Research Article

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Assessing the tourist potential of cultural–historical spatial units of Serbia using comparative application of AHP and mathematical method

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Abstract: Various socio-historical and cultural influences that have permeated the territory of Serbia have created a specific cultural heritage composed of interesting architecture, spatial and environmental units, folklore, gastronomy, lifestyle, and other specifics, which are usually under protection and are significantly visited by tourists. The value of resources and the state of development determine the overall tourist potential of the area. In this research, two methods were used to assess the tourist potential for six spatial, cultural, and historical units in Serbia: the analytical hierarchical process and the mathematical model, which is based on the du Cros method. The aim of the research is to determine the validity of the obtained results through their comparison and to record the shortcomings. The same indicators and sub-indicators were used in both methodologies, while the weighting coefficients differed according to the methodology. The importance of the research is reflected in the confirmation of the fact that there is a need to develop new methods that would eliminate all the shortcomings and increase the level of objectivity in the assessment of tourism potential.

Keywords: tourism potential, assessment, methods, spatial, cultural, and historical units, Serbia

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1 Introduction

Cultural resources cover a wide range of cultural heritage sites [1,2], from global to regional levels [3], from the city to small streets and squares [4,5], from urban to rural settlements [6], and from an area to a route [7]. Cultural and heritage tourism has become the fastest-growing segment in the tourism industry [8]. Some research shows that cultural heritage plays an increasing role in the overall economic development of the region and that, by further developing their cultural heritage, destinations can build their competitiveness [9,10]. During times of global challenges for the economy and tourism, especially during the COVID-19 pandemic, cultural tourism resources become a development feature, helping rural areas to revitalize the local economy during the pandemic [11].

Cultural–historical units and other larger spatial units, such as complexes of buildings with the surrounding environment and numerous cultural–historical or ethnological achievements within these areas, can be recognized by tourists. This study assesses the tourist potential and the state of development of selected spatial, cultural, and historical units in Serbia using two different methods: the analytical hierarchical process (AHP) [12] and the mathematical method [13,14]. In the first method, the authors, as experts in the relevant field, assess the tourist potential of selected spatial, cultural, and historical units, whereas in the second method, the assessment or evaluation through a survey is performed by tourists. Such methods aggregate landscape components to obtain a total value, implying that overall scenic quality is the sum of its parts [15]. The importance of the research is reflected in determining the degree of objectivity as well as the need to develop a new method that would eliminate the shortcomings of existing methods. The results of the

assessment of the tourist potential can be applied to the strategies of tourism development, all with the aim of achieving the competitiveness of the analyzed destinations and overall economic development.

2 Literature review

The AHP model is one of the best multiple-criteria decision-making tools, which has applications in the field of tourism and hospitality. It is designed to systematize complex problems and is capable of evaluating the relative importance of critical factors and their sub-factors of the research questions [16]. This model was combined with other methods such as SWOT, Fuzzy, and GIS, which were applied in order to develop new models [17–20]. In their study, Durlević et al. [21] applied the AHP and obtained results on the total susceptibility to natural hazards of the territory of Štrpce. Wickramasinghe and Takano [22] used a combination of a SWOT matrix and the AHP model in their strategic marketing planning for tourism revival. Park and Yoon [23] tried to develop indicators that measure sustainable rural tourism development within a sustainable framework by combining the Delphi and AHP methods. Yaolin [24] used AHP in order to develop a strategy for China's cultural heritage conservation, while Chen [25] used the AHP method for convention site selection. AHP has been used in numerous studies to assess the attractiveness of cultural heritage sites [7,26,27]. Sisto et al. [28] applied a combination of backcasting with multiple criteria decision analysis tools to the strategic planning of rural settlements. In this study, the assessment of attractiveness using the AHP method was performed for six spatial, cultural, and historical units in Serbia.

In assessing tourism potential, one of the most commonly used models is du Cros [29], which is made up of two groups of indicators: preservation of cultural values and commodification of market attractiveness (heritage management and tourism development). McKercher and Ho [30] significantly improved or completed the du Cros model. Their model consists of four dimensions: cultural, physical, product, and experiential value. The given dimensions were created by breaking down the factors in the du Cros model as well as adding new ones. A new, more comprehensive mathematical model for estimating the tourist potential of cultural heritage sites was provided by Yan et al. [13]. This method determines the value of resources and the state of development of the tourist potential of a site. The values of indicators and sub-indicators are calculated, creating a hierarchy of the values of tourist potential on the site.

Based on comprehensive research on the topic of assessing the tourist potential, it is concluded that for this research to be more objective, the opinions of experts and tourists are necessary. A good example of this is the method that deals with geosite assessment performed by tourists (M-GAM) [31–34], while the assessment of cultural heritage is mainly based on the assessment of experts or tourists. In her research, Dolnicar [35] confirmed that such claims are not reliable. She pointed out that 5/7-point "Likert scales" are not always the best option, as their validity is undermined by lack of reliability, response style bias, long completion times, and limitations to permissible statistical procedures. Thus, there is a need to determine the level of objectivity in research by performing a comparative analysis of two different methods, as well as a need to create a new method for assessing the tourist potential that would eliminate the existing shortcomings of the methods used.

3 Materials and methods

3.1 Description of the study area

Serbia is a real treasure trove of cultural values, which differ according to their historical, artistic, and civilizational affiliation. Various sociohistorical and cultural influences that have permeated the territory of Serbia have created a specific cultural heritage composed of interesting architecture, spatial and environmental units, folklore, gastronomy, lifestyle, and other specifics. These goods are usually under the protection regime and have significant tourist value. The sustainability of tourism development in protected areas relies largely on the ability of destination management to harmonize the activities of visitors, local communities, entrepreneurs, and other tourism actors with the primary aim of nature and landscape protection [36].

Currently, 93 spatial, cultural, and historical units are entered in the central register of the Republic Institute for the Protection of Cultural Monuments. Among the immovable cultural assets of exceptional importance, there are 13 spatial and cultural–historical units, while 28 of them are of great importance (Institute for the Protection of Cultural Monuments – IMP). In this research, the assessment of tourist potential was performed for six selected spatial, cultural, and historical units in Serbia (Figure 1). The

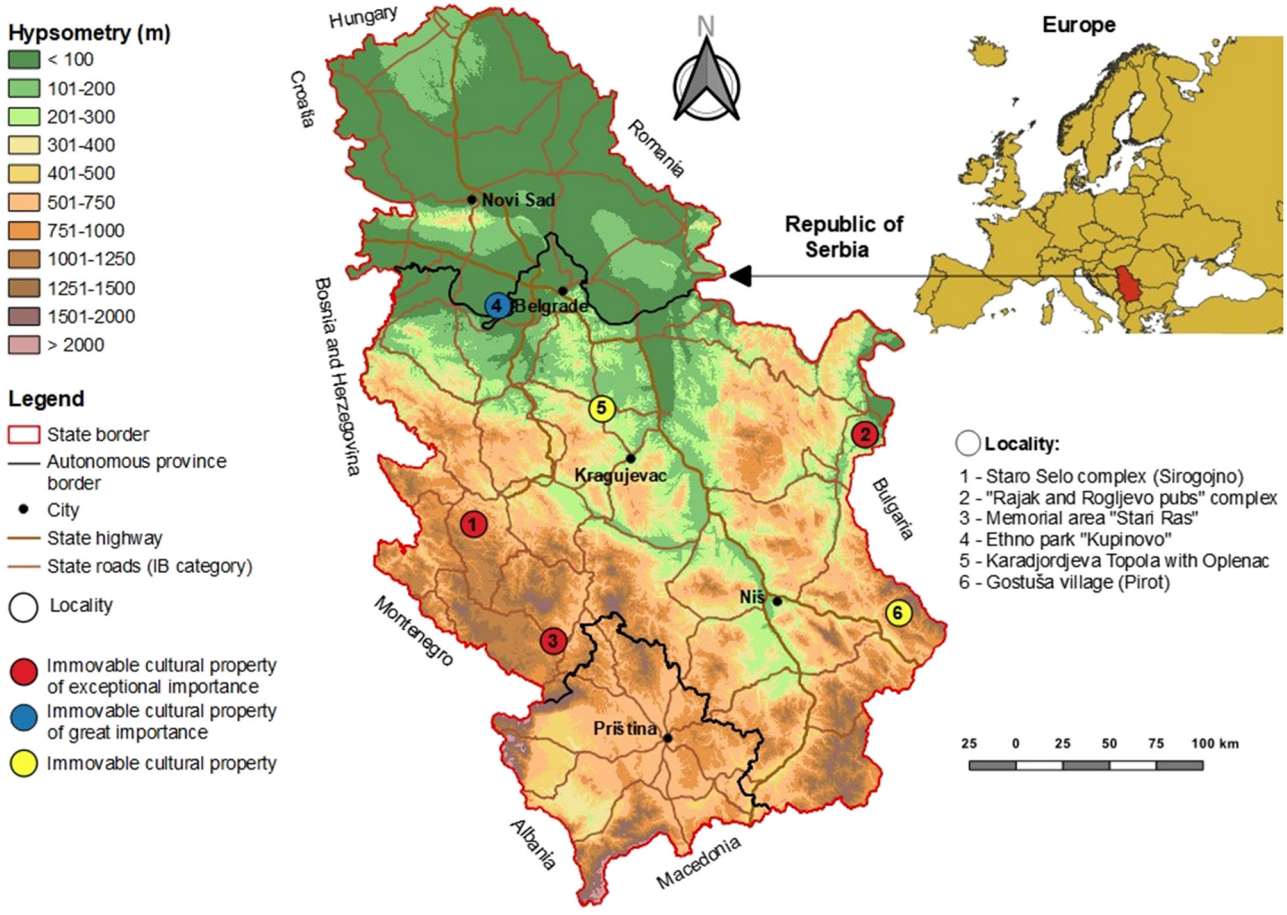

Figure 1: Location map of selected cultural and historical spatial units in Serbia.

selected localities are on the list of immovable cultural assets of exceptional importance. The localities have been carefully selected with the aim of showing cultural units of different architecture, purposes, authentic, and priceless artistic values from different areas of Serbia, and historical figures from different eras are associated with some of them.

The *Staro Selo complex in Sirogojno* is located on Zlatibor Mountain (Figure 2), a mountain with the largest tourist turnover in Serbia. It belongs to the category of immovable cultural goods of exceptional importance. This spatial cultural–historical unit was founded in 1980 and includes the physiognomic part of the Sirogojno settlement formed by houses and auxiliary buildings of typical architecture of the Zlatibor region. The organization as a cultural and historical entity provides an opportunity to gain an idea of the architecture of the area and the organization of the settlement, as well as the economic and cultural basis and housing culture of the Zlatibor region.

The *Rajac and Rogljevo wine cellars complex* is located in the east of Serbia in the municipality of Negotin (Figure 3). It belongs to the category of immovable cultural goods of exceptional importance. The Rajac and Rogljevo wine cellars are a national cultural heritage site in Serbia, included in 2010 in the UNESCO World Heritage Sites' tentative list due to its uniqueness, as well as authentic spatial and architectural values [37]. This spatial cultural–historical whole depicts the rural economy of the past. They are architectural complexes of wine cellars typical for the area of the Negotinska Krajina (Negotin Frontier), famous for its vineyards dating from ancient times [38]. Traditionally, these rural compounds (settlements consisting of wine cellars) were built in the vicinity of vineyards as secondary settlements of rural communities and were used for making and storing wine and brandy [38]. They were mostly built of stone or wood and exemplify a unique example of *in situ* vernacular heritage in Serbia [37]. These settlements were named after the wine cellars and were called "pivnice" [39]. The Rajac wine cellars and the Rajac

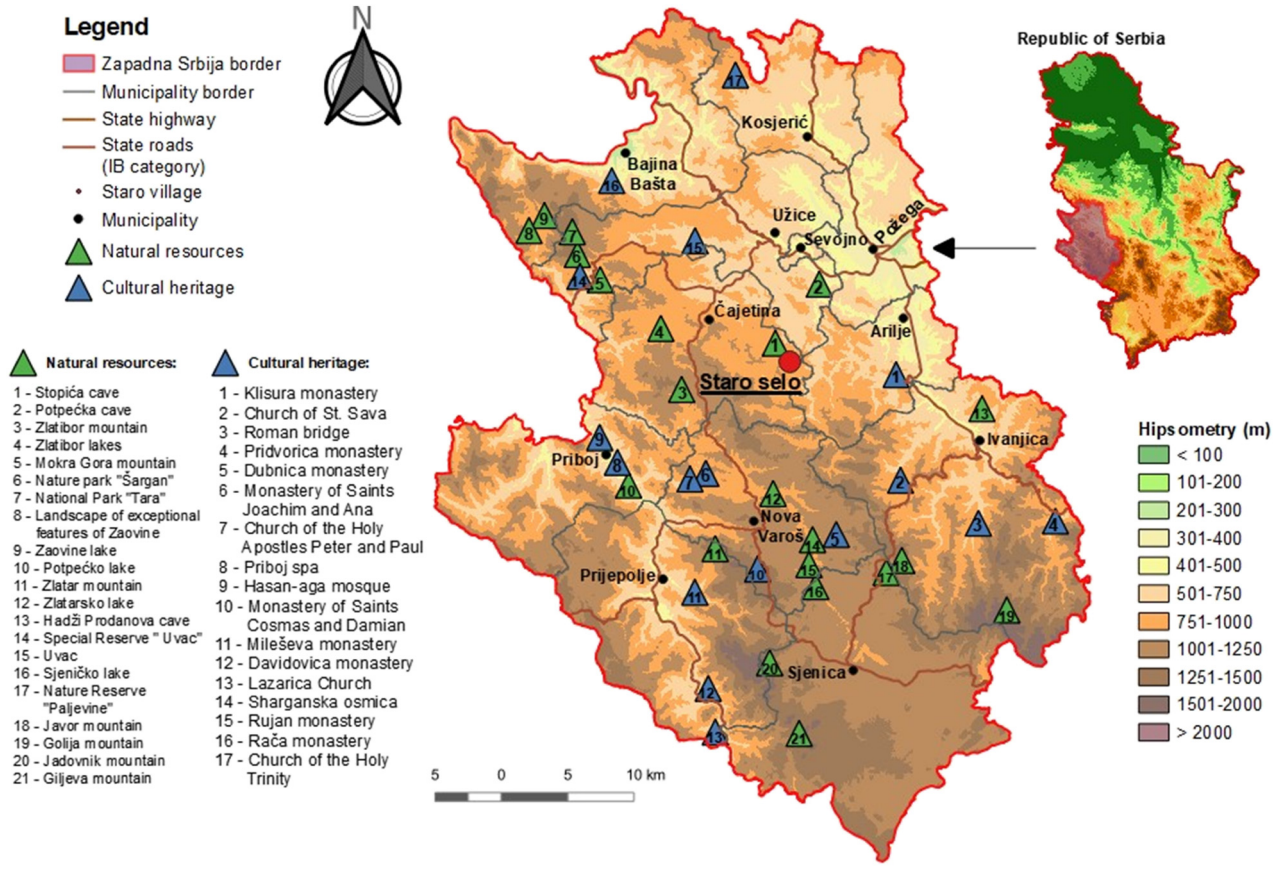

Figure 2: The position of the Staro Selo in the tourist region of Western Serbia [41].

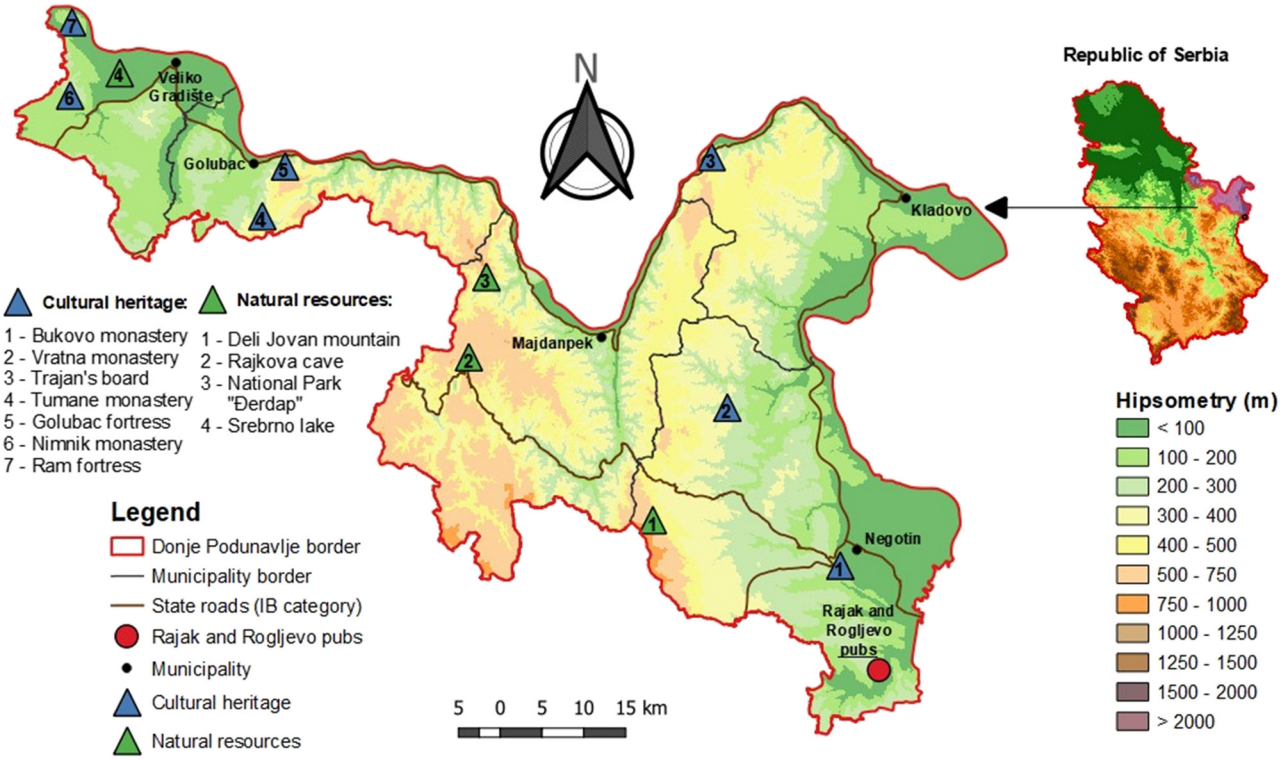

Figure 3: The position of Rajac and Rogljevo wine cellars in the tourist destination of Donje Podunavlje [41].

cemetery were declared cultural heritage in 1980, while Rogljevo wine cellars were declared cultural heritage in 1983 [38]. In the same year, they were all classified as an area of cultural–historical ensemble of outstanding value in the Republic of Serbia [39]. Positive experiences deriving from the brewery can lead to a positive experience with the local destination, and *vice versa*, hence strengthening community-based tourism [40].

The monumental area of Stari Ras is located 11 km west of Novi Pazar and belongs to the category of immovable cultural goods of exceptional importance (Figure 4). A series of monuments illustrate the historical and spiritual–artistic continuity of life in this area. Authentic and invaluable architectural and artistic achievements are firmly connected to events and personalities that left their mark on the history of the Serbian people over a period of several centuries – the church of St. Peter and Paul, the monasteries of Đurđevi Stupovi and Sopoćani, the remains of a fortification above the mouth of the Sebečevska River in Raška, and other archeological sites. These monuments belong to the territorial entity that was inscribed on the World Cultural and Natural Heritage List in 1979.

The *Ethno Park in Kupinovo* is located in Donji Srem (Figure 5), about 20 km from Belgrade, near the famous nature reserve and hunting and fishing area of Obedska Bara. The space exudes the spirit of an old rural unit, which has been placed under protection as a spatial, cultural, and historical whole with monumentally valuable houses and accompanying buildings of great importance. The protected group of nine houses was conceived as the core of the ethno park, which would be supplemented by the most valuable examples of folk architecture from the surrounding area. The oldest among them, next to the church itself, is the house of the Putnik family, which dates from the eighteenth century. Other houses from the nineteenth or early twentieth century were built on the site according to the older ones.

Karađorđeva Topola with Oplenac is located in Šumadija (Figure 6). The settlement of Topola was formed on the slopes of Oplenac Hill. It is known for its large wine cellars

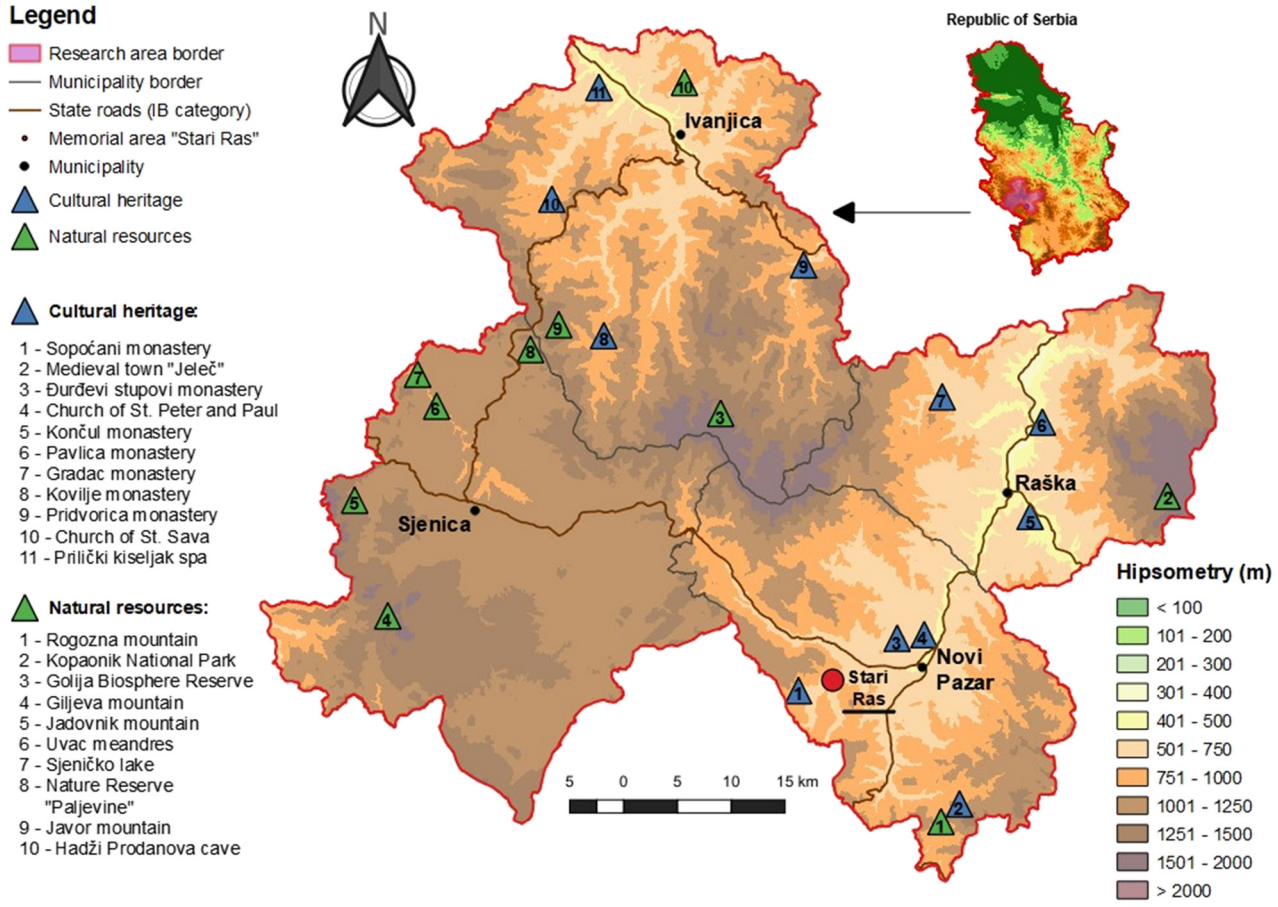

Figure 4: The position of Stari Ras in the tourist destinations of Golija, Novi Pazar, and Ivanjica [41].

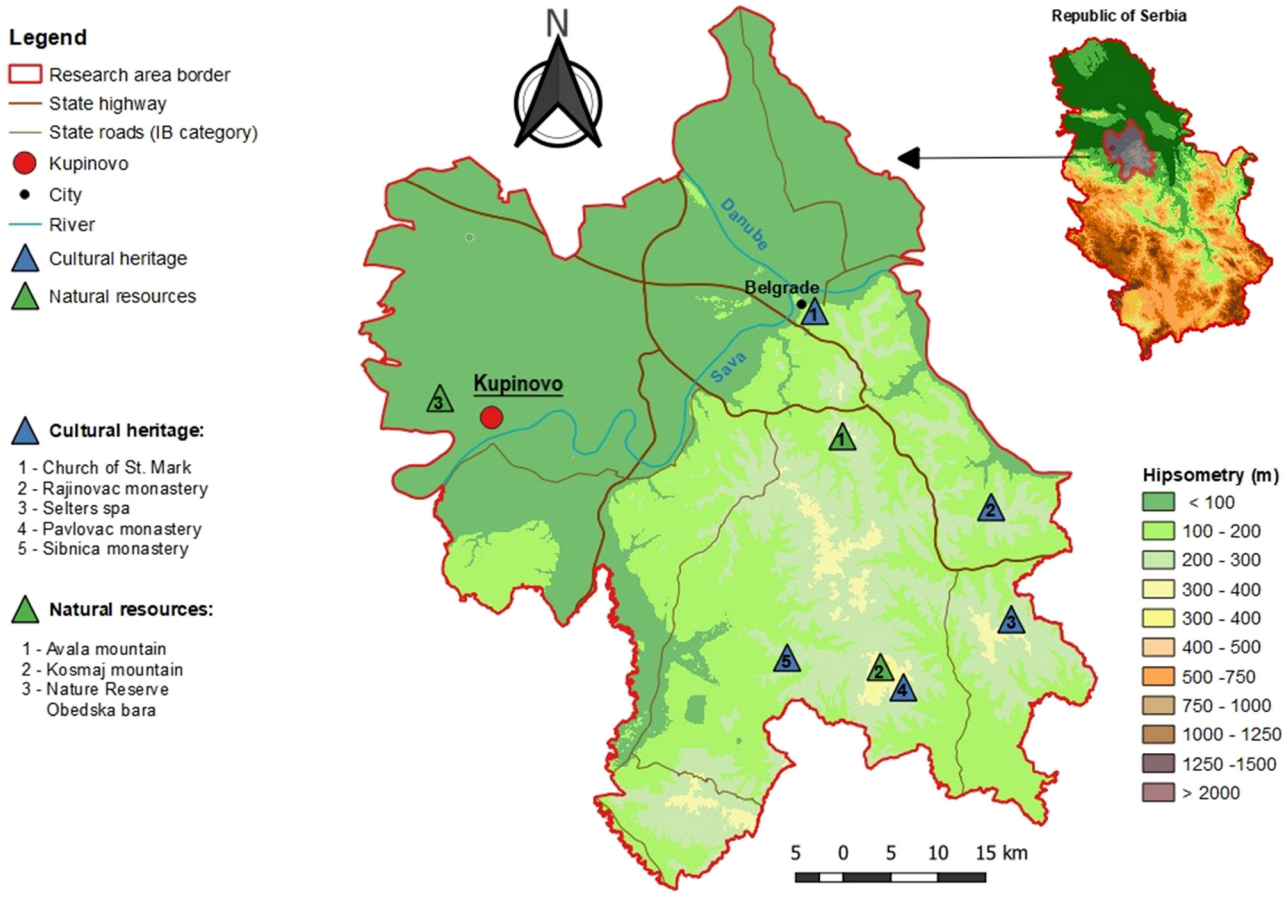

Figure 5: Location of Kupinovo in the tourist destination of gravitaciona zona Beograda [41].

and important events that were held in Serbia during the reign of Karađorđe Petrović. Restored buildings from that period represent a monumental unit that includes the remains of a fortress with a tower, the church, Karađorđe's residence, and his monument, as well as the mausoleum in Oplenac with the church of St. George, the endowment of King Peter I Karađorđević, built between 1910 and 1912.

The village of Gostuša is located near Zavoj Lake 25 km northeast of Pirot (Figure 7). This Stara Planina village was created by widely known local builders at the end of the nineteenth and the beginning of the twentieth century. The houses in the village are built of stone and covered with stone slabs and, as such, are perfectly integrated into the natural environment. In the past, in addition to the house in the village, all the owners had a house in the parish (cadastre), with a hut, a barn, a chaff barn, and a pen. The village is recognizable by its authentic appearance, and due to its specificity, it is also protected as a cultural asset.

3.2 Methods

Two research methods were used in this research. In the AHP method, the authors, as experts in the relevant field, assess the tourist potential of selected spatial, cultural, and historical units, whereas in the mathematical method, the assessment/evaluation through a survey is performed by tourists. The same sub-indicators were used in the assessment of tourist potential. Finally, an analysis of the advantages and disadvantages and a comparison of the obtained results were performed.

AHP is structured as a set of paired comparisons of elements. Each comparison of the two elements of the hierarchy (model) is made using the Satie scale [12]. At the top of the hierarchy is the goal. The next level contains the criteria (subindicators), while the alternatives are at the bottom of the hierarchy. In the end, the synthesis of all evaluations is performed, and the weight coefficients of all elements of the hierarchy are determined

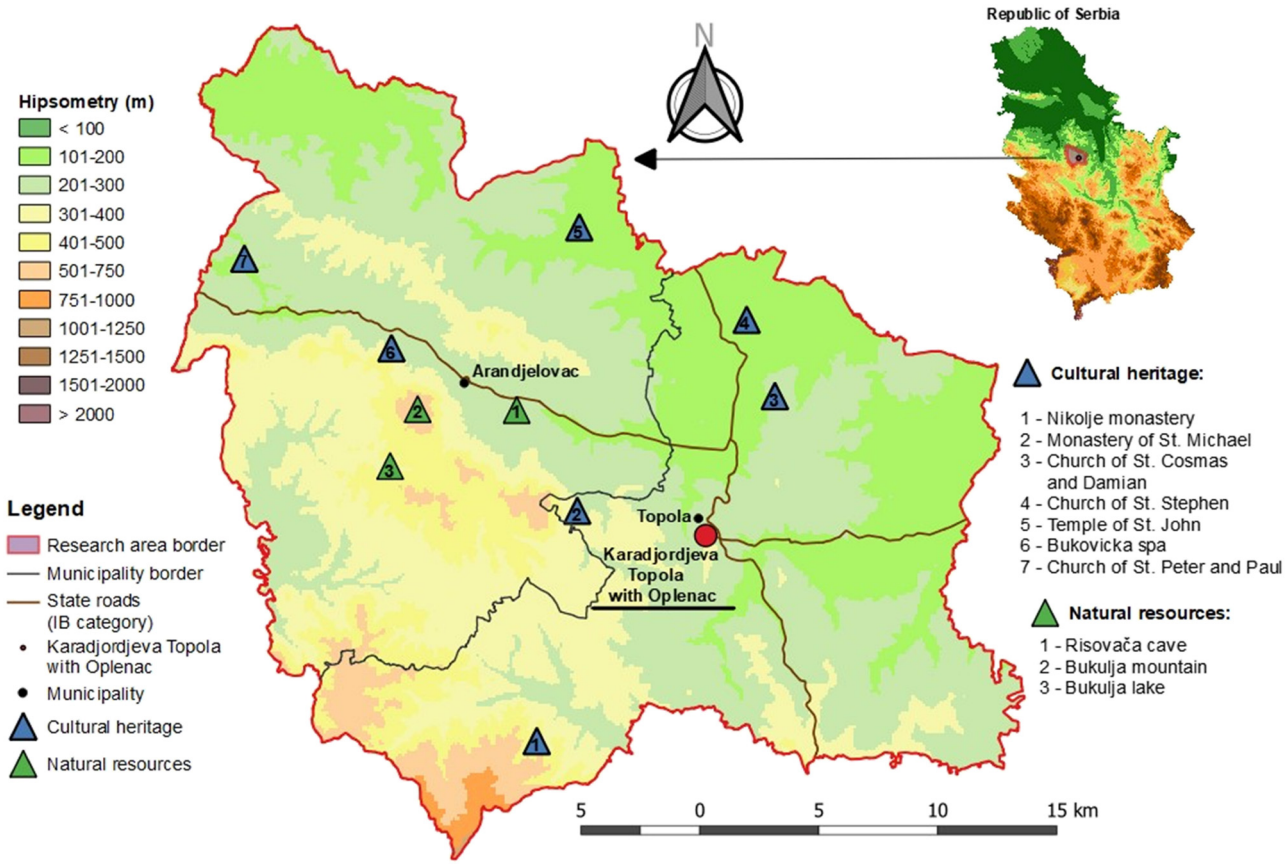

Figure 6: The position of Karađorđeva Topola with Oplenac in the central part of Šumadija [41].

according to a strictly determined mathematical model. The sum of the weights of the elements at each level of the hierarchy is equal to 1, which allows the decision-maker to rank all the elements horizontally and vertically [12,26,27].

The analyzed spatial, cultural, and historical units in this research are alternatives, while the subindicators are criteria in relation to the goal of the total value of resources: historical value, retaining the traditional style, value for time and money, aesthetic value, awareness levels, ambience or setting, and complementarity with adjacent attractions; and in relation to the overall goal state of development: Interpretation *in situ*, Accessibility, Tourist Information, Capability of Retaining Tourists, Proximity to other Attractions, Tourist Facilities, and Catering Services (Figure 8). In the end, the total value of tourist potential for each spatial, cultural, and historical whole is presented as the sum of the value of resources and the overall state of development.

The weight factors are calculated for each element at a given level, and they are then used to determine the so-called composite relative criterion weights of the elements at the lower levels. In the end, the alternative with the highest composite criterion weight is chosen. If there were a possibility to accurately determine the value of the criterion weights of all the elements that are compared to each other at the given level of the hierarchy, the eigenvalues of the matrix would be completely consistent. The redundancy of the pairwise comparison makes AHP less sensitive to judgment errors. This model also provides an opportunity to measure the errors in judgment by calculating the index of consistency for the obtained matrix of comparison, after which the ratio of the consistency itself can be measured.

The degree of consistency is calculated as follows:

$$\mathrm{CR} = \frac{\mathrm{CI}}{\mathrm{RI}}, \tag{1}$$

where CI is the consistency index and RI is the random index.

CI is calculated according to the following formula:

$$\mathrm{CI} = \frac{\lambda_{\max} - n}{n - 1}. \tag{2}$$

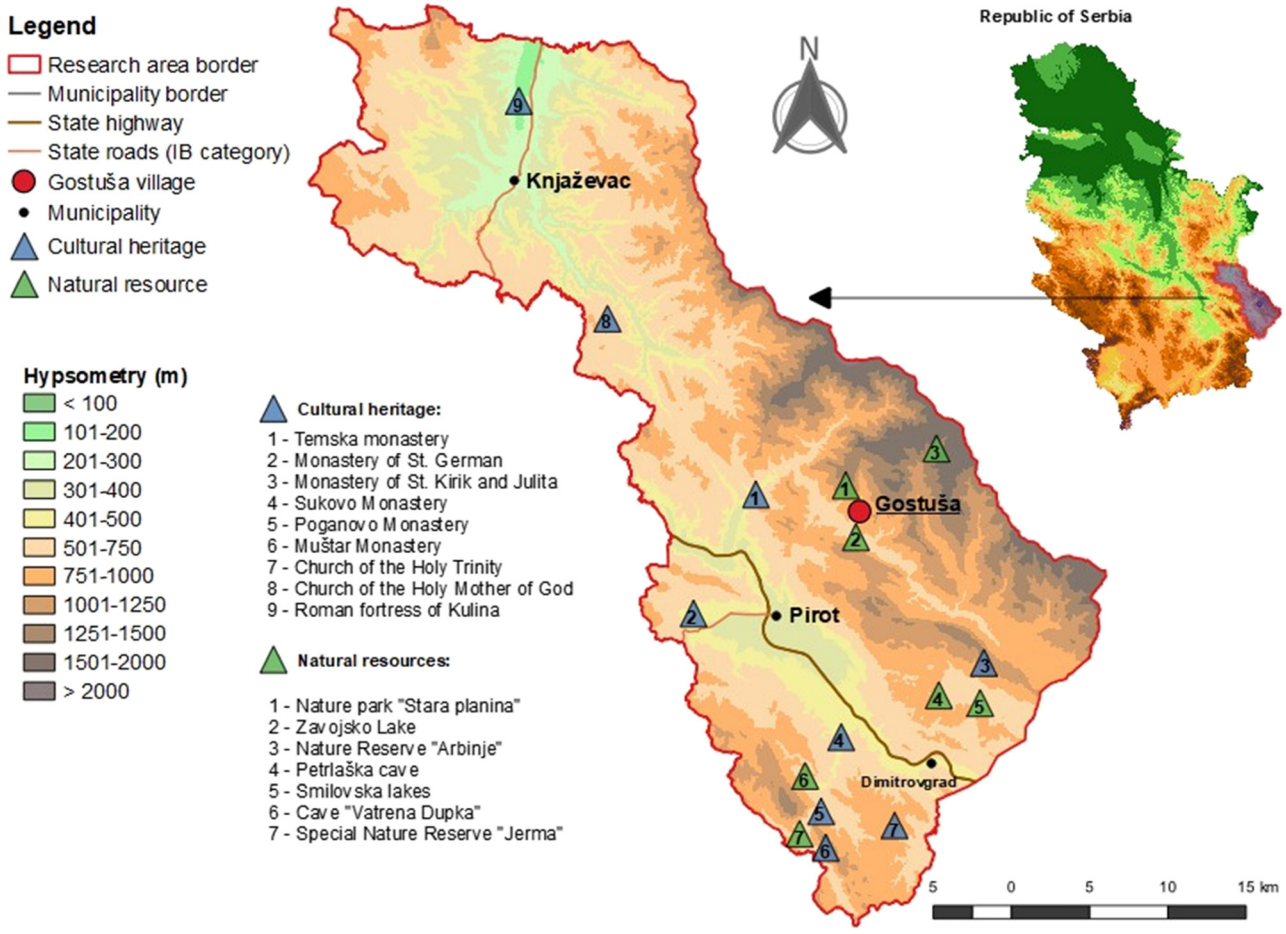

Figure 7: The position of the village Gostuša in the tourist destination Stara Planina [41].

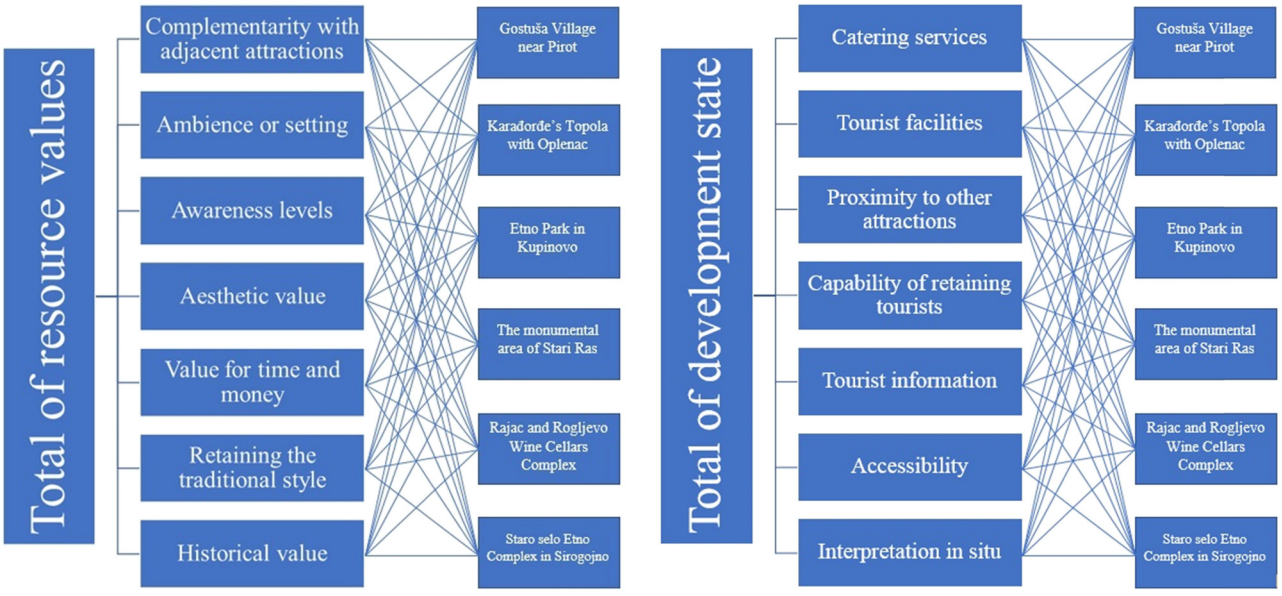

Figure 8: Goals, criteria (sub-indicators), and alternatives in the AHP hierarchy.

The random index (RI) depends on the row of the matrix, where the first row represents the row of the matrix, and the other one represents the random index [12]. If the consistency ratio (CR) is less than 0.10, then the result is sufficiently accurate, and there is no need for adjustments in comparison or for repeating the calculation. If the ratio of consistency is greater than 0.10, then the results should be reanalyzed to determine the reasons for inconsistencies, to remove them by partial repetition of the pairwise comparison, and if repeating the procedure in several steps does not lead to the reduction of the consistency to the tolerable limit of 0.10, all results should be discarded and the whole procedure should be repeated from the beginning [42].

The second method includes tourists, who, through survey research, assess the tourist potential of selected spatial, cultural, and historical units. The assessment of tourism potential in this study was performed based on the quantitative mathematical models developed and applied in order to evaluate the cultural heritage of selected rural settlements in China [13], to assess the tourist values of the UNESCO list of monasteries in Kosovo and Metohija [14], and to assess the tourist potential of the six sites of the Ibar cultural tourism zone in Serbia [43]. The assessment was made on the basis of two indicators: the value of resources and the state of development. The indicators consist of seven sub-indicators. Resource value consists of the following sub-indicators: aesthetic value, historical value, awareness level, ambience or setting, complementarity with adjacent attractions, value for money, and authenticity [13]. The state of development consists of the following sub-indicators: accessibility or transportation, proximity to other attractions, tourist facilities, interpretation *in situ*, tourist information, time for on-site visitation, and catering services *in situ* [13]. Subindicator scores are presented on a scale of 1–5 (low to high), and values from 0.2 to 1.0 are given for easier calculation [13,14,43].

Indicators and sub-indicators were ranked by respondents. Sub-indicators are ranked from 1 to 5 according to their importance for tourism development. The more the respondents, the better the final results. The measured values of each rank were calculated by the following formula:

$$R_i = (\mathrm{MAX}(i) + 1 - i)/\sum I, \tag{3}$$

where i is the ordinal number of ranks.

To calculate the importance of the sub-indicator, all valid answers obtained from the survey were taken, and the importance of the sub-indicator was calculated by the following formula:

$$W_{ji} = \sum(C_{ji} \star R_i)/N, \tag{4}$$

where j is a constant referring to a given indicator, i represents the ordinal number of sub-indicators, C_i is the count of occurrence of the ith rank for a given sub-indicator, and N is the sample size. The importance of subindicators is shown in Table 3.

The authors calculated the importance of indicators. Taking into account that the value of resources comes first in the development of tourism, indicators of the value of resources are ranked first, followed by the state of development.

The total potential value of the resource is calculated by the following formula:

$$V = \sum W_j(W_{ji} \star S_{ji}), \tag{5}$$

where S_{ji} is the average score for the ith sub-indicator in the jth indicator set.

According to the results of potential tourism values, the spatial, cultural, and historical wholes would fall into three categories: low value ($V < 0.4$), mean value ($0.4 \leq V < 0.7$), and high value ($0.7 \leq V < 1$) [13,14,43].

4 Results

Table 1 shows the importance of each sub-indicator for each analyzed unit. According to experts, the sub-indicator retaining the traditional style (0.47) for the Staro Selo complex in Sirogojno has the highest level of significance among the sub-indicators that assess the value of resources. Slightly lower significance goes to sub-indicators: awareness levels (0.37), historical value (0.36), and value for time and money (0.35), while awareness levels (0.28) and aesthetic value (0.25) have significantly lower significance for Stari Ras as a unit. Among the sub-indicators that assess the overall state of development, the sub-indicators near Staro Selo in Sirogojno have the highest values: capability of retaining tourists (0.43) and tourist facilities (0.42), which are accompanied by the importance of tourist information (0.36) and catering services (0.36).

Figure 9 shows the analyzed spatial, cultural, and historical units by the degree of significance for the total value of resources (Figure 9a) and the overall state of development (Figure 9b). The degree of consistency (CR)

Table 1: Importance of sub-indicators for analyzed cultural–historical units

Sub-indicators	Staro Selo Ethno Complex in Sirogojno	Rajac and Rogljevo wine cellars complex	The monumental of Stari Ras	Ethno Park in Kupinovo	Karađorđe s Topola with Oplenac	Gostuša Village near Pirot
Historical value (S11)	0.21	0.14	0.36	0.09	0.16	0.05
Retaining the traditional style (S12)	0.47	0.21	0.09	0.1	0.04	0.08
Value for time and money (S13)	0.18	0.19	0.35	0.07	0.14	0.09
Aesthetic value (S14)	0.24	0.13	0.25	0.14	0.15	0.1
Awareness levels (S15)	0.22	0.16	0.37	0.07	0.14	0.05
Ambience or setting (S16)	0.4	0.16	0.28	0.07	0.09	0.05
Complementarity with adjacent attractions (S17)	0.14	0.17	0.11	0.1	0.07	0.11
Total of resource values	**0.26571428**	**0.165714286**	**0.2585714**	**0.0914285**	**0.11285714**	**0.07571428**
Interpretation *in situ* (S21)	0.21	0.21	0.12	0.2	0.11	0.16
Accessibility (S22)	0.19	0.19	0.17	0.21	0.17	0.08
Tourist information (S23)	0.36	0.13	0.27	0.06	0.13	0.05
Capability of retaining tourists (S24)	0.43	0.23	0.07	0.08	0.08	0.11
Proximity to other attractions (S25)	0.24	0.13	0.3	0.09	0.17	0.06
Tourist facilities (S26)	0.42	0.18	0.09	0.12	0.14	0.1
Catering services (S27)	0.36	0.2	0.1	0.11	0.2	0.06
Total of development state	**0.31571428**	**0.181428571**	**0.16**	**0.124285**	**0.1428571**	**0.0885714**

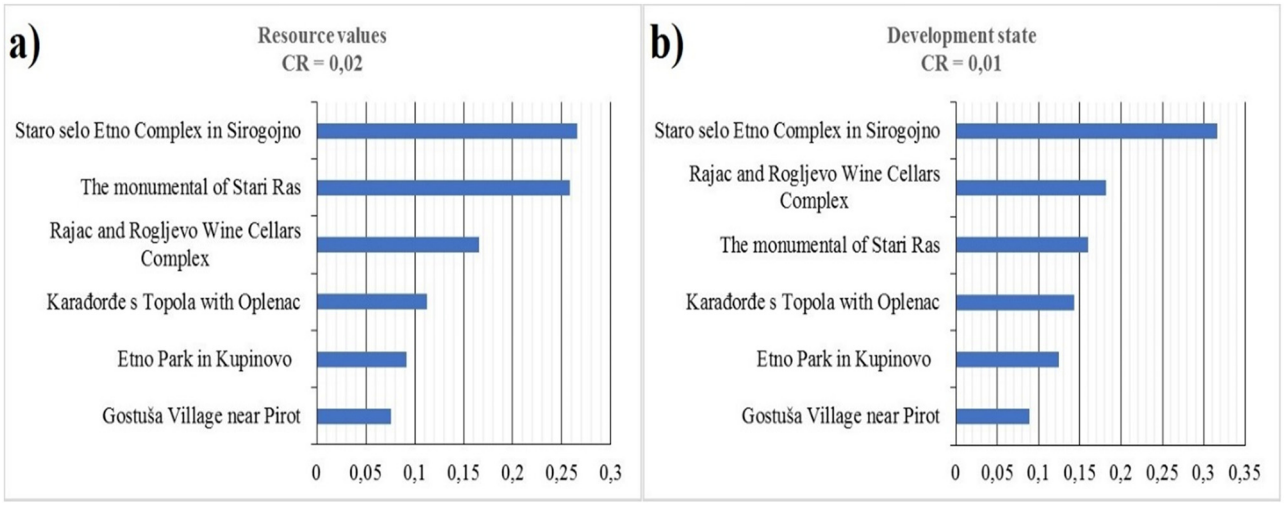

Figure 9: Degree of the significance of spatial and cultural–historical units for the total value of resources (a) and for the overall state of development (b).

in this comparison is less than 0.10 for the total value of resources (0.02) and the total state of development (0.01), which confirms that the result is accurate and there is no need for corrections in comparisons and calculations. The Staro Selo complex in Sirogojno has the highest value of resources (0.27) followed by the monumental area of Stari Ras (0.26). The complex of Rajac and Rogljevo wine cellars (0.17) and Karađorđeva Topola with Oplenac (0.11) have a significantly lower value, while the Ethno Park in Kupinovo (0.09) and the village of Gostuša near Pirot (0.08) have the lowest values. The Staro Selo complex in Sirogojno has the highest value of the total state of development (0.32). Rajac and Rogljevo wine cellars (0.18), the Monument Area of Stari Ras (0.16), Karađorđeva Topola with Oplenac (0.14), and the Ethno Park in Kupinovo (0.12) have significantly lower values, and the village of Gostuša in the vicinity of Pirot has the lowest value (0.09).

Table 2 shows the values of the tourist potential of the analyzed units, and Figure 10 shows the units by importance. The Staro Selo complex in Sirogojno has the highest value of tourist potential (0.29). The second place in terms of the value of tourist potential went to the Monument Area of Stari Ras (0.21). The significance of this unit has diminished the value of the state of development. The third place goes to the complex of Rajac and Rogljevo wine cellars (0.17). It is located in an area of the attractive tourist destination of the Lower Danube. Karađorđeva Topola with Oplenac is in fourth place in terms of values of tourist potential (0.13). It is located in the central part of Šumadija within the tourist destination Arandjelovac, Topola. When it comes to tourist potential, the fifth place goes to Ethno Park in Kupinovo (0.11). In addition to cultural heritage, the area is rich in natural values (Special Nature Reserve “Obedska bara”). The village of Gostuša near Pirot has the lowest value (0.08). It is located in Eastern Serbia, within the tourist destination of Stara Planina.

The second method in this research estimates the total potential value of resources based on the attitude of tourists expressed through the survey questionnaire. Survey questionnaires were collected in the period of

Table 2: Value of tourist potential of analyzed sites by AHP method

	Resource values	Development state	Total value
Staro Selo Ethno complex in Sirogojno	0.265714286	0.315714286	0.290714286
Rajac and Rogljevo wine cellars complex	0.165714286	0.181428571	0.173571429
The monumental of Stari Ras	0.258571429	0.16	0.209285714
Ethno Park in Kupinovo	0.091428571	0.124285714	0.107857143
Karađorđe s Topola with Oplenac	0.112857143	0.142857143	0.127857143
Gostuša Village near Pirot	0.075714286	0.088571429	0.082142857

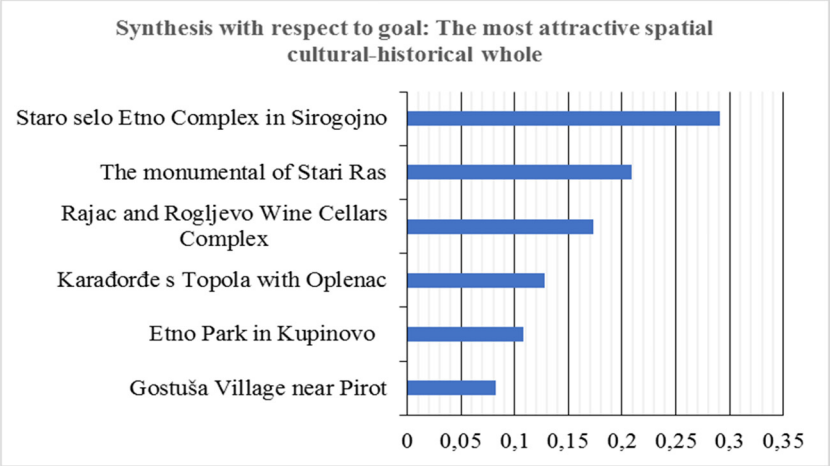

Figure 10: The most attractive spatial and cultural–historical whole.

September–October 2021. The survey was conducted in the form of an online questionnaire using Google, https://docs.google.com/forms/d/e/1FAIpQLScw1UfUqnbSR9MpwnSIZWRNLeTXuvyHckJ7vwwZSskWr8drXQ/viewform?usp=sf_link. The questionnaire was posted on social networks, student groups, and travel agencies that deal with the promotion of tourism in Serbia. The questions are related to the attitudes and satisfaction of the visitors of the given spatial, cultural, and historical units, and the attitudes are defined using the Likert scale.

The number of respondents was 313, which was used to calculate the importance of subindicators. Data processing was created in the IBM SPSS Statistics software No. 21, a program that loads data, performs analysis, and provides printouts of results. To calculate the mean values of the sub-indicators, the data set was divided into six subsets according to the study places, and the number of questionnaires was shown for each place. Of the total number of respondents, 52.7% were women and 47.3% were men. The largest number of respondents were those aged 19–39 (57.5%), followed by those aged 40–59 (22.0%), and those younger than 18 (11.5%), while the lowest percentage of surveyed visitors was over 60 (8.9%). Of the total number of respondents, 36.4% have completed high school, 25.9% of them have a college degree, and 24.6% of them graduated from a university. When the place of residence, i.e., the region of the respondents, is taken into consideration, the given percentages of respondents follow the scheme of analyzed sites, so the largest percentage is from Šumadija and Western Serbia.

Formula (4) was used to calculate the weight for the subindicators. Table 3 shows the results.

Based on the data shown in Table 3, in the group of resource values, retaining the traditional style (Staro Selo Ethno Complex in Sirogojno, Rajac and Rogljevo Wine Cellars Complex, Ethno Park in Kupinovo, and Gostuša Village near Pirot) appears first, followed by the ambience of the mentioned spatial, cultural, and historical units (Staro Selo Ethno Complex in Sirogojno, Rajac and Rogljevo Wine Cellars Complex, Ethno Park in Kupinovo, and Karađorđe's Topola with Oplenac), aesthetic value, and complementarity with neighboring attractions. The historical value of these units is significant, especially in the monumental areas of Stari Ras and Karađorđeva Topola with Oplenac, as well as the value for time and money, while the awareness levels are the lowest. In the group of sub-indicators that determine the state of development, the factor of interpretation is ranked first, followed by accessibility, then the proximity of other attractions with accompanying tourist facilities, services, and tourist information, all of which affect the ability to retain tourists.

The mean value for two rough sub-indicators was analyzed, which referred to the value of resources and the state of development. The results are shown in Table 4.

By analyzing the subindicators that determine the value of resources, most of the high values refer to the Staro Selo Ethno Complex in Sirogojno, Rajac and Rogljevo Wine Cellars Complex, and Karađorđe's Topola with Oplenac, while most of these subindicators have a medium value. Among the analyzed sub-indicators, the monumental area of Stari Ras has the greatest historical value, followed by Karađorđeva Topola with Oplenac and the Staro Selo complex in Sirogojno, while other complexes

Table 3: Importance of sub-indicators (based on formula 4)

Sub-indicator	Staro Selo Ethno Complex in Sirogojno Weight	Rajac and Rogljevo Wine cellars complex Weight	The monumental area of Stari Ras Weight	Ethno Park in Kupinovo Weight	Karađorđe's Topola with Oplenac Weight	Gostuša Village near Pirot Weight
Historical value (S11)	0.131	0.125	0.171	0.129	0.163	0.128
Retaining the traditional style (S12)	0.168	0.161	0.153	0.162	0.134	0.165
Value for time and money (S13)	0.128	0.146	0.143	0.137	0.139	0.125
Aesthetic value (S14)	0.152	0.156	0.151	0.147	0.154	0.157
Awareness levels (S15)	0.122	0.121	0.117	0.119	0.117	0.119
Ambience or setting (S16)	0.162	0.159	0.145	0.153	0.157	0.148
Complementarity with adjacent attractions (S17)	0.141	0.132	0.123	0.153	0.137	0.159
Total of resource values	**1.004**	**1**	**1.003**	**1**	**1.001**	**1.001**
Interpretation *in situ* (S21)	0.168	0.165	0.161	0.169	0.158	0.173
Accessibility (S22)	0.152	0.156	0.145	0.163	0.154	0.121
Tourist information (S23)	0.157	0.135	0.149	0.122	0.151	0.135
Capability of retaining tourists (S24)	0.123	0.129	0.121	0.129	0.129	0.151
Proximity to other attractions (S25)	0.129	0.139	0.158	0.137	0.141	0.139
Tourist facilities (S26)	0.131	0.127	0.133	0.139	0.126	0.137
Catering services (S27)	0.139	0.149	0.135	0.143	0.139	0.145
Total of development state	**0.999**	**1**	**1.002**	**1.002**	**0.998**	**1.001**

Table 4: Mean scores for the sub-indicators

	Staro selo Ethno complex in Sirogojno		Rajac and Rogljevo Wine cellars complex		The monumental area of Stari Ras		Ethno Park in Kupinovo		Karađorđe's Topola with Oplenac		Gostuša Village near Pirot	
	(*N* = 245)		(*N* = 205)		(*N* = 220)		(*N* = 188)		(*N* = 246)		(*N* = 192)	
Sub-indicator	**Mean[a]**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Historical value (S11)	0.641	0.106	0.566	0.148	0.788	0.143	0.582	0.106	0.75	0.122	0.576	0.135
Retaining the traditional style (S12)	0.89	0.127	0.755	0.181	0.673	0.184	0.782	0.199	0.587	0.185	0.761	0.187
Value for time and money (S13)	0.581	0.121	0.66	0.166	0.656	0.197	0.615	0.193	0.637	0.108	0.564	0.105
Aesthetic value (S14)	0.891	0.159	0.711	0.116	0.692	0.131	0.664	0.173	0.707	0.178	0.714	0.141
Awareness levels (S15)	0.584	0.145	0.474	0.175	0.462	0.162	0.462	0.196	0.464	0.127	0.461	0.117
Ambience or setting (S16)	0.75	0.165	0.73	0.181	0.711	0.189	0.696	0.184	0.722	0.179	0.676	0.184
Complementarity with adjacent attractions (S17)	0.639	0.108	0.521	0.162	0.541	0.146	0.6	0.139	0.553	0.112	0.67	0.154
Interpretation *in situ* (S21)	0.724	0.217	0.706	0.229	0.684	0.192	0.725	0.175	0.67	0.178	0.74	0.167
Accessibility (S22)	0.582	0.126	0.588	0.105	0.554	0.199	0.624	0.199	0.599	0.119	0.454	0.127
Tourist information (S23)	0.604	0.125	0.506	0.185	0.569	0.147	0.454	0.224	0.581	0.105	0.502	0.207
Capability of retaining tourists (S24)	0.44	0.254	0.459	0.279	0.421	0.232	0.453	0.265	0.442	0.227	0.521	0.216
Proximity to other attractions (S25)	0.455	0.18	0.484	0.176	0.664	0.163	0.478	0.144	0.505	0.146	0.484	0.163
Tourist facilities (S26)	0.461	0.163	0.453	0.125	0.48	0.171	0.397	0.207	0.466	0.154	0.473	0.179
Catering services (S27)	0.503	0.121	0.527	0.152	0.479	0.139	0.505	0.135	0.503	0.101	0.508	0.179

[a]Items were measured on an ordinal scale, with 0.2 representing the lowest score and 1.0 the highest score.

have almost the same historical value. The retention of the traditional style is strongest in the Staro Selo complex in Sirogojno, followed by the Ethno Park in Kupinovo, the village of Gostuša near Pirot, and the complex of Rajac and Rogljevo wine cellars. The value is somewhat lower in the monumental area of Stari Ras and the lowest in Karađorđeva Topola with Oplenac. In terms of value for time and money, the values are almost uniform for most sites, while they are somewhat lower near the Staro Selo in Sirogojno, and the lowest for the village of Gostuša near Pirot. Most of the analyzed units have a high aesthetic and ambient value, the highest is in the Staro Selo complex in Sirogojno, and significantly lower in the Ethno Park in Kupinovo and the village of Gostuša near Pirot. The awareness of the value of the analyzed units belongs to the middle level and is significantly lower in relation to the analyzed sub-indicators. The complementarity of the site with the environment is most pronounced in the village of Gostuša near Pirot because it is located in the Stara Planina Nature Park, then the Staro Selo complex in Sirogojno is in complementarity with the natural values of the Zlatibor Nature Park, while the Ethno Park in Kupinovo is in complementarity with the nature reserves and hunting and fishing area of Obedska Bara.

The high value among the sub-indicators that determine the development state is the interpretation for the Old Village complex in Sirogojno, the Rajac and Rogljevo wine cellars, the Ethno Park in Kupinovo and the village of Gostuša near Pirot, while other sub-indicators have a medium value. The Ethno Park in Kupinovo has the best accessibility, and the lowest value is for the village of Gostuša near Pirot. According to tourists, the most tourist information is available for the Ethno Village complex in Sirogojno, and the least for the Ethno Park in Kupinovo. The strongest impression on tourists is left by the village of Gostuša near Pirot, and with that, the desire to keep tourists in this area is the greatest. On the contrary, the tourists stated that they would stay in the monumental area of Stari Ras for the shortest time, while in the vicinity of this unit there are numerous other cultural attractions, so this sub-indicator has the highest value. The proximity of urban settlements where important tourist and catering facilities are located has influenced the importance of these sub-indicators (tourist facilities and catering services) for the monumental areas of Stari Ras and Karađorđe's Topola with Oplenac, while in other units, accommodation and catering facilities are located within rural households.

The values of tourist potential for the six analyzed units were calculated using formula (5). The values show that the analyzed units have a medium level of tourist potential, except for the complex Staro Selo in Sirogojno, which has a high level of value (Table 5). In all analyzed units, the value for the state of development is significantly lower than the value of resources, which indicates that the spatial, cultural, and historical units are insufficiently developed. Lower values for the state of development reduce the total potential value.

The Staro Selo complex in Sirogojno has the highest total potential value among the analyzed spatial, cultural, and historical units (0.625). It has a high value of resources, where the preservation of traditional style, aesthetic, and ambient value is especially emphasized. The natural values of Zlatibor (Stopića cave and Gostilje Waterfall) as well as the numerous cultural heritages located in the immediate vicinity of the Ethno Complex Staro Selo have influenced the importance of this sub-indicator (Figure 11a and b).

Ethno Park in Kupinovo (0.574) is an attractive area where the ethnographic tourist values of Srem are displayed. The ethno park is completed by sacral buildings and fortifications, and next to the park there is a special nature reserve, Obedska bara. This spatial, cultural, and historical unit has an excellent geographical, tourist, and traffic position, as well as the proximity of the major emitting centers of Belgrade and Novi Sad (Figure 11c and d).

The monument area of Stari Ras has a slightly lower value of resources, so in the total potential value, this unit is in second place (0.598). The unit is characterized

Table 5: Tourism potential value calculation

	Resource values	Development state	Tourism potential value calculation
Staro Selo Ethno Complex in Sirogojno	0.711	0.538	0.6245
The monumental of Stari Ras	0.646	0.55	0.598
Karađorđe s Topola with Oplenac	0.631	0.538	0.5845
Rajac and Rogljevo Wine Cellars Complex	0.631	0.532	0.5815
Gostuša Village near Pirot	0.632	0.526	0.579
Ethno Park in Kupinovo	0.629	0.519	0.574

Figure 11: Staro Selo complex in Sirogojno (a and b) and Ethno Park in Kupinovo (c and d).

Figure 12: Stari Ras monument area (a and b) and Karađorđeva Topola with Oplenac (c and d).

Figure 13: Rajac and Rogljevo wine cellars complex (a and b) and The village of Gostuša near Pirot (c and d).

by high historical value as well as ambient and aesthetic value. Rich material values are accompanied by a very rich intangible cultural heritage (culinary traditions, folklore, and old crafts) (Figure 12a and b).

Karađorđe's Topola with Oplenac occupies the third place when it comes to the total potential value (0.585). It is characterized by high historical, ambient, and aesthetic value. Its dominance in relation to the sites in the area is emphasized. The significant value of resources did not affect the importance of tourist retention (Figure 12c and d).

The complex of Rajac and Rogljevo wine cellars (0.582) is a representative example of the appearance of economic buildings from the end of the nineteenth and the beginning of the twentieth century. Hence, the preservation of traditional style has the most significant value followed by ambient and aesthetic values (Figure 13a and b).

The village of Gostuša near Pirot (0.579) is a representative example of the appearance of a mountain village in Eastern Serbia. The village is hidden among the slopes of the Stara Planina. This isolation from urban environments and modern influence on nature and its values managed to preserve the village in its original form, which has become an attraction for modern tourists (Figure 13c and d).

5 Conclusion

By comparing the results of two different methods (AHP – expert assessment and Mathematical model of potential assessment – tourist assessment) that assess the overall tourism potential of a given area, in this case for six different spatial, cultural, and historical units in Serbia, we notice small deviations between the methods, which in this case are attributed to the lack of objectivity of tourists. In both cases, the first position on the scale of values was taken by the complex Staro Selo in Sirogojno and the second by the monumental area of Stari Ras. The difference in the total tourist potential can be seen in the complex of Rajac and Rogljevo wine cellars in relation to Karađorđeva Topola with Oplenac. According to experts, a significant advantage was given to Rajački and Rogljevski breweries (0.174) in relation to Karađorđe's Topola with Oplenac (0.128), while tourists gave a slight advantage to Karađorđe's Topola with Oplenac (0.585) in relation to Rajac and Rogljevo wine cellars (0.582). The

fact is that Karađorđe's Topola with Oplenac has better tourist promotion and a long tradition in tourism, and thus the tourists are familiar with it. This claim is confirmed by the comparison of the total tourist potential of the other two analyzed spatial, cultural, and historical units. According to experts, the Ethno Park in Kupinovo has a significantly higher value (0.108) in relation to the village of Gostuša near Pirot (0.082), while according to tourists, a slight advantage is given to the village of Gostuša near Pirot.

The analysis of the achieved level in the valorization of the mentioned spatial, cultural, and historical units and the high attendance of these destinations show their value and attractiveness, and as such, they belong to the category of affirmed tourist units of wider national importance.

The significance of this research is that it confirms the fact that the final results differ slightly if different methods are used, in this case, the AHP method and the mathematical model for estimating tourism potential. All relevant elements indicate that the improvement of their development can significantly affect the increase of tourist traffic in them with the aim of comprehensive tourism development. Measuring the tourist potential of spatial, cultural, and historical units is a very complex and inspiring research work. Therefore, the goal should not be only the tourists' evaluation of their motives, but the need to protect cultural monuments must also be taken into account. The results show significant opportunities but also shortcomings. A comparative analysis of two different methods of spatial cultural–historical units confirms the issue of objectivity in assessing the potential, and all this imposes the need to develop a new model based on expert and tourist assessment, which would eliminate existing shortcomings and raise the level of objectivity. This is a recommendation for future studies interested in the assessment of the tourism potential of immovable cultural assets. In order to improve the offer made to tourists and eliminate potential shortcomings of these spatial units, it would be desirable to present the results of the analysis to competent organizations. These facts should be taken into account in future research because only a systematized attitude toward the development of these units can achieve greater results in the future tourist offer of Serbia and beyond.

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