be concluded that deviations from the average are small when it

comes to parameters that are not directly related to the number of overnight stays. However, when it comes to the number of tourists (domestic and foreign), as well as the number of hotels and similar accommodation establishments, deviations from the average values are high. In particular, there are high deviations regarding the average sizes of domestic and international tourists, as there are the biggest differences between minimum and maximum values among countries.

The final ranking of countries in measuring the tourist market performance shows the PROMETHEE rainbows diagram. This diagram represents a synthesized view of the net flow values. In this diagram, alternatives (countries) are shown from left to right side according to their rank. Each alternative is represented by a vertical bar consisting of parts - criteria. Each part of the vertical line shows the contribution of a single criterion in the formation of the total net flow value for a given alternative. The height of the vertical line represents the net flow multiplied by the corresponding weight of the given criterion, where the net flow represents the difference between the positive and the negative preference flows. Indicators that have the highest positive values of one alternative are on the top of the vertical bar, while the indicators with the highest negative values of one alternative are at the bottom of the vertical bar. Based on this, PROMETHEE rainbow diagram shows the profile of all alternatives and criteria, taking into account the weight of each of the criteria.

Figure 2: *PROMETHEE rainbow diagram for performance evaluation*



Source: *Authors calculation*

The final set of ranking alternatives is presented in Figure 2. Across the EU, the top five most popular destinations were Germany, United Kingdom, France, Spain and Italy. Such a situation is not surprising, taking into account that of the total number of foreign tourists' overnight stays, 21% stayed in Germany and 29% in United Kingdom. The top three most popular destinations Germany, United Kingdom and France together accounted for more than half (54 %) of the total nights spent in the EU-28. But, risk to German tourism performance can be data that Germany has been receiving large and growing gross migration flows from other countries in the European Union in recent years around 4.4 million between 2006 and 2014, and contributing to make it the second largest migrant destination in the OECD (Bertoli et al., 2016).

Also, the average number of hotels in the EU 28 amounted to 202 253. Most of that number is concentrated in the United Kingdom (20%), Germany (17%), Italy (17%) and Spain (10%). This result is similar in the research conducted by the authors Antonakakis et al. (2015) who said that tourism is the leading economic activity for Italy, Germany, Portugal and Spain, whereas an economic-driven tourism growth is evident for Austria and Greece.

The least common destinations by used performance indicators in EU 28 from 2012-2015 were Netherlands, Malta and Luxembourg. Bearing in mind all used performance indicators, Netherlands have all negative net preference flows. For Malta and Luxemborug the effect of the size of these Member States should be considered when interpreting these values.

In addition to the mentioned parameters, in terms of rail line indicators, the length of rail lines in the EU is 211688 km, and from that length Germany, France, Poland and Italy occupy 47%. The longest rail lines are in Germany (33,428 km or 16%) and France (30,013 or 14%). Of the total number of airports in the EU (3171), Germany has 539, France 464, United Kingdom 460. On the other hand, Malta and Luxembourg have lower number of airports, 1 and 2, respectively. In addition to ranking the given alternatives, on table 4 relative country positions (RCP) are presented. This indicator is calculated using the formula:

$$RCP_{ij} = \frac{x_{ij}}{\bar{x}_j} * 100 \quad (3)$$

$i = 1, 2, \dots, n$
 $j = 1, 2, \dots, m$

Where RCP_{ij} represent relative country i position for year j

x_{ij} is indicator for country i in year j

\bar{x}_j is average E28 indicator for year j

Table 4. *Relative country positions of tourism indicators*

	IT ↑	DT ↑	H ↑	AP ↓	PD ↓	RL ↑	CPL ↓	NA ↑
BEL	182%	10%	23%	103%	210%	48%	119%	36%
BUL	6%	28%	29%	176%	38%	53%	54%	60%
CZE	30%	74%	85%	131%	78%	125%	74%	113%
DNK	103%	22%	7%	69%	76%	28%	153%	71%
GER	583%	358%	476%	89%	132%	442%	113%	476%
EST	8%	5%	6%	55%	18%	12%	82%	16%
IRE	18%	15%	35%	63%	38%	24%	134%	35%
GRE	16%	62%	137%	81%	48%	31%	98%	68%
ESP	85%	354%	271%	64%	53%	206%	104%	132%
FRA	107%	549%	242%	80%	69%	397%	119%	410%
HRV	13%	22%	13%	127%	43%	35%	74%	61%
ITA	199%	328%	462%	113%	117%	222%	113%	114%
CYP	8%	4%	11%	109%	71%	0%	101%	13%
LVA	8%	9%	4%	121%	18%	25%	78%	37%
LTV	37%	15%	6%	120%	27%	24%	69%	54%
LUX	17%	0%	3%	107%	121%	4%	134%	2%
HUN	26%	60%	29%	141%	62%	104%	66%	36%
MLT	4%	1%	2%	92%	756%	0%	89%	1%
NLD	155%	69%	48%	96%	284%	40%	121%	26%
AUT	86%	29%	179%	105%	59%	65%	116%	46%
POL	135%	256%	49%	160%	71%	251%	62%	111%
PRT	16%	57%	32%	62%	65%	34%	92%	57%
ROU	12%	84%	34%	126%	49%	142%	58%	40%
SVN	29%	5%	9%	118%	58%	16%	92%	14%
SVK	49%	25%	20%	128%	64%	48%	76%	31%
FIN	13%	30%	11%	46%	10%	79%	134%	131%
SWE	45%	46%	28%	37%	13%	129%	140%	204%
UK	813%	282%	549%	81%	151%	215%	137%	406%

Source: *Authors calculation*

Table 4 shows the participation of indicators of a particular country in the average indicator at the level of the EU28 for the period 2012-2015. Values above 100% indicate the values higher than average in a given indicator.

In addition to Promethee ranking, the relative country position shows that Italy (in comparison to all other countries) records above-average values. Within all eight indicators, Italy has values over 100%. This country has a strong resort-based tourism vocation and tourism demand for Italy is especially directed to private accommodation (Guizzardi & Mazzocchi, 2010). Also, in the case of Promethee methodology, Italy was in the top 5 countries. In addition to Italy, Germany and United Kingdom are the countries that have the above-average values of the observed tourist indicators in 7 out of 8 criteria. Interesting is, for example, Belgium, which has the above-average values of some of the observed parameters (4 out of 8), but at Promethee ranking shows negative performance in absolutely all indicators. It is also interesting for the Baltic countries (Lithuania, Latvia and Estonia) to have all observed performances below average values.

Conclusion and policy recommendations

The tourism industry is one of the global leaders that are crucial to the EU economy, especially when it comes to the income and employment. Tourism is a diverse activity, influenced by a number of factors. For this reason it was necessary to observe a large number of segments that affect the performance of the tourist economy. Evaluating the performance of tourist destinations is one of the strategic issues for decision making in the tourism industry. However, depending on the selection of the criteria for ranking, the result of the best tourist destination depends. This paper presents the application of an integrated MCDM approach for tourism performance of 28 EU countries in tourism using PROMETHEE-GAIA method.

This analysis highlights three relevant issues. First, we concluded that tourism performance of Italy, France, Germany and UK are the best in terms of relative position and according to the Promethee ranking.

The second conclusion and the solution of the worst ranked countries to improve their tourist performance lie in the countries with the best tourist performance. Thus, for example, countries such as Ireland, Belgium and Denmark can boost their tourist performance by promoting their tourism products to the first ranked countries. By developing an appropriate strategy, Ireland can, for example, transfer its tourism potential and attract a German or British tourist who certainly prefers international tourism. Possible strategies for the future development of tourism in countries with

the worst performance are: motivation-based consumer segmentation strategy that clearly identifies the priority consumer segments, highly targeted brand communications, a better differentiation of the tourism market compared to the competitors and continuing to enhance, develop and promote air access.

Also, considering Ardahaey (2011) the impacts of tourism can be increased by selling local products and by helping local people retain ownership of businesses that serve tourists. This author emphasized that there are two ways to increase impact of tourism: increase the number of visitors or increase the amount that each visitor spends. According to them and results of our investigation, it can be concluded that countries with less tourism performance (in our way the worst ranked) should attract even more travelers with new infrastructure, more attractions, regional programs and special events over the next years. Also, these countries should develop new programs targeting the tourism market of best ranked counties (in our way UK, German and French market).

In order to develop a strategy for better positioning of tourist performances, the role of the public authorities is also important. Public authorities can significantly influence the development of the tourism industry. For example, in France, public authorities support the construction of tourist infrastructure (ports and inland waterways, the railway network, airports, roads and a dense motorway network). The public authorities provide natural and cultural resources (network of 40 regional nature parks and cultural heritage). Also, professional assistance is provided through a network of public agencies for business and commerce related with tourism (159 chambers of commerce and industry, as well as 20 regional chambers are grouped together) (Guerin, 2004).

Based on this analysis of tourism performance, basic challenges in the tourism industry can be specified, which will be relevant in the coming period. These challenges can also increase the competitiveness of the EU's tourism industry through further exploitation of their strengths and minimizing the existing weaknesses. Recommendations for the future tourism development are (Hagiu & Tanascovici, 2012): (1) strengthening the tourism industry as a high-quality service sector, (2) positioning the EU as the best tourist destination, (3) developing sustainable tourism, (4) develop knowledge based tourism, (5) increasing value in tourism based on existing resources, and (6) strengthening business tourism activities.

During the preparation of the tourism development strategy of the Republic of Serbia, it was established that nine tourism products had potential for further development and investments. The study showed that five prominent tourism products can achieve success in a short period of time, these being (Lakićević & Žarevac, 2016):

- City break;
- Touring;
- Business tourism and MICE;
- Events and
- Special interests.

Results of evaluation tourist performance in EU can also be applied in the strategy of forming the tourism development in the Republic of Serbia. By combining and developing the potentials of the tourism strategy of the Republic of Serbia and the proposed challenges of the EU, a strategy for tourism development in this country can be formed based on competitive advantage, sustainable tourism and knowledge-based tourism.

For further research it may be recommended to expand the set of criteria for evaluating tourist performance. In this evaluation process, a number of criteria are chosen through literature review. For next investigation, authors can include more criteria considering tourism experts and more authors. However, this paper presents a base for decision making in tourism market in whole EU. Using this research, each EU member state can see its tourist status and based on that create a tourism development strategy.

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