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CENTER AND PERIPHERY IN BOSNIA AND HERZEGOVINA – SOCIAL AND SPATIAL INDICATORS OF REGIONAL DISPARITIES

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Abstract
Geographic research continues to be focused on multidimensional categories of center and periphery, as well as margins in the identification of development disparities, mainly in reaction to dynamic polycentric regional development. The detection of key factors that lead to the process of peripheralization is particularly significant for the territory of Bosnia and Herzegovina, as a European periphery with specific implications of such a status on the border regions. The statistical significance between the chosen peripheral (border) and central regions was analyzed using 50 specified criteria, divided into groups that represent various dimensions of peripheralization. Despite statistical limits, the results based on two-sample t-test reveal a certain degree of applicability in the use of specific statistical variables for determining peripheral areas. The relationship between the center and periphery in Bosnia and Herzegovina has never before been scientifically explored using a variety of spatial, economic, demographic, educational, cultural, and political indicators.

Key words
Bosnia and Herzegovina, center, periphery, border regions, socioeconomic development, spatial indicators, regional disparities

INTRODUCTION

The dynamic categories of center, periphery and margin have attracted increasing attention among scholars since the second half of 20th century (Pycia-Koščak, 2021). Within the geographic discourse, these terms and processes (peripheralization and marginalization) are primarily addressed as spatial response to the intense overall societal development of the past century (Matlovič and Matlovičova, 2020). In fact, these are specialized variations of various developmental components, such as economic, social, cultural and political advancement (Katunarić, 1992; Katunarić, 2006; Lošonc, 2015). Precise definition and conceptualization is challenging due to its multidimensional nature. Various definitions and interpretations exist, but

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they are greatly influenced by the scope of scientific field and type of conducted research (Marković, 1999). In the simplest sense, the periphery can be defined as the outer edge of a surface, object, or space, and it is most easily understood in relation to its opposite – the center or core (Anderson, 2000; Danson and de Souza, 2012). An example where this dichotomy is most evident is in the theory of center and periphery (Vanolo, 2008), and for a better understanding of these terms, it is necessary to delve into the essence and evolution of the theory that played a significant role in establishing generally clear patterns in the manifestation of these spatial variations (Martinus, 2022).

While polycentricity is a global trend in contemporary regional development, developmental patterns still indicate the presence of center-periphery dynamics (Penzes and Demeter, 2021), and existing disparities were further accentuated during the COVID-19 pandemic, especially in Europe (Barbero and Rodriguez-Crespo, 2022). Centers, in this sense, represent areas of diversified economic development, population concentration and a high standard of living (Pavlaković-Koči and Pejnović, 2005), while peripheries are distant, economically constrained regions with weakened intellectual and social capital (Lay, 1998; Görg and Ruane, 1999; Azaryahu, 2008; Scott and Storper, 2015). In the context of these spatial concepts, the main discussions pertain to their hierarchical relationship, where defining the inherent indicators of the periphery attracts significant interest within contemporary academic circles (Žafran and Radeljak Kaufmann, 2022). Although center-periphery spatial patterns are considered a traditional developmental paradigm, some authors are revitalizing the significance of these types of interrelations in interpreting and manifesting current global and regional issues, such as climate change (Knox-Hayes, 2022). It is crucial to note that the concept of margin/marginalization is frequently strongly related to periphery/peripheralization and implies a higher degree of functional than geographic isolation (Dery et al., 2012).

In the spatial definition of periphery, physical distance and transportation accessibility have long been perceived as key indicators. However, thanks to contemporary development concepts, a set of non-spatial indicators in defining peripheral areas has gained prominence, highlighting the necessity of embracing a multidimensional approach (Anđelković-Stoilković, 2018). As Nejašmić et al. (2018) emphasize, this includes demographic, social, technological, identity-related, institutional and political factors (Charron et al., 2014). Identification and measurement of intellectual capital is also a significant indicator of spatial inequalities, i.e. the periphery (Pachura et al, 2018). The heterogeneous concept of defining and perceiving the periphery has underscored the need for a holistic approach to understanding it. For example, within the 4D model, the periphery is considered in terms of distance (Arzeni et al., 2002; Fuduric, 2008), its dependency on the center, diversity, and the discourse of the periphery (Ferrau and Lopes,

2004). Different definitions and their multidimensional and nuanced nature have led to the emergence of various types of periphery: economic, political and cultural. In the latter case, creating a distinct identity at the periphery is a factor regardless of the first two.

Finding appropriate determination criteria for peripheral areas continues to be the focus of many research efforts. Since there are not any indicators of peripherality that are universally recognized, this paper will attempt to incorporate the most spatial and non-spatial criteria from earlier research. We will start with Keeble's model of gravitational relationships (Keeble et al., 1981), which includes a variety of spatial indicators that Copus (2001) refers to as "elements of conventional spatial concepts" such as transportation, travel expenses, distances from major centers, population density, etc. In addition to conventional indicators, the spatial scope also includes altitude as a crucial indicator of physical isolation, as considered in determining the ultra-peripheral regions of the European Union (Trujillano et al., 2005), urbanization rate, important in the context of development considering the spatial conditions and resources (Barrado et al., 2020; Keenan et al., 2022), the proportion of unutilized arable land (Chen et al., 2022) and the percentage of abandoned villages, as indicators of spatial transformation due to intense depopulation.

Non-spatial indicators of peripherality commonly focus on demographic and economic aspects of a region (Štambuk et al, 2002; Gatzweiler et al., 2011; Avdić et al., 2022). Apart from economic and demographic indicators, significant patterns in the center-periphery relationship also manifest in cultural-educational and political dimensions. Culture is often analyzed within the context of global trends, emphasizing that cultural production, the level of innovation, and the political involvement of the population diminish with increasing distance from the center (Dobreytsina, 2020). This can lead to the emergence of new identities in the periphery, often characterized by specific borderland identities (Zorko et al., 2012; Fuerst-Bjeliš, 2014; Fuerst-Bjeliš, 2020). Electoral volatility in recent studies (Bertus and Kovacs, 2022) reveals interesting spatial disparities and significant indications of processes of peripheralization and marginalization.

In the context of analysis of peripheral areas, significant number of authors from Southeast Europe (Lay, 1998; Pejnović, 2004; Lukić et al., 2009; Nejašmić et al., 2018; Zupanc, 2018; Stiperski et al., 2021; Žafran and Radeljak Kaufmann, 2022) highlight borderland zones – peripheral and problematic areas treated as economically, socially, and demographically disadvantaged (Van Houtum, 2000; Studzinska, 2023). Similar observations can be made for rural regions, particularly those at higher altitudes (Kubeš and Chvojkova, 2020; Banda et al., 2022; Sikorski, 2023). The significant contribution of authors from Central Europe is reflected in the analysis of peripheral regions after the political transition (Penzes and Demeter, 2021) using a different set of multivariate statistical methods, but also in specific

studies devoted to revitalization measures for marginalized and spatially excluded social groups (Brunn et al, 2017; Matlovičová et al., 2022). Bosnia and Herzegovina is frequently left out of the international studies concerning socio-economic development and spatial demography (Newsham and Rowe, 2023). The research of center-periphery relations within this country is also underrepresented in academic discourse despite numerous authors emphasizing that this particular area should be considered significant in studying processes leading to peripheralization (Zorko, 2012; Malikova et al., 2015; Leutloff-Grandits, 2023).

In an attempt to define development axes in the geographic space of Bosnia and Herzegovina, Nurković (2006) identified peripheral regions, which include border areas. Stagnant and spatially differentiated demographic development, pronounced demographic polarization, ageing and its spatial differentiation, ethnic homogenization, disintegration of settlement system, social issues in urban areas are just some of the characteristics that mark peripheral areas. However, there is heightened interest today in studying the key factors leading to peripheralization, particularly with clear implications for its population, in light of contemporary development patterns in Bosnia and Herzegovina. This is of greater significance when the entire territory of Bosnia and Herzegovina, as a country in the process of economic transition, is viewed as a periphery in the European context, which has specific implications in border regions, especially towards neighboring Croatia, which recently became the external border of the European Union and the Schengen area. The primary goal of this research is to identify key indicators of peripheriality in particular borderland regions of Bosnia and Herzegovina. The applicability of the obtained results is reflected in the possibility of creating specific revitalization measures for local units with the highest degree of peripheralization, of which the importance of interlocal cooperation is particularly emphasized in the literature (Klamar et al., 2019). Such a bottom-up approach in overcoming development limitations is also recognized by the European Union, especially in development assistance activities (Jančovič et al, 2021).

TERRITORIAL SCOPE OF RESEARCH

Within Bosnia and Herzegovina, there are significant socio-demographic, economic, and general societal disparities between Federation of Bosnia and Herzegovina and Republika Srpska. Since noticeable differences in center-periphery pattern exist between these entities, this research exclusively focuses on larger entity – the Federation of Bosnia and Herzegovina, which is administratively divided into ten cantons. Their geographic and population size vary considerably (Tab. 1), primarily due to the ethnopolitical basis of this territorial structure. More than half (55%) of the population of the Federation of Bosnia and Herzegovina resides in three cantons – Tuzla, Sarajevo and Zenica-Doboj. The capital city is located in Sarajevo Canton, which also boasts the highest economic standard. The

Tuzla Canton has the largest population (2013 census) and, along with the Zenica-Doboj Canton, constitutes the core of mining and industrial production in Bosnia and Herzegovina. The Zenica-Doboj Canton also holds an exceptionally important position within national road network. Due to these facts, these three cantons can be considered a sort of economic, demographic and historical core of Federation of Bosnia and Herzegovina and even the entire country. All other cantons exhibit varying degrees of peripherality, although not necessarily across all aspects.

Based on the criterion of distance from the capital, the Una-Sana Canton has the most pronounced peripheral character. It encompasses the territory of eight local administrative units in the far northwest of Bosnia and Herzegovina: Bihać (administrative center), Cazin, Velika Kladuša, Bužim, Bosanska Krupa, Sanski Most, Ključ and Bosanski Petrovac. Covering an area of 4125 km^2 (the third-largest in Federation of Bosnia and Herzegovina), it was inhabited by cca 270 thousand people according to the 2013 census. Population density (66 people per km^2) is roughly the national average, but shows significant spatial variations primarily linked to environmental factors (Korjenić, 2012; Korjenić and Misilo, 2016). Notably, the Una River valley with the Cazin region in the west can be considered a generally densely populated area. The valley of Sana River in the east features moderate population density, while the southern and central areas with a mountainous and karstic character are quite sparsely populated. Depopulation trends have marked the demographic landscape of a large portion of the Una-Sana Canton since the second decade of the 21st century (Mehić and Gabeljić, 2018). Due to its specific geographic location, this canton has borne the heaviest burden of recent international migration crisis in Bosnia and Herzegovina since 2016 (Ramić, 2019; Helms, 2023).

Tab. 1 Area and population size of cantons in Federation of Bosnia and Herzegovina

Cantons	Area (km^2)	Population (2023)
Una-Sana	4.125	260.859
Posavina	325	39.629
Tuzla	2.649	430.571
Zenica-Doboj	3.344	350.778
Bosnian Podrinje	505	21.728
Central Bosnia	3.189	244.547
Herzegovina-Neretva	4.401	212.101
West Herzegovina	1.362	92.305
Sarajevo	1.277	420.287
Canton 10	4.934	77.249

Source: Federal Bureau of Statistics (2022); Agency for Statistics of Bosnia and Herzegovina (2016)

The spatial definition of the western periphery of Bosnia and Herzegovina also encompasses Canton 10 (also known as Herzeg-Bosnia County). This is the largest canton in terms of area within the Federation of Bosnia and Herzegovina (4934 km^2), with slightly over 80 thousand inhabitants in 2013. This area belongs to the physiognomic region of High Karst (Avdić et al., 2019), which results in a relatively low population density (17 people per km^2). More favorable conditions for settlement are provided by the local karst fields, primarily Livanjsko and Duvanjsko, where the majority of the population of this canton resides. Canton 10 comprises six local administrative units: Livno (administrative center), Tomislavgrad, Kupres, Glamoč, Bosansko Grahovo and Drvar. Despite its potential, especially in terms of forestry and tourism (Mirić et al., 2016), this canton is characterized by a generally low level of economic development (Hodžić, 2010), accompanied by intense depopulation (Pobrić and Avdić, 2020). These trends can largely be attributed to the consequences of the war between 1992 and 1995, the effects of which are still present in this area (Krevs et al., 2021).

In this research context, the Una-Sana Canton and Canton 10 have been identified as western peripheral areas of Bosnia and Herzegovina (Figure 1).

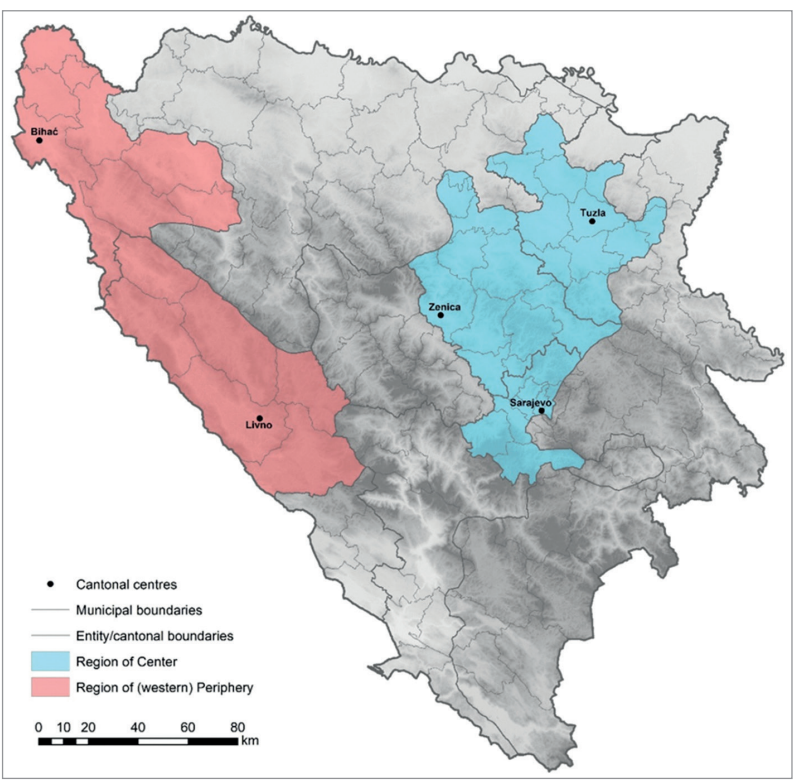

Fig. 1 Regions of Center and (western) Periphery in Bosnia and Herzegovina

Their status is reinforced by the fact that they spatially adjoin Croatian peripheral regions across the national border – Banovina (Banija), Kordun, Lika and Dalmatian Hinterland. The characterization of peripherality in this administratively defined area can be relatively easily confirmed through qualitative methods, but this study is focused on identifying relevant quantitative indicators at the cantonal and municipal levels. For this purpose, available data from latest population census (2013) and more recent statistical sources are utilized for statistical comparision with cantons that are designated as 'central.'

METHODOLOGY

Within this research, a total of 50 quantitative parameters were collected for the municipal/city-level in Federation of Bosnia and Herzegovina from official statistical publications or derived from other available sources. These selected parameters were then categorized into five groups for analytical purposes: demographic (9 parameters), economic (14 parameters), political (7 parameters), spatial (9 parameters) and educational/cultural (11 parameters). All these parameters are listed according to relevant group in Figure 2.

Within the demographic parameter group, data relevant to interpreting the demographic composition of population in selected regions and creating composite indices are used (Nejašmić, 2010; Marić et al., 2020). These parameters

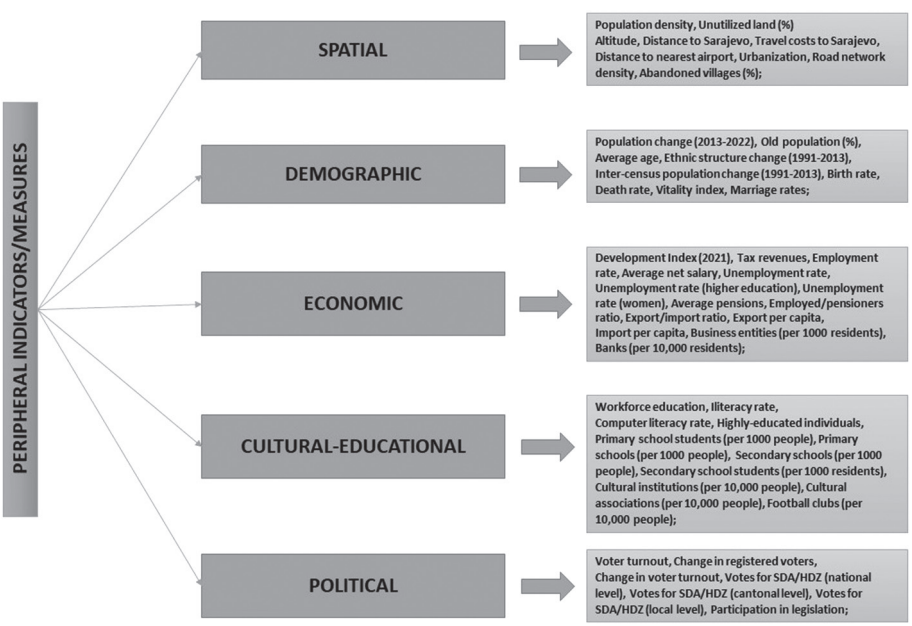

Fig. 2 Selected parameters/indicators of peripherality

include inter-census population movement, vital statistics and demographic ageing (Kačerova et al., 2022). The economic dimension is essential in peripherality analyses (Saberifar, Mishra, 2020; Blečić et al., 2023), and this group comprises the largest number of parameters. The index of development is the only composite indicator, while others mainly address employment and unemployment among specific population categories, trade dimensions (import and export), the number of business entities, as well as the number of banks, which are increasingly being analyzed in center-periphery patterns in terms of accessibility (Raagmaa, 2003). Group of cultural and education parameters include the number of cultural institutions and associations, as well as football clubs (the most significant indicator in the field of sports), along with educational parameters such as the number of school institutions, students, and educational structure of the population. For the analysis of the political aspect of spatial phenomena, parameters indicating changes in voter registration and turnout, participation in legislative authority, as well as the number of votes for leading national parties that have had a decades-long dominance in the political scene of the Federation of Bosnia and Herzegovina, were selected.

After collecting data at the local level for all selected parameters, the examination of differences between municipalities/cities belonging to peripheral cantons (14 in total) and those belonging to the three centrally positioned cantons (34 municipalities/cities) was undertaken. In order to determine whether statistically significant differences exist between the mentioned two groups of municipalities/cities, a two-sample t-test was utilized as a fundamental form of inferential statistical method, applied in the comparative analysis of all 50 indicators. Since the total number of municipalities/cities that entered the test analysis is relatively small (a total of 48), three levels of significance were defined: high ($\alpha < .01$), medium ($\alpha < .05$) and low ($\alpha < .10$). This way, not only the selection of significant indicators in defining the socio-geographic periphery of Bosnia and Herzegovina was obtained, but also their gradation based on significance.

RESULTS AND DISCUSSION

Given that in this study, the relationship between the national center and periphery is primarily observed from a geographical aspect, the first step was to test regional differences in spatial indicators between central and peripheral municipalities/cities covered in the analysis (Table 2). Among the nine tested indicators, a certain level of statistical significance was identified in six of them. As expected, the most significant differences were noted regarding the distance and travel costs to Sarajevo, the capital city ($p = .000$), which is understandable considering that Sarajevo municipalities themselves are included in the central region. Almost identical levels of statistical significance were found for the distance to the nearest international airport in Bosnia and Herzegovina. Two such airports

(Sarajevo and Tuzla) in central regions, while in the peripheral region, there are none – in most cases, the distance was calculated relative to the Banja Luka airport. A high significance level (p = .009) was also identified in terms of the percentage of uncultivated land, which is a clear indicator of rural depopulation and is much higher in the peripheral region.

A moderate level of statistical significance relates to population density (p = .040), which is understandable when considering the average population density in both regions – 168 people/km^2 in the central region compared to 39 people/km^2 in the peripheral region (in 2013). A lower level of statistical significance was found for the density of main roads and highways per unit area of 100 km^2 (p = .058), with no weighting applied in this case based on the rank or importance of the analyzed roadways. On the other hand, tested spatial indicators where no degree of statistical significance was identified include the altitude of municipal/city centers, the level of urbanization and the share of abandoned settlements.

Tab. 2 Spatial parameters as indicators of peripherality

Indicators	t	df	p	Significance
Population density	2,14	33	,040	**
Unutillized land (%)	-2,81	26	,009	***
Altitude	-1,51	16	,150	
Distance from Sarajevo	-8,21	21	,000	***
Travel costs to Sarajevo	-9,72	22	,000	***
Distance to nearest airport	-10,1	21	,000	***
Urbanization	-0,21	38	,836	
Density of road networks	1,95	40	,058	*
Abandoned villages (%)	-0,19	25	,853	

*Statistical significance levels: *** p < ,01; ** p < ,05; p < ,10*
Source: Agency for Statistics of Bosnia and Herzegovina (2016); Federal Institute for Development Programming (2022); Google Earth (2023); viamichelin.com (2023).

The demographic group consists of nine tested indicators (Table 3), of which four show a certain level of statistical significance in uncovering spatial disparities between the center and periphery. Among the indicators of vital statistics (birth rates, death rates, marriage rates and the vital index), a high level of statistical significance was found for birth rates (p = .000) and vital index (p = .0028), which is also strongly influenced by the number of births. However, there are no clear differences in the mentioned center-periphery relationship for the remaining rates. The analyzed change in population between the last two censuses demonstrates low significance (p = .066), while recent population trends (2013-2022) exhibit a moderate level of statistical significance (p = .011).

Tab. 3 Demographic parameters as indicators of peripherality

Indicators	t	df	p	Significance
Population change (2013-2022)	2,73	23	,011	**
Age dependancy ratio	-1,74	15	,102	
Average age	-1,20	16	,249	
Change in ethnic structure	-0,03	20	,975	
Inter-census population change	1,96	18	,066	*
Birth rate	6,35	39	,000	***
Death rate	0,76	18	,864	
Vitality index	2,59	26	,028	**
Marriage rate	1,03	15	,320	

*Statistical significance levels: *** p < ,01; ** p < ,05; p < ,10*
Source: Agency for Statistics of Bosnia and Herzegovina (2016); Federal Bureau of Statistics (2020, 2023); Federal Institute for Development Programming (2022).

Interestingly, indicators of demographic ageing, one of the most prominent demographic trends at the national level (share of elderly population and the average age) do not show significant differences in values between the central and western peripheral regions. This outcome is due to a certain number of highly vital municipalities in the Bosanska Krajina region within the examined western periphery, where the birth rates are among the highest in the country. This naturally affects the age structure of entire region, which, with a significant share of young population, is rather expansive in terms of Bosnian-Herzegovinian standards. Interestingly, in this study, the change in ethnic structure, often mentioned as a factor in demographic differences and changes, did not prove to be a significant indicator in uncovering the mentioned patterns.

In the economic group, the statistical significance of differences between the central and western peripheral regions was examined for 14 indicators, of which nine showed a certain significance level (Table 4). A special place in this analysis was reserved for the development index, a composite indicator created in 2021 by the Federal Institute for Development Programming. Five individual parameters were used to obtain this index, including two of an economic nature - income tax per capita and employment rate. A high level of statistical significance was found for both, the composite development index (p = .000) and its tested components (p = .001 for income tax and p = .008 for employment rate). Unlike employment, the unemployment rate did not indicate significance in the same context. However, unemployment as an indicator was also analyzed selectively, focusing on the female and highly educated populations. Interestingly, in both cases, a high degree of statistical significance was discovered regarding the observed differences (p = .003 for women and p = .006 for highly educated individuals).

Tab. 4 Economic parameters as indicators of peripherality

Indicators	t	df	p	Significance
Development index (2021)	4,21	46	,000	***
Tax revenues	3,62	42	,001	***
Employment rate	2,79	45	,008	***
Average net salary	0,71	39	,481	
Unemployment rate	-0,11	28	,914	
Unemployment rate (highly educated)	2,91	46	,006	***
Unemployment rate (women)	3,45	16	,003	***
Average pensions	3,24	26	,003	***
Employed/pensioners ratio	-2,30	23	,031	**
Export/import ratio	-1,09	13	,295	
Export per capita	2,04	42	,048	**
Import per capita	3,72	42	,000	***
Bussiness entities (per 1000 people)	0,78	39	,439	
Banks (per 10.000 people)	1,32	27	,199	

*Statistical significance levels: *** p < ,01; ** p < ,05; p < ,10*
Source: Federal Institute for Development Programming (2022); Federal Bureau of Statistics (2022).

Components of trade exchange for local administrative units were also considered, revealing that imports per capita are a highly significant indicator of difference (p = .000). Export value per capita, though slightly smaller, still demonstrated statistical significance (p = .048), while no level of statistical significance was identified for the import-export ratio. An important set of indicators regarding the economic standard of a specific area pertains to personal monthly income, i.e. wages and pensions. The average wage did not prove significant in the examined aspect, but the average pension amount exhibited the highest level of statistical significance (p = .003). Additionally, the number of employed individuals relative to the number of retirees had a moderate significance level in determining differences between the central and peripheral regions (p = .031). The analysis also included the number of business entities per 1000 inhabitants and, for the first time in research of this type, the number of banks per 10,000 inhabitants. However, no significant differences were found in these cases.

Analysis of educational and cultural indicators has yielded the fewest statistically significant results. Among the 11 examined indicators, only three showed differences between the central and peripheral regions with a certain degree of significance (Table 5). The number of primary school students relative to the total population (per 1000 inhabitants) is the only parameter that exhibited the highest level of statistical significance (p = .000), which correlates with certain

demographic indicators such as the birth rate, since in both cases the central region has significantly higher values compared to the western periphery. A lower level of significance (p = .068) was observed in the ratio of the number of high school students to the total population. Only one other indicator related to computer literacy among the population fell within this category of statistically obtained results (p = .082).

Tab. 5 Cultural and education parameters as indicators of peripherality

Indicators	t	df	p	Significance
Education level of workforce	-2,75	15	,448	
Illiteracy rate	0,31	45	,757	
Computer literacy rate	1,80	31	,082	*
Highly-educated individuals (%)	0,91	44	,368	
Primary school students (per 1000 people)	4,43	23	,000	***
Primary schools (per 1000 people)	0,96	40	,341	
Secondary schools (per 1000 people)	-0,90	20	,378	
Secondary school students (per 1000 people)	1,87	46	,068	*
Cultural institutions (per 10.000 people)	-0,36	17	,672	
Cultural associations (per 10.000 people)	-1,58	16	,133	
Football clubs (per 10.000 people)	1,6	29	,121	

*Statistical significance levels: *** p < ,01; ** p < ,05; p < ,10*
Source: Federal Institute for Development Programming (2022); Agency for Statistics of Bosnia and Herzegovina (2016); Federal Bureau of Statistics (2023); Football Association of Bosnia and Herzegovina (2022).

None of the remaining cultural/education parameters indicated statistical significance in the center and periphery differences. The indicators closest to reaching statistical significance were the relative numbers of cultural associations and football clubs representing cultural and sports development in local communities. The lack of the sought-after significance is particularly pronounced in the case of the number of cultural institutions relative to the total population, although it is possible that available data for this indicator may be incomplete. The number of primary and secondary schools also did not prove significant in this context. The same can be said for the share of highly educated population, educational level of the workforce and the illiteracy rate.

Within the scope of this research, a set of political indicators was, for the first time, analytically considered in terms of the center-periphery relationship in Bosnia and Herzegovina. Among the seven individual indicators in this group, a higher significance level in differences between the central and peripheral regions was

found in two cases and a lower level in two additional cases (Table 6). For a total of three political indicators, none of the three predefined levels of significance were established. One of the most interesting results in this context is the voter turnout rate, which is significantly higher in the central compared to the western peripheral region (p = .000). A lower level of significance (p = .056) was observed regarding differences in the trend or changes in voter turnout – a more pronounced decline was recorded in the peripheral region. A high level of significance in differences (p = .007) was identified in terms of the share of votes won by Party of Democratic Action (SDA) and Croatian Democratic Union (HDZ BiH), known as national parties and decades-long key players in the political landscape of the Federation of Bosnia and Herzegovina. These parties achieved significantly better recent election results on cantonal level in central than peripheral regions. A lower significance level of this nature (p = .085) was found in votes obtained in local (municipal/city) elections. When it comes to voting for the state parliament, no significant differences between the center and periphery were observed, which certainly leads to interesting conclusions.

Tab. 6 Political parameters as indicators of peripherality

Indicators	t	df	p	Significance
Voter turnout	5,02	31	,000	***
Change in registered voters	-0,30	24	,768	
Change in voter turnout	2,00	27	,056	*
Votes for SDA/HDZ (national level)	0,34	31	,734	
Votes for SDA/HDZ (cantonal level)	2,87	37	,007	***
Votes for SDA/HDZ (local level)	1,78	30	,085	*
Participation in legislative authority	0,77	21	,451	

*Statistical significance levels: *** p < ,01; ** p < ,05; p < ,10*
Source: Central Electoral Commission Bosnia and Herzegovina (2012, 2014, 2020, 2022).

In terms of the territorial representation of delegates in legislative authorities at the national and entity levels, no significant level of differences was found, particularly influenced by the high value of this indicator for the city of Bihać, the most significant political center in the western periphery of the Federation of Bosnia and Herzegovina. The change in the number of registered voters is also an indicator that did not show statistical significance, although this was not unexpected considering certain established demographic trends.

CONCLUSIONS

This study has provided a certain number of arguments to consider the Una-Sana Canton and Canton 10, the far western parts of the Federation of Bosnia and Herzegovina, as peripheral regions within the national territory. This assessment primarily rests on their geographic distance from Sarajevo, the capital city, as well as other major regional centers and international airports. It is reflected through various spatial, socio-economic and demographic indicators. Identifying the periphery based on distance from the center is closely linked to geography and regional studies' contribution to the scholarly debate on this topic (Kolsut and Stryjakiewicz, 2021). This spatial pattern is analogous to many examples from other countries, including neighboring Croatia (Zupanc, 2018), it is possible to relate it to the phenomenon of double periphery. Beyond distance, these regions' spatial dimension of peripherality is also observed through lower population density, road network quality and the proportion of undeveloped land. While not the only region in Bosnia and Herzegovina showing signs of peripherality, its specific geographical position, encompassing a traditional borderland character and immediate proximity to the European Union in the contemporary context, offers significant potential for exploring broader effects of peripheralization and marginalization. Studying these effects in this context has the potential to reveal general principles associated with this phenomenon.

Spatial inequalities in the center-periphery relationship often manifest through regional and national economic development. Negative trends in economic criteria contribute to functional marginalization and overall deprivation, characterizing peripheral regions as areas requiring careful attention in regional development policies (Zorko, 2012; Popović and Radeljak Kaufmann, 2011). A significant number of the indicators in this analysis pertains to the economic dimension, with particular focus on the development index, the only composite indicator used for the socio-economic ranking of municipalities in the Federation of Bosnia and Herzegovina. Its values indicate weaker economic performances in peripheral regions compared to central areas. Considering its components (employment rate, income from taxes, and population movement), which also exhibit statistical significance, it becomes clear that this index is a reliable tool for identifying economic disparities. However, the asynchronous publication and methodological disparities among entity statistical institutions limit the use of this indicator for all local administrative units. In future analyses, using the development index for ranking all municipalities at the national level would be beneficial. Besides the composite index, specific economic indicators reveal unique phenomena. Selective unemployment analysis, focusing on specific population segments, such as women and highly educated individuals, indicates significant differences in the center-periphery divide (Hakim, 1990). Including women in all aspects of the labor market is a sign of sustainable economic development, aligned with contemporary

global development narratives and practices. An interesting result is the significant difference in average pension values between observed spatial units, proving more informative than average salary levels. As a significant indicator of economic activity through import and export indicators, trade exchange also sheds light on these spatial patterns.

Among the selected demographic indicators, including total and natural population movements, vital statistics and age structure of the population, birth rates emerged as the most significant criterion for determination of peripherality. Their values should be interpreted in line with other indicators of the economic and socio-cultural dimesion, particularly taking into account that demographic challenges are considered consequences of general societal and economic processes (Pejnović, 2004; Penzes, 2016). However, a somewhat anomalous situation can be observed in the part of the Una-Sana Canton known as Cazinska Krajina, where birth rates are traditionally considerably higher than the national average. This phenomenon is often attributed to ethno-cultural factors (Avdić et al., 2022) and traditional family planning patterns. As characteristic of areas undergoing functional peripheralization processes, birth rate trends in both observed peripheral cantons are regressive due to the intensified ageing process. For interpreting these disparities, the vital index (the ratio of birth and death rates) is of some significance, with lower values in peripheral regions compared to central regions. The same applies to the net migration index, which indicates significant depopulation processes, especially pronounced in Canton 10, primarily associated with contemporary emigration waves of the workforce (Pobrić, 2002; Domazet et al., 2020). This reinforces the cumulative causality of demographic and economic trends in exacerbating regional disparities.

The group of education and cultural indicators, as significant criteria indicating spatial and functional periphery, plays a crucial role in deciphering similar patterns in the context of Bosnia and Herzegovina, particularly considering the proximity of the observed regions to the European economic and cultural space. Despite the growing literature on the topic of lower level of innovation, technological progress and education in peripheral regions (Eder, 2019), the prevailing principle remains that geographic distance and degree of economic development categorize peripheral regions as less innovative compared to centers (Howells and Bessant, 2012). Without more substantial indicators for these dimensions, the study tested indicators related to the educational and cultural dimensions. Indicators such as the level of computer literacy and number of students showed relevant levels of statistical significance in interpreting differences along the center-periphery line. The lower number of students and lower computer literacy rates in the western Bosnian-Herzegovinian periphery can be linked to the previously described demographic trends, as well as limited access to formal education, which has been confirmed on larger regional scales (Rasmussen, 2012). In these areas, the distance

from schools, universities and educational hubs, due to pronounced transport isolation, leads to negative trends in the education structure. Attention should also be paid to the reorganization of the school network, which has been disrupted due to the closure of schools stemming from adverse demographic and economic trends, particularly in Canton 10.

Peripherality sometimes takes on its political manifestation when specific spatial, socio-economic and cultural conditions are met (Nettl, 1966; Boneta, 2004). Bosnia and Herzegovina is burdened with a ethno-political polarity, which is much more based on historical narratives than spatial identification. As a result, regionalisms that are typical for other European countries have yet to emerge in Bosnia and Herzegovina. However, the parameters used in this study also indicate conclusions about the existence of certain political differences between the observed center and periphery regions, independent of the ethnic context. This is primarily indicated by lower voter turnout in peripheral cantons, with an increasing discrepancy between the center and periphery in this regard over the past ten years. This could be a consequence of increased political indifference among the population of peripheral regions, as well as the demographic depopulation of these areas due to recent migrations (Bertus and Kovacs, 2022). Even more interesting conclusions have been drawn from analyzing the voting preferences structure over the past decade. It was noticed that the share of votes for Party of Democratic Action (SDA) and Croatian Democratic Union (HDZ BiH), as parties that traditionally (with rare exceptions) receive the most votes among Bosniaks and Croats in Bosnia and Herzegovina, does not significantly differ between center and periphery regions when it comes to higher levels of government, where intra-ethnic unity is still viewed as a matter of vital national interest. However, more recent elections for cantonal assemblies, and partially for municipal councils, have shown a significantly different pattern – with the emergence of parties of strong regional character, the influence of these mainstream parties weakens in peripheral regions, both in majority Bosniak and majority Croat communities. Given that the western part of the Federation of Bosnia and Herzegovina also includes several municipalities with a Serbian ethnic majority, this effect is even more pronounced.

Contrary to all the aforementioned parameters that have proven to be valuable indicators in detecting various dimensions of peripherality in Bosnia and Herzegovina, this study also considered numerous parameters for which the expected differences in the comparative relationship between the center and periphery were not identified. There are several reasons for this, ranging from the internal heterogeneity of the selected regions and spatial contradictions to insufficiently realistic statistical data and the methodological inability to adapt to all the considered phenomena. The most surprising aspect is the absence of statistical significance in many demographic parameters, especially those related to the ageing process (dependency ratio, average age and death rate). An explanation

can be sought in the process that Nejašmić and Toskić (2013) referred to as the homogenization of ageing. Furthermore, among the frequently used economic indicators of development that have not proven relevant in the case of Bosnia and Herzegovina are unemployment rate and mean wage. In passive regions, the employable population often migrates massively to more promising environments or abroad (Domazet et al., 2020), keeping local unemployment rates relatively low. On the other hand, a higher share of industry in the overall economic activity often reduces the mean wage, which can falsely suggest a low degree of economic development (Development of Industrial Policy in FBiH, 2009). The same factor also negatively affects certain parameters about education, such as share of highly educated individuals and educational attainment of the workforce. Similar effects are observed in local communities that prioritize agricultural development. Spatial parameters such as elevation, urbanization rate and the percentage of abandoned settlements also fall into this category, primarily due to the mountainous terrain, which is also significantly present in central cantons.

Although a non-typical and contextually limited methodology was used for this type of research, the significance of this study is threefold. Firstly, it statistically confirmed the significant lag of cantons in the western periphery of the Federation of Bosnia and Herzegovina compared to cantons that are a priori labeled as center across various objective indicators. This is the first time that the relationship between the center and periphery has been empirically examined in Bosnia and Herzegovina through an array of spatial, economic, demographic, educational, cultural and political indicators. This lays the groundwork for positioning Bosnia and Herzegovina within the broader theoretical concept of center and periphery and for its comparison with neighboring and broader countries. Secondly, a selection of available indicators was made based on their relevance in determining the level of development of a geographic area, with a gradation from those that most clearly indicate peripherality to those that cannot be effectively used for this purpose. This is important for developing more suitable and specialized quantitative methodologies in future studies exploring regional disparities of this kind. Thirdly, the practical need for targeted implementation of regional policies at the level of Bosnia and Herzegovina and its entities has been emphasized and the selection of relevant parameters could help identify key challenges of peripheral areas of this country.

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