Open Data and Smart Tourism Development in Viticultural Areas in Serbia

Radmila JOVANOVIĆ*
Institute of Agricultural Economics, Belgrade, Serbia; Faculty of Tourism,
University of Malaga, Spain
*Corresponding author, jogurada@yahoo.com

María Paula MICHALIJOS
Department of Geography and Tourism - National University, of the South,
Bahía Blanca, Argentina
mpmichalijos@yahoo.com.ar

Cornelius SECIU
Bucharest University of Economic Studies, Bucharest, Romania
seciucornelius17@stud.ase.ro

Abstract: *Viticulture and wine production have a long tradition and are a very important agricultural branch in Serbia with a potential that is still untapped. However, the development of viticulture had different periods and stages of development, from stagnation and war events, bad climatic and economic conditions to the placement and sale of wine on the domestic and world markets. Open data enables the management of tourist destinations, but in Serbia there are no or rare examples of good practice, studies and research on this matter. Smart tourist destinations make up the concept of tourist development, the basis of which lies in innovative solutions and modern technology. Numerous tourist destinations in Serbia is not even at the beginning of improving smart tourism in destinations or are just beginning to implement them.*

The Belgrade viticultural region has a high rating due to its proximity to the destination itself, primarily Belgrade, as the main and important emissions center, which makes the trip shorter, the longer stay and the participation of tourists more attractive. The capital of the Republic of Serbia is located in this region, as well as the immediate surroundings of other city centers with a large share of the population. Belgrade is the main transit point of Serbia: good traffic connections, as well as the proximity of the "Nikola Tesla" Airport.

In the vineyards of Serbia, the formation of wine products and accompanying tourist content did not occur, but they remained in the tourist offer as part of the rural tourist offer.

Keywords: open data, smart tourism, GIS mapping, vineyard area, destination, Serbia

Introduction

Viticulture in Serbia for centuries had different periods of development: from bad climatic and economic difficulties, war circumstances to reconstruction, new seedlings and a positive sales balance in the domestic and world markets. The stage of viticulture and winemaking has not yet reached the maximum stage of utilization and potential in Serbia, although this branch of agriculture is very important and has a long tradition. In recent years, the production of grapes in Serbia has been declining: in 2018, it amounted to 149.6 t, which is 10% less than in 2017. The overall decline in production compared to 2017 is 7% less.

During the seventies of the XX century, vines were grown on large areas. This had a negative impact on the quality of wine and the cessation of production by individual producers. The law on planting material, subsidies from the Ministry of Agriculture for raising new plantations, establishment of private wineries contributed to the development of viticulture (Jakšić et al., 2015) (Table 1).

Table 1. Total wine production (l)

Wine production (l)	Year
238046000	2009
148753700	2010
158084500	2011
126400000	2012
145283700	2013
198183000	2014

Source: Jakšić et al., 2015.

Milić and Kalanović-Bulatović (2013) believe that negative market conditions, marketing, production of low-quality wine, import of cheap wine from border countries have influenced such a bad state of viticulture and wine. The collection and processing of information, (open) data can enable the management of which services and activities should be offered to the tourist market (Jovanović, et al., 2023).

The total area of the viticultural areas of Serbia is 23675 km². The viticultural areas of Serbia consists of 3 viticultural units: Central Serbia, Vojvodina and Kosovo and Metohija. Within the wine-growing units are 22 wine-growing regions and 79 wine-growing districts (Figure 1).
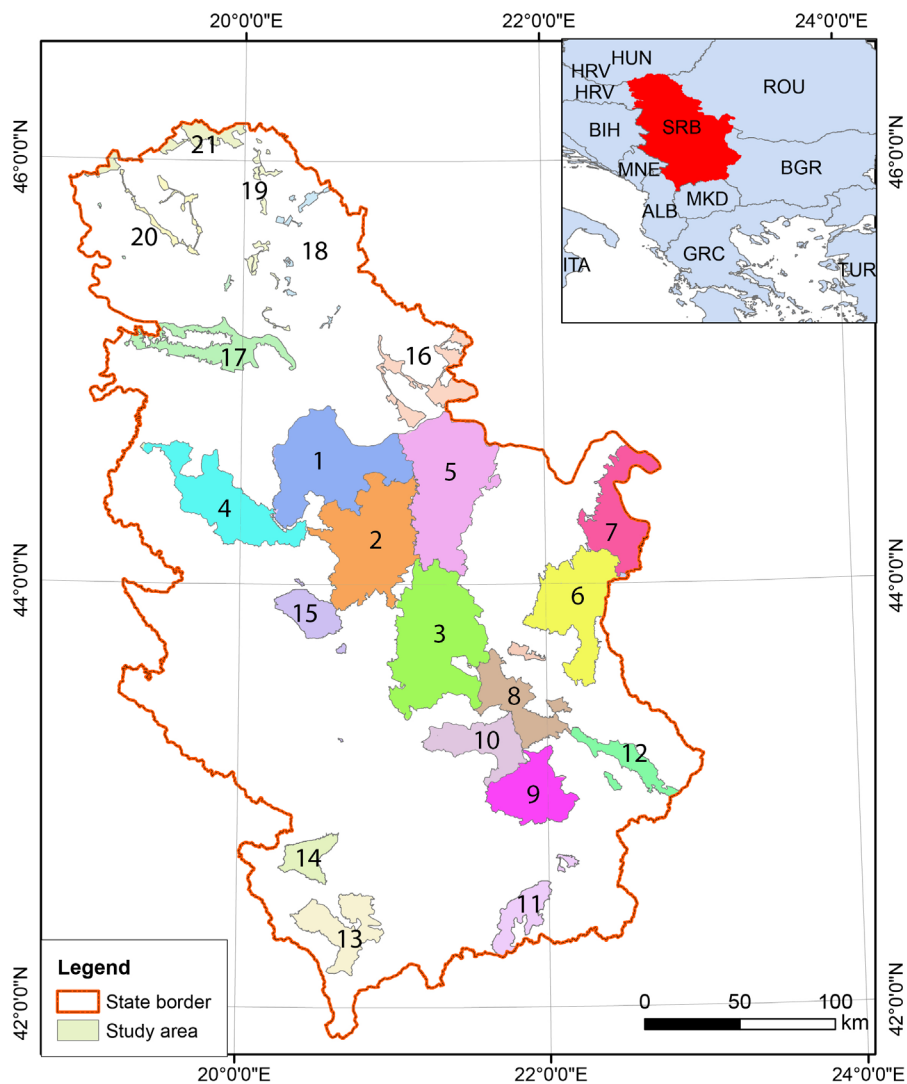
Figure 1. Viticultural regions and units in Serbia

Source: Elaborated by authors.

Wine-growing regions:

1	Belgrade	12	Nišava
2	Šumadija	13	South Metohija
3	Three Morava	14	North Metohija
4	Pocerina-Valjevo	15	Čačak-Kraljevo
5	Mlava	16	South Banat
6	Knjaževac	17	Srem
7	Negotin	18	Potisje
8	Niš	19	Banat
9	Leskovac	20	Teleč
10	Toplica	21	Subotica
11	Vranje		

The largest wine-growing unit is Central Serbia with the two largest wine-growing regions: Belgrade (2473 km²) and Šumadija (2484 km²). Within these two wine-growing regions are the largest urban centers of Serbia: Belgrade, Kragujevac, Smederevo with the highest concentration of people. Smaller urban centers are also in the immediate vicinity: Lazarevac, Mladenovac, Sopot, Topola, Batočina, Lapovo, Velika Plana and Aranđelovac.

The Belgrade viticultural area covers space between 21°7' and 21°12" east longitude, 44°16' and 44°50' north longitude (Jovanović et al., 2024). This region consists of 5 wine-growing districts: Grocka, Smederevo, Lazarevac, Dubon and wine-growing district Avala and Kosmaj. Original grape varieties, unique landscapes, tourist attractiveness and good infrastructure form the basis of tourism in the zone of this wine-growing region. (Jovanović et al., 2024).

Literature review

Through the smart technology of The Internet of Things (IoT), Artificial Intelligence (AI), Virtual Reality (VR), many offers, promotion and attractiveness of tourist destinations are improved, improved managed tourist resources (Méndez and Muñoz-Leiva, 2015). Thus, tourist destinations become smart (Zhang et al., 2022), through the use of various smart devices and technology. The Tourism Development Strategy of the Republic of Serbia (2016-2025) recognizes the importance of digital technology as a basis for further tourism promotion and development. The strategy defines 3 goals:

1. Sustainable economic, ecological and social development of tourism,
2. It improves the competitiveness of tourism on the domestic and world markets,
3. A higher share of tourism in the gross national product of Serbia gives a better image of Serbia in the world.

Guo et al., (2014) believes that smart cities preceded the development of smart tourism and were its forerunner. Based on this, smart tourism in Serbia affirms the smart city model, which is still in the initial stages of development. In this context, the city of Priboj is an example of good practice (Republic of Serbia), which has made its data open and available. These are tourist information about marked routes. In order to improve the tourist offer of Priboj, new, open data are planned, which will be adapted to the different needs of tourist platforms and applications.

Open data is of great importance in the management of tourist destinations, especially in their assessment. Open data is mostly distributed through social networks, followed by reviews, comments, etc. Maccani et al., (2015) believe that open data is made available and redistributed for all users. Mobile technology has changed the concept of mass tourism and made the availability of data (about accommodation, attractions, transportation) faster and easier.

Longhi et al., (2014) state that open data was first used precisely in the tourism industry. For tourist destinations, the use of open data affects the development of attractiveness, accessibility, environment, marketing. Well-known sites for the distribution of open data are Tourpedia (Spain), Data Tourism (France). One of the more famous sites is Tripadvisor, which influences the source of destinations, trips, visits to tourist attractions, etc.

Greater use of open data in Serbia would make quck progress in the tourism sector, services would be more visible, which would especially contribute to the development of viticultural destinations and wine tourism.

Lopez de Avila (2015) defines smart tourist destinations as one that is built on modern infrastructure, sustainable development, enables the integration of all elements and is accessible to everyone. Gretzel et al., (2015) define smart tourism as the integration and collection of data

used in combination with modern technology for social connectivity, efficiency, sustainability and enriching the experience.

Methodology

The implementation of smart technology through smart cities also influenced the development of smart destinations. According to Buhalis (2000) concept, smart destinations are defined by 6A:

1. Attractions - can be physical-geographic (national parks, lakes, protected areas, etc.) and anthropo-geographic (cultural monuments, churches, monasteries, events, etc.),

2. Accessibility – refers to public traffic and accessible roads,

3. Amenities – refers to stay services,

4. Available packages - a package of services necessary for a pleasant stay of tourists at the destination

5. Activities - tourist resources of destinations that tourists want to visit, and

6. Ancillary - refers to banking, shops, etc.

Based on Buhalis' (2000) concept, the evaluation of the Belgrade wine-growing region was done. The concept of smart tourist destinations has been modified for research purposes. In this analysis, the performance is divided into 5 elements: accessibility, attractiveness and recognition, general infrastructure, tourist infrastructure and aesthetic value (Figure 2).
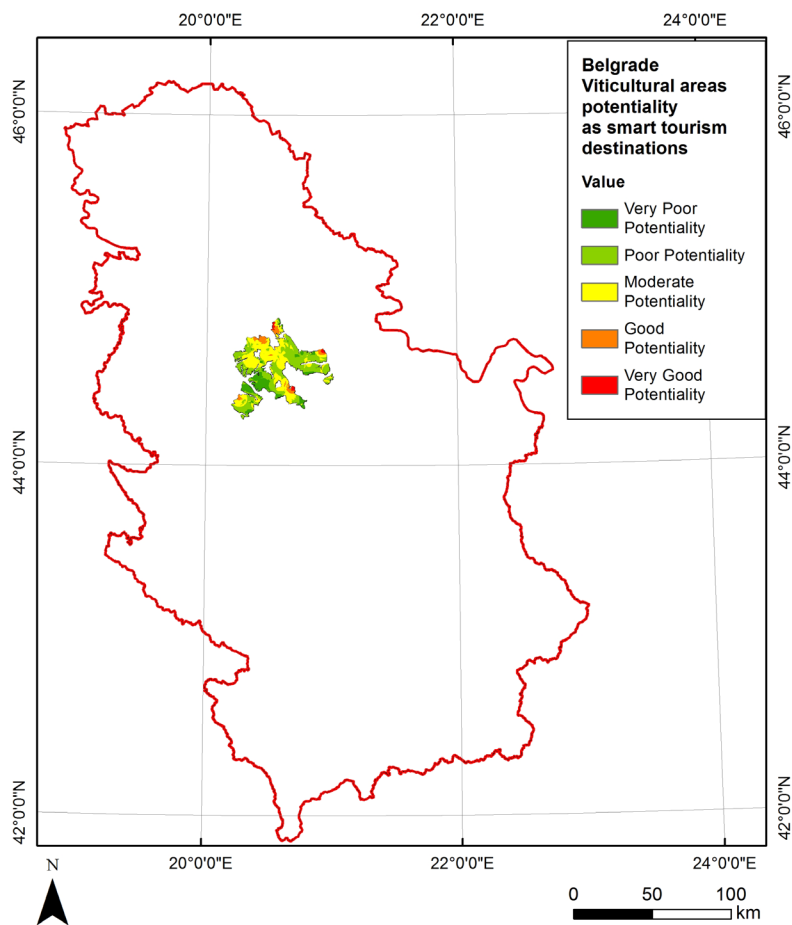
Figure 2. Belgrade viticultural region as a possible smart tourism destination

Source: Elaborated by authors.

Accessibility

Accessibility represents the distance from emission centers, and it is made by the fast flow of traffic and tourists in the optimal period of travel of tourists to a certain destination with minimal costs. Certain parts of the Belgrade viticultural region have an excellent traffic network. Other parts of the Belgrade viticultural region, compared to the central part, are not as developed in terms of traffic, and additional engagement and investment in traffic infrastructure is necessary.

Attractiveness

Two groups of attractions stand out for the valorization of the Belgrade wine region: natural and artificial. The result of the analysis of this element shows that additional promotion and marketing is necessary in order to increase the attractiveness of the region.

General infrastructure

In the assessment of the general infrastructure, indicators such as the water supply and sewerage network, shops, institutions for prevention and health protection, pumps, banks, parking spaces, internet and mobile network availability etc. were used. It can be stated that the general infrastructure is very well developed in Belgrade wine-growing region.

Tourist infrastructure

In the analysis of the Belgrade wine-growing region as a smart tourist destination, catering facilities for accommodation, food and drink facilities, sports facilities and areas for recreation and entertainment, pedestrian and bicycle paths were taken. The results show that additional attention should be paid to this element, because it is an important indicator of tourism development of a certain tourist destination.

Aesthetic value

As an important element of the valorization of smart tourist destinations, especially in the case of wine tourism, is the evaluation of the landscape. It is a value that directly affects the experience of a tourist destination. A negative experience has a bad effect on the destination's image and weakens its economic value (Wang et al., 2008). Maquet (1986) believes that what is important are "visible objects". In Belgrade wine-growing region most "visible objects" there are outside the urban centers, and they are expressed in the peripheral zones of the region.

Results and discussions

Very poor and poor zones have the weakest possibility for the development of smart tourism in the Belgrade viticultural region. On the other hand, these categories show the largest participation in the total analyzed area. These two categories include the peripheral parts of the Belgrade wine-growing region, where the rural type of settlement is more dominant, with weaker traffic, tourist and general infrastructure.

Moderate potential shows the average development potential of Belgrade wine-growing area into smart destinations. This area is located between urban and semi-urban zones. Individually, the most significant potential in this zone is near larger urban settlements compared to rural areas. These are the ruined parts of Belgrade, Mladenovac, Smederevo, Lazarevac, etc.

The greatest value of the Belgrade wine-growing area for the development of a smart tourist destination zone is shown by the city centers themselves. There is the biggest one,

Belgrade, then Smederevo, Lazarevac, Mladenovac, etc. This area is the smallest, but also the most influential, coinciding with the urban centers of this viticultural region.

Conclusion

The Belgrade viticultural region has the only possibility for the development of smart tourism. This is indicated by several facts that distinguish this wine-growing region from others: where the capital of the Republic of Serbia is located, as well as the immediate surroundings of other city centers with a large share of the population. Belgrade is the main transit point of Serbia: good traffic connections (road, rail and river traffic), as well as the proximity of the "Nikola Tesla" Airport. On the other hand, by moving away from the Belgrade city core, the possibility of developing smart destinations in other parts of the Belgrade wine-growing region is reduced. All this indicates that work should be done on the improvement of peripheral areas as well, so that all parts have approximately the same tourist development.

Open data has a considerable influence for scaling innovation and management of destinations in tourism. For further research and progress in this field, further development of methodologies and scientific research are needed. Open data enables the management of tourist destinations, but in Serbia there are no or rare examples of good practice, studies and research on this matter. Serbia has good climatic conditions, long tradition in viticulture and wine production, cultural and historical heritage.

Open data and the use of flair in the wine tourism of Serbia would make a greater advance by forming a national service of open data in tourism (data as: accommodations, restaurants, tourist attractions, etc.). The availability of data should be enabled through the Tourist Organization of Serbia, as well as local tourist organizations in order to provide innovative tourist services. All this would allow tourists to explore the area thematically, especially the wine-growing areas of Serbia.

Serbia has unique varieties and types of grapes and wine, with favorable geographical conditions and location, good relief features, diverse flora and fauna, gastronomy, rich cultural and historical heritage. The development of vines in Serbia has a long tradition. One of the roles of open and big data in tourism, through this work, is shown through the evaluation and planning of wine tourism destinations based on available potential (attractions), workforce, location, infrastructure, places of public importance, institutions, cultural facilities, etc. in those environments that have the greatest prospects for it.

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