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A GIS-BASED ANALYSIS OF TOURIST DISTRIBUTION IN MONTENEGRO

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Abstract: Montenegro is facing significant changes in tourist turnover. Tourism activity has become increasingly more skewed toward the Montenegrin coastal area, which confirms the concern about regional inequality of tourism. This study analyzed the spatial and temporal distribution of foreign and domestic tourists in Montenegro, based on spatial statistical tools as a set of Geographical Information Systems. The results indicated that during the analyzed period (2007–2016), the spatial distribution of domestic and foreign tourists was different. Main geographical center of foreign tourists is Budva and of domestic tourists is Cetinje. There was apparent uneven dispersion of tourist demand between Coastal (on the south) and Northern region. Moreover, the results revealed tourist distribution clusters in order to identify the tourism centers with the highest number of tourists in different geographical areas of Montenegro. Understanding the spatial and temporal distribution is a very important tool for the reduction of regional economic inequality. Also, the results of the spatial distribution of tourists can be used for the forecasting of future tourist behavior.

Keywords: spatial distribution; GIS; tourist flows; disparity; Montenegro

Introduction

Nowadays, Geographic Information System (GIS) has a significant role in tourism development and tourism management. The existing research of GIS in this field range from sustainable tourism planning (Bahaire & Elliot-White, 1999), tourism management (Davidović, Marković, Vasiljević, & Stankov, 2010; McAdam, 1999), tourist movement patterns (Lau & McKercher, 2006), travel costs (Han, Byun, Lee, & Lee, 2013), and segmentation of visitors (Luberichs & Wachowiak, 2010) to overall tourism marketing applications (Bertazzon, Crouch, Draper, & Waters, 1997). Farsari and Pratacos (2004) stated that GIS is mostly used in the evaluation of suitable location for tourism development. When it comes to destination management, research of Larbig, Kämpf, and Keller (2004) focused on a development

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of benchmarking tool for destinations which is based on the use of GIS. Research related to tourists as a subject of interest are mostly dedicated to the spatial activities, the pattern of their movement in determined place and rarely to the analysis of distribution and segmentation of tourists in destination. Spatial distribution in tourism is discussed through different aspects in several researches. Burton (1994) analyzed different travel patterns which are under the influence of economic, political or cultural factors. Jansen-Verbeke and Spee (1995) analyzed tourist flow on a regional level indicating some relevant characteristics of the European tourism market. In the research conducted by Dickey and Higham (2005), ecotourism operator database was analyzed using the ArcGIS computer software program to perform spatial analyses and display major ecotourism regions. On the other side, some studies investigated the spatial distribution of foreign and domestic tourist flow using spatial data analysis (Li & Yang, 2017; Wen & Sinha, 2009; Yang & Wong, 2012, 2013). Such research is most often conducted in China, where it turned out that there is significant spatial inequality in the distribution of international tourism. It is a fact that tourist flows and patters of spatial layout are not fortuitous. Information about the tourists' location contributes to the tourism planning and development. Regarding this, Rendeiro Martín-Cejas and Suárez Vega (2014) proposed a methodology to assess the impacts of tourist mobility on the island of Lanzarote in order to achieve sustainable development.

Numerous spatial statistical techniques for spatio-temporal analysis are included in some GIS software packages as well as in various standalone programs (Sugumaran, Larson, & DeGroote, 2009), such as ArcGIS, GeoDa or GS+. The application of GIS is very important in visualizing spatial data through mapping (Basiron, Ahmad, & Masron, 2014). Since diverse spatial patterns coexist in form of clusters of popular and unpopular places, spatial inequality in tourism sector has been observed in different countries (Chhetri, Arrowsmith, Chhetri, & Corcoran 2013; Kang, Kim, & Nicholls, 2014; Klepers & Rozite, 2009; Xing-zhu & Qun, 2014; Yang & Wong, 2013; Yang, Ya Dong, Wang, & Guo, 2013; Zhang, Xu, & Zhuang 2011). Goh, Li, and Li (2014) compared the spatial distribution of foreign and domestic tourists within and among China's three economic regions. The results showed a misbalance in the spatial distribution of tourism, where domestic tourism more contributed to balanced regional economic development than international tourism. On the other hand, Stankov et al., (2017) stated that study with the methodology based on municipality data, can be very useful in the decision-making process during planning.

Based on the analyzed data of tourist turnover from Montenegro Statistical Office (2017), Montenegro is facing significant changes in tourist turnover in the period of ten years. The growth rates in the tourism sector have been remarkable since 2007. Tourism activity has become increasingly more skewed toward Montenegrin coastal area, which confirms the concern about regional inequality of tourism. The highest number of tourists was concentrated on the Coastal region where, in 2007, it was 89.2% of total tourist turnover, while Northern (4.6%) and Central region (6.2%) had much smaller percentage of arrivals. In 2016, the main distribution of tourists was also observed on the Coastal region (89.3%), and the total number of tourists was 58% higher in 2016 comparing to 2007.

The aim of this research was a quantitative measurement and comparison of spatial inequality of domestic and foreign tourist arrivals in, and among three main regions of Montenegro (Northern, Central and Coastal). According to that, the elements of tourism and geo-information sciences are integrated in order to show the approach of GIS support for the analysis and presentation of temporal changes in spatial distribution of tourist arrival data. In similar studies, researches (Yüncü, Günay, & Kantar, 2016) observed global and local distribution of cities and examined spatial aggregation analysis.

Namely, the objective of this study is to use several geo-statistical methods, holding highest practical potential for the analysis of the spatial characteristic of tourist data. Those methods include

measuring geographic distributions (central features, directional distribution, mean center) and mapping clusters (Hot Spot analysis).

Methodology

For the purpose of this study, the authors analyzed spatial patterns of tourism and spatial distribution of tourists. Data from Montenegro Statistical Office, regarding tourist turnover for the period of 2007-2016, were allocated, processed and preserved in a form of spatial database suitable for the mapping in GIS. ArcGIS 10.5 software was used for analyzing and plotting the results. This analysis is important in order to:

- examine which European countries are important emissive centers in tourism of Montenegro;
- determine the major centers (municipalities) with the highest percentage of tourist arrivals in the period from 2007 to 2016;
- determine a direction of tourist distribution in relation to other municipalities in Montenegro;
- identify spatial clusters with a high value (hot spots) and with the low value (cold spots).

Gordon (1999) stated that the cluster analysis is one of the most useful methods of exploratory data analysis, especially when it comes to larger datasets. One of the aims for the implementation of this analysis was to determine in what way and how much the knowledge of the tourist turnover in certain municipalities contributed to understanding and recognition of not only the most attractive tourism centers, but also of the potential ones. The analysis is based on the spatial statistics by using a hot spot tool in ArcGis 10.5 software, that is based on Getis-Ord Gi* algorithm. This tool identifies statistically important spatial clusters with a high value—hot spots, and with the low value (cold spots) (Getis & Ord, 1992).

Results

For more complex spatial distribution analysis of tourists and its presentation on thematic maps, seven European countries were isolated as emissive markets in Montenegro in the period from 2007 to 2016 (except the municipalities of Plav, Andrijevica, and Šavnik, where the record of the achieved tourist turnover according to the tourists' origin was not made).

Three main emissive markets in tourism of Montenegro are: Serbia, Russia and Bosnia and Herzegovina—a dominating international demand that makes about 50% of arrivals in 2016 and more than 52% in 2007. When it comes to the structure of foreign tourists' arrivals, it is obvious that tourist arrivals from these seven countries make 58% of the total number of arrivals in 2007, and 57% in 2016 (Figure 1 and 2). The highest number of arrivals in 2016 was from Serbia (21.8%), and then from Russia (17.4%) and Bosnia and Herzegovina (9%). The situation was slightly different in 2007 when tourists from Serbia made 34% of the total number of arrivals, 9% from Russia and 8.9% from Bosnia and Herzegovina.

The results indicated (Figure 2), that there is a decrease of tourists from Serbia in Coastal and Northern region in 2016 comparing to 2007. A possible reason for reducing the number of tourists can be explained by the fact that from 2006 Serbia and Montenegro are no longer a union of two republics. However, it has not reflected significantly on the total spatial distribution of tourists, since the number of tourists, not only from Russia, but also from other countries, has considerably increased in the mentioned regions. This trend should be continued, and the Scandinavian countries should be particularly animated, since the 0.6% of Norwegian tourists, in the structure of foreign tourists' overnight stays, represented the overnight stays realized on the health tourism basis (World Travel and Tourism Council, 2011).

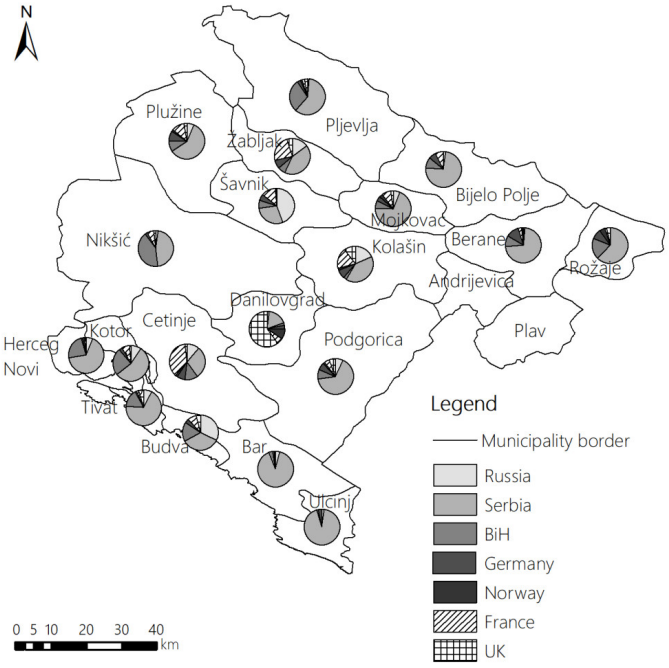

Figure 1. Spatial concentration of tourists by the country of origin (2007)

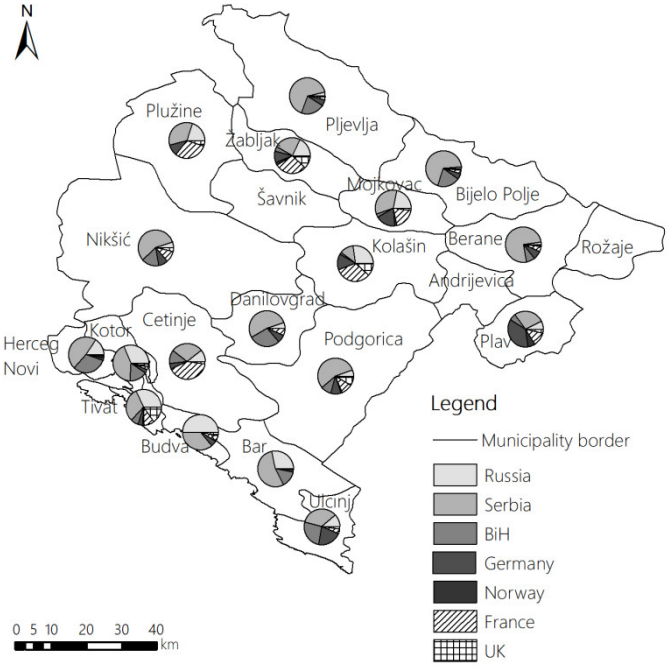

Figure 2. Spatial concentration of tourists by the country of origin (2016)

Since the trend of increase was especially noted in 2010, it resulted in emphasizing the changes for particular countries in that year. There was a noticeable decline in the number of realized overnight stays of tourists from Bosnia and Herzegovina in 2010 (–13%), but the number of arrivals increased by 3%, which, on the other hand, led to the decrease in the average length of stay (World Travel and Tourism Council report, 2011). Russia provided satisfying results, not only in terms of arrivals, but also in terms of overnight stays (+24% and +18%, respectively). But, the trend of increase is more modest in 2010 (+3%). However, Russian market recorded an average annual increase of approximately 30% in the second half of the 2000s, and that is how it outperforms most of the leading sources (World Travel and Tourism Council, 2011). It is a fact that significant numbers of Russians still buy real estate in Montenegro and invite friends and family to use their accommodation facilities, and it contributes to the maintenance of the demand. Since many of those stays have not been officially recorded, it implies that the number of Russian tourists is underestimated.

Based on the analysis (Figure 1 and 2) there was an increase in the number of arrivals of French tourists of approximately 11% in 2016 comparing to 2007, especially in the Northern region. The increase in arrivals can be explained by the fact that the biggest Western European market is France. However, this market has been developing slower, mostly because of the poor access to airline traffic (World Travel and Tourism Council, 2011). According to the research of World Travel and Tourism Council (2011), the French are less focused on "3S" offer (sun, sea, sand) than the majority of Europeans involved in international tourism. Since they have an abundance of sunny coastal centers in France, they are looking for different types of recreation and activities when traveling abroad. Therefore, they can be analyzed as a market with good potential for mountain sports, rural and cultural tourism.

Just as France, Great Britain also began to show its potential in the second half of the 2000s. The number of tourists, in the period from 2007 to 2016, was increased by 27% (Figure 1 and 2). A decrease of arrivals in 2008 was recorded, primarily caused by poor airline access. However, according to the report of World Travel and Tourism Council (2011), the situation has radically improved from 2010 by introducing the flights of Montenegro Airlines from London to Tivat, and that trend has been continued.

Regarding the number of tourists from Germany, there can be noticed an extremely high percentage growth, that was 83% higher in 2016 comparing to 2007 (Figure 1 and 2). It implied that, besides the large number of Germans who traveled to Montenegro with leading tour operators of mass tourism, the destination can become increasingly popular for hikers, cyclists and other market niches, such as bird watchers, that are eager to experience natural attractions of Montenegro.

Analysis of geographical distribution of tourist demand in Montenegro

According to the analysis of the statistical data for the period from 2007 to 2016 by the computer software ArcGis 10.5, the results pointed out that the main tourist destination in Montenegro is the municipality of Budva (Figure 3), where 39% of the total number of arrivals in 2007 was registered. In 2016 there were 45% of tourists, although it is important to highlight that in the period of ten years, the total number of tourists increased by 36%. This is one of the areas that have achieved the largest and fastest growth in the observed period—mostly because of the basic tourism infrastructure that has already existed. Since there are new infrastructural development and investment projects, the increase in the number of tourists can certainly be expected in other areas that are less built as well (Ministry of Sustainable Development and Tourism, 2008).

On Figure 3, it can be clearly noticed that the distribution of domestic tourists had less dispersion in space comparing to foreign tourists. One of the reasons appeared in the fact that tourism product had not been sufficiently diversified. For that reason, domestic tourist market has been mostly focused on "3S" offer as a principal tourist product of Montenegro, which was based on the offer of coastal destinations. However, considering the fact that the availability of tourism infrastructure and different attractions was the same for both of the groups of tourists, the differences in distribution can also be caused by different preferences among these groups, or by higher flexibility of foreign tourists.

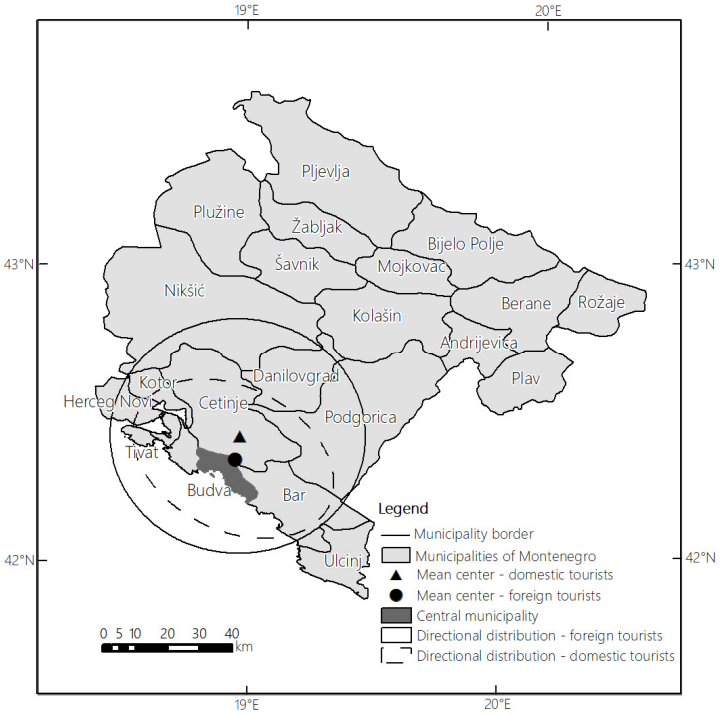

Figure 3. Direction of distribution of domestic and foreign tourists, central municipality and geographical center of domestic and foreign tourists

The results indicated that the main geographical centers of domestic and foreign tourists have not been changed in the period of ten years. Geographical centers were located on the territories of municipalities of Budva and Cetinje, the former for foreign and the latter for domestic tourists.. One of the main reasons is that foreign tourists have larger dispersion in space than domestic tourists. Considering the fact that of approximately 90% of foreign tourists, 45% of them stay in Budva, it is quite understendable why this municipality represents a center of striking tourist concetration. On the other hand, the city of Cetinje is the best-known and the most visited destination when it comes to interesting Montenegrin cultural and tourist destinations. Tourists mostly and preferably visit cultural and historical monuments of Cetinje: museums, monasteries, churches, mausoleum of Petar II Petrović Njegoš on Lovćen, and also the excursion site Ivanova Korita and the birthplace of Njegoš. According to an analysis of data on tourist turnover, besides Cetinje, domestic tourists also dominate in the whole Central and Northern parts of Montenegro.

HotSpot analysis

In the analysis of spatial data, it is often required to determine the existence of identified spatial patterns. For example, we can perform the examination of spatial patterns by focusing on the locations of the examined sample, and, afterwards, by the study of values related to these locations, or—by combining these analyses. Based on the tourist turnover data in the period of ten years (2007–2016), the analysis of clusters (grouping) was performed in order to identify the tourism centers with the highest number of tourists in different geographical areas of Montenegro.

Taking into account the aggregate of the measured data, Getis-Ord Gi* statistics identified the clusters with the values that were larger in scope, more than it was expected for them to be identified by a random choice. Greater G_i* showed significant spatial grouping with the values > 2 (Potter, 2009). A layer of municipalities of Montenegro was used as an input layer in Hot Spot analysis. An area with significant Gi* values was the municipality of Budva, and the high values are also noticed in the municipalities of Herceg Novi, Bar and Ulcinj for 2016 (right map). The mentioned municipalities have shown statistically significant ($p < .05$) spatial grouping. It indicated that these areas have considerably higher number of total tourist arrivals and overnight stays comparing to the other areas, and they were presented as the most important tourism centers of Montenegro. For that reason, they were segregated as important tourism clusters.

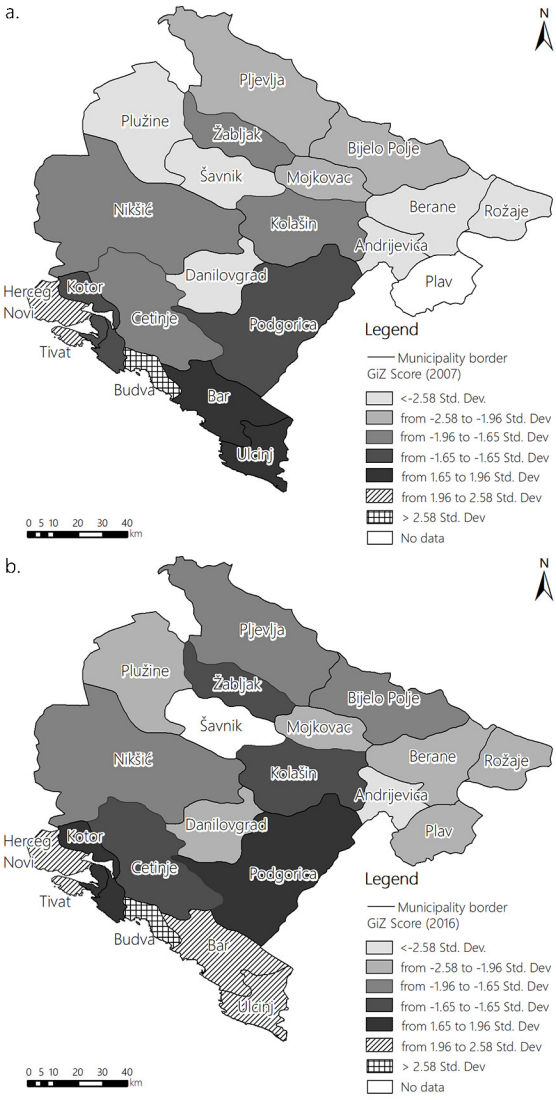

Figure 4. HotSpot analysis of spatial concentration for 2007 (a) and 2016 (b)

HotSpot map allowed easier interpretation of clusters with the highest number of tourist turnover and with the clear presentation of their geographical location. It can be noticed that there were the differences in 2007 comparing to 2016 (Figure 4), except that the standard deviation for the municipality of Budva was similar for those two years. The biggest difference was noticed in the Northern region where there were much more municipalities with the lower number of tourist spatial concentration in 2007 compared to 2016. Those areas represent so-called "cold" spots in

terms of the number of tourists. The differences between those two years confirmed that there was an annual increase of spatial tourist distribution in Montenegro, which caused positioning of new and potential tourism centers that did not belong exclusively to the Coastal region, as it was the case in previous years. It could be much more achieved by the advancement and promotion of mountain tourism, which can be integrated with coastal tourism, as it was already indicated.

Discussion and conclusion

Reviewing the current situation of Montenegrin tourism, there can be seen uneven dispersion of tourist demand between Coastal and Northern region, so it can be concluded that there was a spatio-temporal inequality of tourist distribution among the three regions of Montenegro. HotSpot analysis indicated that areas with considerably higher number of total tourist arrivals and overnight stays were Budva, Herceg Novi, Bar and Ulcinj. These municipalities also represented the most important tourism centers of Montenegro.

Tourism sector represents one of the main pillars of economic development and transformation of Montenegro. The analysis of statistical data has shown that three principal emissive markets for Montenegro are Serbia, Russia and Bosnia and Herzegovina. The main destination and geographical center of tourist distribution in Montenegro is the municipality of Budva. Almost half of the foreign tourists stayed in this area. On the other hand, the concentration of domestic consumer groups was largely concentrated on the territory of Cetinje.

The results of the analysis have provided detailed spatial insight in the previous spatial distribution in all the municipalities of Montenegro, monitoring of changes in the structure of tourists, but also the insight in emissive markets. Since there was a large concentration of tourists on the coast comparing to the northern part, it was not in accordance with the true tourism values of Montenegro. Integrated tourism product of Montenegro should represent juncture of the north and the south and that can be achieved by valuing the natural tourism motives in the north of the country. All these new challenges can be successfully controlled through the implementation of an effective destination management approach. It means that a destination needs to define and understand how to utilize available resources for improving the tourist offer, but also to be aware of the tourist demand and to find the most effective way to attract potential tourists.

The results from this study will enable tourism industry professionals, as well as policy makers to better understand the changes of tourist distribution and spatial concentration throughout the country. Also, it is possible to gain insight into the problem of the uneven distribution of tourists, and activate all the regions since they have equal potential for tourism development. Further, it can be very useful in the decision-making process during planning.

Since tourism represents one of the most significant and fastest growing economic sectors in many countries, understanding of spatial and temporal distribution is a very important tool for the reduction of regional economic inequality. Also, spatial distribution of tourists can be used for forecasting future tourist behavior.

Certain limitations concern the lack of continuous data on tourist turnover for certain municipalities in Montenegro. The main problem is inadequate data records in certain municipalities (e.g. Plav, Andrijevica, Plužine). Therefore, a clear picture of the tourist trends for a ten-year period could not be created. Future research implies in depth analysis on the regional economic impact of tourism. For this purpose, it would be important to use other tourism parameters such as the length of tourists stay and their distribution on a daily basis within the

country. To this end, GPS should be used to track their paths. This would enable to create advanced statistical models that could provide predictions on the tourist flow. These data would be significant for DMOs or local tourism organizations to create personalized tourist tours throughout the country in accordance with their interests.

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