

VISITOR FLOW ANALYSIS IN A TOURISM DESTINATION USING A SMALL DATA APPROACH: A CASE STUDY OF THE KOŠICE REGION

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Abstract: This research paper provides a comprehensive understanding of visitor flows within a tourist destination through the lens of network analysis. Data for the analysis was collected through a questionnaire survey, where respondents provided insights into the specific places they visited during their stay in the destination. The total number of respondents was 276. The study used network analysis methods to map and visualise the connections between different tourist locations, ultimately producing a topographical map that depicts the complex patterns of visitor movement. For the purposes of network analysis, a software called Gephi was used. The main purpose was to demonstrate one of the many ways of identifying visitor flows in a tourist destination using small data obtained from a questionnaire survey on a case study of the Košice Region. The results, presented visually on a topographic map, provide a detailed view of the interconnectivity between different tourist locations within the destination. The network analysis highlights key nodes, popular routes and potential areas for further development within the destination. Visitor flow analysis can tell us where, in what numbers and at what times visitors stay in the destination being studied. If we combine it with other data, such as socio-demographics, satisfaction levels, spending habits, accommodation preferences, modes of transport used, activities and attractions visited, etc., we can turn this analysis into a strategic tool for managing and developing the destination from a business perspective. By strategically positioning themselves along popular routes, businesses can increase their visibility and attract a higher volume of potential customers. In addition, identifying underexplored areas offers businesses the opportunity to pioneer new experiences and diversify the services offered within the destination. Furthermore, analysing visitor flows can contribute to the sustainability of tourism.

Keywords: visitor flows, tourism destination, spatial analysis, tourist behaviour, destination management

JEL Classification: L83, Z32

INTRODUCTION

Tourism is one of the most dynamic sectors of the global economy. It makes a significant contribution to global GDP, but above all it is a huge source of employment, either directly or indirectly, in every corner of the world. Before the COVID-19 pandemic, 333 million people were employed in the tourism industry, which generated 10.3% of world GDP (Alsaifi et al., 2023). It is the main source of income for many countries. Tourism is also important for the Czech Republic, where in the period before the pandemic, tourism receipts exceeded expenditures and contributed to a positive balance of payments (Janeček & Satýnek, 2021). Due to its significant role, it is necessary to continuously develop and innovate its management.

An innovative approach whose benefits can be exploited in tourism planning and management at different levels and within different tourism organisations is the monitoring of visitor flows at the destination.

When it comes to research focusing on the analysis of visitor flows, or tourism research in general, two approaches can be identified. The first is research based on small data, which includes traditional data collection methods such as: questionnaire surveys, travel diaries, interviews or observation (Baggio

& Scaglione, 2018). They are characterised by a small sample size compared to big data. Such techniques tend to be time-consuming and not always accurate, as the information is retrieved retrospectively from the memory of the respondents. The other method is based on large amounts of data and is called a big data approach. Big data can be characterised as information that, due to its size and structure, cannot be processed by traditional analytical methods and needs to be analysed computationally. In tourism, it is mainly data on the consumption and behaviour or location of visitors (Xu et al., 2020). They are a way of getting answers to virtually any question about visitors' behaviour, views and feelings. Processing this type of data requires specific skills and technical equipment, which can be a limiting factor for tourism researchers or those working in the sector (Mariani et al., 2018). However, the big data approach seems to be more precise and modern, so for the purposes of this paper we will use data collected through a questionnaire survey. When designing a questionnaire, it is possible to focus on a particular area of research by the type of questions used. In this way, we can obtain information on visitors' motivations, activities undertaken, place of stay, means of transport to/from the destination, point of entry/exit, expenditure incurred, places visited or length of stay (Padrón-Ávila & Hernández-Martín, 2020). A tourism destination can be characterised as a place to which a tourist travels or a destination of a journey. It is the place where businesses offering tourism products operate. The World Tourism Organisation (UNWTO, 2019) defines a tourism destination as the place visited that is central to the decision to travel. Tourism destinations are complex systems made up of different components. While tourists represent the demand side, the supply side is represented by stakeholders of different sizes and structures (Gajdošík, 2023). Identified visitor flows in a destination can become a strategic tool for destination management and bring a new perspective to destination management organisations. The essence of a visitor flow lies in the identification of the movement of people within a certain geographical area, but it can be complemented by socio-demographic information, their motivation, temporal information, etc. (Baggio & Scaglione, 2018). According to Beritelli et al. (2019), visitor flows in a destination are characterized by common features:

- Visitor flows are concentrated in a specific geographical area
- At the same time, there are few or no visitors in other areas
- Each individual visitor flow is characterised by a unique visitor profile, set of activities and sequence
- Visitors with similar profiles and activities form recurring flows.

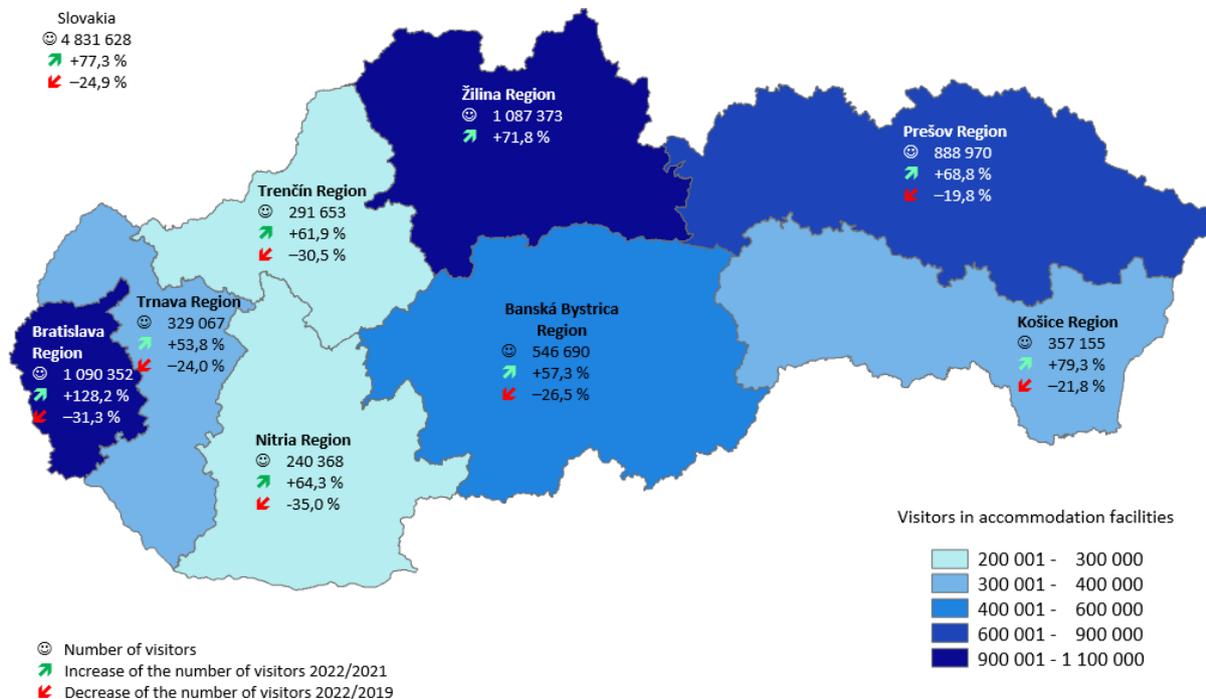
The traditional approach to destination management sees the destination as a single entity made up of products, managed under a single brand, vision and image. The new approach, also known as the flow-based approach, is demand-driven and focuses on the needs of the individual visitor. The new approach allows for parallel, simultaneous and loosely linked stakeholder initiatives. The whole activity should be based on tourist flows that represent demand (Beritelli et al., 2019).

The aim of this paper is to demonstrate visitor flow analysis using a small data approach, specifically using the results of the questionnaire survey.

The Košice region is located in the eastern part of Slovakia. In terms of tourism attractiveness, it is one of the most attractive destinations with a number of natural and cultural attractions, but some of them extend into other regions, which may be reflected in the performance in terms of visitor arrivals or number of overnight stays. The most important city is Košice, which is the second largest city in Slovakia and offers a number of cultural monuments and other attractions and also has an international airport. In 2013, this city became the European Capital of Culture (Šebová et al., 2014). In terms of natural potential, the biggest attraction is the Slovak Paradise National Park in the western part of the region with many nature trails and paths. This national park is exposed to environmental degradation by heavy tourist loads and authors Janočková et al. (2015) have already pointed out the importance of sustainable development of this precious place. Figure

1 shows the map of Slovakia divided into different regions and depicts their performance in terms of visitors in accommodation facilities.

Fig. 1 Map of Slovakia with number of visitors in accommodation facilities based on the regions.



Source: Statistical Office of the SR, 2023

The Košice Region ranks 5th out of 8 regions with a total of 357,155 visitors in accommodation facilities (Statistical Office of the SR, 2023).

1. MATERIAL AND METHODS

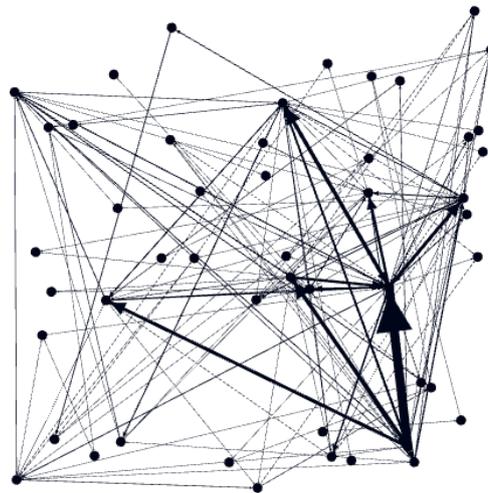
For the purposes of this paper, we work with data obtained through questionnaire surveys. The questionnaire was distributed to visitors to the Košice Region, who were asked to answer the question "Which destination (place) in the Košice Region were you most interested in? (please fill one answer)". The visitor was then given the opportunity to fill in the following block "Please indicate which other places you have visited in the Košice Region". The purpose of this was to identify other places visited during their trips within the Košice Region. The questionnaire was administered by the regional tourism organisation Košice Region Tourism in 2019, which provided the data. The questionnaire also contained other questions, but for the purpose of this article we will only work with the answers to the given questions about the places visited and their order. The characteristics of the respondents are not available to us, nor are they the subject of this paper, but in practice they would be an important addition to this analysis.

2. RESULTS

The total number of respondents was 276, from which we subsequently excluded those who had visited only one place or those who listed places that are not located in the Košice Region, except for those that are located in the vicinity of the region, such as Prešov, Spišské Podhradie, Humenné. Some answers had to be generalised to make the results clearer (e.g. for Suchá Belá, we generalised this place to the Slovak Paradise because it is located in its area). The next step was to divide the individual routes between visited places (answers) into two columns in the Microsoft Excel spreadsheet, called source and target. After processing

the individual answers, we obtained 408 trips (routes) made by the interviewed visitors between the places they visited. We then imported this data into a software called Gephi. Gephi is an open source software designed for network visualization and analysis allowing for spatialization, filtering, navigating, manipulating, and clustering (Bastian et al., 2009). Using network analysis, we created a network of visitor flows from the data we processed (Fig. 2). Gephi created one point for each place visited, and based on the links (paths) between the two places visited and their frequency, created a network consisting of all the places visited, representing the relationships between them.

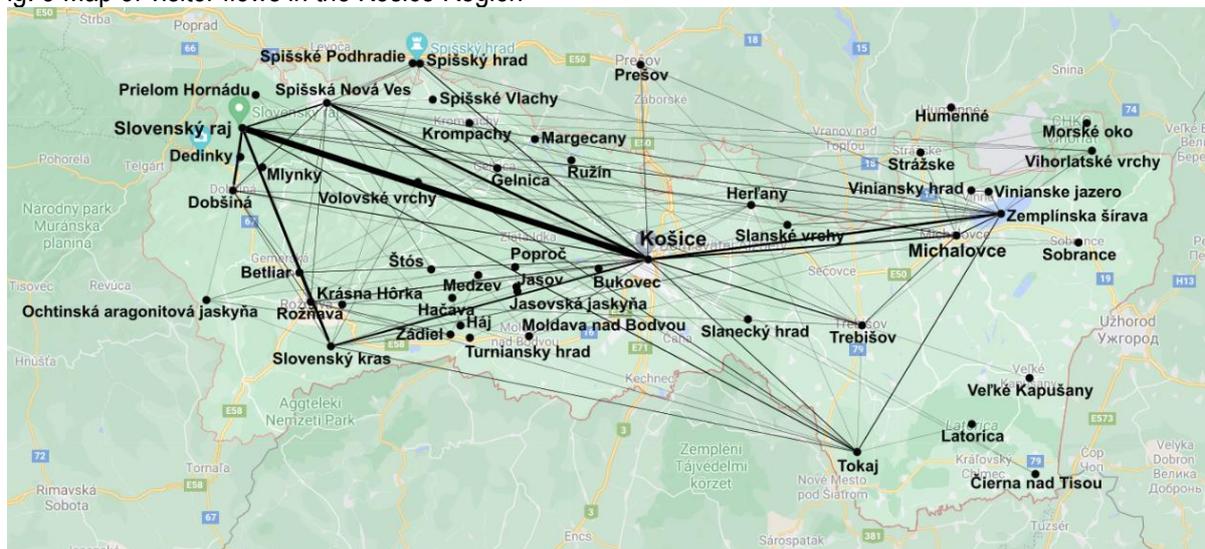
Fig. 2 Graph of the network of visitor flows in the Košice Region



Source: own elaboration, 2023

The black dots represent the places visited, connected by lines indicating the places between which the visitors travelled during their stay in the region. The thicker the line, the greater the flow of visitors, or the greater the number of visitors on a given trip. The arrow indicates the direction in which the visitors travelled (e.g. a visit to the Slovak Paradise was followed by a visit to Košice, etc.). Such a presentation of network analysis requires further modifications. Since we are working with real places, we assigned GPS coordinates to each point, representing a visited place. We then re-ran the network analysis using the geo-layout in Gephi and redistributed the points according to their geographical location. The authors Beritelli et al. (2019) recommend using a topographical map of the destination to depict different visitor flows. Using the vector graphics editor Inkscape, we took the updated network with GPS coordinates and superimposed it on the topographic map of the Košice Region (Fig. 3). The borders of the Košice Region are marked with a red line.

Fig. 3 Map of visitor flows in the Košice Region



Source: own elaboration, 2023

The thicker the line between two places, the stronger the flow. From the figure we can conclude that the centre of interest for visitors to the Košice Region is the city of Košice together with the Slovak Paradise. Table 1 shows the 10 strongest flows in the destination.

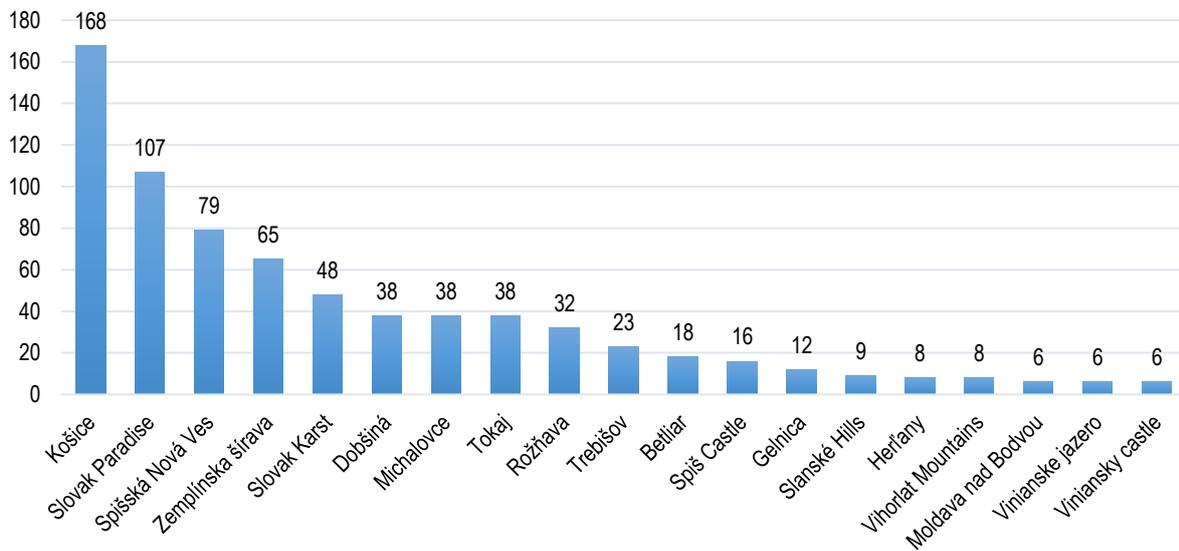
Tab. 1 Top 10 visitor flows in the Košice Region

Ranking	Source	Target
1.	Slovak Paradise	Košice
2.	Slovak Paradise	Slovak Karst
3.	Košice	Spišská Nová Ves
4.	Košice	Zemplínska šírava
5.	Slovak Paradise	Dobšiná
6.	Košice	Michalovce
7.	Slovak Karst	Košice
8.	Spišská Nová Ves	Košice
9.	Slovak Paradise	Spišská Nová Ves
10.	Zemplínska šírava	Košice

Source: own elaboration, 2023

The strongest flow is located between the Slovak Paradise and the town of Košice. The second most frequently occurring flow is the Slovak Paradise - Slovak Karst. It can be concluded that visitors who travel to the natural attractions of the Slovak Paradise tend to visit the Slovak Karst at the same time, which is relatively close. The third strongest flow is the Košice - Spišská Nová Ves. Both towns are characterised by their strong cultural and historical potential and are a major attraction for visitors throughout the year. In fourth place is the flow between Košice and Zemplínska šírava. The fifth place belongs to the flow between Slovak Paradise and Dobšiná. In sixth place is the Košice - Michalovce flow. Seventh to tenth place are the flows between the above mentioned places, but in different combinations or directions.

Fig. 4 Number of visits to individual locations in the Košice Region



Source: own elaboration, 2023

Figure 4 complements Table 1 by showing the absolute number of visits to each location by at least six visitors. The first place with 168 visits is occupied by the city of Košice, which can be considered as a kind of centre of interest for visitors, as Košice is the regional and the largest city of the region with a rich history and a wide range of attractions and opportunities to meet the needs of visitors. The second place with 107 visits is occupied by the Slovak Paradise, which is the biggest natural attraction of the region, and it was between these two places that the visitors moved most often. The third and fourth most visited places are Spišská Nová Ves and Zemplínska šírava with 79 and 65 visits respectively. The Slovak Karst was visited by 48 respondents. Dobšiná, Michalovce and the Tokaj wine region ranked sixth to eighth with 38 visits. The ninth most visited place is Rožňava, visited by 32 respondents. Its main attraction is the 14th-century Krásna Hôrka castle, located near the town of Rožňava. Trebišov rounds off the top ten most visited places with 23 visits.

CONCLUSION

The main purpose of the paper was to demonstrate one of many ways to identify visitor flows in a tourist destination, which we successfully carried out. As a result of the network analysis of the data obtained from the questionnaire survey, visitor flows in the researched location of the Košice Region are identified. Figure 3 shows all identified visitor flows, differentiated by the thickness of the line between each location. Network analysis is a suitable tool for visualising visitor flows. Our analysis has its limitations. One is the number of respondents, which is not very large. We also do not know the structure and characteristics of the respondents, so the next step would be to allocate additional information to the identified visitor flows. The main purpose of the analysis was to demonstrate one of many ways to identify visitor flows in a tourist destination based on small data.

The questionnaire survey can also be used to gather additional information about visitors. The next step should be to answer the questions: who? what kind of visitors? what do they do? where do they stay? where do they come from? where do they go? when do they come? what is their motivation? Processing such data would transform the identified flows into a strategic tool to be used by destination management organisations in a tourist destination. However, the results of our analysis also have their applicability. These results can be compared with other information available to the destination management organisation and can lead to new

decisions or be the subject of further discussion. Network analysis can help tourism destinations optimise their facilities and services based on their network position on different tourist routes (Shih, 2006). Analysing visitor movement is crucial for tourism planning and management as it helps to understand the composition of demand and identify common patterns of movement from one place to another (Bujosa et al., 2015). Understanding the presence and movement of visitors in a destination is useful for tourism planning, hazard management, business marketing and government policy (Sowkhya et al., 2018). Based on the flow of visitors, it is possible to identify points of interest, the direction in which visitors move, and to classify points of interest according to their attractiveness and frequency of visitation. Such data can be used by tourism businesses in the planning and decision-making process. When planning the further construction of accommodation or hospitality facilities, information boards, rest areas, car parks, etc. (Padrón-Ávila & Hernández-Martín, 2020). Analysing visitor flows can also be important for sustainable tourism development, analysing visitor flows can be helpful in infrastructure planning, balancing tourism impact and supporting local businesses, but most importantly in environmental impact assessment, biodiversity conservation or carbon footprint reduction by optimizing transportation routes for example.

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