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# Spatial analysis and methods of cartographic representation of youth football in Bihor County

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**Abstract:** This paper analyzes, from a spatial point of view, the places in Bihor County where we have sports associations, private clubs, small teams of children and juniors, where children and young people who have not yet reached the age of majority work. Among the research methods used and applied in carrying out this paper we mention: observation method, analytical method, the statistical-mathematical method and the method of graphic and cartographic representation and the basic tool is represented in the cartographic modeling by the ArcGis program. The Bihor football map includes 55 clubs, of which 12 have only activity with junior teams. The total number of clubs with junior teams is 31 and which totals 84 junior teams. A number of 24 clubs with senior teams 55.8% (out of 43) have no activity with junior teams. Most clubs that have junior activity are in Oradea 16, followed by Salonta 3, the rest of the localities having only one club. These clubs are distributed in 23 localities. Only 19 clubs with activity in the senior teams also have groups of children registered in official competitions. Through this study we aimed to improve the cartographic aspect the representation of the sports phenomenon in general and the football one in particular in order to show the importance of the cartographic product in the qualitative and quantitative spatial analysis, in the analytical and synthetic one.

**Keywords:** football map, football clubs, children and juniors, spatial analysis

## Introduction

The relationship between sport and geography (Ilies et al., 2014a) reflected in the spatial analysis of an element or phenomenon is an important support in developing strategies for planning sports activities (Ilies et al., 2016a; Erdely et al., 2020), youth football in the Bihor county, in the case of the present study. The Romanian literature (Ilies et al., 2014b; Ilies et al., 2015; Ilies et al., 2020) or the

international one (Reilly and Gilbourne, 2003; Bale, 2003; Conner, 2014; Kozma et al., 2015) through the works published in the last period, encourage and fully complement this approach.

The approach of this topic was chosen to analyze, from a spatial point of view, the distribution of localities in Bihor county that have sports associations, private clubs or small teams of children and juniors, in which children and young people who have not yet reached adulthood activates. Thus, we try to spatially analyze at county level, the development perimeter of youth football in Bihor County (Herman et al., 2021; Herman et al., 2020a). In this sense, we conducted a correlative study between the youth component of football included in the age group 15-19 years organized at the level of football clubs, the network of high schools in the territory and local authorities. All this in a logical construction based on the dual concept of education and sports and which has continuity in the university environment, thus prolonging the "sports life in an organized environment" on a contingent of ages between 18-25 years (duration of a complete university cycle).

### **Materials and Methods**

The spatial analysis at the level of this study is based on the cartographic transposition of the specific elements that make up the final cartographic ensemble. As in any geographical study, in order to reach a final result relevant to the researched field, the successive use of the three basic principles in geography is required: spatiality, causality and integration, the final synthetic result being, in this case, the cartographic component.

Among the research methods used and applied in carrying out this paper we mention: the observation method; analytical method; the statistical-mathematical method and the method of graphic and cartographic representation (Armas, 2006); and the basic tool is represented in the cartographic modeling by the ArcGis program (Caciora et al., 2021; Herman et al., 2020b).

According to the principle of spatiality, the research of the sports phenomenon determined by the particularities of the youth football from Bihor county uses observation as a basic method and description as a means of rendering. The purpose of this process is materialized in the elaboration of the descriptive model (widely used in the sports practice of information and popularization) which highlights:

- qualitative elements of the sports-football phenomenon: age categories, competitive levels etc;
- quantitative elements- by representations of statistical data or of those personally collected from the field, all graphically dimensioned on an expressive scale.

In 2017, in a research focused on the spatial analysis of amateur football in Romania, we introduced as measurement elements, the territorial development index of football ( $I_{dtf}$ ) with 5 classes (Bulz and Ilies, 2017):

$$I_{dtf} = (N_e/N_{loc}) * 100 \quad (1)$$

where:

$N_e$  – the total number of teams in the county (only one team per locality/commune/city is taken into account if there are several);

$N_{loc.}$  – the number of localities/communes in the county or a higher area as an extension and which includes at least two localities;

100 – constant multiplication value.

The quantitative results obtained from this analysis are between indices of 0 and 1, where the maximum value shows that throughout the county there is more than one team per city/commune, in which low values indicate a very low level of development and the absence of teams sports (Table 1).

**Table 1.** The results of the index that indicate the particularities of the territorial administrative units related to the presence in the territory of the sports teams

Class	Value	Peculiarities at the level of cities + communes
1	Above 1,00	The degree of territorial coverage indicates the fact that on the entire territory of the county there is more than one football team per city / commune.
2	0,75-99,00	High degree of coverage highlighting a high level of development of amateur football.
3	0,50 – 0,74	Average level of development with two subcategories differentiated by the average value of the indicator per country.
4	0,25- 0,49	Low level of development.
5	Below 0,30	Very low level of development.

The amateur football practice index ( $I_{pfa}$ ) through its values can highlight the impact of this type of sport and the related competition on the population in a reporting area (country, region, county, locality etc) by reporting the number of legitimate practitioners per thousand of inhabitants (male and female population; by age groups etc). For the present study, this indicator was adapted as follows:

$$I_{pfa} (N_j/P_{m4-19})*1000 \quad (2)$$

where:

$N_j$  – the total number of players in the county;

$P_{m4-19}$  – specific reporting population. In our case it was about junior teams, we used the male population aged between 4 and 19 years;

1000 – constant multiplication value.

This indicator can be adapted to specific age groups, in the case of the present study to the groups included in youth football, between 4-19 years (Figure 1).

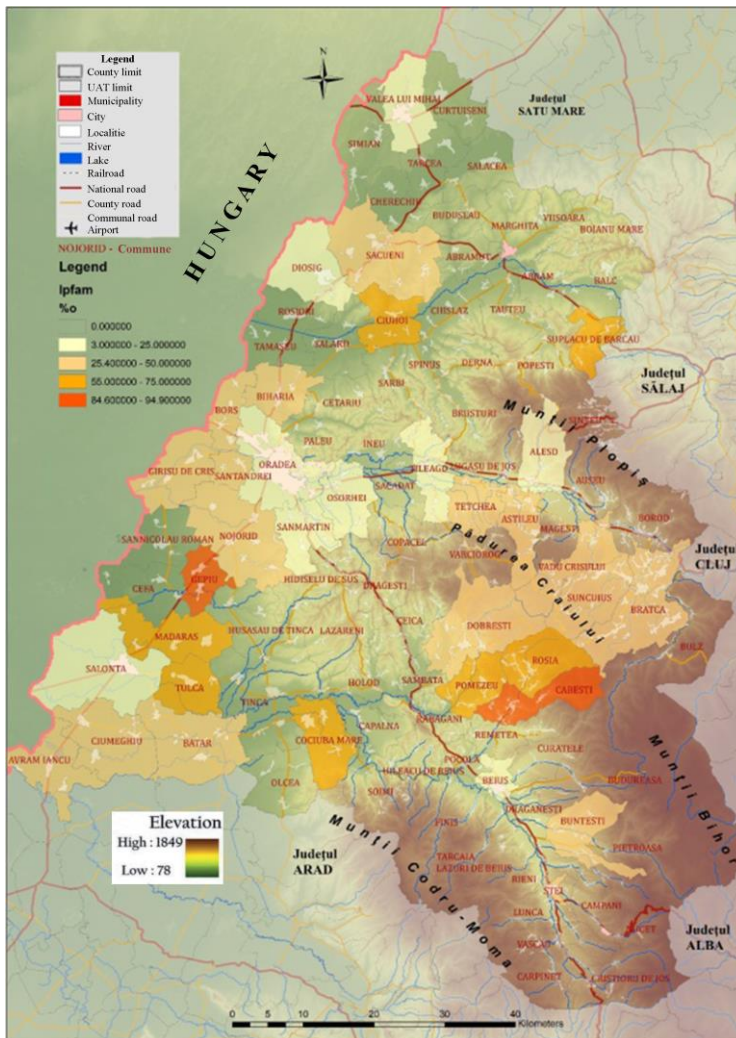


Figure 1. Amateur football practice index at the level of 2017 (processing after Bulz, 2017)

## Results and discussions

### *Demographic component - resource for youth sports*

The human resource of the county on July 1, 2020 amounted to 617.927 inhabitants, a value that places Bihor on the 13th place in Romania (INSSE, 2020).

From a structural point of view, the population of the county was distributed as follows:

- 48.78% (301,476 inhabitants) male population;
- 51.22% (316,451 inhabitants) female population.

At the media level:

- the urban population from the 10 cities, through the 316.979 inhabitants represents 49.2% of the total population per county, in turn being

structured by gender as follows: 150.928 male population (47.61%) and 166,051 female population (52.39%);

- the rural population with 300.948 inhabitants represents 50.8%, of which 150.548 are male (50.02%); 150.400 women (49.97%).

The population density at county level was 82.0 inhabitants/km<sup>2</sup>, differentiated as follows: 370.7 inhabitants/km<sup>2</sup> in urban areas and 43.8 inhabitants/km<sup>2</sup> in rural areas.

The ethnic and confessional structure promotes the image of a multicultural and heterogeneous county in terms of ethnicity and confessional. From an ethnic point of view, on a dominant Romanian background 63.7%, in the localities of the county, grouped or dispersed together with other ethnic communities are: Hungarians (24.0%), Roma (6%), Slovaks (1.1%), Germans etc. In terms of spatial distribution and the level of confessional structure we find a distribution similar to the ethnic one, there is a certain overlap and an ethno-confessional identity at the level of localities. And in this case on a dominant Orthodox background (55.8%) the confessional structure includes Reformed (16.6%), Roman Catholics (8.4%), Greek Catholics (2.1%), Pentecostals (6, 6%), Baptists (3.8%), others (6.7%) etc.

An important aspect for the study is the structure of the population by age groups, which reflects the demographic potential for the selection of participants in sports activities.

At the level of 2019, the major age group 0-14 years amounted to 94.272 people, representing 15.3% of the total population of the county. At the gender level, the male population was 48.266 people (17.3%) and the female population was 46.067 people (15.5%). The important share was held by the adult population 15-59 years with a total of 381.077 representing 61.8%. The population over 60 years represents 22.8% (140.680 people). The school population of the county as the main resource for recruiting athletes in youth sports included 108.162 people representing 17.5% of the county's population.

At the level of the 107 schools in the county, at the level of the 2018/2019 school year, 49.652 students attended, of which 24.130 were female (48.6%). In high school education (Figure 2 and Table 2), their number in the 51 high school institutions was 18.116 of which 9.367 were female (51.7%). The only high school structure with a sports profile, LPS Bihorul Oradea had 258 students enrolled in the 2018/2019 school year, a much lower value compared to the 2014/2015 school year with 311 students.

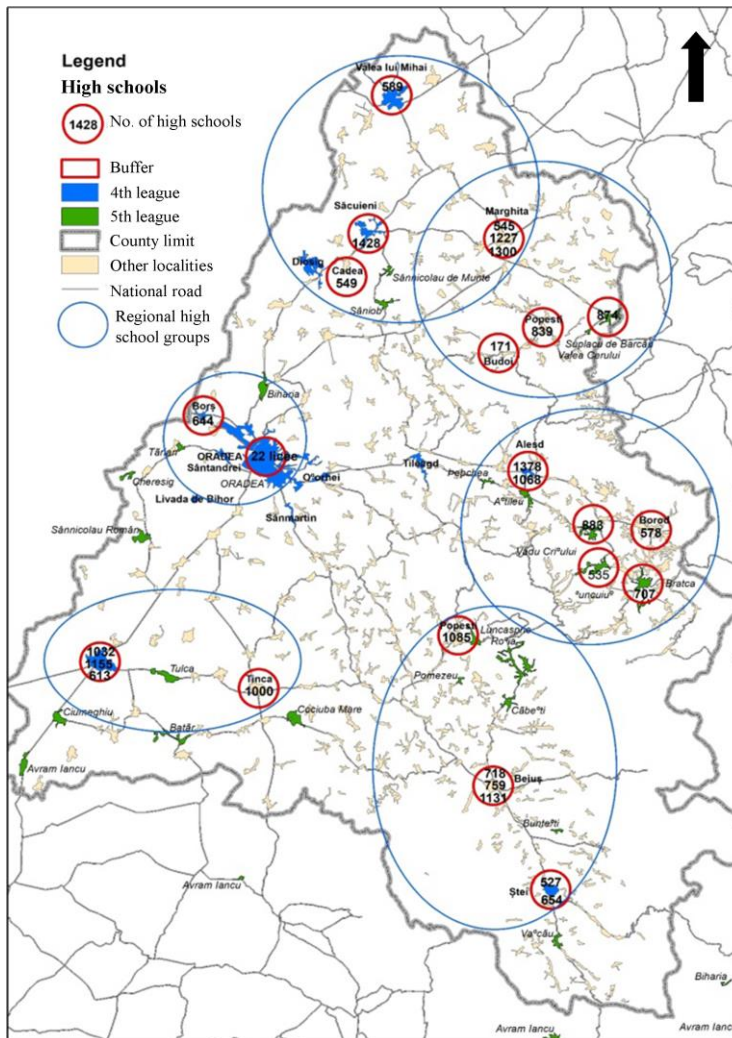
The dropout rate was 1.8% differentiated as follows: 1.6% in the primary school, 2.1% in middle school and 1.5% in high school education.

**Table 2.** Bihor County. The main age groups overlap the selection areas for youth sports in general and football in particular.

Age group	Total (no.)	Male (no.)	Female (no.)
1-4 years	25.361	12.964	12.397
5-9 years	31.217	16.003	15.214
10-14 years	31.847	16.337	15.510

15-19 years	33.350	17.261	16.289
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The sports activity, according to the same county statistical source at the level of 2018, registered 5,536 legitimate athletes distributed at the level of 183 affiliated sports sections under the guidance of 251 coaches and 72 instructors.



**Figure 2.** Bihor County. The localities with high schools and the number of students at the level of the 2019/2020 school year, respectively the localities with football teams in leagues 4 and 5 in the 2019/2020 season

**Infrastructural component**

A reference work in the literature is the one published in 2014 in the *Geographical Atlas of the tourist heritage of Crişana and Maramures* (Ilies et al., 2014c) with a chapter dedicated to tourist infrastructure. The transposition of this model at the level of Bihor county comes in support of a spatial analysis of the specific

infrastructure in terms of quantity (number, elements) but also qualitative (equipment level etc). The management of such a database through GIS faithfully reproduces this type of information through the resulting cartographic product.

The sports bases identified in the localities of Bihor county, also used by the youth football, are differentiated according to the age category, being generally, especially at the level of the rural environment, with the basic infrastructure of the locality. At the level of urban environment there is a diversification of the infrastructure generated by the existence of support financial resources with values higher than those existing in rural areas. At the level of this study we propose a mapping of the specific infrastructure on two categories:

- outdoors;
- covered land, which is usually identified for small age groups with gyms belonging to schools or town halls.

Another typology concerns:

- lands with natural grass;
- land of various sizes covered with synthetic surfaces.

From the point of view of the competitive level for which the football fields of the clubs with football teams at the level of Bihor county have been approved, in 2020 the infrastructure of this type can be ranked as follows:

### 1. **League 3: Oradea**

- Iuliu Bodola municipal stadium with two fields with natural grass and a synthetic field, where the CAO 1910 Oradea club operates;
- Tineretului stadium with a field with natural grass and a synthetic field, for the Junior Elite Championship. To this are added three covered fields for mini-football;
- University of Oradea stadium with natural grass field and two synthetic mini-football fields.

### **Sânmartin**

- CSC Sânmartin team stadium - two fields with natural grass;
- Luceafărul Oradea stadium - two fields with natural grass.

In certain situations, in localities where football teams have been active in the upper echelons of Romanian football, there is a high quality infrastructure currently used only at the level of lower leagues of amateurs (4 or 5), children and juniors: Salonta, Aleșd, Beiuș , Valea lui Mihai, Marghita, Ștei etc. Although it has a stadium where league 3 matches were played, currently the city of Marghita is represented in Bihor football only by junior teams. There are also good quality football fields: Borș, Sântandrei, Valea lui Mihai, Aleșd, Tileagd, Salonta, Beiuș, Ștei etc. Unfortunately, there is also quality infrastructure, unused or temporarily used: Paleu, Marghita, Hidișelu de Sus, Gepiu etc.

2. The infrastructure approved for the development of League 4 senior and junior competitions includes at the level of 2020 stadiums from 18 localities, 9 cities:

Oradea, Salonta, Beiuș, Ștei, Valea lui Mihai, Aleșd, Săcuieni and 9 communal stadiums: Avram Iancu, Cociuba Mare, Sânmartin, Tileagd, Borș, Mădăras, Livada, Diosig, Voivozi.

The way of cartographic representation of infrastructures uses the ArcGis program as a tool and the elements and quantitative and qualitative phenomena are rendered by signs, symbols, pictograms rendered at scale and chromatically supported by color spectrum to render the intensity of the phenomenon and the size of the element. All these methods of cartographic representation facilitate at the highest level the spatial analysis with an important role in the elaboration of spatial planning strategies in general and in the field of sport in particular. This type of map is extremely useful in the competitive region, especially correlated with the communication infrastructure.

3. Infrastructure approved for football competitions at league level 5.

4. Approved or adaptable infrastructure for mini-football. In this case, reference is made especially to the synthetic mini-football fields managed by schools or local communities.

### ***Youth competitions***

Analyzing the competitions organized at county level in the 2019-2020 season, until the declaration of the state of emergency, we found a certain stability compared to the previous season.

The content of this chapter focuses on qualitative representation. The map made shows spatially, through symbols adapted to localities, the level of competition in hierarchical aspect or by age categories. The method of concentric circles combined with symbols or icons is the most suggestive to highlight the competitive level or age category in which a club in a particular locality participates. In certain situations, as is the case of Oradea, such cartographic representations also result in a ratio between the number of clubs/teams and the existing infrastructure. Such analyzes highlight the pressure exerted by the youth human resource on the infrastructure; its insufficiency; poor quality etc.

### ***Juniors A, B and A1 (17-19 years old)***

The A1 junior group includes children aged 17-19 and younger and who are usually high school students in grades XI-XII. The exceptions are usually in rural areas, where some of them dropped out of school. In these cases, through a strategy at community level, through a well-defined relationship between family, school and club, they can be attracted to sports and implicitly motivated to continue school. Such situations can be found in Tileagd, Livada, Diosig or Săcuieni.

In the 2019/2020 season, at the level of the 4th league, 12 junior teams were activated. Of these, two teams are from Oradea, CAO 1910 and FC Universitatea Oradea, 5 teams are from the Oradea metropolitan area: Crișul Sântandrei, Viitorul Borș, CSC Sânmartin, Embrak Livada and CS Oșorhei, and another 5 junior teams come from areas with tradition in this sport: CSO Ștei, Crișul Aleșd, CS Unirea Valea lui Mihai, CSM Olimpia Salonta and Foresta Tileagd. We mention that compared to the previous seasons (2017/2018 and 2018/2019), the number of A1 junior teams is on



a negative trend and this should give food for thought to those involved in this phenomenon. At this level, compared to the previous season, these groups were abolished at the clubs in Beiuș, Săcuieni, Diosig and Mădăras. If in the communes of Diosig and Mădăras the lack of human resources of selection was invoked, the situation in the cities of Beiuș and Săcuieni, old centers of Bihor football, is not even more explained. In both cities there are high schools as a selection area (Table 3), those in rural areas are usually based on children from the local horizon. As can be seen in Figure 2, the commune of Diosig has a high school unit in the vicinity of Cadea, which could ensure a club-high school partnership relationship.

**Table 3.** The junior teams from Bihor county registered in the 4th league, 2019/2020 season  
(Source: AJF Bihor - Juniors 4th league, 2020)

#	Echipa	M	V	E	I	GM	GP	P
1	ACS CAO 1910 Oradea	11	11	0	0	90	6	33p
2	FC Universitatea Oradea	11	10	0	1	58	18	30p
3	Clubul Sportiv Oșorhei	11	8	0	3	39	17	24p
4	CSO Ștel	11	7	1	3	44	14	22p
5	Crișul Aleșd	11	7	0	4	58	24	21p
6	CS Unirea Valea lui Mihai	11	5	1	5	27	25	16p
7	CSC Crișul Sântandrei	11	4	1	6	62	31	13p
8	CSM Olimpia Salonta	11	4	1	6	52	37	13p
9	CSC Sănmartin	11	3	2	6	26	41	11p
10	CS Viitorul Borș	11	2	1	8	12	48	7p
11	Unirea Embrak Livada	11	1	0	10	17	132	3p
12	Foresta Tileagd	11	0	1	10	16	108	1p

### *The relationship between high school institutions and sports clubs: Strategies and solutions*

A strategy to revive youth football at this age category can be based on a correlative spatial analysis at the level of localities with teams in league 4 where there is an obligation to have such a group and the existence of high schools that could provide the necessary human resources. Thus, a county strategy can be put into practice that combines the dual concept of school and sports (Herman et al., 2020c). Specifically, it would be necessary to sign a partnership between the club and the high school(s) in the locality or neighborhood, and according to the Western model, those who, in addition to teaching and extracurricular activities at club level to be compensated through the school with sports scholarships. This mechanism, if there is interest from clubs and local communities, should be put into practice given that most clubs and all public schools are under the authority of the mayor's office (Table 4 and 5).

**Table 4.** The high school network from Bihor County in the 2019/2020 school year (*ISJ BIHOR, 2020*)

Nr. Crt.	Residence	Name of the educational unit	Locality	Total no. of classes PJ	Total no. of students PJ	School sports club
1	URBAN	COLEGIUL ECONOMIC "PARTENIE	ORADEA	48	1272	
2	URBAN	COLEGIUL NAȚIONAL "EMANUIL	ORADEA	40	1153	
3	URBAN	COLEGIUL NAȚIONAL "IOSIF VULCAN"	ORADEA	58	1557	
4	URBAN	COLEGIUL NAȚIONAL "MIHAI	ORADEA	50	1395	SSC 1
5	URBAN	COLEGIUL NAȚIONAL "ONISIFOR	ORADEA	61	1813	
6	URBAN	COLEGIUL TEHNIC "MIHAI VITEAZUL"	ORADEA	54	1544	
7	URBAN	COLEGIUL TEHNIC "TRAIAN VUIA"	ORADEA	73	1910	
8	URBAN	LICEUL CU PROGRAM SPORTIV	ORADEA	21	578	SSC 2
9	URBAN	LICEUL DE ARTE ORADEA	ORADEA	36	885	
10	URBAN	LICEUL GRECO-CATOLIC "IULIU	ORADEA	37	1025	
11	URBAN	LICEUL ORTODOX "EPISCOP ROMAN	ORADEA	28	782	
12	URBAN	LICEUL REFORMAT "LORANTFFY	ORADEA	21	457	
13	URBAN	LICEUL TEHNOLOGIC "CONSTANTIN	ORADEA	30	876	
14	URBAN	"VASILE VOICULESCU" ORADEA	ORADEA	29	728	
15	URBAN	LICEUL TEHNOLOGIC SPECIAL NR.1	ORADEA	45	502	
16	URBAN	LICEUL TEOLOGIC BAPTIST	ORADEA	31	915	
17	URBAN	LICEUL TEOLOGIC PENTICOSTAL	ORADEA	53	1446	
18	URBAN	LICEUL TEOLOGIC ROMANO-CATOLIC	ORADEA	37	893	
19	URBAN	LICEUL TEORETIC "ADY ENDRE"	ORADEA	28	734	
20	URBAN	LICEUL TEORETIC "AUREL LAZĂR"	ORADEA	19	548	
21	URBAN	"FRIEDRICH SCHILLER" ORADEA	ORADEA	36	785	
22	URBAN	LICEUL TEORETIC "LUCIAN BLAGA"	ORADEA	37	1014	
23	URBAN	COLEGIUL NAȚIONAL "SAMUIL	BEIUȘ	28	759	SSC 3
24	URBAN	COLEGIUL TEHNIC "IOAN CIORDAȘ"	BEIUȘ	30	718	
25	URBAN	LICEUL VOCAȚIONAL PEDAGOGIC	BEIUȘ	43	1131	
26	URBAN	COLEGIUL NAȚIONAL "AVRAM IANCU"	ȘTEI	20	527	SSC 6
27	URBAN	LICEUL TEHNOLOGIC "UNIREA" ȘTEI	ȘTEI	26	654	
28	URBAN	COLEGIUL NAȚIONAL "OCTAVIAN	MARGHITA	47	1300	
29	URBAN	LICEUL TEHNOLOGIC "HOREA"	MARGHITA	20	545	
30	URBAN	LICEUL TEORETIC "HORVATH JANOS"	MARGHITA	53	1227	
31	URBAN	LICEUL TEORETIC "ARANY JANOS"	SALONTA	46	1032	
32	URBAN	COLEGIUL NAȚIONAL "TEODOR NEȘ"	SALONTA	46	1155	SSC 4
33	URBAN	LICEUL TEHNOLOGIC NR.1 SALONTA	SALONTA	23	613	
34	URBAN	COLEGIUL TEHNIC "ALEXANDRU	ALEȘD	43	1068	SSC 5
35	URBAN	LICEUL TEORETIC "CONSTANTIN	ALEȘD	60	1378	
36	URBAN	LICEUL TEHNOLOGIC NR.1 VALEA LUI	VALEA LUI	25	589	
37	URBAN	LICEUL TEORETIC "PETOFI SANDOR"	SĂCUIENI	73	1428	
38	RURAL	AGROINDUSTRIAL "TAMASI ARON"	BORȘ	33	644	
39	RURAL	LICEUL TEORETIC "GABRIEL TEPELEA"	BOROD	29	578	

40	RURAL	LICEUL TEORETIC NR.1 BRATCA	BRATCA	38	707
41	RURAL	LICEUL TEORETIC "JOZEF KOZACEK"	BUDOI	12	171
42	RURAL	LICEUL TEHNOLOGIC NR. 1 CADEA	CADEA	26	549
43	RURAL	LICEUL TEHNOLOGIC NR.1 DOBREȘTI	DOBREȘTI	51	1085
44	RURAL	LICEUL TEHNOLOGIC NR.1 POPEȘTI	POPEȘTI	42	839
45	RURAL	LICEUL TEHNOLOGIC NR.1 SUPLACU	SUPLACU DE BARCAU	49	874
46	RURAL	LICEUL TEHNOLOGIC NR.1 ȘUNCUIUȘ	ȘUNCUIUȘ	26	535
47	RURAL	LICEUL TEORETIC "NICOLAE JIGA"	TINCA	48	1013
48	RURAL	COLEGIUL TEHNIC NR.1 VADU	VADU CRIȘULUI	43	883
				<b>1852</b>	<b>44.814</b>

**Table 5.** The network of high schools with sports classes under the title of School Sports Club rounded LPS CSS Bihorul from Oradea

Residence	Name of the educational unit	Locality
URBAN	School sports club No.1	ORADEA
URBAN	School sports club No.2	ORADEA
URBAN	School sports club No.3	BEIUS
URBAN	School sports club No.4	SALONTA
URBAN	School sports club No.5	ALEȘD
URBAN	School sports club No.6	STEI

Quantitatively correlating the age group 14-19 years with the number of students in high school and the number of existing A1 and B1 junior football teams can be noted the interest shown by local authorities and communities for sports but especially the possibility of developing a strategy to create a useful connection to the community in this regard, Of the 48 high schools in the county, 37 are in urban areas (77.0%) with a total of 36936 students (82.4%) of which 22 (45.8%) in Oradea municipality with a total of 22,812 students (50.9%). To these are added 11 high schools in rural areas distributed in 11 localities and totaling 7878 students (17.6% of the total by county). Based on this analysis, the regional grouping could look like this:

1. The municipality of Oradea, which includes over half of the number of students in the county and almost similarly the number of high schools (22) has the most important selection base.

2. The group of localities with 2-3 high schools that includes 5 cities: Beiuș (3), Marghita (3), Salonta (3), Ștei (2) and Aleșd (2). The following mention is required: except for the municipality of Marghita, all the other cities included in one of the rounded high schools and sports classes, respectively School Sports Clubs.

3. Grouping localities with a high school: two cities: Valea lui Mihai and Săcuieni; and 11 rural localities: Borș, Borod, Bratca, Budoii, Cadea (administratively belongs to the town of Săcuieni), Dobrești, Popești, Suplacu de Barcău, Șuncuiuș, Tinca and Vadu Crișului.

In table 6 we present correlatively the relationship that could exist in a future county strategy for reviving youth football between the local authority, high school and sports club.

**Table 6.** Bihor County. ATUs, high schools and sports clubs with a football profile at the level of 2020

Nr. Crt.	Locality	No. Of high schools	Competitive level			No. teams
			Republican championship	4th league	5th league	
1	Oradea	22	Luceafărul LPS Bihorul CSM Viitorul Pandurii	CAO FC Universitatea	CAO	13
2	Salonta	3		CSM Olimpia		1
3	Marghita	3	Without team			
4	Beiuș	3		CF Bihorul		1
5	Aleșd	2		Crișul		1
6	Ștei	2		CSO		1
7	Valea lui Mihai	1		Unirea		1
8	Săcuieni	1		Stăruința		1
9	Borș	1		Viitorul		1
10	Borod	1	Without team			
11	Bratca	1			Unirea	
12	Budoi	1	Without team			
13	Cadea	1	Without team			
14	Dobrești	1			Vulturii	
15	Popești	1			Poienarii	
16	Suplacu de Barcău	1			Voința	
17	Șuncuiuș	1			Minerul	
18	Tinca	1	Without team			
19	Vadu Crișului	1			Stânca	
	Total	48	8	9	7	20

Unfortunately, the negative trend regarding the declining interest among young people is also reflected in table 5 which shows the following conclusions: Oradea, which also has a high school with a sports program, at a number of 22 high schools has only 9 teams juniors A and B of which 8 in national level competitions and only 3 in amateur competitions. To these are added another 6 teams at league level 4, of which only 5 in urban and one in rural La Borș. On a normal logic of encouraging sports so that each high school has at least one team, we find a large territorial deficit. At a number of 15 high schools in the urban area there are only 5 junior teams, all in amateur football. Of the 11 rural localities with high schools, only Borșul is in league 4 and has a team of juniors A1, instead other 6 rural localities with high schools have senior teams in league 5. The probability that high school students from these localities will work in these teams is also high. On the other hand, the municipality of Marghita does not exist on the map of Bihor football at the level of seniors and juniors A1, to which are added 4 other communes, of which Borod and Tinca with a great youth potential.

A solution in this sense would be the organization at the level of Bihor county, in partnership between AJF Bihor, ISJ Bihor, the town halls from the localities with high schools and the existing football clubs, a championship between educational institutions. The map of such a championship would include no less than 21 localities with high schools: 10 urban and 11 rural. Specifically, teams could be registered as follows:

- high school representatives: theoretically a potential of 48 teams, of which in Oradea there are 22. This aspect would impose a championship at municipal level;
- if there are partnerships between the clubs in the locality or neighboring localities attesting the fact that at least 75% of the players are the students of the partner high school, the clubs in question can be graduated by the existence of a junior team. A good example in this sense could be the commune of Diosig, with a team in league 4 but which there is a high school nearby in Cadea that also has an homologable football field. A partnership between the CS Diosig club and the Cadea High School, even if they are in different ATUs, would substantially contribute to the development of youth football, to the reduction of school dropout and especially to the increased social integration at the level of the local community;
- another advantage from an economic point of view would be the support of these school teams from the MEN budget and additionally from the funds of the local authorities under whose jurisdiction the high school or club is located, and the third source is local, regional sponsors etc.

### ***Sports clubs and football teams: Spatial analysis***

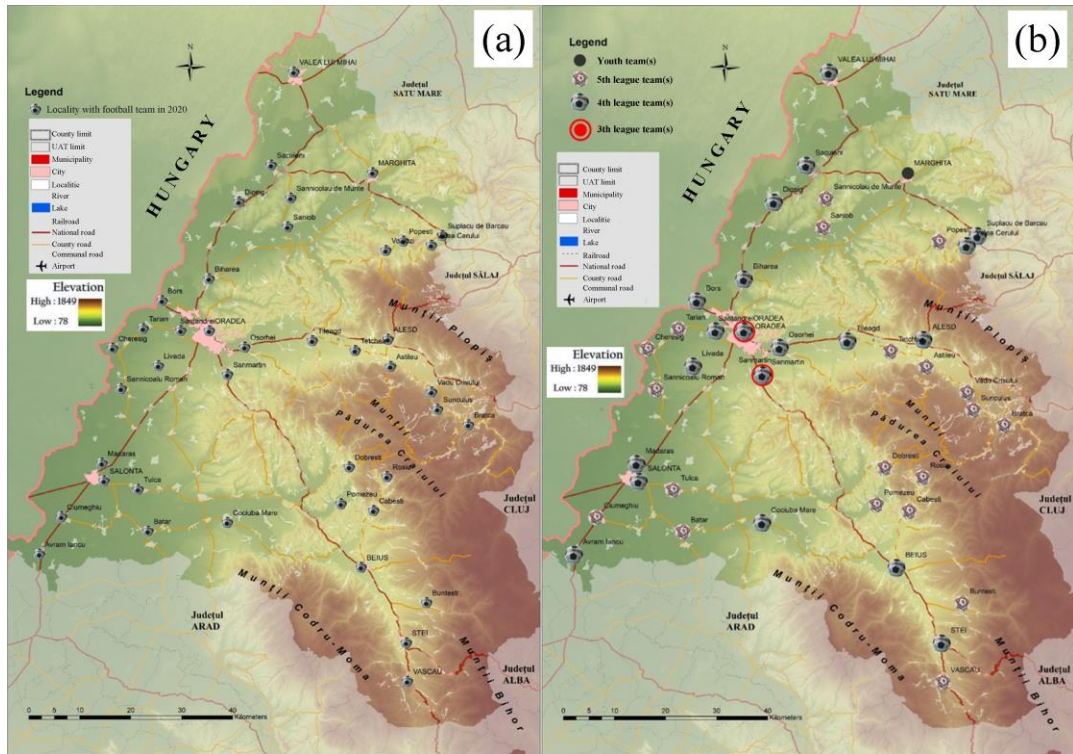
The graphic and cartographic way of representing in quantitative and qualitative aspect the human resource that forms a team/club but also their number is extremely diverse. At the level of this study we will present some ways of representation and the typology of specific or synthetic cartographic products.

Cartographic modeling can very faithfully render a territorial reality of a phenomenon generated by the geographical positioning of the component elements. For example, we will present a junior championship project (14-19 years) as a way to revitalize the sport in this age group and especially the possibility of increased interest from communities and local authorities to support such a demers.

The actors of such a project are: local sports clubs with a football profile (it can be transposed as a model for other sports); local authorities, local socio-economic communities and the most important "recruitment field" are the existing high schools in the network in Bihor County.

The aim is to create a socially and economically efficient regional structure with a positive impact at the level of local communities. A model based on the promotion of the dual concept *education* and *sport*. Thus, regarding the analysis of the number and territorial distribution of the localities that have football teams (Figure 3a) indicates a uniform distribution in the territory, with a final number of 43 such localities. Regarding the competitive distribution: 2 clubs operate in the 3rd

league, 20 in the 4th league and 20 in the 5th league, while one team has only groups of children and juniors (Figure 3a).



**Figure 3.** Football map from Bihor county in 2020 (a - sports clubs with local football teams; b - ierarhizarea competițională a cluburilor la nivel de localități) (Source: AJF Bihor, 2020)

The action area is structured as follows with 5 regional groups:

1. An area included in the Oradea Metropolitan Area that groups the best performing clubs and the highest infrastructural density: 3 clubs in league 3; LPS Bihor in the Elite League; 7 clubs in league 4 and 3 clubs in league 5. In this geographical area there are also the largest number of clubs and teams of children and juniors: 11 in Oradea and 6 in the communes of ZMO (Figure 4)

2. Other 4 regional groups at county level having as concentration poles localities with high schools: Barcău-Ier Region (Figure 5); Valea Crișului Repede (Figure 6); Salonta area (Figure 7) and Crișului Negru Valley (Țara Beiușului; Figure 8)

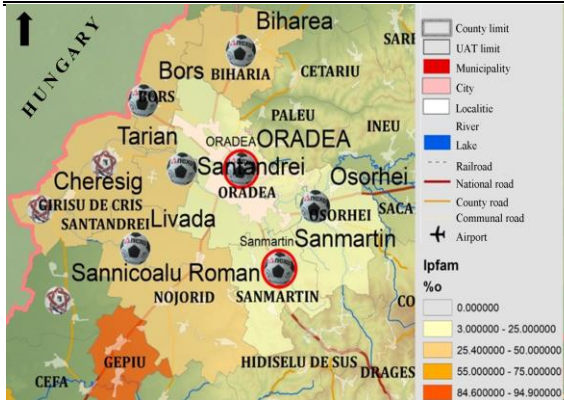


Figure 4. Oradea Metropolitan Area: Sports clubs and competitive levels in 2020

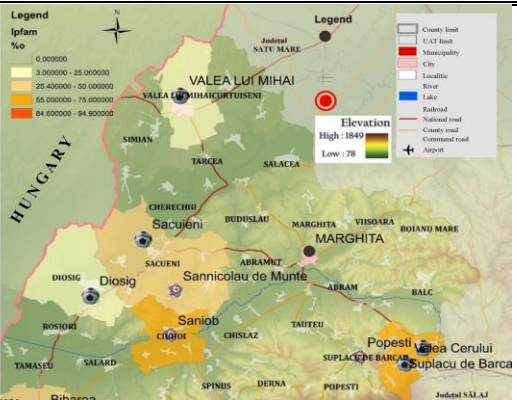


Figure 5. Barcău-Ier Area: Sports clubs and competitive levels at the level of 2020

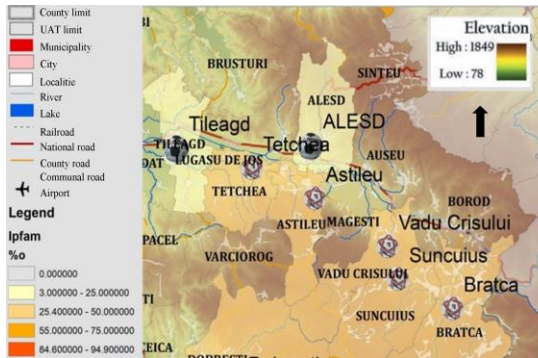


Figure 6. Crișului Repede Valley: Sports clubs and competitive levels in 2020



Figure 7. Salonta Area: Sports clubs and competitive levels by 2020

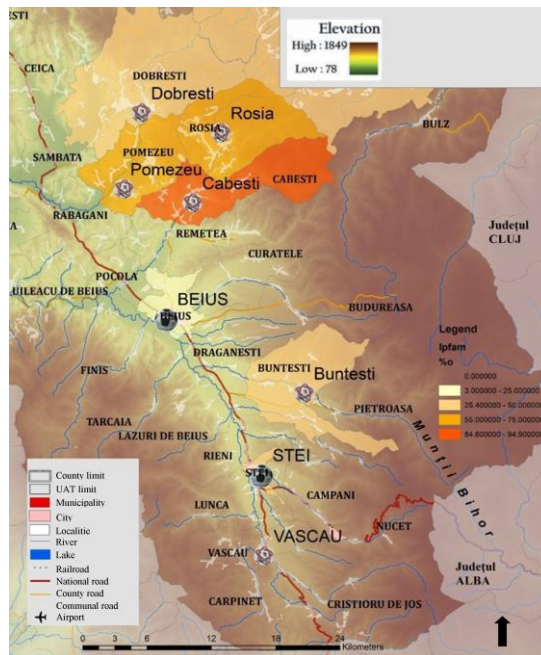


Figure 8. Crișul Negru Valley: Sports clubs and competitive levels in 2020

In the geographical football space of the county are thus identified 6 polarization regions outlined around urban centers and rural localities with high schools and sports clubs. According to table 6, the map of Bihor football includes 55 clubs, of which 12 have only activity with junior teams. The total number of clubs with junior teams is 31 and which totals 84 junior teams. A number of 24 clubs with senior teams 55.8% (out of 43) have no activity with junior teams.

Most clubs that have junior activity are in Oradea 16, followed by Salonta 3, the rest of the localities having only one club. These clubs are distributed in 23 localities. Only 19 clubs with activity in the senior teams also have groups of children registered in official competitions: 3 from league 3 and 16 from league 4 (Table 7).

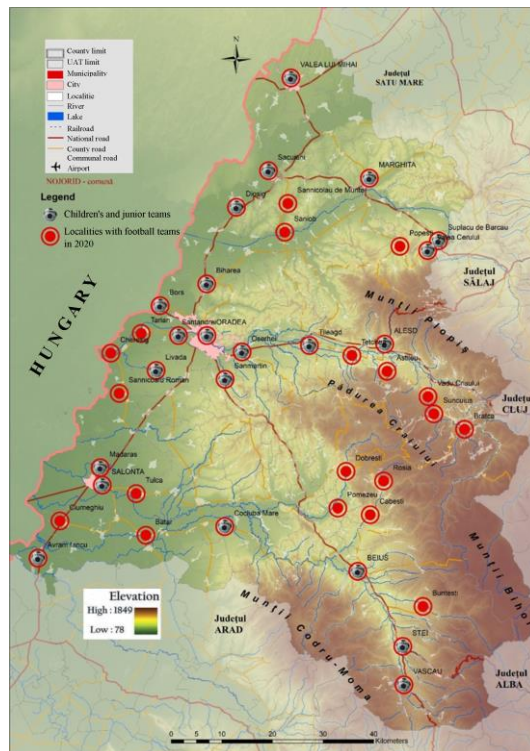
**Table 7.** Bihor County. The network of sports clubs with junior and children's football teams in 2020  
(Source: AJF Bihor, 2020)

Nr.crt	Team name	League	Senior Groups						
			Elite	A	B	A1	C	D	E
<b>A</b>	<b>3th League</b>								
1	CAO Oradea	3, 5				1	2		
2	Luceafărul Oradea	3		1	2		1	1	1
3	CSC Sânmartin	3, 4				1	1	2	1
<b>B</b>	<b>Clubs without senior teams</b>								
1	CS Athletic Oradea							1	1
2	AS Zenit Oradea							1	2
3	Viitorul Oradea			1	1		1		1
4	LPS Bihorul Oradea		2	2	2		3	4	1
5	NAC Oradea						1	1	1
6	CSM Oradea							2	2
7	CS Dinamo Oradea						1	1	
8	CS Inter Oradea								1
9	CF Liberty Oradea								1
10	CS Junioru 2017 Salonta								1
11	CSS Salonta							1	
12	Viitorul Marghita						1	1	1
<b>C</b>	<b>4th League</b>								
1	FC Universitatea Oradea	4				1			
2	CSM Olimpia Salonta	4				1	1	1	1
3	Bihorul Beiuș	4					1	2	1
4	Cs Viitorul Borș	4				1			
5	CS Unirea Valea lui Mihai	4				1	1	2	1
6	Unirea Livada	4				1			
7	CSO Ștei	4				1	1		
8	Crișul Sântandrei	4				1			
9	CS Oșorhei	4				1			
10	Foresta Tileagd	4				1	1		
11	Crișul Aleșd	4				1	1	1	1
12	CS Diosig	4						1	
13	ACS Vulturii Săcuieni	4						1	
14	CS Mădăras	4							1
15	Voința Suplac	4					1	1	1
16	Izvorul Cociuba Mare	4					1		
17	Victoria Avram Iancu	4							
18	ACS Slovan Valea Cerului	4							
19	AS Gloria Beiuș	4							
<b>D</b>	<b>5th league</b>								
1	ACS Progresul Săniob	5							
2	AS Vadu Crișului	5							

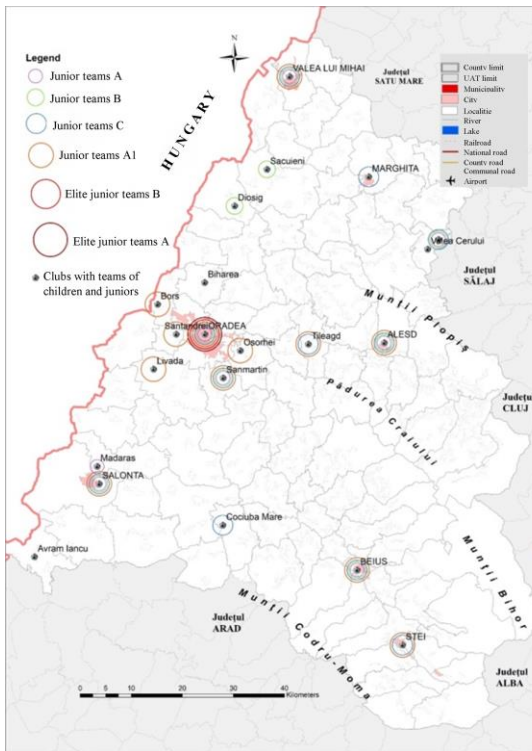


3	Cetatea Biharia	5							
4	CSC Viitorul Bratca	5							
5	Inter Aștileu	5							
6	Locadin Țețchea	5							
7	Minerul Șuncuiuș	5							
8	Toldy Sânnicolau de Munte	5							
9	Voința Cheresig	5							
10	ACS Viitorul Batâr	5							
11	ACS Voința Ciumeghiu	5							
12	Biharia Marmogranit Vașcău	5							
13	Gloria Căbești	5							
14	Partizanul Sânnicolau Român	5							
15	Unirea Roșia	5							
16	ACS Poienarii Popești	5							
17	Victoria Tulca	5							
18	Vida Pomezueu	5							
19	Viitorul Târian	5							
20	Vulturul Dobrești	5							
21	Zorile Buntești	5							
	<b>Total</b>		<b>2</b>	<b>3</b>	<b>4</b>	<b>12</b>	<b>19</b>	<b>24</b>	<b>20</b>

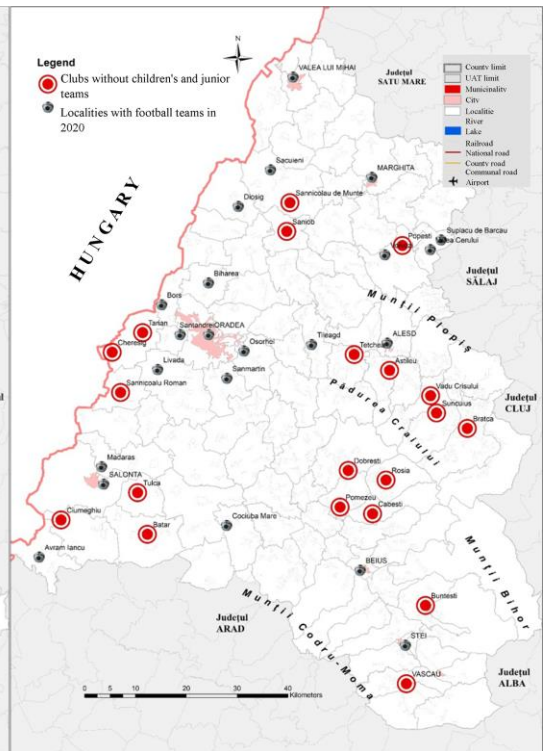
Regarding the number of junior teams that can be linked to high school activity (14-19 years) the number of clubs is extremely low, only 13 clubs: Luceafărul from league 3 and 12 from league 4 to which is added LPS Bihorul with teams in national championships: Elite and Republican U19 and U17 (Figure 9, 10 and 11).



**Figure 9.** Bihor County: Localities with football clubs and teams of children and juniors at the level of 2020 (Source: AJF Bihor, 2020)



**Figure 10.** Bihor County: Localities with football clubs and teams of children and juniors at the level of 2020 on competitive levels (Source: AJF Bihor, 2020)



**Figure 11.** Bihor County: Localities with football clubs without teams of children and juniors at the level of 2020 on competitive levels (Source: AJF Bihor, 2020)

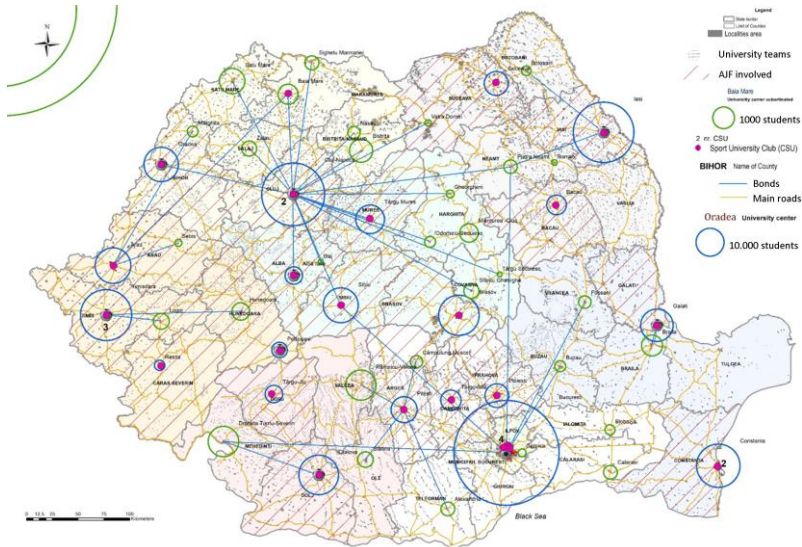
**Post-junior continuity in the university socio-sports environment: National University League**

The strategic chain can continue beyond the age of juniority. In the same idea of reducing school dropout a significant number of students who choose the dual form of education and sports, football in this case can continue at the university level. Such a project aims to develop a national university football championship in Romania in order to coagulate the university environment, following the British model, and through representation at the level of sports movement. With a potential of 92 public and private universities and implicitly as many university teams, a large part of young juniors have such a perspective of personal development on a professional level in parallel with sports. The maps presented (Fig.22 and 23), by the way they are made and the number of elements presented are extremely suggestive in order to highlight a huge untapped sports potential in Romania, focused mainly on young people between 16-23 years old.

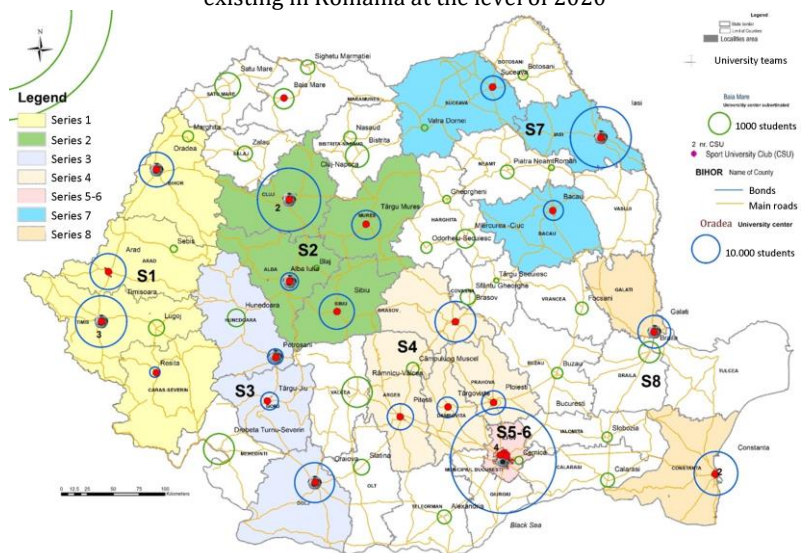
And in this context, at the level of Bihor County, the Oradea university center with the 5 higher education institutions can be constituted in poles of coagulation of the university sports movement. In this sense, in 2011, As FC Universitatea Oradea was established, a sports club with a football profile that operates at county level and in the national university championship.

After its establishment, in the absence of a professional perspective on sports, a significant number of juniors turned to higher education at the University of Oradea. In parallel with the university studies, in the 9 years of operation, over a hundred sports students were identified. Usually a complete cycle in the university football team coincides with the student period.

In general, university clubs have their own infrastructure (Figure 12 and 13) that facilitates the access of a significant number of sports students to extracurricular activities.



**Figure 12.** Romania. The network of public and private universities, university centers and sports clubs existing in Romania at the level of 2020



**Figure 13.** Romania. The network of public and private universities, university centers and sports clubs existing in Romania at the level of 2020 and a proposal for their grouping in order to establish the national university football league in Romania

## Conclusions

Through this study we aimed to improve the cartographic aspect the representation of the sports phenomenon in general and the football one in particular in order to show the importance of the cartographic product in the qualitative and quantitative spatial analysis, in the analytical and synthetic one. Using methods and tools specific to the geographical field and delving into the geography of sport, after a complex national study conducted in 2017 and other niche works published in 2014-2020, we come with this study focused on a specific component such as youth football. After defining the qualitative and quantitative elements that are the object of the study, we hope that through the original methods of representation we bring a substantial contribution to the methodology of spatial analysis of the sports phenomenon in general and of football in particular.

In the first phase, after the spatial delimitation of the study area superimposed on the Bihor county area, we defined the elements of representation: human resource, infrastructure and competitive level. All 3 groups of elements are represented qualitatively and quantitatively by the maps included in the study.

The first map is the physical-geographical and administrative one of Bihor county as a basis for representing the proposed elements. The second set of maps covers the infrastructure in terms of quantity (number) and quality (approval level etc).

Group three of maps identifies the level of competition and the degree of involvement at the level of local communities. The most complex set of maps targets the human resource in terms of quantity (number, age groups, etc.) and qualitative (competitive level of participation, teams, performance etc).

A number of over 30 cartographic materials made using a specific cartography methodology, were designed to render individual or group elements, phenomena, aspects of a quantitative and qualitative nature, etc. generating for the first time such cartographic products to define a cultural-sports space having as main theme football in general and youth football in particular.

Also, the spatial analysis allowed us the geographical regionalization of the cultural-sports space defined by football at the level of Bihor county in 5 specific regions: Oradea metropolitan area; Salona plain area; Ier-Barcău area; Crisului Repede Valley Area and Țara Beiușului or Crișului Negru Valley Area.

The basic product of this study is the synthesis map that cumulates the elements previously presented individually, systemically transposed. The map must be suggestive, correctly made and adapted to scale in order to be useful both to specialists in the geographical field but especially to the communities that manage the sports phenomenon from local to regional and national level.

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