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TOURISM DESTINATION MAPPING THROUGH CLUSTER ANALYSIS

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Abstract

The concept of tourism destination appeared in theory and practice after the development of mass tourism and tourism marketing. They are theoretically "travel market units" or areas that are capable "to exist independently and efficiently in the tourism market according to the principles of marketing and the policy of tourism product". However the main idea of which we start this paper is that the most of tourism destinations are not born naturally, they were created by implementing an efficient development management of attractions, accessibility and amenities at a specific area level. We consider that the stakeholders can intervene in an area with touristic potential to support the development of rural tourism and implement measures that can transform it in a touristic destination. With this purpose in mind we present in this paper a methodology to map the areas with rural tourism development potential by utilising cluster analysis. The case studies are the villages from Gorj County with touristic potential that have a proximity access to high value natural and/or anthropic touristic resources. The main results of our research is that in this county exists five areas where can be implemented tourism destination management plans and through which can be assured a better promotion and valorisation of rural tourism.

Key words**:** *cluster analysis, rural tourism, tourism destination*

INTRODUCTION

Dealing with tourism destinations as being geographical concentrations of cluster type [1] and space delimitation of these ones [2] starts from the idea that the group of localities with touristic potential around the natural resources and/or anthropics with a high touristic value may generate the formation and the development of the local touristic market.

The concentration of the specific terms of the rural tourism industry in limited areas taking into account the proximity criteria of the places represent the main idea regarding the researches inside this work.

By specific methods of the cluster theory which we used, the work identifies the best group of the places inside the touristic destinations of Gorj county, so that they may assure the logistic low costs and the distributions of the touristic products as well as the concentration of the touristic resources.

We consider that these groups may be changed into lifely touristic destinations by the incorporated methods of the touristic management at the local level of these components and by sustaining of relationships that develops spontaneously within a given geographical area [3].

MATERIALS AND METHODS

Mapping the touristic destinations we started from the point that every touristic destination needs orientation and promotion of the touristic objectives with a uniform character which allow the creation of specialized touristic products as well as of certain touristic connections efficient from the economic point of view. Taking into account this goal the methods of grouping these localities from one area were the following: the nearness of these localities regarding the most important touristic objectives (natural resources or anthropic ones recognized at the national level); one may organize at least one touristic pension inside the localities with a medium, high and very high potential, obtaining in this way many more groups, each of them concentrated on promotion and evaluation of natural objectives or anthropic ones; the group must allow the best organization of touristic circuit, that is every

selected area within a touristic destination is at less than 50 km from the other ones.

The main instrument used in order to demarcate the touristic destinations is represented by the spatial-geographic mapping. This allows us in the context of our research to demarcate which is the best group of the areas within the touristic destinations starting from the spatial proximity of those.

In order to achieve the delimitation of the touristic destinations we created a cluster mapping for which we used multiple types of stats analysis placed at our disposal by the Statistical Package for the Social Sciences program (SPSS).

ALSCAL (Multidimensional scaling) - MDS is a statistical method used to obtain the geometric representation of the distances; in this work we applied it with the intention to view the dimensional structure of the clusters;

The principal component of the analyses – PCA represents a statistical analysis method used to achieve the predictive models starting from the date of analysis obtained from the exploratory observations; More accurately, PCA takes over an n dimensional variable and through otogonal transformation it allows it's representation on a map compared with the criteria of the minimal quadratic error; within these researches when the distances between areas cannot be calculated directly, the distances become variables expressed through normal standardized deviations, following their focus towards the average and the reduction of the standard deviations.

Centroid Linkage (Hierarchical Cluster Method) – HCM uses algorhytms of statistical analysis which allow the connection between the objects inside the cluster based on the distance between them. One of the analysis methods from this statistical approach is represented by the complete linkage clustering, based on the maximum distances between the objects.

Next to the specified cluster type analysis methods we also used IDW (INVERSE DISTANCE WEIGHTED) and ADW (AVERAGE DISTANCE WEIGHTED) . These represents the interpolation methods of the landmarks based on the reversed distances, more accurately the average between those. This interpolation function is known by the name of Shepard Method and it allows interpolation through the smallest squares from the inverse of the distance, being similar to the ponderate method after the distance inverse. In our steps to analyze which area presents the best concentration towards the other areas from the touristic destination, The used formulas are:

$$IDW = \frac{1}{j-1} * \sum_{1}^{j} \frac{1}{Dj} \quad \textbf{and} \quad ADW = (j-1) * \frac{1}{\sum_{1}^{j} \frac{1}{Dj}}$$

Where D= the distance of an are "j" towards the other areas, J = The areas within a touristic destination

RESULTS AND DISCUSSIONS

The Gorj County presents the following main features: landforms: plain, hill, mountain, hidrographical network of the Jiu river; natural protected places of national interest and Nature 2000; the majority of the antrophic touristic objectives(museums, festivals, archeological sites, historic monuments, religious monuments) they are concentrated in the north of the county aproximatively paralel with the mountain line; 7 commons with very big potential, 22 commons with big potential and 29 of them with average potential, and those with very high potential and high are concentrated especially in the north area of the county; the city Targu- Jiu represents the main polarizing economic center of the county.

Areas with touristic potential are dispersed liniar along the mountain line, but we considered that is necessary to select more elements that can stay at the group's base, respectively natural resources categories and antrophic that can constitute the main nucleus of the future touristic rural products from the area.

The touristic destinations design based on the natural touristic resources

From the natural touristic resources point of view, it can be observed the fact that besides the achieved score for the natural scenery of plain or hill some areas can dispose of some

strengths. Thus, of the 58 communities with medium potential, high and very high, 28 have direct access to natural areas of national interest or Natura 2000 reserves.

Given direct access to protected areas of these cities we have seen fit to design tourist destinations in the county that have as main objective the promotion of tourism products centered on these elements. So the questions that we must respond initially are: each locality has the best distribution within that group of localities in terms of proximity and grouping by proximity localities may be attracted to the group. How many places have the best distribution within that group of cities in terms of proximity and how many localities can be attracted in the group's proximity.

To identify the number of clusters(groups of localities) we applied ASCL and PCA methods on the matrix of destination between the 28 localities, which visually showed us that it can be formed three main tourist destinations (Figure 1).

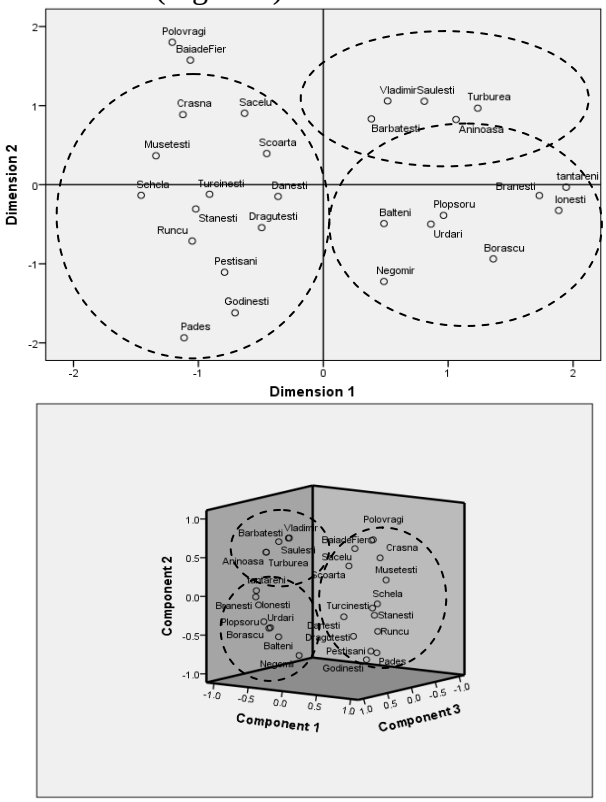

Figure. 1 ALSCAL (Multidimensional Scaling – Derived Stimulus Configuration Euclidean distance model) and Principal Component Analysis Extraction Methods

Optimal grouping of localities in the three clusters is done correctly with the HCM - Centroid Linkage (Hierarchical cluster method). Processing matrix distances between places with high natural potential; This method allowed us to obtain an optimal grouping of localities within the three destinations. Thus, according to the applied HCM method ,the component of tourist destination s is the following: 5 localities-group 1,15 localities -group 2; 8 localities-group 3 (table 1, figure2).

Table 1 Hierachical Cluster Method – Centroid Linkage

Cluster 1	Cluster 2	Cluster 3
Aninoasa	Baia de Fier	Bâlteni
Bărbăteşti	Crasna	Borăscu
Săuleşti	Dăneşti	Brăneşti
Turburea	Drăguţeşti	Ioneşti
Vladimir	Godineşti	Negomir
	Muşeteşti	Plopşoru
	Padeş	Tânţăreni
	Peştişani	Urdari
	Polovragi	
	Runcu	
	Săcelu	
	Schela	
	Scoarţa	
	Stăneşti	
	Turcineşti	

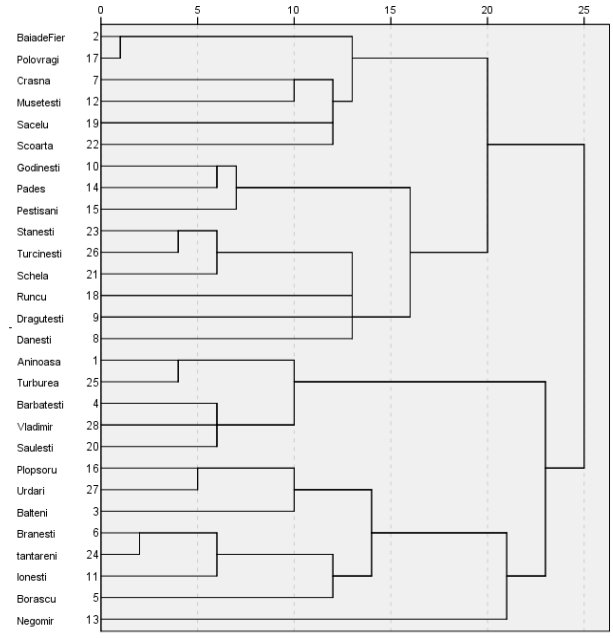

Figure. 2 Hierachical Cluster Method – Dendogram using Centroid linkage – Rescaled Distance Cluster Combine

The next step is to calculate the inverse distance weighted (IDW) and average distance weighted (ADW) between localities within each destination

that permits the identification of the locality with the most good spatial concentration towards the other areas, but those most dispersed.

The appliance of these methodologies offered us a good clasification of these areas, more respectively the higher the IDW is and the lower the ADW, by that the respective areas are more grouped. By calculating the mentioned indicators at the two clusters mentioned before(tabel 2), it can be noticed that areas such as Saulesti, Turcinesti and Plopsoru presents the highest spatial concentration towards the other areas that have access to the same cluster. This allows us to conclude that the 3 areas can represent the reference point within each cluster and it can be considered the optimal starting points for the touristic circuits at the delimited touristic destination level.

Table 2 The evaluation of the IDW (Inverse Distance Weighted) şi ADW (Average Distance Weighted) of the areas with natural potential Gorj County

	IDW	ADW
Cluster 1		
Vladimir	0.068	14.6
Turburea	0.071	14.1
Bărbăteşti	0.075	13.4
Aninoasa	0.086	11.6
Săuleşti	0.091	11.0
Cluster 2		
Padeş	0.023	43.4
Godineşti	0.029	34.9
Schela	0.030	33.0
Polovragi	0.031	32.7
Baia de Fier	0.033	30.3
Săcelu	0.033	30.3
Peştişani	0.035	28.6
Runcu	0.036	28.1
Crasna	0.037	26.9
Dăneşti	0.037	27.1
Scoarţa	0.037	26.8
Drăguţeşti	0.038	26.4
Muşeteşti	0.039	25.7
Stăneşti	0.039	25.4
Turcineşti	0.045	22.0
Cluster 3		
Negomir	0.034	29.4
Borăscu	0.044	22.7
Ioneşti	0.045	22.0
Bâlteni	0.050	19.8
Ţânţăreni	0.053	19.0
Brăneşti	0.059	17.0
Urdari	0.061	16.5
Plopşoru	0.062	16.1

Design of the touristic destinations based on the anthropogenic touristic resources

From the anthropogenic touristic resources point of view, at the county we can find historic and architectural monuments, archeological remains, habits and folkloric traditions. Most of the areas also present traditional and folkloric objectives which justify the creation of touristic concentrated products in this domain.

Considering that the areas with anthropogenic resources are dispersed on the county's territory, for an optimal association within the clusters which can capitalize the local resources we will apply for the start the HCM method on the matrix distances between the 32 areas with anthropogenic resources.

Leaving from the premise that 2 or 3 clusters can be formed, applying this method gave us an inadvertence between our dates which lead to the elimination of the areas Plopsoru and Anionoasa and forced us to remake the calculations. The new results showed an optimal formation of the 2 touristic destinations. (9 areas –group 4; 21 areas – group 5) (table 3).

Table 3 Clusters component generated by the HCM method

Cluster 4	Cluster 5	
Baia de Fier	Arcani	Mătăsari
Bengeşti-Ciocadia	Bălăneşti	Muşeteşti
Bustuchin	Bolboşi	Padeş
Cruşeţ	Câlnic	Peştişani
Dănciuleşti	Ciuperceni	Runcu
Hurezani	Crasna	Schela
Polovragi	Drăgoteşti	Scoarţa
Prigoria	Glogova	Slivileti
Săcelu	Godineşti	Stăneşti
	Leleşti	Teleşti
		Turcineşti

After this we calculated the weighted inverse distances (IDW) and the weighted average distances from each area identifying as the center of the clusters the areas such as Baia de Fier and Arcani. Hereinafter, we counted the inverse distance weighting (IDW) and the average daily wage (ADW) between the localities of each destination , identifing them as clusters centres Baia de Fier and Arcani localities (Table 4).

Centralizing the information given by a spacial- geographical locality, we may conclude that at Gorj county level there is a spacial- geographical potential for the development of the following touristic destinations (Figure 3).

G1 – located in the Southerner part of the county conditioned of 5 localities

(Aninoasa, Bărbăteşti, Săuleşti, Turburea, Vladimir), having a proximity access to natual resources and protected areas;

Table 4 The evaluation of the IDW (Inverse Distance Weighted) şi ADW (Average Distance Weighted) of the areas with anthropogenic potential Gorj County

No.	Localities	IDW	ADW
Cluster 1			
1	Danciulesti	0.019	53.3
2	Cruset	0.023	43.7
3	Hurezani	0.028	36.0
4	Bustuchin	0.031	32.2
5	Sacelu	0.037	27.2
6	Prigoria	0.039	25.7
7	Bengesti-Ciocadia	0.043	23.1
8	Polovragi	0.045	22.0
9	Baia de Fier	0.047	21.2
Cluster 2			
10	Glogova	0.026	39.0
11	Crasna	0.027	36.6
12	Schela	0.028	36.3
13	Slivilesti	0.028	35.5
14	Pades	0.029	34.4
15	Scoarta	0.030	33.0
16	Bolbosi	0.030	33.2
17	Musetesti	0.034	29.7
18	Godinesti	0.037	26.9
19	Dragotesti	0.037	27.2
20	Balanesti	0.037	27.0
21	Stanesti	0.038	26.3
22	Matasari	0.038	26.5
23	Ciuperceni	0.040	24.8
24	Turcinesti	0.041	24.3
25	Lelesti	0.042	23.6
26	Telesti	0.043	23.1
27	Pestisani	0.044	22.8
28	Runcu	0.046	21.8
29	Câlnic	0.047	21.1
30	Arcani	0.052	19.3

Source: own calculations on the basis of distances from the http://www.distanta.com/ site.

G3-located in the south-eastern part of the county, consisting of 8 locations (Balteni, Borascu, Branesti, Ionesti, Negomir, Plopsoru, Tantareni, Urdari), with proximity access to natural resources and protected areas;

G4-located in the eastern part of the county, consisting of 9 cities (Baia de fier, Bengesti-Ciocadia, Bustuchin, Cruset, Danciulesti, Huruzeni, Polovragi, Prigoria, Sacelu), with direct proximity access to natural resources;

G5-located in the north-west and west of the county, consisting of 21 localities (Arcani, Balanesti, Bolbosi, Calnic, Ciuperceni, Crasna, Dragotesti, Glogova, Godinesti, Lelesti, Matasari, Musetesti, Pades, Pestisani, Runcu, Schela, Scoarta, Slivilesti, Stanesti, Telesti, Turcinesti), with direct proximity access to natural resources.

CONCLUSIONS

Findings of this paper highlight ways of grouping rural localities so as to ensure optimal access to local tourist resources. Thus, as a criterion for organization to layout the space grid of the localities of tourist resources has allowed the location and mapping tourist destinations and to establish polarizing centres. This approach allowed us to identify localities in the county Gorj with tourism development potential, locations that allow the best distribution from natural and anthropogenic local tourism resources (most optimal training sightseeing in the defined area as a tourist destination).

This methodology allows the placement of natural and anthropogenic resources that can be exploited through tourism products at the level of tourist destinations so that ensure optimal use of proximity and relative proximity analysis of localities allowing joint use of tourism resources.

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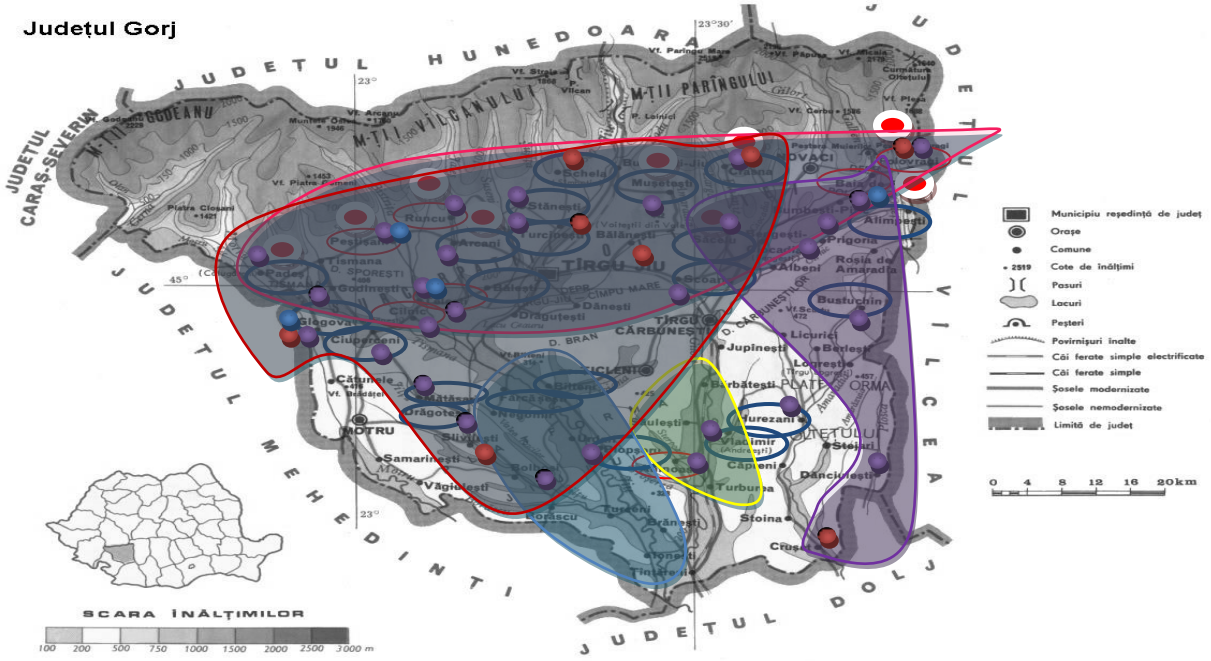
Figure 3. Territorial delimitation of touristic destinations in terms of development's potential



	Communes with touristic accomodation (pensions) selected from the database (Arcani, Baia de Fier, Crasna, Muşeteşti, Padeş, Peştişani, Polovragi, Runcu, Săcelu) Localities with high potential
	Anthropic objective- archaeological vestiges Anthropic objective – historical, architectural and religious monuments
	G1 G2 G3 G4