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1

CONTENT / SOMMAIRE / INHALT / CUPRINS

BOOK REVIEWS

In Memoriam:

Profesorul Virgil Gârbacea şi moştenirea sa geografică

L-am cunoscut pe profesorul Virgil Gârbacea în toamna anului 1969 când, în calitate de *îndrumător de an cadru didactic,* a fost pentru generaţia mea cel mai apropiat sfătuitor şi ghid prin labirintul nu totdeauna uşor de străbătut al studenţiei. De atunci şi până în primăvara anului 2025, când am avut ultima convorbire telefonică, deci mai mult de cinci decenii şi jumătate, am fost cu domnia sa într-un contact nemijlocit. Fapt care a adunat în sipetul amintirilor mele varii ipostaze ale manifestării personalităţii sale, o cunoaştere profundă a modului său de a fi şi a acţiona, de a percepe şi înţelege ştiinţa geografică în devenirea sa continuă, de a imagina relaţiile cu colegii săi şi cu cei din preajmă etc.

Profesor dr. Virgil-Achiles Gârbacea
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Înainte de orice, încercând să anticipăm ceea ce timpul cu siguranţă va face, adică de a selecta şi permanentiza contribuţiile sale ştiinţifice, respectiv aportul adus la afirmarea geografiei clujene în special şi româneşti în general, ne oprim asupra condiţiei sale de cercetător geograf, derulată şi etalată timp de peste şapte decenii. Să nu uităm, Virgil Gârbacea şi Grigore Posea au deschis, în anul 1953, seria de iluştri doctoranzi ai profesorului Tiberiu Morariu, din care vor face parte ulterior Valeria Velcea, Petre Gâştescu, Mihai Iancu, Lucian Badea, Alexandru Roşu, Ion Donisă, Ion Hârjoabă, Gheorghe Pop, Marcian Bleahu, etc., adică personalităţi geografice de referinţă din cele trei mari centre universitare ale ţării: Bucureşti, Iaşi şi Cluj-Napoca. Teza sa de doctorat *Dealurile Bistriţei. Studiu geomorfologic*, rămâne un model de introspecţie morfologică în care interrelaţiile factorilor geografici generează structuri şi forme de relief cu totul aparte.

A doua lucrare care, cu certitudine va rămâne ca reper obligatoriu pentru toţi cei care vor detalia şi aprofunda problematica alunecărilor de teren, este *Relieful de glimee* (2013), o operă de senectute creatoare ce nu-şi găseşte corespondent, ca poziţionare temporală, în istoria geografiei naţionale. Ea a fost răsplătită de altfel, în anul 2015, de Academia Română cu premiul „Simion Mehedinţi", certificându-i, încă o dată, valoarea.

De asemenea, nu pot lipsi dintr-un bilanţ final al trudei sale de geograf studiile, elaborate individual sau în colaborare cu alţi confraţi clujeni, între care Tiberiu Morariu, Ion Mac, Alexandru Savu sau Petru Tudoran, referitoare la terasele fluviatile, procesele de versant, regionarea geomorfologică a unor unităţi de relief din Transilvania, evoluţia reţelelor hidrografice etc.

A doua componentă a personalităţii sale care va rămâne vie cel puţin în memoria celor care l-au cunoscut, a miilor de studenţi care i-au ascultat de-a lungul unei cariere universitare neîntrerupte prelegerile, dar şi a colegilor clujeni sau din alte centre academice, este cea de dascăl, de profesor universitar. Beneficiind de o instrucţie aleasă şi o ancorare culturală temeinică în spiritul vremii, el s-a distins prin elocinţă, prin rigoarea şi precizia formulărilor, prin decantarea judicioasă a informaţiei astfel încât grăuntele aurifer al ideii, al esenţei, să eclate din îmbrăţişarea nisipului anodin al faptelor comune şi banale. Prin ţinuta vestimentară impecabilă, prin vocabularul de specialitate bogat şi nuanţat, cu o coerenţă interioară a discursului didactic ireproşabilă, prezenţa sa în faţa studenţilor era întotdeauna agreabilă şi agreată.

Tot în plan didactic, Virgil Gârbacea a pus la dispoziţia studenţilor săi materiale didactice de înalt nivel calitativ, cursul aferent Africii, în primul rând, fiind un model de abordare regională integrată fiind publicat cu mult înainte ca sintagma respectivă să devină intens vehiculată în lumea geografică. În mod similar, cursurile dedicate celorlalte continente, elaborate în colaborare cu colegii bucureşteni şi ieşeni, se disting prin aceeaşi tentă de abordare ideatică.

Profesorul Gârbacea s-a implicat în mod activ, cu o discreţie şi eficienţă savantă în toate problemele care au vizat Geografia clujeană începând din anii '70 ai secolului trecut şi până la pensionarea sa în anul 2000. A făcut-o şi atunci când mentorul său, Tiberiu Morariu, era pe nedrept contestat de detractorii lui, ţinându-i partea, a făcut-o şi atunci când Ion Mac desfăşura campania de individualizare a Geografiei ca facultate separată de Biologie şi Geologie, alăturându-i-se. Dar, mai ales, prin crearea, la iniţiativa sa exclusivă, a Catedrei de Geografie Regională, devenită ulterior Departamentul de Geografie Regională şi Planificare Teritorială. Un for instituţional geografic pe care l-a condus în primii ani ai fiinţării şi care, prin ambianţa creată şi tinerii valoroşi atraşi a devenit ulterior un creuzet efervescent al întregii geografii clujene.

Pe lângă aportul său ştiinţific, didactic şi instituţional, profesorul Virgil Gârbacea ne-a lăsat tuturor, geografi şi negeografi deopotrivă, un model unic de proiecţie asupra vieţii care, fiind finită, trebuie trăită cu ardoare, chiar şi la vârsta când majoritatea absolută dintre noi credem că ne-am încheiat socotelile cu destinul. Faptul că opera sa capitală şi adjudecarea celui mai prestigios premiu academic acordat în ţară le-a realizat la o vârstă înaintată, după pensionare, spune totul în acest sens.

Profesorul Virgil Gârbacea – un cercetător geograf inovativ şi perseverent, un dascăl iscusit, un om al vremii sale.

Profesor universitar dr. Pompei COCEAN

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ASSESSMENT OF SOLAR CLIMATE RESOURCES ON THE TERRITORY OF THE REPUBLIC OF MOLDOVA IN THE CONTEXT OF CLIMATE CHANGE

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ABSTRACT. – Assessment of Solar Climate Resources on the Territory of the Republic of Moldova in the Context of Climate Change. This study evaluates the solar climate resources of the Republic of Moldova in the context of climate change. The analysis covers data from representative meteorological stations for the periods 1961-1990 and 1991-2020. The main focus is on global and direct solar radiation, as well as sunshine duration. Results indicate an increasing trend in solar radiation and sunshine duration, particularly in the northern part of the country. The study also discusses the implications for the use of solar energy in Moldova, highlighting the potential for enhanced heliothermal resources due to climate change. The findings provide a comprehensive understanding of solar climate variations and their impact on renewable energy potential.

Keywords: Solar radiation, Sunshine duration, Climate change, Renewable energy, Moldova.

1. INTRODUCTION

Renewable energy sources (wind, solar, hydro, ocean, geothermal, biomass and biofuels) are alternatives to fossil fuels that help reduce greenhouse gas emissions, diversify energy supply and reduce dependence on volatile and uncertain fossil fuel markets, especially oil and gas (Babiker and Ciucci, 2025). Solar energy resources are solar energy resources that can be used to produce electricity.

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Solar radiation is one of the main renewable energy sources, the use of which is not associated with negative environmental impacts. For these reasons, solar energy fully satisfies the sustainable development of society by ensuring a rational use of natural resources and the development of energy-efficient technologies in the conditions of climate change, and the assessment of solar radiation climate resources is not only fundamental but also of an applied nature.

2. MATERIALS AND METHODS

Observations on solar radiation are performed only at the Chişinău meteorological station, whose data are representative for the whole country. In analysing the duration of sunshine, information from the distributed meteorological stations was used so that the collected data would be representative (table 1).

Table 1. Meteorological stations whose data were used in the study

Station	Observation period, years	Station	Observation period, years
Briceni	1951-2007; 2010-2020	Chişinău	1951-2020
Balti	1958-2007; 2010-2020	Tiraspol	1951-1987; 1989-2020
Râbniţa	1964-1986; 1990-2020	Cahul	1956-2007; 201-2013; 2015-2020
Dubăsari	1958-1991		

According to the recommendations of the WMO (World Meteorological Organization), the data analysis and synthesis was carried out for 30-year time intervals, starting from 1961 (WMO, 2017). In case of missing data for some years or months of a year, the method of data restoration was applied by using the arithmetic mean for the analysed period of the string.

Statistical processing and string homogeneity checks, calculation of basic statistical parameters was performed using the Excel formula package. For spatial modelling the spline interpolation method from ArcMap was used. Application of the regression method did not provide satisfactory results.

For illustration, the main specialized indicators of climate resources for the operation of solar power stations and their application diapason in Russia (*Encyclopedia of climatic resources of the Russian Federation*, 2008, p. 63) are presented in table 2.

Table 2. Diagram of the main specialized indicators
of helioenergy climate resources

Indicator	Unit of measurement	Minimum	Maxima
1. Annual amount of global radiation on a horizontal surface	MJ/m^2	2659	5019
2. Annual amount of direct radiation on a horizontal surface	MJ/m^2	768	2859
3. Sun's annual sunshine duration	hours	1040	2397
4. Mean annual amount of total nebulosity	grade	5,3	7,4
5. Mean annual amount of lower nebulosity	grade	2,3	5,5
6. Number of days without Sun	days	37	137

The increase of indicators 1-3 (table 2) contributes to the increase of helium-energy resources, and indicators 4-6 - to their decrease (*Encyclopedia of climatic resources of the Russian Federation*, 2008, p. 63). When analysing the combined effect of all these indicators on the value of helioenergy resources, the greatest importance is given to indicators 1-3, the rest are considered complementary (*Encyclopedia of climatic resources of the Russian Federation*, 2008, p. 63).

3. RESULTS AND DISCUSSIONS

Global solar radiation, measured at the Chişinău meteorological station, in the analyzed time intervals evaluated as shown in tab. 3, fig. 1.

Table 3. Global solar radiation recorded at Chişinău
meteorological station, MJ/m^2

Observation period	Multiannual average	Average in the warm season (May-September)	Average in the cold season (October-April)
1961-1990	4318	2877	1441
1971-2000	4285	2848	1437
1981-2010	4342	2876	1466
1991-2020	4416	2943	1473
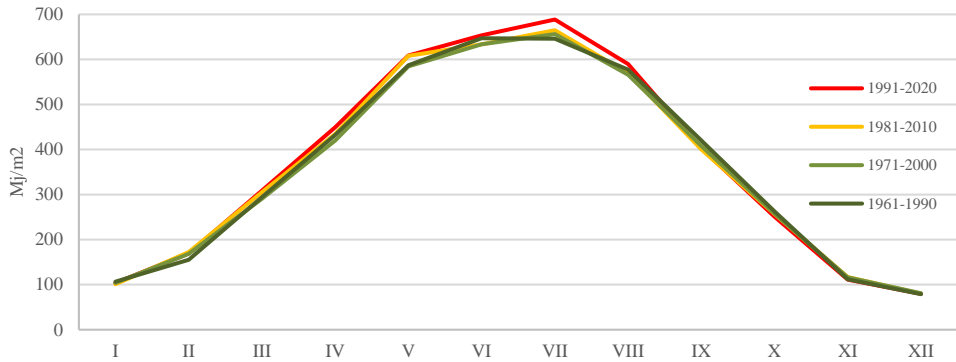
Fig. 1. Average monthly variation of global solar radiation for different periods

The difference between the average values of the period 1991-2020 and those of 1971-2000 increased by 131 MJ/m² (3,1%), and for the warm and cold periods of the year - by 95 (3,3%) and 36 (2,5%) MJ/m² respectively.

The period 1961-1990 is described by a lower global radiation, but due to the lack of previous observational data we cannot point to any finite cycle, which is also confirmed by the general plot of the parameter time evolution for the whole period of available data 1954-2021 (fig. 2).
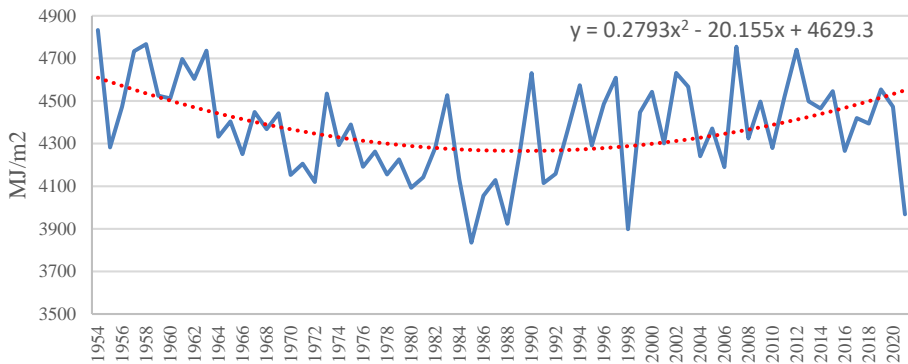
Fig. 2. Global annual mean solar radiation dynamics at
Chişinău meteorological station (1954-2021)

Thus, the multiannual average value for the observation period 1961-2020 is 4355 MJ/m², and from the last analyzed reference interval 1991-2020 - 4416 MJ/m². The same trends are observed in the time distribution of direct solar radiation values, tab. 4, fig. 3.

Table 4. Direct solar radiation recorded at Chişinău meteorological station, MJ/m^2

Observation period	Multiannual average	Average in the warm season (May-September)	Average in the cold season (October-April)
1961-1990	2204	1583	621
1971-2000	2169	1557	612
1981-2010	2281	1639	642
1991-2020	2501	1806	696
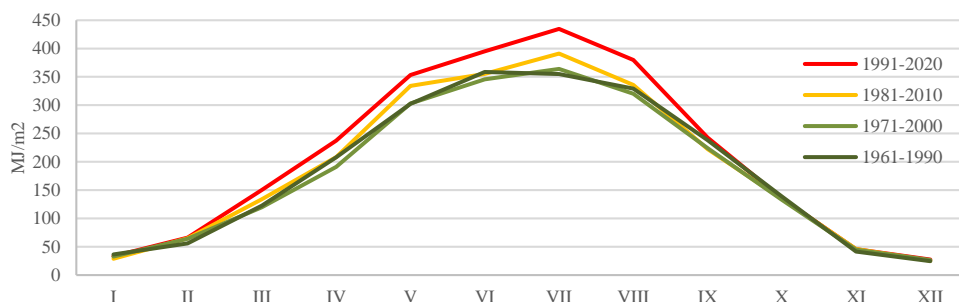
Fig. 3. Average monthly variation of direct solar radiation for different periods

Similar to global solar radiation, direct radiation has been increasing since the 1980s - the difference between the values for the period 1991-2020 compared to 1971-2000 is 333 (15,3%) MJ/m^2, and for the warm and cold periods 249 (16,0%) and 84 (13,7%) MJ/m^2, respectively.

In the case of direct solar radiation, the phase of increasing values since the 1990s is even better expressed, but due to the lack of observational data prior to the 1960s, we cannot point to a certain finite cycle (fig. 4).

$$y = 0.4628x^2 - 26.597x + 2549.3$$
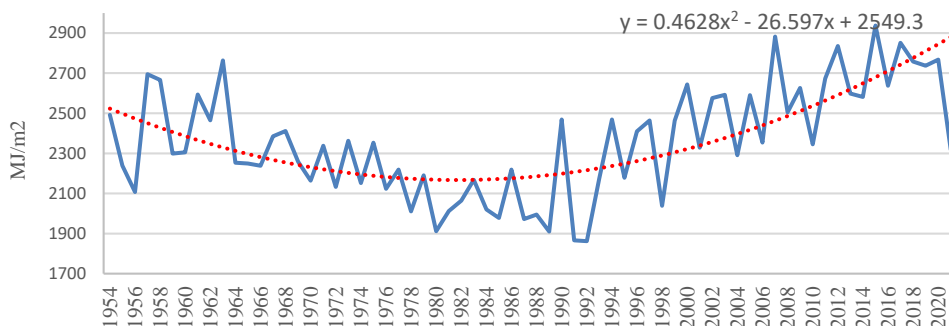
Fig. 4. Annual mean direct solar radiation dynamics at Chişinău meteorological station (1954-2021)

Global radiation and direct radiation during the warm period of the year also increased significantly. The minimum mean annual average value of global solar radiation was registered in 1985 - 3855 MJ/m² (12,6% below the average for the period, a questionable value since several months of that year had no data and their values were restored). The maximum annual average value was recorded in 2007 - 4755 MJ/m² (7,1% above the average for that period and note the severe drought in the summer of that year).

The multiannual average minimum value of direct solar radiation was in 1992 - 1862 MJ/m² (25,6% below the average for that period). The maximum multiannual average maximum value was recorded in 2015 - 2937 MJ/m² (17,4% above the average for that period and the drought and severe heatwave in the summer of that year).

It is worth mentioning that the solar radiation, both direct and indirect, recorded at meteorological stations in neighboring countries (Romania and Ukraine) correlates with the data from the Chişinău meteorological station and is in line with the global trends reflected in the literature (Lipinsky, Dyachuk, and Babichenko, 2003; Sandu, Pescaru, and Poiană, 2008; *Encyclopedia of climatic resources of the Russian Federation*, 2008; Ohmura, 2009).

Direct solar radiation (annual average, MJ/m²) can also be evaluated by the sunshine duration (fig. 5), which is expressed by the function $R_d = f(1,3269 \cdot n - 546,77)$, where n - annual average sunshine duration, in hours. The obtained linear function correlates with data published in regional studies (Păltineanu *et al*, 2002; Suehrcke, Bowden and Hollands, 2013).

The variation of the mean sunshine duration for the analyzed time intervals is shown in table 5, fig. 6.

Table 5. Average sunshine duration at representative
meteorological stations

Reference period	Briceni			Chişinău			Cahul		
	Annual	Warm period	Cold period	Annual	Warm period	Cold period	Annual	Warm period	Cold period
1961-1990	1912	1222	690	2122	1354	769	2177	1347	830
1971-2000	1931	1236	695	2134	1349	786	2188	1346	841
1981-2010	1993	1273	721	2194	1388	806	2272	1390	881
1991-2020	2107	1345	762	2271	1439	832	2328	1430	898
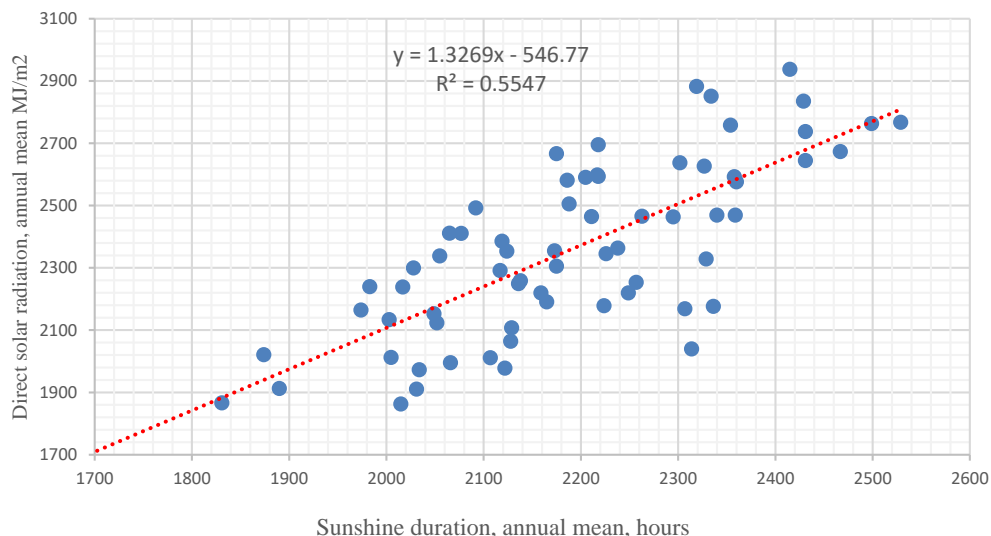
Fig. 5. Correlation of direct solar radiation with sunshine duration at Chişinău
meteorological station (annual mean values)

Sunshine duration, as given in table 5 and fig. 6, 7, 8, is increasing for all
analyzed periods. In particular, the duration of sunshine increases in the North
of Moldova, where the difference between 1961-1990 and 1991-2020 is 195
hours (10,2%), while in Chişinău the same difference is 149 hours (7,0%). The
warm period of the year is characterized by a more pronounced increase in the
average annual sunshine duration - from 123 hours (10,1%) in the North of the
country (Briceni) to 83 hours (6,2%) in the south (Cahul). In the cold period of
the year these differences are smaller - 72 hours (10.4%) in Briceni and 68
hours (8,2%) in Cahul, but the upward trend is evident.

The spatial analysis of sunshine duration for the proposed time
intervals is shown in fig. 7. Obviously, the lack of interpolation reference points
outside the analyzed territory leaves its mark on the quality of the models,
particularly at the periphery of the analyzed area, but the proposed goal is the
general spatial highlighting of the evolution of the sunshine at different time
intervals on the territory of the Republic of Moldova.
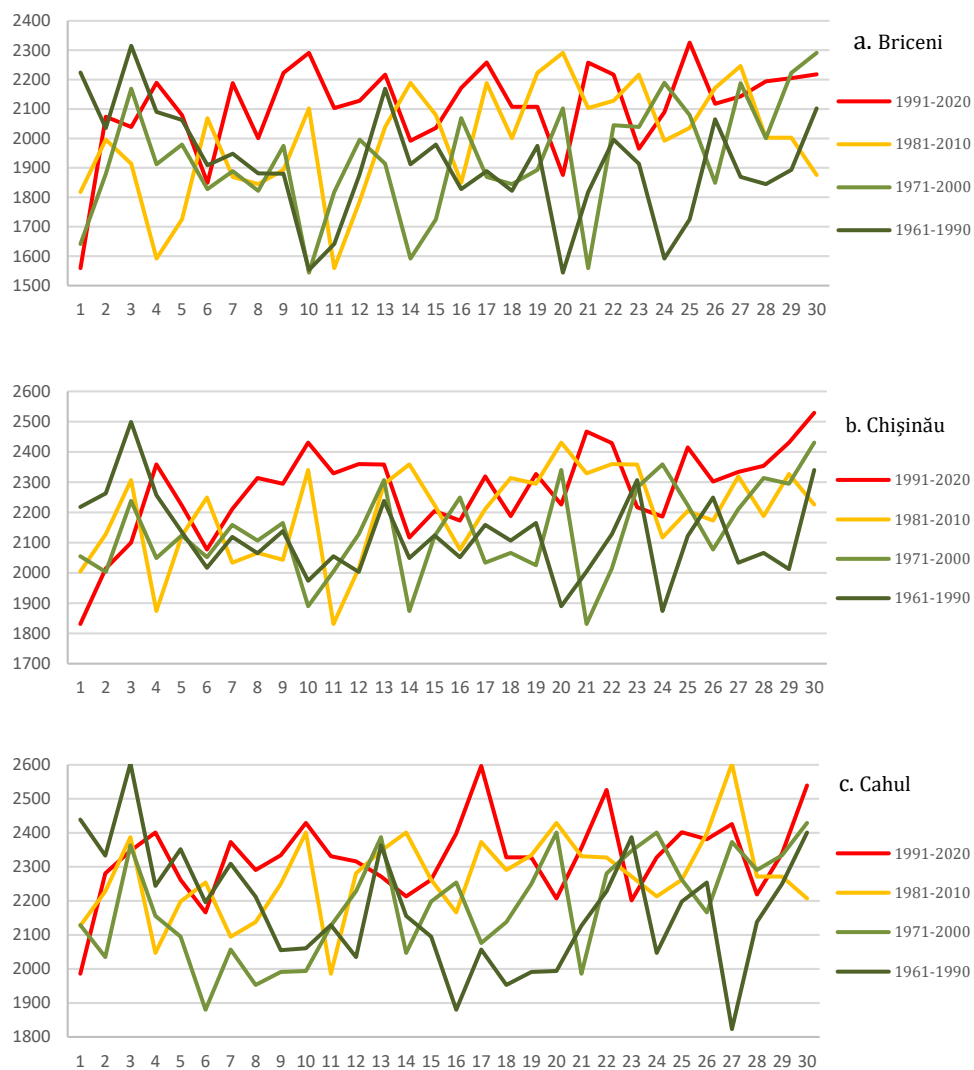
Fig. 6. Variation of mean annual sunshine duration (hours) for
different time intervals at meteorological stations:
a - Briceni; b - Chişinău; c - Cahul
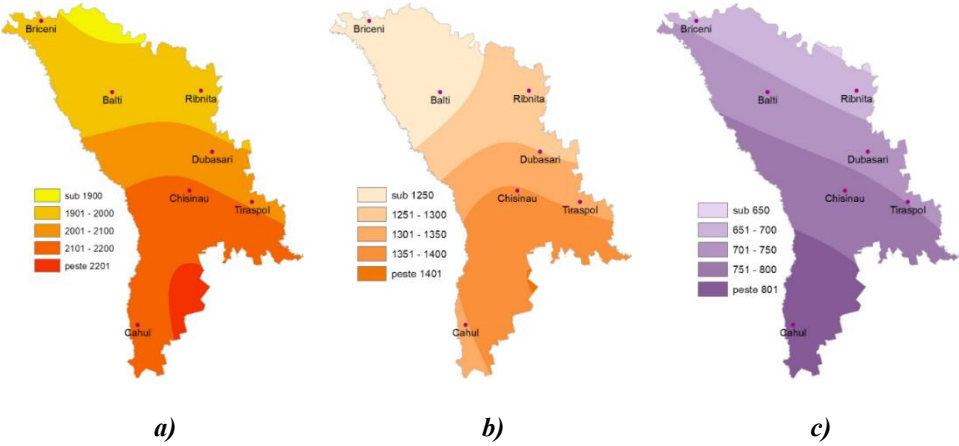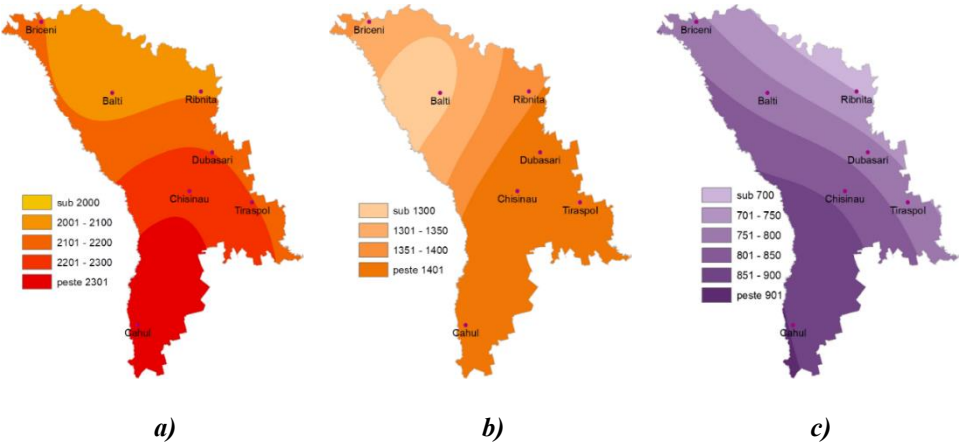
1961-1990

1991-2020

Fig. 7. Spatial assessment of sunshine duration (hours): a) annual average,
b) in the warm period and c) in the cold period of the year,
for the years: 1961-1990 and 1991-2020
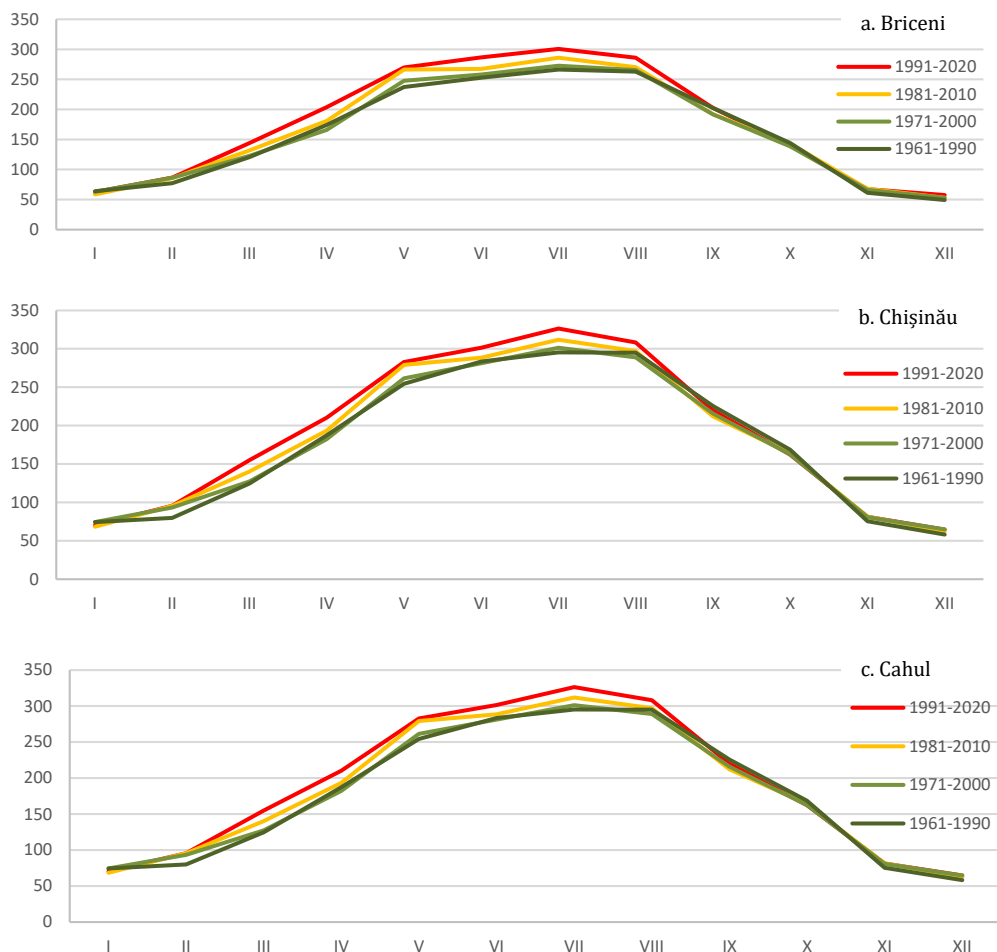
Fig. 8. Average monthly variation of sunshine duration (hours) for different time periods at meteorological stations:
a - Briceni; b - Chișinău; c - Cahul

In the case of the evaluation of the average monthly sunshine duration, the same trends of increase in the number of hours of sunshine are preserved for all months (fig. 8), but the most pronounced increase is in spring and summer months (table 6). Note that in the North of the country the average monthly sunshine duration increased more than in the South. Thus, at Briceni meteorological station, the maximum increase in June and July was recorded with 34 hours in the years 1991-2020 compared to 1961-1990, while at the Cahul meteorological station - the maximum gap is 27 hours in August.

In winter, in January, large variations are not registered, in the North and center there is even a small decrease in the average sunshine duration. December and February are characterized by an increase in the average sunshine duration, but inversely - more pronounced in the South. Thus, in December and February in Cahul the average sunshine duration increased by 12 and 24 hours, while in Briceni only by 8 and 9 hours (table 6).

Table 6. Difference between average monthly sunshine duration (hours) in the years 1991-2020 and 1961-1990

Station	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Briceni	-1	9	24	30	33	34	34	23	0	-4	6	8
Chişinău	-4	16	30	23	28	18	31	13	-6	-6	6	6
Cahul	4	24	21	17	20	17	27	15	-5	-16	6	12

The variation of the monthly mean sunshine duration for a sunny day calculated for different time intervals is shown in fig. 9, and the differences between 1991-2020 and 1961-1990 - in table 7.

Table7. Difference between monthly average sunshine duration (hours) for a sunny day in the years 1991-2020 and 1961-1991

Station	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	An
Briceni	0.06	0.95	0.24	1.28	1.05	1.43	1.05	0.79	0.35	0.18	0.52	0.30	8.20
Chişinău	-0.23	0.90	0.28	0.82	0.67	0.98	0.88	0.29	0.27	-0.03	0.63	0.27	5.72
Cahul	0.15	0.98	0.44	0.67	0.40	0.85	0.79	0.49	0.07	-0.19	0.68	0.41	5.74
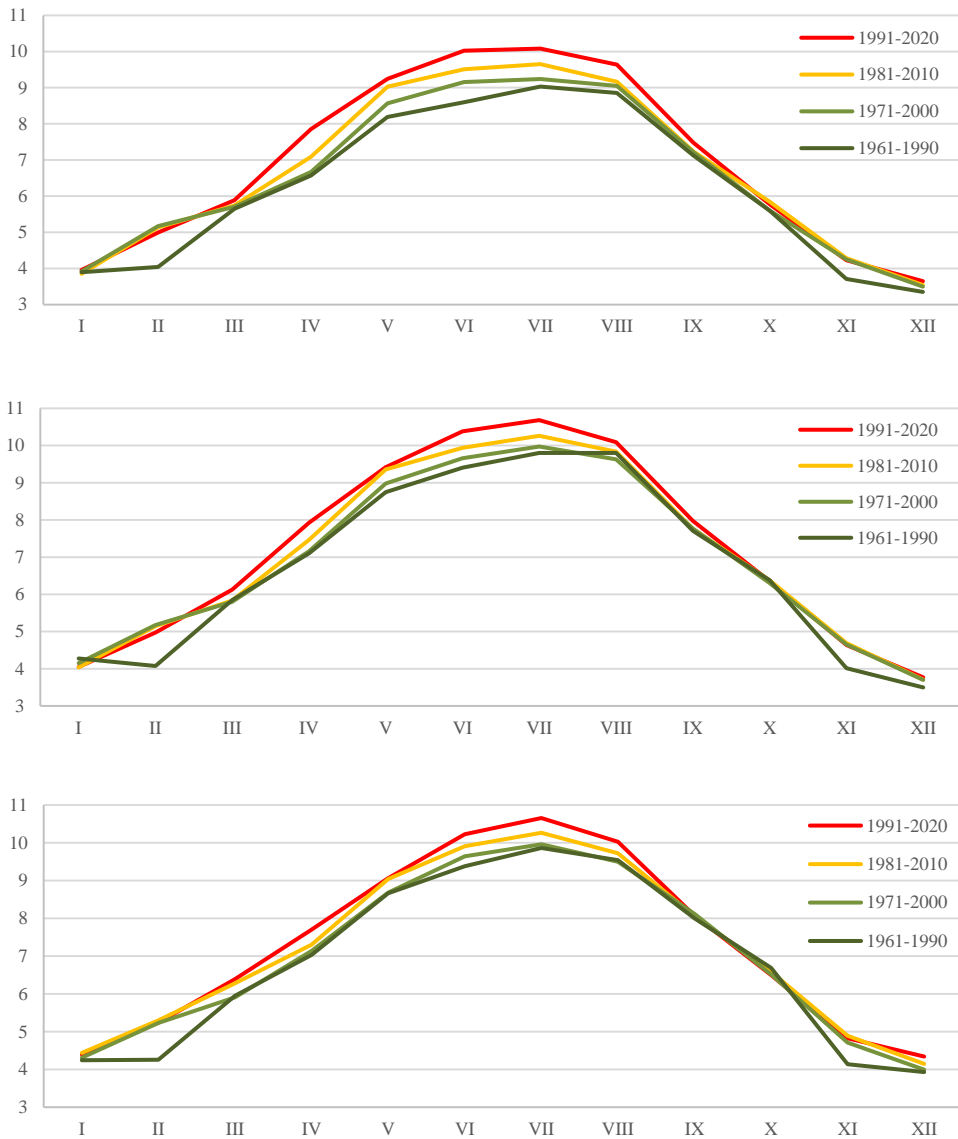
Fig. 9. Average monthly sunshine duration (hours) for a sunny day
calculated for different time intervals

As with the monthly average sunshine duration, the monthly average sunshine duration on a sunny day is increasing. The general spatial assessment of the evolution of the sunshine duration on a sunny day in different time intervals over the territory of the Republic of Moldova is presented in Fig. 10.
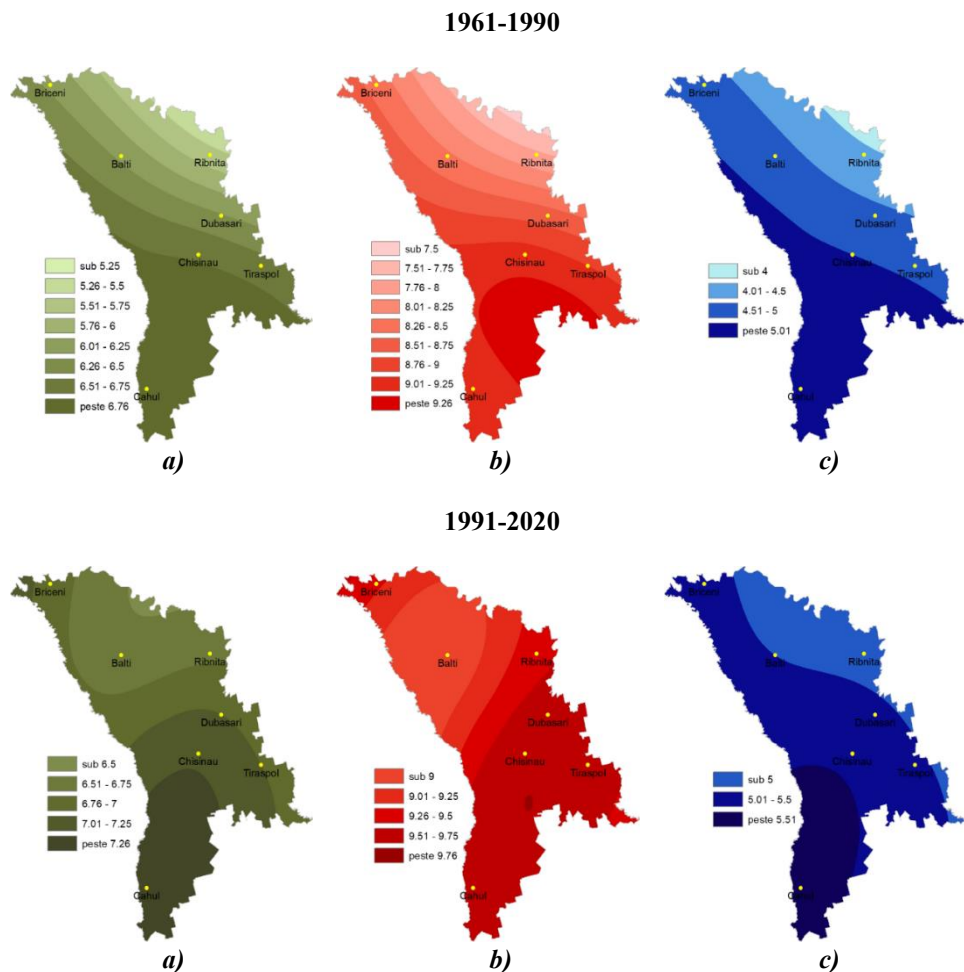
1961-1990

1991-2020

Fig. 10. Spatial evaluation of the average sunshine duration (hours) on a sunny day:
a) annual average, b) in the warm period and c) in the cold period of the year,
b) for the years: 1961-1990 and 1991-2020

The increase in the duration of sunshine on a sunny day is more pronounced in the North of the country, where in summer the values for 1991-2020 are 1.43 hours (June, Briceni) compared to 0.85 in the South (June, Cahul) higher than in 1961-1990. In winter, the increasing trend is less expressed, but here the reverse is true - in the South the values are slightly more increasing than in the North: Briceni - in January the difference is 0.06 hours and in Cahul – 0.15.

Another important indicator, which characterizes the radiative regime and complements the present analysis is the number of days without sunshine for a time interval, table 8.

Table 8. Average number of days without sunshine
at representative weather stations

Reference period	Briceni			Chişinău			Cahul		
	Annual	Warm period	Cold period	Annual	Warm period	Cold period	Annual	Warm period	Cold period
1961-1990	87	9	78	78	7	71	71	6	64
1971-2000	88	11	78	75	7	68	69	7	62
1981-2010	87	10	76	73	7	67	65	6	59
1991-2020	82	9	73	70	6	64	63	5	58

Thus, the average number of days without sunshine is decreasing in the annual aspect and in the cold period of the year, depending on the time interval analyzed. Also, this indicator is decreasing also in latitude - from North to South. At Briceni meteorological station, there are now on average 5 fewer days without sunshine each year than in the 1961-1990 period; in Cahul - 8 days. In the cold period of the year this difference is 5 days in Briceni and 6 days in Cahul. The change is not so obvious during the warm period of the year.

4. CONCLUSIONS

1. The upward trend in solar radiation (direct and global), which has been observed since the 1980s of the last century, is characterized by an increase in solar radiation (direct and global) up to the present, amplifying climate change in the study area. Thus, the difference between the annual average values of global radiation in 1991-2020 and 1971-2000 has increased by 131 MJ/m^2 (3,1%), and for the warm and cold periods of the year - by 95 (3,3%) and 36 (2,5%) MJ/m^2, respectively;

2. Average annual sunshine duration is increasing for all analysed periods. In particular, the sunshine duration increases in the North of the country, where the difference between the years 1961-1990 and 1991-2020 is 196 hours. The warm period of the year is characterized by a more pronounced increase in the average annual sunshine duration - from 124 hours in the North of the country (Briceni) to 83 hours in the South (Cahul). In the cold period of the year these differences are smaller - 72 hours in Briceni and 68 hours in Cahul;

3. The duration of sunshine on a sunny day is increasing and is more pronounced in the North of the country, where in summer the values for 1991-2020 are 1.43 hours (June, Briceni) compared to 0.85 in the South (June, Cahul) higher than in 1961-1990. In winter, the increasing trend is less obvious, but here the reverse is true - in the South the values are slightly more increasing than in the North: Briceni - in January the difference is 0.06 hours and in Cahul – 0.15.

4. The average number of days without sunshine is decreasing annually and in the cold period of the year. At Briceni meteorological station, there are now on average 5 fewer days without sunshine each year compared to the 1961-1990 period; and in Cahul - 8 days. In the cold period of the year this difference is 5 days in Briceni and 6 days in Cahul. The change is not so obvious during the warm period of the year.

5. The amplification of climate change since the 1980s of the last century is expressed by an increase in the amount of direct and global solar radiation, accompanied by an increase in the duration of sunshine, an increase in the duration of sunshine on a sunny day and a decrease in the number of days without sunshine. These trends favor the contemporary solar energy potential of the Republic of Moldova.

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ASSESSING TEMPORAL AND TERRITORIAL PERFORMANCE OF SDG 11 AT LOCAL SCALE

Kinga TEMERDEK-IVAN[1] 📷, Vivien MEZEI[1]

ABSTRACT. – Assessing Temporal and Territorial Performance of SDG 11 at Local Scale. This study aims to evaluate the performance of each LAU (Local Administrative Unit) within Satu Mare County and the Satu Mare Metropolitan Area in achieving Sustainable Development Goal 11 (SDG 11) - "Sustainable Cities and Communities", for two distinct reference years: 2016 and 2024. For this purpose, a dataset was collected, based on which ten relevant indicators, identical for both years analysed, were calculated. The data were organised in a PostgreSQL database, where most of the computations were performed, including the normalisation process of the indicators. The SDG 11 Index was calculated using the normalised values, applying equal weights to each indicator. This approach enabled the assessment of the progress achieved over the past eight years towards achieving SDG 11, both at the level of Satu Mare County and the metropolitan area.

Keywords: SDG 11, local level, PostgreSQL, Temporal analysis, Satu Mare.

1. INTRODUCTION

In line with the 2030 Agenda for Sustainable Development, supported by the United Nations and adopted by all 193 member states, a global commitment was agreed upon to combat inequalities and injustices, eradicate poverty, and take concrete action to protect the planet. The 2030 Agenda includes 17 Sustainable Development Goals (SDGs) and 169 associated targets, which are subject to ongoing

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monitoring until the end of the reference period. This initiative provides a new perspective on how to view the world and serves as a global framework for doing things better, through clear and measurable objectives (Benedek *et al.*, 2021). It is important to assess the performance observed in progressing towards the Sustainable Development Goals, while also monitoring progress over time. Concerns regarding the measurement of progress at local and regional levels in Romania have been raised by Benedek et al. (2021), who calculated 90 sustainable development indicators at the subnational level for all 17 SDGs. Studies assessing sustainable development at the local level in Romania remain relatively scarce (Nagy, Benedek and Ivan, 2018), largely due to the lack of available data at lower administrative levels for all SDG targets. According to the study by Wang and Zhao (2025), the most extensively analysed SDGs between 2003 and 2024 were SDG 13 (Climate Action), SDG 3 (Good Health and Well-being), and SDG 11 (Sustainable Cities and Communities), which together accounted for 36% of the 21,076 articles examined.

Understanding and comparing the performance of municipalities and cities in terms of sustainable development is essential for improving quality of life, mapping spatial inequalities, and identifying problematic areas (Murphy *et al.*, 2025). Among the 17 Sustainable Development Goals, SDG 11 - Sustainable Cities and Communities – measures the level of sustainable development in urban areas and human settlements. Feng *et al.* (2023) calculated eight SDG 11 indicators and an integrated SDG 11 index for 64 cities in the Yellow River Basin, concluding that the index increased significantly in most of the cities analysed. In Japan, Yamasaki and Yamada (2022) calculated 52 SDG 11 indicators at the local level and analysed the relationships between them to identify the factors supporting progress towards SDG 11. The main challenge in assessing SDG 11 remains the lack of local-level data, particularly in rural settlements (Feng *et al.*, 2023; Khalid, Sharma and Dubey, 2020; Liu *et al.*, 2023). Methodological efforts have been made to address this data gap, such as the study conducted by Poli, Cuntò and Muccio (2024), who applied Machine Learning algorithms to predict missing values in a dataset used to compute 18 SDG 11 indicators across three regions in Italy.

This study assessed SDG 11 indicators and the corresponding composite index at the local level for two reference years: 2016 and 2024. Satu Mare County and its Metropolitan Area were selected as the case study, enabling both a spatial analysis of territorial disparities and a temporal evaluation of sustainable development trends based on ten consistently calculated indicators.

2. STUDY AREA AND DATA SOURCE

2.1. Study area

Satu Mare County is located in the northwestern part of Romania, within the North-West Development Region, near the borders with Hungary and Ukraine (fig. 1). The county comprises 59 communes, four towns (Ardud, Livada, Negreşti-Oaş, and Tăşnad), and two cities - Satu Mare (the county seat) and Carei.
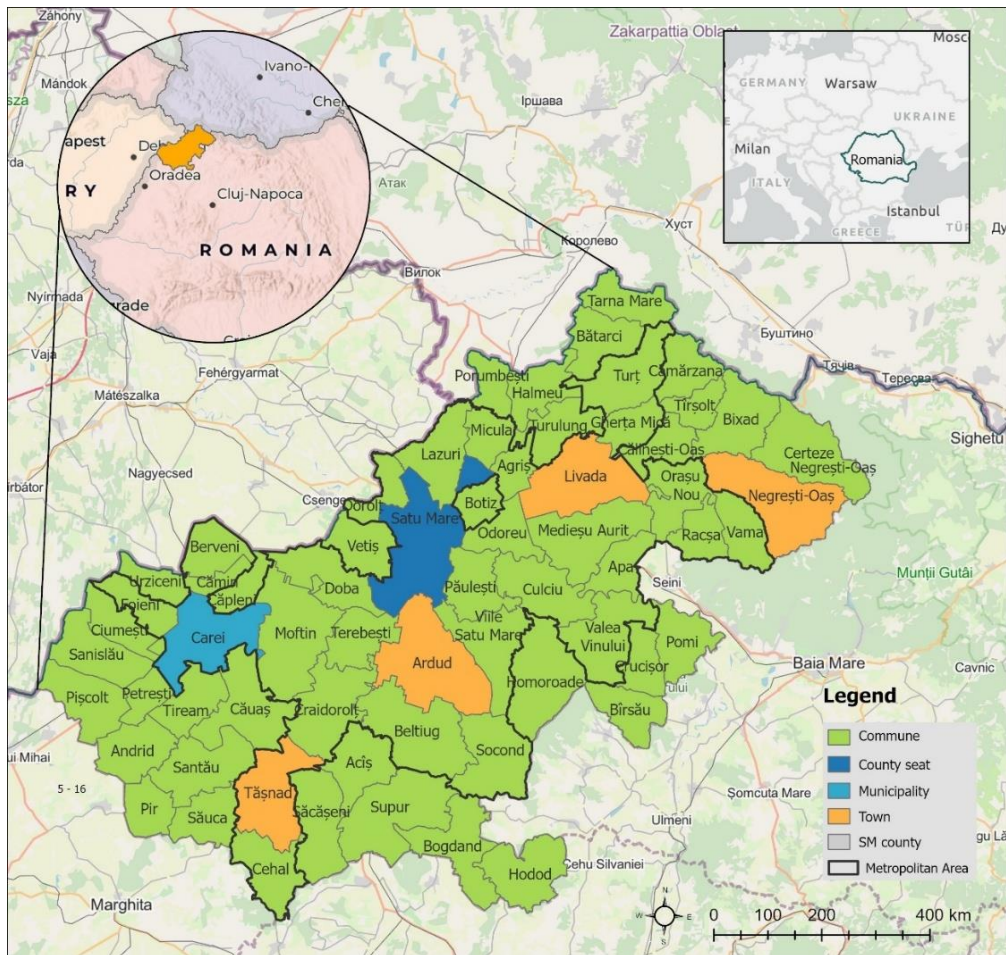
Fig. 1. Location of the study area.
Source: the authors.

The Satu Mare Metropolitan Area (SMMA) was established in 2013 and includes 31 administrative-territorial units (ATUs): the cities of Satu Mare and Carei, the towns of Livada, Tăşnad, and Ardud, as well as the communes of Agriş, Apa, Beltiug, Berveni, Cămin, Cehal, Craidorolţ, Culciu, Doba, Dorolţ, Foieni, Gherţa Mică, Lazuri, Medieşu Aurit, Moftin, Micula, Odoreu, Oraşu Nou, Păuleşti, Racşa, Socond, Terebeşti, Turţ, Vama, Valea Vinului, and Viile Satu Mare (SIDU, 2016). The population of the SMMA is approximately 253,592 inhabitants, of whom 112,421 reside in the city of Satu Mare (NIS, 2025).

2.2. Data source

To calculate the SDG 11 indicators (Table 1), a diverse range of data sources was employed. The first source consisted of statistical data provided by the National Institute of Statistics (NIS) for the years 2016 and 2024 (NIS, 2025). The second source included land cover datasets from the Dynamic World database (Brown *et al.*, 2022), with a spatial resolution of 10 metres, downloaded via the Google Earth Engine (GEE) platform. Based on population data from NIS and land cover information, the indicator 'Ratio of land consumption rate to population growth rate' was computed (Table 1). This indicator has also been successfully applied by Aquilino *et al.* (2020) in monitoring SDG 11 indicators at the local level in Bari, Italy. The third source consisted of data provided by the Romanian Police (GIRPTD, 2025), offering detailed records on the number of road traffic accidents and associated fatalities, serious injuries, and minor injuries for both 2016 and 2024. These accident data were spatially aggregated at the level of administrative territorial units using ArcGIS Pro.

Table 1. Summary of indicators used to construct the SDG 11 Index

SDG Indicator	Source	Normalisation
Finished dwellings (per 10000 people)	NIS	Min-Max
Population density (people per km^2)	NIS	Min-Max
Population growth rate (%) 2016-2020 and 2020-2024	NIS	Min-Max
Ratio of land consumption rate to population growth rate 2016-2023	EO and NIS	Min-Max
Living floor (m^2 per person)	NIS	Min-Max
Traffic death rate (per 1000 people)	GIRPTD	Max-Min
Serious traffic accident rate (per 1000 people)	GIRPTD	Max-Min
Slight traffic accident rate (per 1000 people)	GIRPTD	Max-Min
Traffic accidents (per 1000 people)	GIRPTD	Max-Min
Building permits (per 1000 people)	NIS	Min-Max

Source: the authors

3. METHODOLOGY

The data collected for each SDG indicator was processed and subsequently imported into a PostgreSQL database. Within this database, the ten indicators were computed separately for the two reference years, and the resulting values were then normalised on a scale from 0 to 10. Based on these normalised values, the SDG 11 index was calculated for both Satu Mare County and its Metropolitan Area. Figure 2 presents a graphical overview of the workflow, while subsections 3.1–3.3 provide a detailed description of each step in the process.
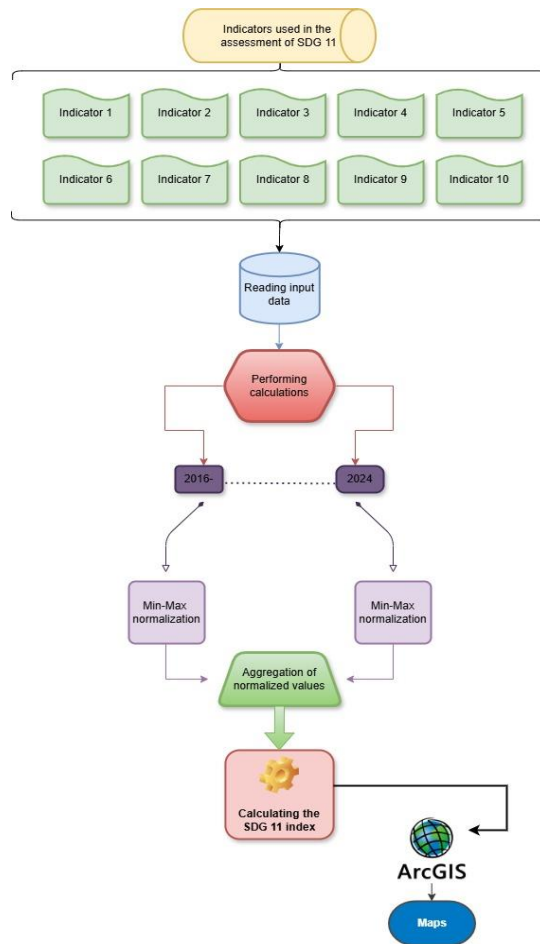
Fig. 2. Flow chart of the methodology used to calculate SDG 11.
Source: the authors.

3.1 Data processing

To calculate the indicators Finished dwellings (per 10,000 people), Population density (people per km^2), Population growth rate (%) for the periods 2016–2020 and 2020–2024, Living floor area (m^2 per person), and Building permits (per 1,000 people), data at the local administrative unit (LAU) level were obtained from the National Institute of Statistics (NIS). Using the JOIN function, the multiple datasets required for calculating these indicators were merged into a single table. Road traffic accident data, obtained from GIRPTD, were aggregated at the LAU level and included both the total number of accidents and the number of victims: fatalities, serious injuries, and minor injuries (fig. 3).
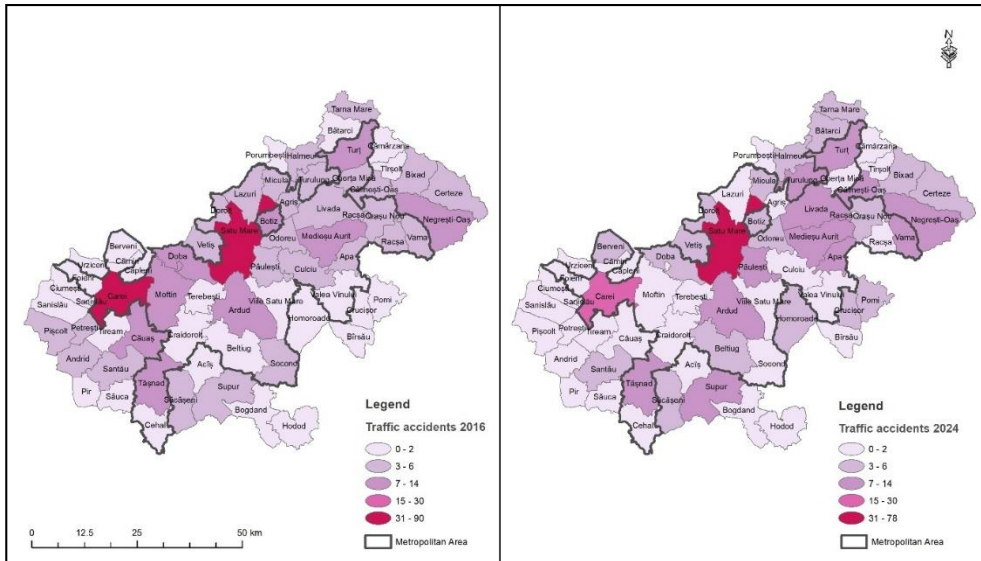
Fig. 3. Total number of accidents in Satu Mare County, 2016 and 2024.
Source: the authors.

A comparison of the two maps (fig. 3) clearly illustrates the spatial distribution of road traffic accidents within the county and the metropolitan area between 2016 and 2024. The total number of road accidents in the county decreased from 337 in 2016 to 318 in 2024, while in the Satu Mare Metropolitan Area (SMMA), the number dropped from 240 to 211 over the same period. Similarly, the number of victims in SMMA followed a downward trend: in 2016, there were 17 fatalities, 72 seriously injured, and 235 slightly injured persons, compared to 22 fatalities, 61 seriously injured, and 213 slightly injured in 2024. This evolution is most evident in the county seat, where the number of accidents decreased from 90 in

2016 to 78 in 2024, representing a reduction of approximately 13%. Although the county seat remains the primary hotspot for traffic accidents, overall road safety within the metropolitan area improved between 2016 and 2024. Nonetheless, the urban core continues to pose a high-risk zone, requiring targeted interventions to further reduce accident rates.

The SDG 11.3.1 indicator - Ratio of land consumption rate to population growth rate - was calculated for two-time intervals: 2016–2020 and 2020–2024, based on land cover data extracted from the Dynamic World database (Brown *et al.*, 2022). The land cover dataset includes nine classes (water, trees, grass, flooded vegetation, crops, shrub and scrub, built-up, bare, snow and ice), retrieved for September and October in the years 2016, 2020, and 2024 using the Google Earth Engine platform. The land cover data were then processed in ArcGIS Pro using the Tabulate Area tool, while population data for the three reference years were obtained from the National Institute of Statistics (NIS).

3.2 PostgreSQL database
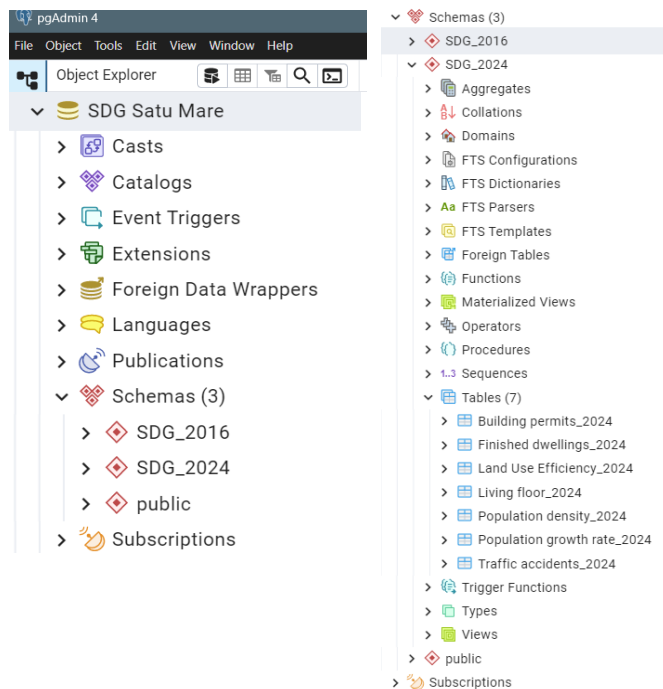
Fig. 4. Illustration of the database structure and schemas in PostgreSQL.
Source: the authors.

The locally collected data were imported into a PostgreSQL database, organised into two separate schemas - one for 2016 and the other for 2024 (Figure 4). The use of schema structures enabled the clear distinction and separate processing of data for each analysed year. As a result, information within the database could be easily queried and analysed. PostgreSQL offers the advantage of handling large volumes of data efficiently and supports fast querying capabilities, while the PostGIS extension enables the manipulation and analysis of spatial data (Haynes, Mitchell and Shook, 2020).

All ten SDG 11 indicators (table 1) were computed within the PostgreSQL database using the SQL programming language. Road traffic accident and casualty data, along with building permits, were standardised per 1,000 inhabitants, while finished dwellings were calculated per 10,000 inhabitants. Population density was expressed in people per square kilometre, and the population growth rate was calculated for two intervals: 2016–2020 and 2020–2024. The Ratio of land consumption rate to population growth rate was calculated following the UN-Habitat methodology, as the ratio between the land consumption rate (LCR) and the population growth rate (PGR). Both LCR and PGR were computed using the formulas presented below (Holobâcă *et al.*, 2022):

$$LCR_{2016} = Ln\ (Built\text{-}up_{2020} / Built\text{-}up_{2016}) / 4 \qquad (1)$$
$$LCR_{2024} = Ln\ (Built\text{-}up_{2024} / Built\text{-}up_{2020}) / 4 \qquad (2)$$

$$PGR_{2016} = Ln(Pop_{2020} / Pop_{2016}) / 4 \qquad (3)$$
$$PGR_{2024} = Ln(Pop_{2024} / Pop_{2020}) / 4 \qquad (4)$$

$$LCRPGR_{2016\text{-}2020} = LCR_{2016} / PGR_{2016} \qquad (5)$$
$$LCRPGR\_{2020\text{-}2024} = LCR_{2024} / PGR_{2024} \qquad (6)$$

where: Built-up is the built-up space, Pop is the population, Ln - the natural logarithm, y is the number of years of the reference period, LCRPGR - Land consumption rate and population growth rate, LCR - Land Consumption Rate, PGR - Population Growth Rate.

3.3 Normalization of indicators

The SDG indicator values were normalised on a scale from 1 to 10 to ensure comparability, using both the min–max ($\hat{x}$) and max-min ($\check{x}$) normalisation methods:

$$\hat{x} = \left(\frac{x - min(x)}{max(x) - min(x)} \right) \times 10 \qquad \check{x} = \left(\frac{max(x) - x}{max(x) - min(x)} \right) \times 10$$

Where: x represents the raw data value, min(x) and max(x) define the lower and upper bounds corresponding to the weakest and best performances, respectively, while $\hat{x}$ and ($\check{x}$) denote the rescaled normalised values.

For most indicators, the min–max normalisation method was applied, where 0 represents the lowest performance and 10 the highest level of SDG achievement (Benedek *et al.*, 2021; Nagy, Benedek and Ivan, 2018). An exception was made for the indicators Traffic deaths rate, Serious traffic accidents rate, Slight traffic accidents rate, and Total traffic accidents, for which the max–min method was used, where a value of 10 corresponds to the weakest performance, and 0 to the best.

Following the normalisation of the indicators, the SDG 11 index was calculated using equal weights, meaning that each indicator contributed equally to the final value of the SDG 11 index (Sachs *et al.*, 2020; Benedek *et al.*, 2021; Schmidt-Traub *et al.*, 2017; Tomalty *et al.*, 2017). Accordingly, the SDG 11 index was computed for the years 2016 and 2024, and the results were spatially represented using ArcGIS Pro.

4. RESULTS AND DISCUSSIONS

The locally calculated SDG 11 index features standardised values ranging from 0 (the lowest level of sustainable development) to 10 (the highest level of sustainable development). In 2016, the highest sustainability score was recorded in the commune of Păuleşti (7.1), while in 2024, the highest score was found in the commune of Odoreu (7.6) (fig. 5). At the opposite end, the lowest score in 2016 was registered in Săcăşeni (1.9), and in 2024, in the commune of Apa (3.0). These results reveal a slight upward trend in SDG 11 index values in 2024 compared to 2016 across Satu Mare County. This evolution may be attributed to the implementation of various projects over the past eight years, including infrastructure investments and the attraction of more complex development initiatives. These findings are consistent with trends reported in the literature.

For instance, Feng *et al.* (2023) remarked a significant increase in the SDG 11 index during the 2015–2020 period in the majority of the cities analysed.
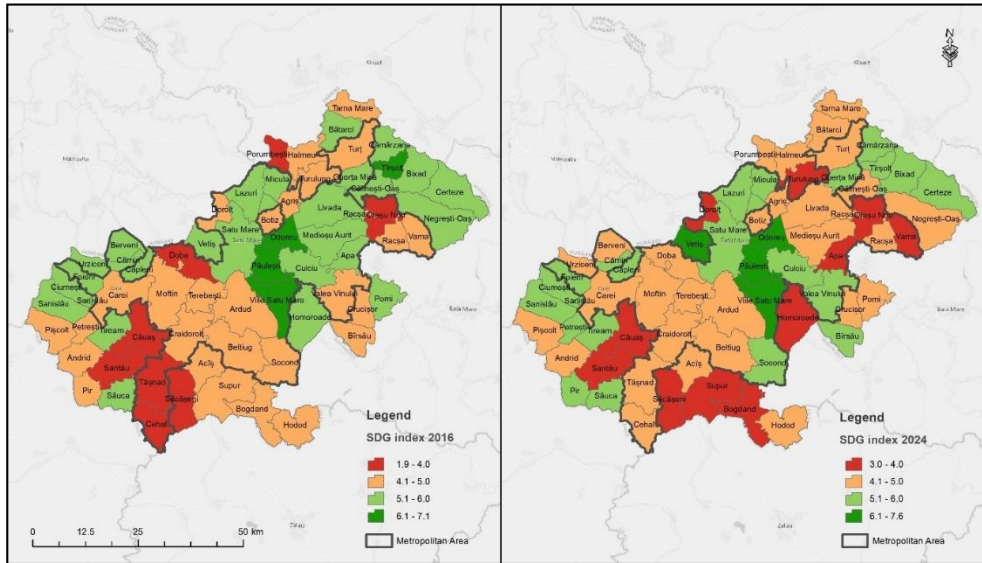
Fig. 5. SDG Index at the local level in Satu Mare County
and its metropolitan area, 2016 vs. 2024.
Source: the authors.

Although the sustainable development scores were generally higher in 2024 compared to 2016, figure 5 shows that in 2016, there were 8 local administrative units (LAUs) with SDG 11 scores below 4 (Săcăşeni, Căuaş, Santău, Oraşu Nou, Doba, Cehal, Porumbeşti, and Tăşnad), while in 2024, this number increased to 11 LAUs (Apa, Homoroade, Vama, Turulung, Săcăşeni, Supur, Căuaş, Dorolţ, Oraşu Nou, Bogdand, and Santău). Among these, Săcăşeni, Căuaş, and Santău located near the town of Tăşnad, and Oraşu Nou consistently ranked among the lowest in both periods. These communes are characterised by an ageing population and demographic decline. For instance, between 2016 and 2024, the population of Căuaş decreased by 3.8%, Săcăşeni by 5.97%, Santău by approximately 4.9%, and Oraşu Nou by 7.2%, according to NIS data. The economic profile of these communes is predominantly agricultural, with economies largely based on farming and limited access to essential services. Nevertheless, local administrations are making continuous efforts to modernise infrastructure and utility networks in these areas (CJ Satu Mare, 2021).

When analysing towns and cities separately (fig. 5), a decline in SDG 11 index scores can be observed with decreasing urban size. This trend highlights the need to strengthen efforts aimed at improving SDG progress in smaller towns to ensure more balanced sustainability across the county. These findings are consistent with those of Liu *et al.* (2023), who assessed SDG progress in 254 Chinese cities using open-source big data.

When examining the localities with the highest sustainable development scores (> 6), four territorial entities were identified in 2016 (Tîrşolţ, Viile Satu Mare, Odoreu, and Păuleşti), and their positions remained generally consistent in 2024 (Păuleşti, Viile Satu Mare, Vetiş, and Odoreu). These peri-urban communes, located within the Satu Mare Metropolitan Area (SMMA) and close to the city of Satu Mare, are among the most dynamic and developed rural settlements in the county. According to NIS statistical data, between 2016 and 2024, the population of Odoreu increased by approximately 13%, Păuleşti by 12%, Vetiş by 9.8%, and Viile Satu Mare by 6.5%. Their inclusion in the SMMA, combined with the administrative capacity of local authorities, provides opportunities for attracting funding and implementing development projects. In contrast, localities more distant from the city of Satu Mare and experiencing population decline (such as Săcăşeni, Căuaş, Santău, and Oraşu Nou) recorded low SDG 11 index values in both years analysed.

The normalised SDG 11 indicators, calculated using the min–max and max–min methods (table 1), reveal relatively strong local performance in indicators related to the number of road traffic victims and total traffic accidents per 1,000 inhabitants, followed by the population growth rate. In contrast, the weakest performances were observed for population density, finished dwellings, and building permits. These trends remained consistent across both years analysed at the county level.

Within the Satu Mare Metropolitan Area (SMMA), the highest SDG 11 scores mirrored those recorded at the county level: in 2016, Păuleşti achieved an SDG index of 7.1, while in 2024, Odoreu recorded the highest score of 7.6. Conversely, the lowest level of sustainable development was recorded in 2016 in Oraşu Nou (SDG index 3.3) and in 2024 in Apa (SDG index 3.0). In both Apa and Oraşu Nou, agriculture remains the predominant economic activity, and both localities experienced demographic decline (approximately 2.6%). However, several complex development projects are currently being implemented, which are likely to improve their sustainable development rankings in the future. These findings indicate that the SMMA recorded both the highest and lowest SDG 11 scores within the county. In 2016, localities with SDG 11 index values below 4 included Oraşu Nou, Cehal, Doba, and Tăşnad - all experiencing demographic decline, except Doba. In 2024, the lowest scores were recorded in

Apa, Vama, Dorolţ, and again in Oraşu Nou. The highest levels of sustainable development in SMMA were consistently observed in Păuleşti, Viile Satu Mare, and Odoreu across both years (fig. 5). An analysis of the normalised SDG 11 indicators at the metropolitan level reveals trends similar to those at the county level, with no significant differences in performance noticed across the metropolitan area.

5. CONCLUSIONS

This study proposes the measurement, evaluation, and comparison of local-level sustainable development (SDG 11) in the period 2016-2024, based on the United Nations methodology. The performance of each rural and urban settlement in Satu Mare County was quantified using a diverse range of data sources, including Earth Observation data. All SDG 11 indicators and datasets were stored and processed within a PostgreSQL database. The results revealed higher SDG 11 scores in the peri-urban areas of Satu Mare municipality, particularly in the most dynamic communes of the county - Păuleşti, Viile Satu Mare, Vetiş, and Odoreu - which consistently ranked highest in both analysed years. Conversely, the lowest levels of sustainable development (SDG 11) were recorded in the communes of Săcăşeni, Căuaş, Santău, and Oraşu Nou - areas characterised by population decline, ageing demographics, and agriculture-based economies.

The results of the study will enhance the capacity of local administrations to identify the necessary levers for improving the level of sustainable development in localities facing demographic decline and low SDG 11 scores. Furthermore, the findings will contribute to a more balanced, sustainable development across the county, help reduce territorial disparities, and support local authorities in formulating robust local development strategies.

Disclaimer: This paper has been edited using the ChatGPT model 4.5 (ChatGPT Plus) to improve fluency, clarity, and readability. All content, ideas, analysis, and conclusions are the sole work of the authors.

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THE NATIONAL STRUCTURE OF THE ROMANIAN POPULATION AT THE 1ST DECEMBER 2021 CENSUS

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ABSTRACT. – The National Structure of the Romanian Population at the 1st December 2021 Census. This study aims to focus on the spatial distribution of the 21 ethnic groups at the level of geographical-historical provinces and counties, based on the final results recorded at the Population and Housing Census of 1st December 2021. Compared to the total stable population of 19,053,815 inhabitants, the Romanian ethnic group has a percentage of 77.68%, followed at a great distance by the Hungarians (5.26%) and the Roma (3.00%), after which the other 18 ethnic groups (Ukrainians, Germans, Turks, Russian-Lipovans, Tatars, Serbs, Slovaks, Bulgarians, Croats, Greeks, Italians, Jews, Czechs, Poles, Ruthenians, Armenians, Albanians and Macedonians) all together represent only 0.92% of the total population. There is also the category *Other ethnicity* (Csangos, Gagauz, Chinese and other ethnicities from intra- and extra-community states) with 0.10%, as well as the category *Unavailable information*, which includes an important segment of the population of 13.04%.

Keywords: Romania, census, statistics, nationalities, territorial distribution.

1. INTRODUCTION

The analysis of the national structure of Romania at the census held on the 1st of December 2021 is based on the final results published by the National Institute of Statistics, on the website   https://www.recensamantromania.ro,

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category *Ethno-cultural demographic characteristics*, chapters *2.1. Population by ethnicity at the censuses from 1930-2021* (table 2.01), *2.2. Resident population by ethnicity* (tables 2.02.1 and 2.02.2) and *2.7. Resident population by current activity status and ethnicity* (table 2.07).

According to a similar study, in relation to the total resident population, a detailed analysis of the ethnic structure was considered through the 23 positions (C-Y), highlighted by absolute values, starting with *Romanians* (position C) to *Macedonians* (position W), and then continuing with the categories *Other ethnicity* (position X) and *Unavailable information* (position Y).

At the 2021 Population and Housing Census, Romania had a total stable population of 19,053,815 inhabitants, the majority of whom are ethnic *Romanians*, who account for 77.68% (14,801,442 people) of the country's total population. They are followed by *Hungarians*, whose percentage is 5.26% (1,002,151) and *Roma*, with 3.00% (569,477), then other 18 nationalities (0.92%, 176,309 people) and other registered categories (0.10%, 19,510 people), as well as the population with *Unavailable information* in terms of ethnicity, which has a percentage of 13.04% (2,484,926 people).

Comparing the situation with the penultimate census of 2011, we notice that a decrease in frequency was recorded for 18 ethnic groups, the most significant decline occurring in the *Romanian* ethnic group (from 83.45% to 77.68%, or 1,991,426 people less), in the same downward trend, but at a great distance, *Hungarians* (6.10% and 5.26%), *Rroma* or *Gypsy* (3.09% and 3.00%), *Ukrainians* (0.25% and 0.24%), *Germans* (0.18% and 0.12%), etc..

Only one of the ethnic groups registered in Romania increased in absolute value between the two censuses, that is the *Italians* (3,203 and 4,039), but with a relative value of 0.02% in both census cases. A slight increase also occurs in the *Other ethnicity* category, from 0.09% (18,524) to 0.10% (19,510), while in *Unavailable information* the share increased by more than half, from 6.15% to 13.04% (with 1,248,116 more people).

Unlike the previous census, when the *Chinese* (2,017 people) and the *Csangos* (1,536 people) were registered separately, two new ethnic groups were introduced in their place, the *Ruthenians* (position T), with 834 people, and the *Albanians* (position V), with 645 people.

No. crt.	A Counties and geographical-historical provinces	B Total table population	C Romanians	D Hungarians	E Gypsies	F Ukrainians	G Germans	H Turks	I Russians - Lipovans	J Tartars	K Serbians	L Slovaks	M Bulgarians	N Croats	O Greeks	P Italians	Q Jews	R Czechs	S Polish	T Ruthenians	U Armenians	V Albanians	W Macedonians	X Other nationality	Y Unavailable information
	ROMANIA	19053815	14801442	1002151	569477	45835	22907	20945	19394	18156	12026	10232	5975	4842	2086	4039	2378	1576	2137	834	1213	645	1089	19510	2484926
1	Alba	325941	268753	11494	13041	19	544	29	10	*	3	17	6	*	*	68	14	8	4	20	*	*	-	124	31780
2	Bistriţa-Năsăud	295988	247935	11049	11127	34	261	8	*	-	3	3	*	-	3	42	19	-	6	-	*	4	-	86	25398
3	Braşov	546615	416664	28221	23472	106	1853	60	105	15	22	12	22	8	76	194	81	*	20	*	14	5	5	770	74884
4	Cluj	679141	488212	78455	17802	250	567	91	89	20	27	56	21	8	68	223	139	14	26	17	83	22	7	1225	91719
5	Covasna	200042	42752	133444	9507	10	73	5	6	*	3	3	*	*	3	13	6	*	8	*	*	-		99	14101
6	Haghita	291950	33634	232157	4928	14	62	11	7	*	8	3	*	-	*	7	4	*	4	-	7	-	*	148	20949
7	Hunedoara	361657	300972	9180	5449	48	500	33	20	*	28	27	16	6	19	97	37	5	28	74	*	24	9	210	44870
8	Mureş	518193	252400	165014	44880	47	904	49	24	9	8	5	11	4	9	77	56	3	5	*	10	3		296	54378
9	Sălaj	212224	136552	40554	16706	25	40	3	*	*	3	760	*	-	*	46	32	*	-	-	4	-	-	75	17416
10	Sibiu	388326	313119	6112	12808	50	2716	47	39	4	22	*	9	3	28	73	23	5	19	-	19	*		296	52930
I	Transylvania	3820077	2500993	715680	159720	603	7520	336			127					840	411							3329	428425
1	Bacău	601387	502150	4561	14578	28	61	40	23	6	4	*	3	*	30	117	31	*	7	*	40	9		335	79358
2	Botoşani	392821	349889	28	4606	1587	17	21	587	*	5	*	-	*	12	61	32	-	7	3	75	4		82	35802
3	Galaţi	496892	413494	90	15366	52	50	60	113	*	4	-	8	-	94	75	33	3	*	-	23	5	3	151	67261
4	Iaşi	760774	613615	98	9964	145	83	84	1495	5	8	-	13	*	72	173	133	5	15	-	37	13	14	593	134207
5	Neamţ	454203	391640	138	5761	46	46	31	136	*	5	4	3	*	31	119	29	*	7	*	54	*		116	56028
6	Suceava	642551	549813	91	13568	7916	475	28	1265	4	7	-	*	*	14	62	36	-	1667	182	35	11	*	168	67205
7	Vaslui	374700	317508	28	5267	12	9	7	30		-	-	*	3	-	5	39	13	*	*	-	*	3	*	58	51711
8	Vrancea	335312	289516	51	13723	11	9	21	4	*	-	*	*	-	5	64	9	-	4	-	3	4	-	76	31809
II	Moldavia	4058640	3427625	5085	82833	9797	750	292	3653						263	710	316							1579	523381
1	Constanţa	655997	504344	313	6593	133	122	16121	4084	16918	20	4	72	3	232	117	37	*	15	*	189	28	52	1559	105039
2	Tulcea	193355	153094	51	3963	900	65	993	8010	106	*	*	34	*	266	65	8	-	*	-	25	4	6	567	25192
III	Dobrudja	849352	657438	364	10556	1033	187	17114	12094	17024			106		498	182	45				214	32	58	2126	130231
1	Argeş	569932	497410	102	17056	26	50	65	26	8	8	*	4	*	30	82	5	3	3	*	29	12	-	195	54814
2	Brăila	281452	239436	47	7435	22	18	143	1759	4	-	*	10	*	97	34	31	*	*	*	3	5	-	154	32248

No. crt.	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
No. crt.	Counties and geographical – historical provinces	Total table population	Romanians	Hungarians	Gypsies	Ukrainians	Germans	Turks	Russians - Lipovans	Tartars	Serbians	Slovaks	Bulgarians	Croats	Greeks	Italians	Jews	Czechs	Polish	Ruthenians	Armenians	Albanians	Macedonians	Other nationality	Unavailable information
3	Buzău	404979	346825	55	17747	17	13	37	14	-	*	*	7	*	10	41	10	*	3	*	*	5	-	121	40067
4	Călăraşi	283458	236433	29	17546	9	12	237	13	128	-	*	16	*	3	22	*	*	5	-	*	*	4	124	28868
5	Dâmboviţa	479404	417521	75	18981	20	35	54	20	*	465	4	1487	-	15	63	10	3	7	*	11	5	*	280	40341
6	Giurgiu	262066	223571	35	11964	8	16	62	9	10	6	-	8	-	7	21	4	3	*	-	12	9	*	259	26060
7	Ialomiţa	250816	204890	35	16063	10	5	70	207	8	3	-	5	*	8	24	*	-	*	-	3	4	*	230	29244
8	Ilfov	542704	431627	397	9186	93	167	690	191	122	26	8	92	*	133	148	94	10	25	*	43	14	14	2169	97444
9	Prahova	695119	605242	214	14024	36	96	158	38	13	7	9	13	-	74	96	23	6	10	-	6	8	*	313	74731
10	Teleorman	323544	282613	22	9457	6	9	15	6	*	*	*	32	-	5	11	3	-	*	*	*	-	-	109	31248
IV	**Muntenia**	**4093474**	**3485568**	**1011**	**139459**	**247**	**421**	**1531**	**2283**				**1674**		**382**	**542**								**3954**	**455065**
1	Dolj	599442	494409	87	29918	25	46	34	13	3	22	3	27	*	34	119	15	3	5	*	11	69	723	281	73592
2	Gorj	314685	280980	114	5883	26	21	12	9	-	7	4	*	*	9	43	*	*	*	-	3	158	4	45	27362
3	Mehedinţi	234339	191250	54	12768	8	53	13	4	-	727	4	7	4	11	26	4	303	*	-	*	-	*	50	29050
4	Olt	383280	338684	39	9812	11	12	35	5	4	9	*	7	*	3	47	3	-	*	-	-	10	11	47	34537
5	Vâlcea	341861	302696	78	8234	16	39	37	9	7	8	-	*	-	7	40	4	*	3	*	-	3	-	68	30607
V	**Oltenia**	**1873607**	**1608019**	**372**	**66615**	**86**	**171**	**131**	**40**		**773**				**64**	**275**								**491**	**195148**
1	Arad	410143	317713	25731	16747	941	2000	66	27	*	510	3310	510	7	16	353	60	94	20	148	*	46	5	534	41301
2	Caraş-Severin	246588	195703	1424	5311	1502	1364	6	11	-	3408	65	17	4567	5	25	21	909	6	*	-	10	37	82	32114
3	Timiş	650533	484243	21285	12438	4131	4684	78	82	14	6447	939	3244	179	42	358	144	141	32	26	16	29	100	1002	110879
VI	**Banat**	**1307264**	**997659**	**48440**	**34496**	**6574**	**8048**	**150**	**120**		**10365**	**4314**	**3771**	**4753**	**63**	**736**	**225**	**1144**	**58**			**85**	**142**	**1618**	**184294**
1	Bihor	551297	347148	112387	36837	89	529	29	25	*	25	4860	15	*	40	180	135	13	25	5	3	49	4	464	48428
VII	**Crişana**	**551297**	**347148**	**112387**	**36837**	**89**	**529**	**29**	**25**	*	**25**	**4860**	**15**	*	**40**	**180**	**135**	**13**	**25**	**5**	**3**	**49**	**4**	**464**	**48428**
1	Maramureş	452475	342052	23153	11881	25690	548	13	17	-	13	14	*	*	10	96	52	*	10	333	47	5	-	156	48380
2	Satu Mare	330668	182750	93491	16340	1361	3722	7	8	-	4	61	*	3	*	45	77	-	3	*	*	*	-	90	32698
VIII	**Maramureş**	**783143**	**524802**	**116644**	**28221**	**27051**	**4270**	**20**	**25**		**17**	**75**			**141**	**129**		**13**						**246**	**81078**
IX	**Bucharest City**	1716961	1252190	2168	10740	355	1011	1342	844	719	147	41	239	*	553	433	906	22	123	*	390	56	80	5703	438876
	ROMANIA	**19053815**	**14801442**	**1002151**	**569477**	**45835**	**22907**	**20945**	**19394**	**18156**	**12026**	**10232**	**5975**	**4842**	**2086**	**4039**	**2378**	**1576**	**2137**	**834**	**1213**	**645**	**1089**	**19510**	**2484926**

Source: National Statistics Institute, Table 2.02.1- Stable population by nationality – counties, cities, towns and rural municipalities.

* Very small numbers (lower than 3).

(-) Meaning they are not present.
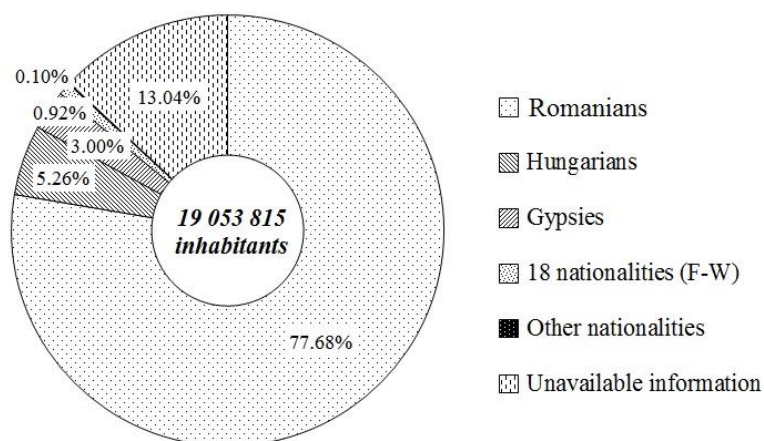
Fig. 1. The ethnic structure of Romania at the 2021 Census.

2. STRUCTURE AND TERRITORIAL DISTRIBUTION OF ETHNIC GROUPS IN ROMANIA

To simplify the analysis of the 21 nationalities, as well as other registered categories, taking into account the nomenclature, three main ethnic groups were put forward: *Romanian* (Romanian, Aromanian, Cic, Istro-Romanian, Macedonian-Romanian, Megleno-Romanian, Vlach), *Hungarian* (Hungarian and Szekler) and *Roma* (Roma, Argintar, Băieş, Bidinar, Boldean, Căldărar, Fierar, Gabor, Gembaş, Lăutar, Rudar, Spoitor, Ursar and Vătraş), followed by the category of other ethnic groups, which includes 18 minorities: *Ukrainians* (Ukrainian, Hahol, Hutsul, Hutan, Zaporozhian Cossack), Germans (German, Landler, Neamţ, Saxon, Swabian, Şipţăr), *Turks, Russian-Lipovans* (Russian-Lipovan, Russian, Lipovan, Russian Starover), *Tatars, Serbs, Slovaks, Bulgarians, Croats, Greeks* (Greek, Hellenic, Greek Cypriot), *Italians, Jews, Czechs, Poles, Ruthenians* (Ruthenian, Rusyn), *Armenians, Albanians* (Albanian, Shqiptar) and *Macedonians*, respectively *Other ethnicities* (Csangos, Gagauz, Chinese and other ethnicities from EU states or non-EU states) and *Unavailable information* which includes the population whose ethnicity was not declared.

2. 1. The Romanian ethnicity

Archaeological remains, historical documents and 20th century censuses clearly show the presence and continuity of the Romanian population throughout the Carpathian-Danubian-Pontic space (Nimigeanu, 1996, p. 92). Following the evolution of the Romanian ethnicity at national level, starting from the first

general census, carried out on December 29, 1930, and until the one of December 1, 2021, we distinguish two distinct stages: one of growth (1930-2002), from 77.85% to 89.48%, and one of decline (2011-2021), from 83.45% to 77.68%.

Naturally, this ethnic group forms the densest and most compact layer of the total population (Erdeli & Cucu, 2005, p. 143), being homogeneously spread across all geographical regions of Romania, without a Romanian ethnic vacuum (Ilinca 1999, p. 79), the unitary and balanced character also being preserved in residential environments (50.47% in urban areas and 49.53% in rural areas). The only exceptions are Covasna and Harghita counties, where in 2021 there were shares of 21.37% (42,752 Romanians out of the total of 200,042 inhabitants of Covasna County), and 11.52% (33,634 Romanians out of the 291,950 inhabitants of Harghita County), attributed to the presence of the Hungarian population (Tofan, 2015, p. 22).

The drastic decrease of the Romanian ethnic group by 1,991,426 people is primarily due to the sharp geodemographic decline in the last decade, when the natural increase rate recorded a historical maximum of -6.3‰ in 2021, corroborated with external migration, which in the same reference year shows that 5,705,942 people had their residence or domicile abroad. Another cause can be attributed to the inadequate methodology in the census of the stable population, because without exaggeration we consider that over 90% of the population category included in the *Unavailable information* column is of Romanian ethnicity.

At the level of geographical-historical provinces, the highest relative (percentage) value appears in Oltenia (85.82%), and the lowest in Crișana (62.97%), the rest of the provinces registering the following frequencies: Muntenia (85.15%), Moldavia (84.45%), Dobrudja (77.40%), Banat (76.32%), Maramureș (67.01%) and Transylvania (65.47%).

At administrative-territorial level, the percentage of Romanians within the 41 counties and the Municipality of Bucharest varies significantly, the highest share being specific to Gorj County (89.29% of the total of 314,685 inhabitants of the county), and the lowest in Harghita County (11.52% of 291,950 inhabitants). In 26 of the counties, Romanians hold an almost absolute majority, with values *over 80%*, among which four counties in Transylvania stand out: Sibiu (80.63%), Alba (82.45%), Hunedoara (83.22%) and Bistrița-Năsăud (83.77%), followed by all the eight counties in Moldavia: Iași (80.66%), Galați (83.22%), Bacău (83.50%), Vaslui (84.74%), Suceava (85.57%), Neamț (86.23%), Vrancea (86.34%) and Botoșani (89.07%); Muntenia with nine of the ten counties: Ialomița (81.69%), Călărași (83.41%), Brăila (85.07%), Giurgiu (85.31%), Buzău (85.64%), Prahova (87.07%), Dâmbovița (87.09%), Argeș (87.28%) and Teleorman (87.35%); Oltenia with all five counties: Mehedinți (81.61%), Dolj (82.48%), Olt (88.36%), Vâlcea (88.54%) and Gorj (89.29%).

Table 2. The General Ethnic Structure of Romania, at the 2011 and 2021 Censuses

No. crt.	Ethnicity	2011	%	2021	%
	Total resident population	**20,121,641**	*100.00*	**19,053,815**	*100.00*
1	Romanian	16,792,868	*83.45*	14,801,442	*77.68*
2	Hungarian	1,227,623	*6.10*	1,002,151	*5.26*
3	Gypsy (Roma)	621,573	*3.09*	569,477	*3.00*
4	Ukrainian	50,920	*0.25*	45,835	*0.24*
5	German	36,042	*0.18*	22,907	*0.12*
6	Turkish	27,698	*0.14*	20,945	*0.10*
7	Russian-Lipovan	23,487	*0.12*	19,394	*0.10*
8	Tatar	20,282	*0.10*	18,156	*0.09*
9	Serbian	18,076	*0.09*	12,026	*0.06*
10	Slovak	13,654	*0.07*	10,232	*0.05*
11	Bulgarian	7,336	*0.04*	5,975	*0.03*
12	Croat	5,408	*0.03*	4,842	*0.02*
13	Greek	3,668	*0.02*	2,086	*0.01*
14	Italian	3,203	*0.02*	4,039	*0.02*
15	Jewish	3,271	*0.02*	2,378	*0.01*
16	Czech	2,477	*0.01*	1,576	*0.00*
17	Polish	2,543	*0.01*	2,137	*0.01*
18	Chinese	2,017	*0.01*	-[3]	-
19	Ruthenian	-[4]	-	834	*0.00*
20	Armenian	1,361	*0.01*	1,213	*0.00*
21	Csango	1,536	*0.01*	-[5]	-
22	Albanian	-[6]	-	645	*0.00*
23	Macedonian	1,264	*0.01*	1,089	*0.00*
24	Other	18,524	*0.09*	19,510	*0.10*
25	Unavailable information	1,236,810	*6.15*	2,484,926	*13.04*

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[3] Included in *Other ethnicities*.

[4] Included in Ukrainian ethnicity.

[5] Included in *Other ethnicities*.

[6] Included in *Other ethnicities*.
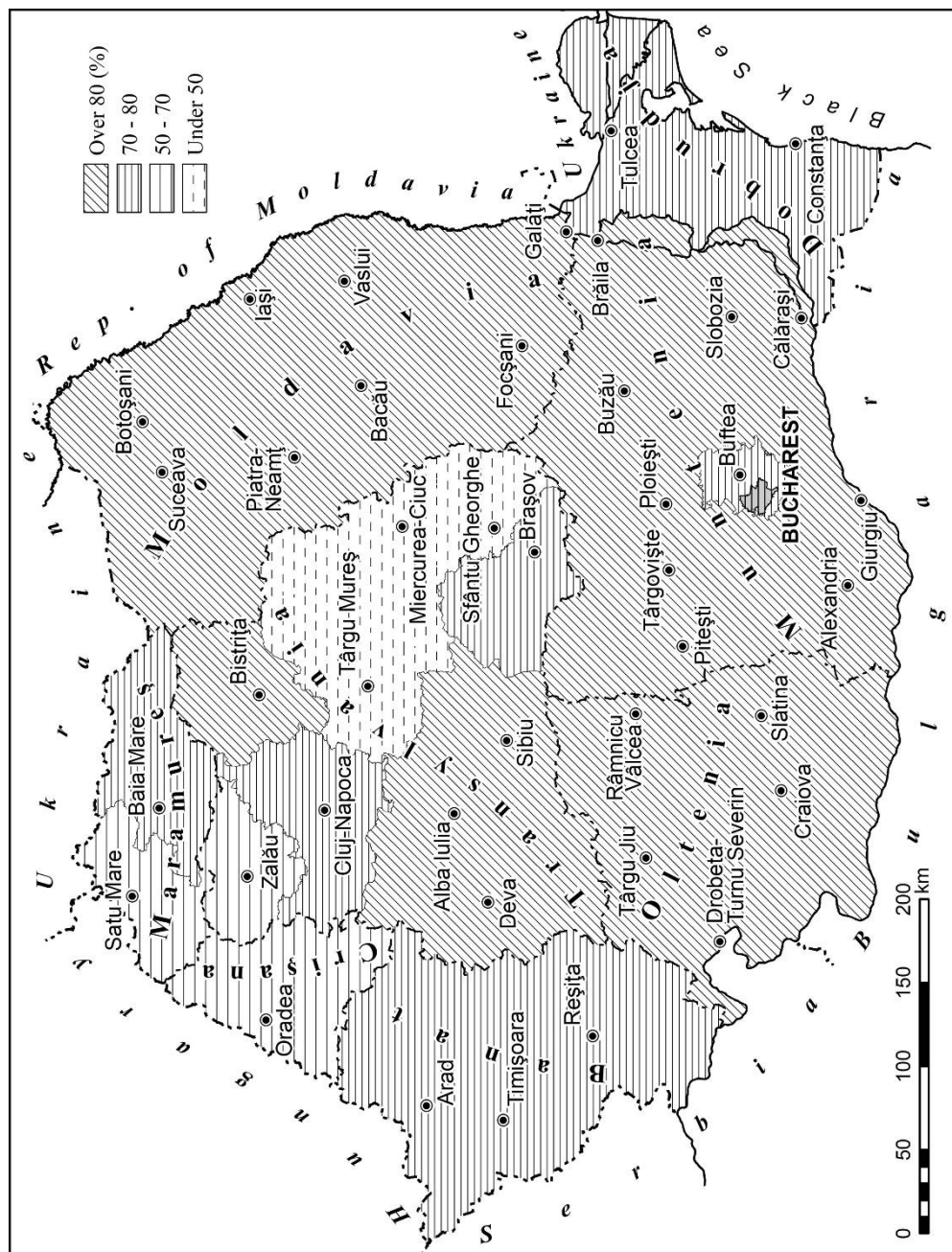
Fig. 2. The territorial distribution of Romanians at the 2021 Census.

Nine other counties have shares between *70-80%* (Cluj, 71.89%; Timiş, 74.44%; Maramureş, 75.60%; Braşov, 76.23%; Constanţa, 76.88%; Arad, 77.46%; Tulcea, 79.18%; Caraş-Severin, 79.36% and Ilfov, 79.53%), as well as Bucharest City with 72.93%.

The *50-70%* interval is solely present in three counties (Satu Mare, 55.27%; Bihor, 62.97% and Sălaj, 64.34%), and the one below 50% appears in the remaining three counties (Mureş, 48.71%; Covasna, 21.37% and Harghita, 11.52%).

2. 2. The Hungarian ethnicity

It is the most representative national minority in Romania, which gradually entered, starting with the 11th – 13th centuries, when Hungarian kings desired to expand their territory in Transylvania (Pop, 1991, p. 7; Pop, 2004, p. 18), and to defend the eastern border against the Cumans and Tatars. They brought Szekler colonists, whom they completely assimilated (Cocean *et al.,* 2013, p. 128), settling them in the eastern part of Transylvania, in the inner mountain basins of Giurgeu, Ciuc, and Braşov (Giurescu & Giurescu, 1974, p. 197).

In order to create a bridge connecting the enclave in the "heart of the Carpathians", the Hungarian state favored the further penetration of the Hungarian population, first in the Western Plain, where it occupied the most fertile lands in the valleys of Mureş, Crişul Repede, Barcău, Crasna and Someş rivers (Bodocan, 2001, p. 29; Pop & Niţă, 2015, p. 55), and from there further East towards the Someşan Plateau and the adjacent area (Zalău, Cluj, Turda, Aiud), part of the Hungarian population being drawn in modern times by the coal, ferrous and non-ferrous metal mining in Maramureş and Hunedoara, as well as by logging operations in the Trotuş and Siret basins, where small colonies of Csangos were established (Geography of Romania, 1982, p. 89).

At the 2021 Census, 1,002,151 Hungarians were registered, corresponding to a weight of 5.26% of the total population of Romania. Regarding the numerical evolution of this ethnic group during the period 1930-2021, in terms of absolute values, we note an increase from 1,423,459 inhabitants in 1930 to 1,713,928 inhabitants in 1977, attributed to the economic recovery after the two world wars, and then it entered a continuous downward trend, following emigration to Hungary, reaching 1,002,151 people in 2021, who live together in normal relations alongside Romanians, 46.89% in urban areas and 53.11% in rural areas.
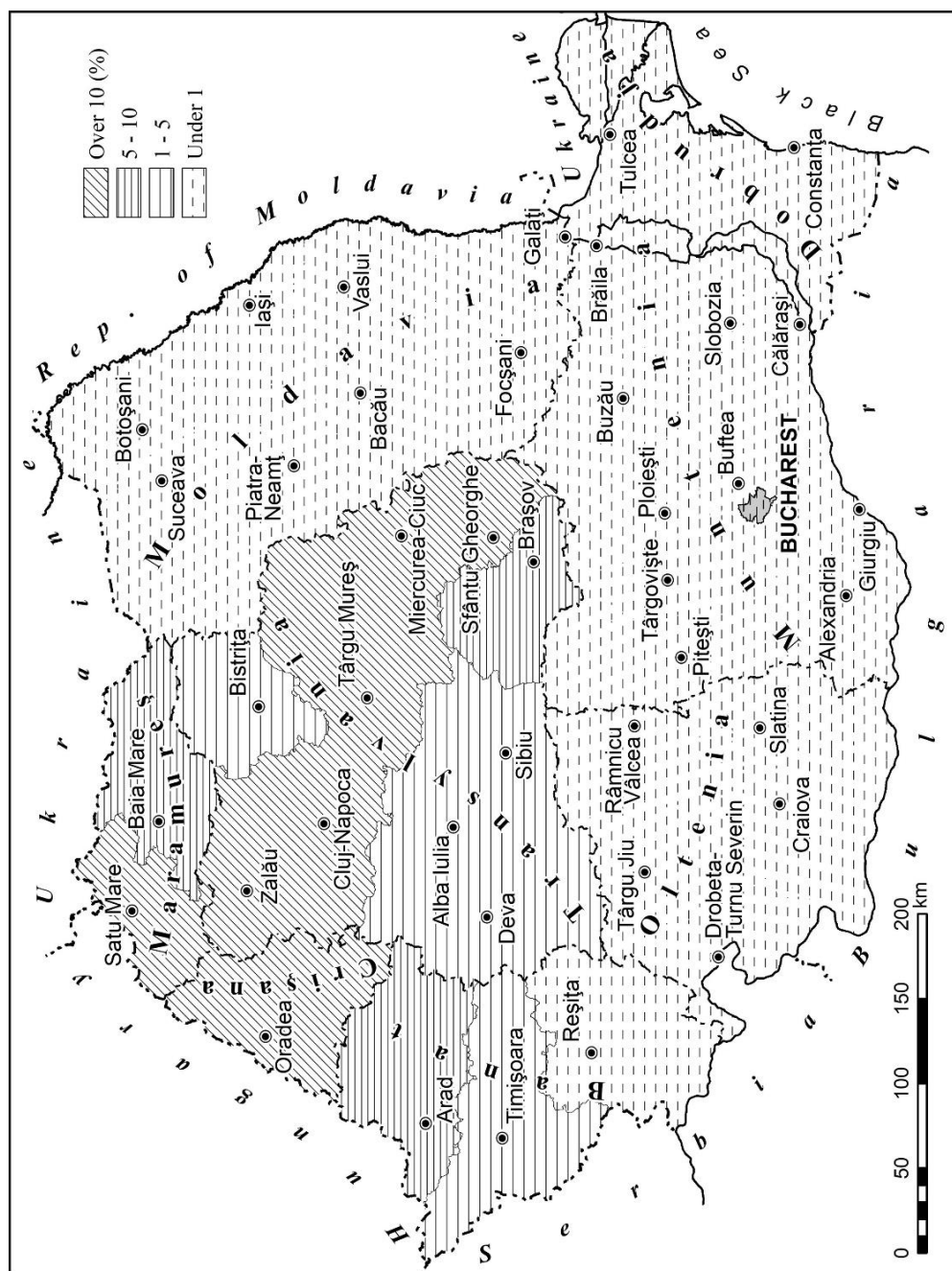
Fig. 3. The territorial distribution of Hungarians at the 2021 Census.

In terms of relative values, for the same reference period, there is a gradual decrease in the frequency of Hungarians on the territory of Romania, from 9.97% in 1930 to 5.26% in 2021, as a result of the action of several factors (low natural growth, high mortality and emigration, degradation of living conditions amid economic, social and political crises, etc.), which determined a different evolution, primarily within the Romanian population, but also among the other cohabiting ethnic groups (Ilieş, 1998, p. 58-61).

At the level of geographical-historical provinces, the presence of the Hungarian ethnic group records the highest weight in Crişana (20.40%, 112,387 Hungarians), Transylvania (18.70%, 715,680), and Maramureş (14.90%, 116,644), dropping significantly to 3.71% in Banat (48,440), concentrated especially around the large cities (Timişoara, Arad, and Lugoj), while in the southern regions (Oltenia, 0.02% and 372 Hungarians; Muntenia, 0.02% and 1,011), southeastern (Dobrudja, 0.04% and 364) and eastern (Moldavia, 0.13%, 5,085), their share is insignificant.

Following the situation of the distribution of Hungarians by county and in the City of Bucharest, we distinguish four ranges:

- *below 1%*, registered in 26 of the counties of Romania (Bacău, Botoşani, Galaţi, Iaşi, Neamţ, Suceava, Vaslui, Vrancea, Constanţa, Tulcea, Argeş, Brăila, Buzău, Călăraşi, Dâmboviţa, Giurgiu, Ialomiţa, Ilfov, Prahova, Teleorman, Dolj, Gorj, Mehedinţi, Olt, Vâlcea and Caraş-Severin) and in the City of Bucharest;

- *1-5%*, included in five of the administrative-territorial units: Sibiu (1.57%), Hunedoara (2.54%), Timiş (3.27%), Alba (3.53%), and Bistriţa-Năsăud (3.73%);

Braşov (5.16%) and Arad (6.27%), and the upper range of *over 10%* includes the remaining seven counties, where there was a massive colonization of Hungarian population: Cluj (11.60%), Sălaj (19.10%), Bihor (20.40%), Satu Mare (28.30%), as well as Mureş (31.80%), Covasna (66.70%), and Harghita (79.50%), where this minority forms an ethnically heterogeneous area (Tofan, 2014a, p. 87; Tofan, 2014b, p. 16). In communes such as Atit, Căpâlniţa, Lueta, Ocland, Porumbeni, Racu, Sântimbru, Satu Mare and Vârşag, the number of those who declared themselves of Romanian ethnicity was below the threshold of 10 people.

2. 3. The Gypsy (Roma) ethnicity

It is the third largest ethnic group (3.00% and 569,477 people), characterized by a high degree of dispersion, especially in the plains, hills and plateaus, and less so in the mountainous areas, with harsh climate and difficult

living conditions. As a whole, they had an oscillating evolution from one census to another (Pop & Rusu, 2014, p. 15), as a result of nomadism and an inconsistent way of self-identification (Vert, 2001, p. 107), which derives from the lack of integration into society and the lack of education, so that some of them declared themselves either Romanians or Hungarians, depending on the majority ethnicity they live with, and others were not censused (Rotariu et al., 2017, p. 87). Thus, Roma representatives have repeatedly contested the official census results, on the grounds that dozens of communities were intentionally omitted from the census, because according to their unofficial statistics, the real number would be closer to about 3,000,000 people, taking into account the phenomenon of oversizing family nuclei, which can be easily noticed in society.

Table 3. The General Ethnic Structure at Geographic-Historical Provinces level at the 2021 Census

Geographical-Historical Provinces	Romanian	Hungarian	Gypsy (Roma)	Other Nationalities	Unavialable information
Transylvania	65.47	18.70	4.18	0.40	11.22
Moldavia	84.45	0.13	2.04	0.49	12.90
Dobrudja	77.40	0.04	1.24	5.98	15.33
Muntenia	85.15	0.02	3.41	0.30	11.12
Oltenia	85.82	0.02	3.56	0.18	10.42
Banat	76.32	3.71	2.64	3.24	14.10
Crişana	62.97	20.40	6.68	1.18	8.78
Maramureş	67.01	14.90	3.60	4.14	10.35

Those from rural areas are the ones that predominate (67.78%, 386,038 people), however, regarding the spatial distribution of this ethnic group at the level of the eight geographical-historical provinces, the highest share was found in the region of Crişana, where they have 6.68% (36,837 people out of the total population of 551,297 inhabitants in Bihor County), and the lowest in Dobrudja (1.24%, 10,556 people out of the 849,352 of the province). In the remaining provinces, the situation is as follows: Moldavia (2.04% and 82,833 Roma), Banat (2.64% and 34,496), Muntenia (3.41% and 139,459), Oltenia (3.56% and 66,615), Maramureş (3.60% and 28,221) and Transylvania (4.18% and 159,720).
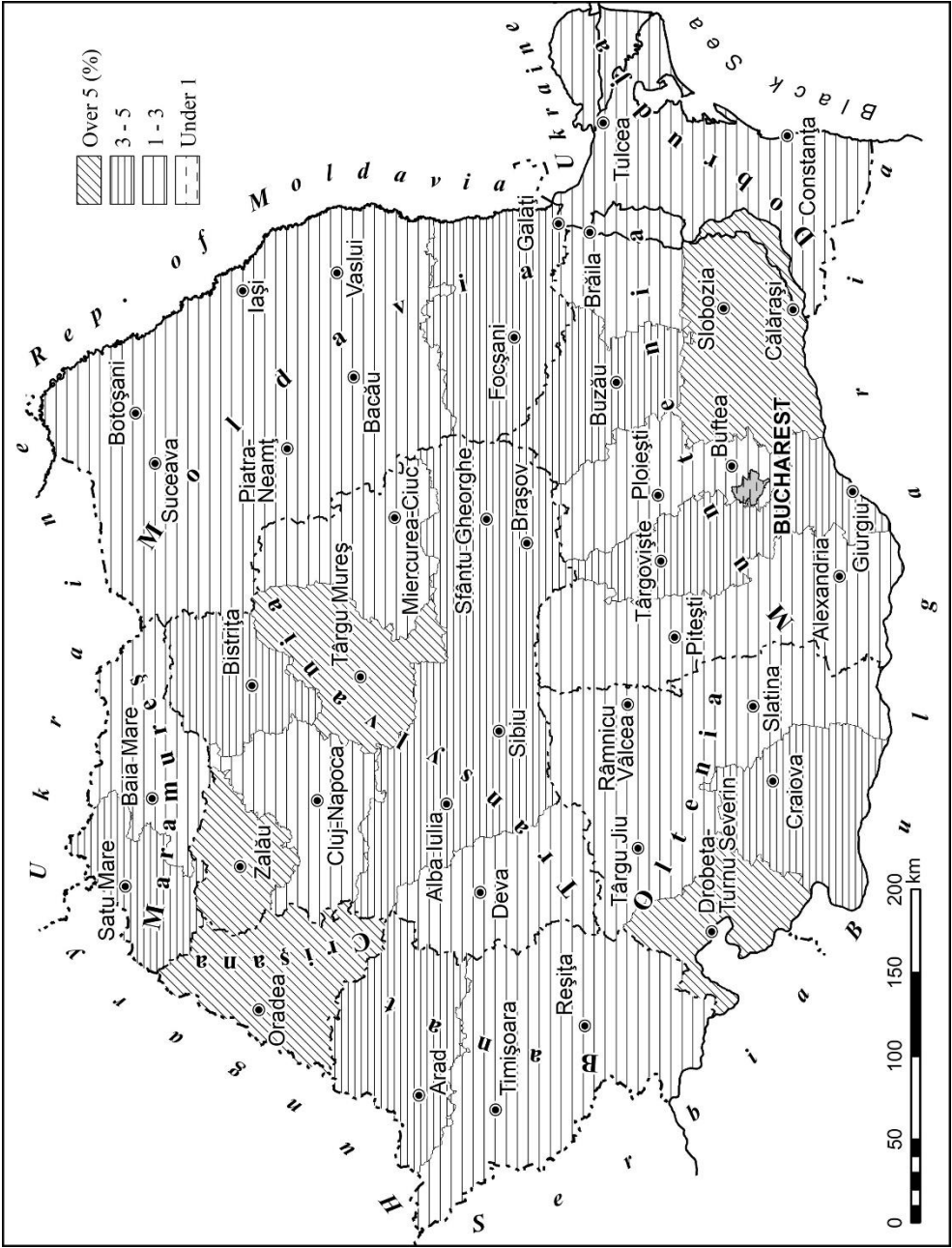
Fig. 4. The territorial distribution of Gypsies (Roma) at the 2021 Census.

Analysing the presence of this ethnic group at the administrative-territorial level, in the 41 counties and in the City of Bucharest, four classes may be established in terms of weight:

- *below 1%*, in which only the City of Bucharest is included (0.63% and 10,740 Roma out of the total of 1,716,961 inhabitants of the capital);

- *1-3%* in 22 counties of Romania, three in Transylvania (Hunedoara, Harghita, and Cluj), six in Moldavia (Botoşani, Neamţ, Iaşi, Vaslui, Suceava, and Bacău), the two counties of Dobrudja (Constanţa and Tulcea), five in Muntenia (Ilfov, Prahova, Brăila, Teleorman, and Argeş), three in Oltenia (Gorj, Vâlcea, and Olt), two in Banat (Timiş and Caraş-Severin) and one in Maramureş (Maramureş);

- the interval between *3-5%* includes 13 counties, located in the central and northwestern part of Romania (Sibiu, Bistriţa-Năsăud, Alba, Braşov, Covasna, Satu Mare), as well as in the eastern part (Galaţi and Vrancea), southeastern part (Dâmboviţa, Buzău and Giurgiu), southern (Dolj) and western (Arad) parts;

- the upper class of *over 5%* is present in the remaining six counties (Mehedinţi, 5.45%; Călăraşi, 6.19%; Ialomiţa, 6.40%; Bihor, 6.68%; Sălaj, 7.87%, and Mureş, 8.66%).
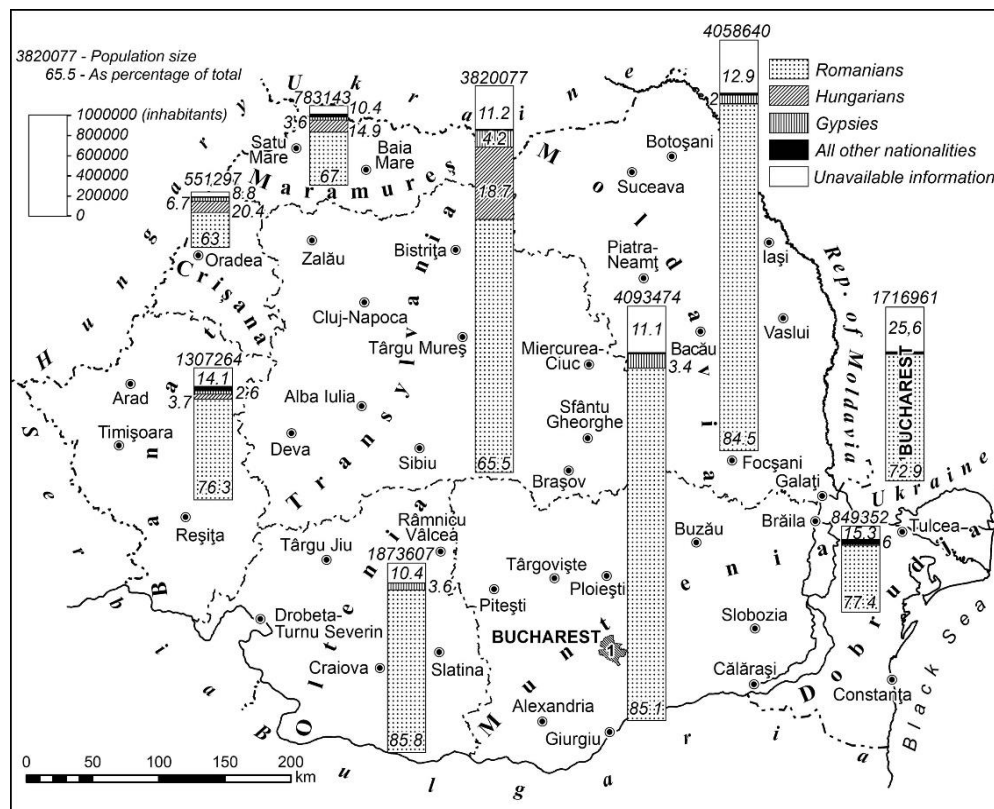
2. 4. The category of other minorities

The 2021 Census data also includes 18 other ethnic minority groups (between positions F-W), representing 0.92% (176,309 people) of the total population of Romania. These are: Ukrainians, Germans, Turks, Russian-Lipovans, Tatars, Serbs, Slovaks, Bulgarians, Croats, Greeks, Italians, Jews, Czechs, Poles, Ruthenians, Armenians, Albanians, and Macedonians. The category *Other minorities* with 0.10% (19,510 people) is mainly made up by Asians (Chinese, Nepalese, Pakistanis, Philipinos, Indians, Sri Lankans, etc.), who came to Romania to work in construction, HoReCa, and more recently in transportation.

a) The Ukrainian ethnic group have settled the northern part of Romania ever since the 13th century, originating from Galicia and Ukraine and mostly occupying territories located in and around the mountain areas and along valleys. Like the previous three ethnic groups, it is characterized by a downward trend, from 0.25% (50,920) in 2011, to 0.24% (45,835), with the mention that 90% live in rural areas (41,361 people). The geographical-historical provinces that have the largest number of Ukrainians are Maramureş (27,051 people), Moldavia (9,797), and Banat (6,574), after which the values are constantly decreasing, namely: Dobrudja (1,033), Transylvania (603), Muntenia (247), Crişana (89) and Oltenia (86).

Categorised according to their numbers, we have the following situation: 25 of the counties have under 50 Ukrainians, with seven counties in Transylvania (Covasna, Harghita, Alba, Sălaj, Bistriţa-Năsăud, Mureş, and Hunedoara); Moldavia with four counties (Vrancea, Vaslui, Bacău, and Neamţ); Muntenia with nine counties (Teleorman 6 people, the lowest absolute value, then Giurgiu, Călăraşi, Ialomiţa, Buzău, Dâmboviţa, Brăila, Argeş, and Prahova), and Oltenia entirely with the five counties (Mehedinţi, Olt, Vâlcea, Dolj, and Gorj).

A number of eight counties fall within the *50-300 Ukrainians* interval (Sibiu, Galaţi, Ilfov, Bihor, Braşov, Cluj, Iaşi, Constanţa), while over 300 are present in the City of Bucharest (355 Ukrainians), as well as in the counties of Tulcea (900), Arad (941), Satu Mare (1,361), Caraş-Severin (1,502), Botoşani (1,587), Timiş (4,131), Suceava (7,916), and Maramureş (25,690), concentrated especially on the territory of several communes in the Vişeu basin (Bistra, Leordina, Petrova, Poienile de sub Munte, Repedea, and Ruscova).

Fig. 5. The national structure of the population of Romania, by geographical-historical provinces, at the 2021 Census.

b) Germans were also colonized on the present territory of Romania by the Hungarian medieval kingdom, in two stages: the first, corresponding to the 12th – 13th centuries, in which Saxons were brought from Saxony, Flanders, the Moselle region, and Luxembourg, being settled in the South and East of Transylvania, as an avant-garde at the Carpathian passes (Bran, Predeal, Turnu Roșu, Deda-Toplița and Tihuța), and the second (in the 18th – 19th centuries), when massive colonizations of Swabians from the south-west of Germany (Baden, Alsace, Swabia), as well as Austria, took place in Banat, Crișana and Maramureș, leading to economic development through activities such as trade, mining, logging and agriculture (Pop, 1986, p. 46).

After 1990, this ethnic group was significantly reduced, when a significant number of people emigrated to Germany (Crețan, 2006, p. 81), the phenomenon continuing today, the share of Germans decreasing from 0.18% in 2011 (36,042 Germans) to 0.12% (22,907 people, of which 14,870 in urban areas and 8,037 in rural areas). In 2021, Germans are fifth among the 21 existing ethnicities. The highest concentration occurs in the areas where they settled, namely in Banat (8,048), Transylvania (7,520) and Maramureș (4,270), while the number in the other provinces is significantly reduced, the situation being as follows: Moldavia (750), Crișana (529), Muntenia (421), Dobrudja (187) and Oltenia (171).

At the county level, it is noted that the highest number of Germans is registered in Timiș (4,684 Swabians), and the lowest in Ialomița (5). In general, a number of 17 counties are below the threshold of *under 50* Germans, including one county in Transylvania (Sălaj), four counties in Moldavia (Vaslui, Vrancea, Botoșani, and Neamț), one in Dobrudja (Tulcea), seven in Muntenia (Ialomița, Teleorman, Călărași, Buzău, Giurgiu, Brăila, and Dâmbovița), and four in Oltenia (Olt, Gorj, Vâlcea, and Dolj); another 11 counties fall within the *50-300 range* (Bistrița-Năsăud, Covasna, Harghita, Bacău, Galați, Iași, Constanța, Argeș, Ilfov, Prahova, and Mehedinți); Suceava (475) and Hunedoara (500) counties have between *300-500* ethnic Germans, and the higher class of *over 500* is found in the remaining 11 counties, namely: Bihor (529), Alba (544), Maramureș (548), Cluj (567), Mureș (904), Caraș-Severin (1,364), Brașov (1,853), Arad (2,000), Sibiu (2,716), Satu Mare (3,722) and Timiș (4,684), as well as Bucharest City, with 1,011 Germans (0.05% of the 1,716,961 inhabitants).

c) The Turkish ethnicity is also included in the downward evolution curve from 27,698 Turks (0.14%) in 2011, to 20,945 (0.10%) in 2021, most of them being located in urban areas (12,424 people). In terms of territorial distribution, more than 75% live in Dobrudja, especially in Constanța County (16,121 people), where they have settled since the 15th century.

In the class of *under 50* people, 25 counties are included, then another 10 administrative-territorial units have values between *50 and 100*, while between *100 and 300* there are only three counties (Brăila, Călărași, and Prahova). The category of *over 300* Turks includes Ilfov (690), Tulcea (993), and Constanța (16,121), as well as the City of Bucharest, with 1,342 Turks, who carry out activities in the fields of trade and the food industry.

d) The Russian-Lipovan ethnic group, originating from Russia, from the lower course of the Don, came to Romania as a result of political-religious persecutions during the Russian Empire (Erdeli & Cucu, 2005, p. 155). Currently, they have a weight of 0.10% (19,394 people, of which 7,873 in urban areas and 11,521 in rural areas), presenting a particular concentration in the geographical-historical province of Dobrudja (12,094 people), where Tulcea County stands out with 8,010 people (the highest value), while their number decreases in Moldavia (3,653), Muntenia (2,283), Banat (120), Oltenia (40), and Crișana (25), while in Transylvania the numbers of this ethnic group cannot be precisely established, because in Bistrița-Năsăud and Sălaj it appears marked with an asterisk (*), which means that it is a confidential value, i.e. the number of people is probably less than 3.

The class of *under 50* Russian-Lipovans includes 26 counties, of which six are in Transylvania (Covasna, Harghita, Alba, Hunedoara, Mureș, and Sibiu), three in Moldavia (Vrancea, Bacău, and Vaslui), seven in Muntenia (Teleorman, Giurgiu, Călărași, Buzău, Dâmbovița, Argeș, and Prahova), five in Oltenia (Mehedinți, Olt, Gorj, Vâlcea, and Dolj), two in Banat (Caraș-Severin and Arad), two in Maramureș (Satu Mare and Maramureș) and one in Crișana (Bihor). Seven counties are in the class of *50-300* Russian-Lipovans (Cluj, Timiș, Brașov, Galați, Neamț, Ilfov, and Ialomița) and *over 300* in the remaining six counties, namely: Botoșani (587), Suceava (1,265), Iași (1,495), Brăila (1,759), Constanța (4,084) and Tulcea (8,010), as well as the City of Bucharest with 844 Russian-Lipovans.

e) The Tatar ethnic group has a weight of only 0.09% (18,156 Tatars), being present alongside Turks and Russian-Lipovans also in Dobrudja (17,024 people). In the case of 13 counties it appears marked in the census with an asterisk (*), and in Bistrița-Năsăud, Vaslui, Buzău, Gorj, Mehedinți, Caraș-Severin, Maramureș, and Satu Mare it appears marked with a hyphen (-), meaning they are not present. We distinguish two thresholds: one of *under 50* people, which includes 16 counties (Dolj, Olt, Sibiu, Brăila, Suceava, Iași, Bacău, Vâlcea, Argeș, Ialomița, Mureș, Giurgiu, Prahova, Timiș, Brașov, and Cluj) and another of *over 50* Tatars, registered in Tulcea (106), Ilfov (122), Călărași (128) and Constanța (16,918), as well as in the City of Bucharest, with 719 Tatars.
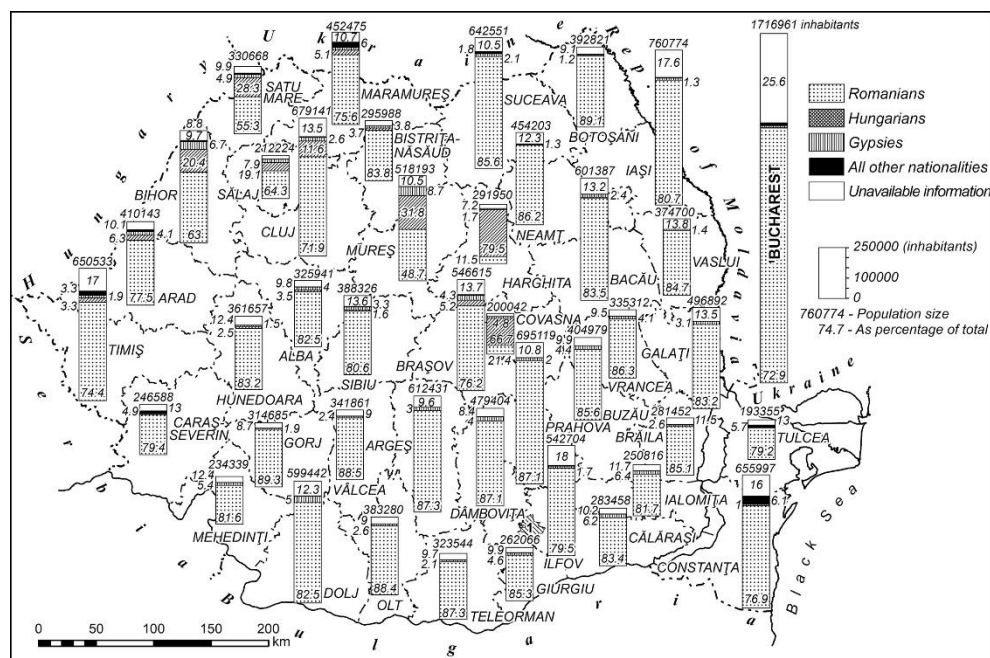
Fig. 6. The national structure of the population of Romania, by counties,
at the 2021 Census.

f) The Serbian ethnic group, who settled mainly due to Ottoman, Austrian and Hungarian persecutions, is represented by 12,026 Serbs (0.06% of the total population of Romania), of which 5,473 people are in urban areas and 6,553 in rural areas. The area with the highest concentration is in the western and southwestern parts of the country, due to its proximity to Serbia. At the provincial level, the province of Banat stands out (10,365 Serbs), followed at a great distance by Oltenia (773), Transylvania (127), Moldavia (33), Crișana (25) and Maramureș (17), while in Dobrudja and Muntenia their exact numbers cannot be established, because the situation of confidentiality arises (*, usually less than 3 people).

At the county level, the following hierarchy appears: *under 50* Serbs, in 29 counties, of which 10 in Transylvania, six in Moldavia, one in Dobrudja, five in Muntenia, four in Oltenia, Bihor in Crișana, and two in Maramureș; *over 50* people in the counties of Dâmbovița (465), Arad (510), Mehedinți (727), Caraș-Severin (3,408) and Timiș (6,447), with 147 Serbs registered in the City of Bucharest. In the counties of Tulcea, Buzău and Teleorman, they appear marked in the census with an asterisk (*), and in Vaslui, Vrancea, Brăila and Călărași there are none (-).

g) *The Slovak ethnic group*, numbering 10,232 people, or 0.05% of the inhabitants of Romania, are distributed almost entirely in the western part of the country (Gubani, 2016, p. 450), with 4,755 people in cities and towns and 5,477 people in communes.

At the level of geographical-historical provinces, the order is as follows: Crişana (4,860 Slovaks), Banat (4,314) and Maramureş (75), while in Transylvania, Moldavia, Dobrudja, Muntenia and Oltenia the situation cannot be precisely established due to confidentiality. Therefore, the representation values are modest also at the county level, where two thresholds are drawn: that of *under 50* Slovaks in 16 counties, of which seven in Transylvania, one in Moldavia (Neamţ), one in Dobrudja (Constanţa), three in Muntenia, three in Oltenia, as well as the City of Bucharest with only 41 Slovaks.

The upper class of *over 50* Slovaks appears in seven counties, namely: Cluj (56), Satu Mare (61), Caraş-Severin (65), Sălaj (760), Timiş (939), Arad (3,310), and Bihor (4,860). In the counties of Sibiu, Bacău, Botoşani, Vaslui, Vrancea, Tulcea, Argeş, Brăila, Buzău, Călăraşi, Teleorman and Olt, there are less than 3 Slovaks, while in Galaţi, Iaşi, Suceava, Giurgiu, Ialomiţa, and Vâlcea this ethnic group is missing.

h) *The Bulgarian ethnic group* migrated north of the Danube during the 17th - 19th centuries, as a result of Ottoman persecution, but also to practice vegetable farming. They account for only 0.03%, i.e. 5,975 people (of which 2,186 in urban areas and 3,789 in rural areas), concentrated largely in Banat (3,771 Bulgarians) and Muntenia (1,674), while in the other provinces the values are insignificant: Dobrudja (106), Crişana (15), and in Transylvania, Moldavia, Oltenia and Maramureş we cannot know the exact number of this minority, as a result of the appearance of the confidentiality sign in the case of some of the counties belonging to them. For this reason, the classification by counties is very difficult to achieve, although it allows for the distinction of two categories: *under 50* people, specific to 25 counties (six in Transylvania, five in Moldavia, one in Dobrudja (Tulcea), eight in Muntenia, three in Muntenia, one in Banat (Caraş-Severin) and one in Crişana (Bihor)) and *over 50* people, specific to the counties of Constanţa (72), Ilfov (92), Arad (510), Dâmboviţa (1,487) and Timiş (3,244), as well as Bucharest City (239). In 10 counties (*) appears, and in Botoşani (-).

i) *The Croatian ethnic group* counts 4,842 people (0.02%), who have their residence predominantly in rural areas (4,389 Croats), concentrated almost entirely in Banat (4,753, 91.97%). 4,567 Croats are residents of Caraş-Severin County, 179 Croats live in Timiş County, then there are eight Croats in Braşov

and Cluj, seven in Arad, six in Hunedoara, four people each in Mehedinți and Mureș, three people each in three other counties (Sibiu, Constanța and Satu Mare), in 19 counties and in the City of Bucharest an asterisk (*) appears, and in 11 counties this ethnic group is missing (Bistrița-Năsăud, Harghita, Sălaj, Galați, Vaslui, Vrancea, Dâmbovița, Giurgiu, Prahova, Teleorman, and Vâlcea).

j) The Greek ethnic group with 2,086 people (0.01%) is present almost exclusively in urban areas (1,786 Greeks). At national level, they have a homogeneous distribution, in all administrative-territorial units, with different values from one place to another.

At the provincial level, the absolute values can only be known in six of them (Dobrudja, 498; Muntenia, 282; Moldavia, 263; Oltenia, 64; Banat, 63 and Crișana, 40), while in Transylvania (Alba, Harghita and Sălaj) and Maramureș (Satu Mare) the situation of confidentiality appears (*). At the county level, the lowest known number of Greeks is three (Bistrița-Năsăud, Covasna, Călărași, and Olt), and the maximum of 266 people in Tulcea. In 28 counties, the condition of *under 50* Greeks appears; the class of *50-100* people is recorded in six counties (Cluj, Iași, Prahova, Brașov, Galați, Brăila), and the higher class of *over 100* appears in Ilfov (133), Constanța (232) and Tulcea (266), as well as in Bucharest City (553).

k) The Italian ethnic group is the only minority that shows a slight increase in absolute numbers, from 3,203 people in 2011 to 4,039 people in 2021, emphasizing the fact that the relative value is 0.02% in both cases. Homogeneously spread throughout the country, more than half (2,533 Italians) live in urban areas.

At the level of geographical-historical provinces, they are present as follows: Transylvania (840), Banat (736), Moldavia (710), Muntenia (542), Oltenia (275), Dobrudja (182), Crișana (180), and Maramureș (141). Analyzed at county level, in a broader manner, we distinguish four categories, namely: *under 50* Italians, present in 17 counties; *50-100* people in 14 counties; *100-200* people in seven counties (Constanța, Bacău, Neamț, Dolj, Ilfov, Iași, Bihor, and Brașov), while the class of *over 200* Italians is specific to the counties of Cluj (223), Arad (353), Timiș (358), and the City of Bucharest (433).

l) The Jewish ethnic group is registered with 2,378 people (0.01%), being present almost exclusively in urban areas (2,171 people). In the counties of Călărași, Ialomița and Gorj it appears marked with an asterisk (*) and for this reason the absolute values can only be given for Transylvania (411), Moldavia (316), Banat (225), Crișana (135), Maramureș (129), and Dobrudja (45). In the lower range of *under 50* people, 28 counties are registered; the class of *50-100* Jews includes six counties (Maramureș, Mureș, Arad, Satu Mare, Brașov, and Ilfov),

and the higher one of *over 100* includes the remaining four counties (Iaşi, 133; Bihor, 135; Cluj, 139 and Timiş, 144), as well as the City of Bucharest with 906 Jews.

m) The Czech ethnic group numbers 1,576 people, of which 446 in urban areas and 1,130 in rural areas, most of them being present in the South-West of Romania, in the geographical-historical province of Banat (1,144 Czechs), where Caraş-Severin County stands out (909), followed at a great distance by Timiş (141) and Arad (94), but also Oltenia, with Mehedinţi County (303). As for the other administrative-territorial units, 14 of them have between 3-14 Czechs, another 14 counties are marked with an asterisk, and nine with a hyphen. In Bucharest City only 22 Czechs were registered at the Census of December 1, 2021.

n) The Polish ethnic group, comprising 2,137 people (521 in urban areas and 1,616 in rural areas), is present in Transylvania (120), Banat (58), Crişana (25), and Maramureş (13), while in the rest of the provinces we cannot establish their specific number due to the confidentiality situation that occurs at the level of some counties. Generally, two classes appear: a lower one of *under 50* Poles, specific to 39 counties, and the upper gap of *over 50* Poles, characteristic only of Suceava County (1,667) and Bucharest City (123), while they are absent in Sălaj.

o) Ruthenians replaced the Chinese ethnic group in the official statistics of the 2021 censuses, but, in the case of other censuses, Ruthenians had been analyzed together with the Ukrainians. In number of only 834 people (139 in urban and 695 in rural areas), they have an uneven spatial distribution, and due to their small number they cannot be assessed at regional level, except only for Crişana (5 people). At administrative-territorial level it is known that most of them are in the counties of Maramureş (333), Suceava (182), Arad (148), and Hunedoara (74), therefore in the upper threshold of *over 50* people. In 20 of the counties and in the City of Bucharest they are in the lower threshold of *under 50* people, and in the remaining 17 administrative-territorial units they were not registered.

p) The Armenian ethnic group with an absolute value of 1,213 people, present almost entirely in urban areas (1,114 Armenians), are recorded in Dobrudja (214) and Crişana (3). Their highest number is in Bucharest Municipality (390) and Constanţa County (189), while *under 100* Armenians are recorded in 38 counties, and in Olt and Caraş-Severin there are none.

q) The Albanian ethnic group consists of only 645 people (404 in urban areas and 241 in rural areas), which at the level of geographical-historical provinces can be quantified only in Banat (85), Crișana (49) and Dobrudja (32). The highest value appears in Gorj County (158), then they are in the class of *under 100* people in 30 counties and in Bucharest City, the confidentiality situation being specific to Alba, Sibiu, Neamț, Călărași, and Satu Mare counties, while in Covasna, Harghita, Sălaj, Teleorman and Mehedinți counties they are not present.

r) The Macedonian ethnic group is the last minority quantitatively nominated in the 2021 Census, with an absolute value of 1,089 people, of which 876 in urban and 213 in rural areas. The most numerous are residents of Dolj County (723), followed by those from Timiș (100), Constanța (52), Caraș-Severin (37), Ilfov (14), Iași (14), Olt (11), after which their number drops below 10 people in the counties of Brașov, Cluj, Harghita, Hunedoara, Galați, Suceava, Vaslui, Tulcea, Călărași, Dâmbovița, Giurgiu, Ialomița, Prahova, Gorj, Mehedinți, Arad, and Bihor, while in the rest of the administrative-territorial units they are not present. There are 80 Macedonians in the city of Bucharest.

s) Other ethnicities include people belonging to ethnic groups, other than the 21 mentioned above, such as Csango, Gagauz, Chinese, Nepalese, Pakistanis, Philipinos, and so on, registering a slight increase from 0.09% (18,524 people) in 2011, to 0.10% (19,510 people) in 2021.

The highest value is recorded in urban areas (14,847, 76.10%), while rural areas have lower absolute and relative values (4,663, 23.90%) of such people. In the eight geographical-historical provinces, the situation is as follows: Muntenia (20.26%, 3,954), Transylvania (17.06%, 3,329), Dobrudja (10.90%, 2,126), Banat (8.29%, 1,618), Moldavia (8.09%, 1,579), Oltenia (2.51%, 491), Crișana (2.37%, 464) and Maramureș (1.26%, 246).

At the level of the 41 administrative-territorial units and in the City of Bucharest, we highlight four classes, namely: *under 100* people, which includes 12 counties (three from Transylvania, three from Moldavia, four from Oltenia, one from Banat and one from Maramureș); *100-300* people, present in 18 counties (five in Transylvania, three in Moldavia, eight in Muntenia, one in Oltenia and one in Maramureș); *300-500* people, which includes three counties (Prahova, 313; Bacău, 335 and Bihor, 464); while *over 500* people is characteristic of the remaining eight counties: Arad (534), Tulcea (567), Iași (593), Brașov (770), Timiș (1,002), Cluj (1,225), Constanța (1,559), Ilfov (2,169), and Bucharest City (5,703).

2. 5. Unavailable information

Recorded at position Y in the databases created by the National Institute of Statistics, this indicator appears for the second time in a census conducted in Romania, after the one in 2011. Against the backdrop of a deeply divided society, to which the conspiracy theories circulated during the COVID-19 pandemic contributed greatly, the spectacular increase in people who did not wish to declare their ethnicity, language or religion was evident (Netedu, 2012, p. 87-88). We are currently witnessing a doubling of this population segment, from 6.15% (1,236,810) in 2011, to 13.04% (2,484,926). 1,723,625 of these people are in urban areas, and 761,301 in rural areas. Moldavia (523,381) stands out first, with Iaşi County (134,207), followed by Muntenia (455,065), Transylvania (428,425), Oltenia (195,148), Banat (184,294), Dobrudja (130,231), Maramureş (81,078), and Crişana (48,428). In the City of Bucharest, under the heading *Unavailable information*, there are 438,876 people whose ethnic identity is unknown.

3. CONCLUSIONS

At the end of this approach, several general conclusions have been drawn:

- at the 2021 Population and Housing Census, out of the total stable population of 19,053,815 inhabitants, only 16,568,889 people declared their ethnicity. The difference of 2,484,926 people is included in the column Unavailable information, an indicator that we consider totally inadequate, as it not only prevents the exact tracking of the spatial-temporal evolution of ethnic groups at the level of geographical-historical provinces and counties, but also creates false leads in calculating the weight of this type of geodemographic structure, by relating it to the total declared population and not to the stable one;

- of all 21 nationalities, the largest number of "hidden ethnics" comes from the Romanian population, which in the last decade has "lost" 1,991,426 people, but nevertheless holds 77.68% of the total population, resulting in an extremely high ethnic homogeneity index of 9.82;

- if in the provinces in the South and East of the country (Oltenia, Muntenia, Moldavia), the Romanians have almost absolute shares, the same cannot be said about the center and West of Romania, where slow and permanent settlement of other ethnic groups (Hungarians, Germans, Ukrainians, Serbs, Czechs, Slovaks, Bulgarians, Croats, etc.) took place, which determined essential changes in the national structure of the population;

- the most representative minority from a numerical point of view is the Hungarian one, representing 5.26%, with higher shares in several counties, such as: Cluj (11.60%), Sălaj (19.10%), Bihor (20.40%), Satu Mare (28.30%), Mureş (31.80%), Covasna (66.70%) and Harghita (79.50%);

- regarding the Roma population, we fully support the views of the representatives of this ethnic group that their number in reality is significantly higher than that included in the 2021 Census, a fact demonstrated by the high birth rate among this group;

- people of Ukrainian nationality are found in the border counties: Maramureş, Suceava, Satu Mare, Caraş-Severin, Botoşani, and Timiş; Germans are more numerous in Timiş, Caraş-Severin, Braşov, Arad, Sibiu, and Satu Mare; Turks, Russian-Lipovans, Tatars and Greeks live predominantly in Dobrudja, while Serbs, Czechs, Slovaks, Bulgarians and Croats have the largest concentrations in Banat and Crişana;

- in the category of other ethnic groups, Asians stand out, mainly represented by Chinese, representing the "first wave" of foreign workers who arrived in Romania to plug the gap in the machine construction industry (electrical and electronic industry, spare parts industry), but also on construction sites in large cities (Bucharest, Cluj-Napoca, Iaşi, Constanţa, Timişoara, Braşov). Later, Nepalese, Pakistanis, Philipinos and Indians were added as immigrants, attracted by the higher salaries compared to those received in their countries of origin, but also by the permissive conditions for employment;

- in terms of distriburion in rural and urban areas, it is noted that Romanians are evenly distributed in the two areas, the Germans, Turks, Tatars, Greeks, Italians, Jews, Armenians, Albanians and Macedonians are more present in urban areas, while Hungarians, Roma, Ukrainians, Russians-Lipovans, Serbians, Slovaks, Bulgarians, Croats, Czechs, Poles, and Ruthenians are mainly spread in rural areas;

- currently, 19 ethnic minorities are automatically represented in the Romanian Parliament (one MP each), while the Hungarians, by means of the political organization Democratic Union of Hungarians in Romania, have been participating in the electoral process since 1990, just like any political party.

The parliamentary group of national minorities is made up of the following associations and political formations: Union of Armenians in Romania; Union of Croats in Romania; Association of Macedonians in Romania; Union of Serbs in Romania; Bulgarian Union of Banat-Romania; Democratic Union of Turkish-Muslim Tatars in Romania; Russian-Lipovan Community in Romania; Cultural Union of Ruthenians in Romania; Democratic Forum of Germans in Romania; Turkish Democratic Union in Romania; Union of Poles in Romania; "Pro-Europe" Association of Roma Party; Association of Italians in Romania - RO.AS.IT;

Association of Albanian League of Romania; Democratic Union of Slovaks and Czechs in Romania; Union of Ukrainians in Romania; The Federation of Jewish Communities in Romania and the Hellenic Union of Romania.

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ROLE OF STREETSCAPE IN SHAPING URBAN DESIGN IN ROMANIA. APPLYING THE CONCEPT OF 3D INTERACTIVE AND INTERCONNECTED STREETS. CASE STUDY: URBAN AXIS BISTRIŢA-BECLEAN-NĂSĂUD-SÂNGEORZ-BĂI

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ABSTRACT. – Role of Streetscape in Shaping Urban Design in Romania. Applying the Concept of 3D Interactive and Interconnected Streets. Case Study: Urban Axis Bistriţa-Beclean-Năsăud-Sângeorz-Băi. Urban boulevards are the most dispersed and heavily trafficked urban open spaces. As urban communities strive to improve decency in the built environment, planners and designers must have a succinct understanding of what contributes to the quality of urban landscapes. Streets are a vital part of any city's public open space system. They act as movement corridors for pedestrians, cyclists, traffic, and vehicles and support many social and commercial activities. The presence and character of the streets play a huge role in determining the overall quality and liveability of the city. The document examines the existence of street elements - paving, street trees, central medians, lighting, and street furniture - which, when applied over time, enrich the city's visual image and urban design. It also focuses on the basic elements and principles of the urban landscape that improve the quality of urban street design, accessibility, and pedestrian circulation. In addition, the analytical study covers some examples by relating the basic principles of the urban landscape to use them to develop the urban landscape of one of the main urban streets on the Bistriţa-Beclean-Năsăud-Sângeorz-Băi urban axis. The article concludes with sustainable urban landscape solutions that will positively impact sustainable urban design, the functional and aesthetic aspects of the built environment, and, therefore, the visual image of cities in Romania.

Keywords: Urban landscape, urban design, Bistriţa-Beclean-Năsăud-Sângeorz Băi urban axis, Romania.

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1. INTRODUCTION

Urban Design is the speciality of creating and shaping urban areas and towns. It involves the arrangement and design of buildings, open spaces, transport systems, services, and amenities (Carmona et al., 2010). It gives form, shape, and character to groups of buildings, entire neighbourhoods, and the city (Bahrainy & Bakhtiar, 2016). It is a system that organises these elements into a network of boulevards, squares, and blocks. Urban design blends architecture, landscape architecture, and city planning to create functional and attractive urban areas.

It includes the character and definition of those components that make up the public realm, including the public streetscape, open and private open spaces, and the buildings that define and locate the street. Urban character is defined by the scale and type of the buildings, the pedestrian scale, and the public spaces created by the buildings (Carmona et al., 2003; Gehl, 2010). Urban design is key to creating places that are effective both socially and economically, great to live in, and attractive to visit (Talen, 1999). Urban design is crucial in creating community identity (Alexander et al., 1977).

Streetscapes are vital components of urban design that serve multiple functions, from enhancing aesthetics to promoting social interactions and economic vitality. By prioritising thoughtful streetscape design, cities can create more livable, vibrant, and sustainable environments (Cervero & Kockelman, 2020, p.132).

In an urban environment that is often very dynamic, benches provide an opportunity to regenerate energy (Fischer & Schmid, 2020). They serve as meeting places for people, facilitating social interaction between individuals and promoting a sense of community (Gehl, 2011). This contributes to building social ties, as street furniture plays a basic role in creating welcoming and functional public spaces (Carr et al., 1992).

Among the key elements, outdoor benches play a prominent role, offering a place to rest and an aesthetic contribution to the surroundings (Murray, 2010).

Effective planning in the broadest sense can help deliver better public services (Bertolini & Spit, 2017). It also achieves value for money in new developments and makes good use of scarce resources (Gehl, 2010). Urban design is ultimately a key method for meeting the challenges of sustainable development (Sustainable Development Solutions Network, 2015). By focusing on reconstructing settlements to improve them, it aims to operationalise strategies for balancing the environment, economy, and social domain (Lehmann, 2018).

The functionality and operation of a geographic system have an active and appropriate character because they must ensure sustainability under various impacts and environmental conditions, as geographical transformations have a specific finality (C.C. Pop, 2016, p. 286). In this context, the reason for the

existence of the geographical axis, interpreted as geosystems in dynamic balance, is given by the active and adequate character of the juxtaposed and ongoing intra-systemic and extra-systemic reactions (C.C. Pop, 2016, p. 286).

The geographical axis operates through the integration of its constituent elements, and every point, place, level, order of organisation, secondary axis, major axis, local mesh, and so on, has its organisational laws (C.C. Pop, 2016, p. 287). A geographical axis comprises elements, and how these elements manifest reflects the status of its functioning (C.C. Pop, 2016, p. 289).

For example, the social axis is a functional territorial axis, defined by the following component elements: an urban functional nucleus, structured into four unequal segments consisting of the dominant urban localities; the territory corresponding to the urban territory (periurban), which is linked with the urban from economic, social, and natural points of view (C.C. Pop, 2016, p. 289).

2. MATERIALS AND METHODS

This component focuses on the overall layout, aesthetics, and functionality of urban spaces. It examines how streetscape design influences social interactions, mobility, and the identity of a place.

The methodology involves:

➢ Literature Review: Analysis of the existing research on urban design principles, historical context, and contemporary practices. Streetscape and Urban Design, Elements of Streetscape, Functions of Streetscape;

➢ Case Studies: Selection of diverse urban environments (e.g., historic districts, modern developments) to assess different streetscape designs and their impacts;

➢ Field Observations: Conduct on-site assessments to evaluate the physical characteristics of streetscapes, including materials, colours, and spatial organisation.

a. Streetscape and Urban Design

Within the framework of urban sustainability, urban communities represent fundamental building blocks of cities. They are not only the primary living environments for residents but also critical spaces for social interaction and public service provision, fulfilling diverse political, cultural, and economic functions (Lai, Wang, & Xia, 2025). Streetscapes are a significant element of the community realm, which not only helps to define mobility but also reflects a community's aesthetic quality, uniqueness, economic activity, well-being, social cohesion, and opportunity. According to Moudon (2018), the design of streetscapes can influence mental health, with elements such as greenery, sidewalk width, and façade

permeability playing a role in reducing anxiety. Streetscape design also has a substantial effect on how people perceive and interact with their community and the built environment. As Parker and Mehta (2020) argue, pedestrian-friendly streetscapes encourage walking, which in turn reduces automobile traffic, supports local businesses, and improves public health.

Designing boulevards can help urban designers create diverse transportation systems and more accessible neighbourhoods by improving non-motorised travel conditions, enhancing urban environments, and incorporating special design features such as pedestrian walkways, cycling tracks, traffic calming measures, and road space reallocation (Buehler & Pucher, 2017).

Streetscaping is a significant component of New Urbanism, Transit-Oriented Development, and other efforts to redevelop urban areas. It often includes wider sidewalks, bus pull-outs, bicycle lanes, and improved on-street parking design (Cervero, 2018). Streets play a vital role in enhancing the experience of individuals, the visual image of the city, and enriching interactions with the city (Gehl, 2019). It helps in understanding the linkages between the city's open spaces (Lehmann, 2020).

Allied pedestrian networks allow people to travel easily and comfortably within the city and facilitate the use of public transportation. They connect open spaces, landmarks, and nodes, and can be at different levels, allowing one to experience the city from various viewpoints (Moudon, 2018). The street, perhaps more than any other single element of urban design, has two powerful effects: it can unite a single enclave, or it can support or undermine the function of a particular enclave—it can be beneficial or detrimental to the area it serves (Sennett, 2018).

The street is one of the most vital factors of urban form. It is to the city what the wheel is to machinery (Cervero, 2019).

Thus, urban design for any city could start with an evaluation of streets according to their widths and positions, and from that, an idea could be formed of where different central city developments might take place, appropriate to the physical dimensions of the city (Talen, 2021).

b. Streetscape elements

Streetscape elements emphasise the unique character of a neighbourhood, block, city centre, or historic district.

For instance, benches in downtown areas or shaded sidewalks on residential streets encourage activity and create an active environment, which significantly contributes to the overall livability of an area (Mehta, 2019; Montgomery, 2020; Jacobs, 2020). (Figure 1)

Elements of streetscape are major constituents of streets' urban design and are encapsulated as follows:

a. Sidewalks: Pavement is a prerequisite element of any streetscape. Sidewalks should be designed to provide secure, appealing, interesting, and pleasant spaces for pedestrians by incorporating well-designed and harmonised tree planting, street furnishings, and lighting (fig. 2).

b. Planters: Planters add texture, colour, and interest to a streetscape. They help define and separate spaces, determine primary building entrances, and boost aesthetic value.

c. Street furnishings: Street furniture should be compatible and harmonised in design, colours, styles, and materials, supporting the architectural style.

d. Benches: Benches are significant public resources that contribute to making the city an enjoyable space for pedestrians.

e. Lighting: Lighting is a vital component of the streetscape, creating safe, secure, and aesthetically appealing public spaces, especially at night.

f. Trash receptacles: Trash receptacles are essential streetscape elements and should be strategically placed near benches, bus stops, and other activity nodes to minimise pollution.

g. Signage: Signage plays a major role in designing a pleasant urban environment by providing orientation tools and visual guides for both drivers and pedestrians.

h. Bus shelters: Bus shelters are structures situated at bus stops to protect passengers from the weather. All bus stops should be marked by bus stop signage and equipped with benches and trash receptacles.

i. Street corners: Street corners provide enhanced pedestrian space and opportunities for people to interact and communicate through the arrangement of benches and site furnishings (fig. 3).

j. Medians: Medians are an effective method of making a streetscape more pedestrian-friendly and dramatically altering the visual character of the street for both pedestrians and motorists.

k. Crossings: Crosswalks are an essential part of the pedestrian network. Enhanced crosswalk paving can make motorists more aware of pedestrian activity.

l. Public art and Café space: Public art can valuably contribute to local identity and provide multiple and layered expressions. It can become a local landmark or add richness to a building or landscape.

Outdoor cafes provide an active street frontage and natural locations for arranged and spontaneous social interactions (Zhang, L. & Zhao, Y., 2016, p. 267).

Trash receptacles play a crucial role in urban research for several reasons:

➢ Litter Reduction: Proper placement and availability of trash receptacles significantly reduce litter in public spaces.

Studies have shown that increasing the number of trash receptacles can decrease litter and the time spent by staff cleaning.

➢ Public Health: Effective waste management through well-placed trash receptacles helps maintain public health by reducing the spread of diseases and pests associated with litter.

➢ Urban Aesthetics: Trash receptacles contribute to the overall aesthetics of urban areas. Well-designed and strategically placed receptacles can enhance the visual appeal of streetscapes.

➢ Social Behaviour: The presence and accessibility of trash receptacles influence social behaviours. People are more likely to dispose of waste properly if receptacles are conveniently located.

➢ Environmental Impact: Proper waste disposal reduces environmental pollution. Trash receptacles help in segregating waste, promoting recycling, and reducing the amount of waste that ends up in landfills.

➢ Data Collection: Trash receptacles can be used to collect data on waste generation patterns, which can inform urban planning and waste management strategies.

Fig. 1. Identification of streetscape elements (bench, litter bin)
Source: the authors, Bistriţa, Lamă area - Andrei Mureşanu Street

The number of trash receptacles required will depend on specific local conditions, including waste management practices and community needs. Adjustments may be necessary depending on actual waste composition, disposal methods, population growth in the city and living space.
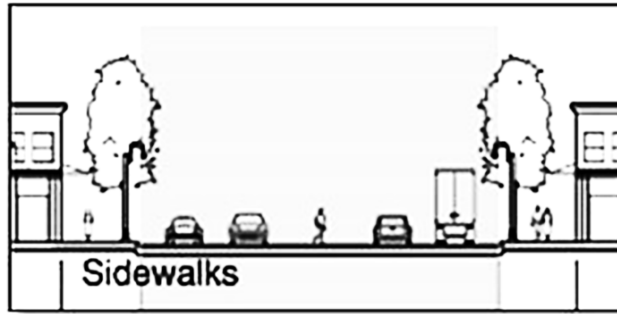
Fig. 2. Model Sketch Sidewalks
Source: Realised by the authors in https://www.giraffe.build/
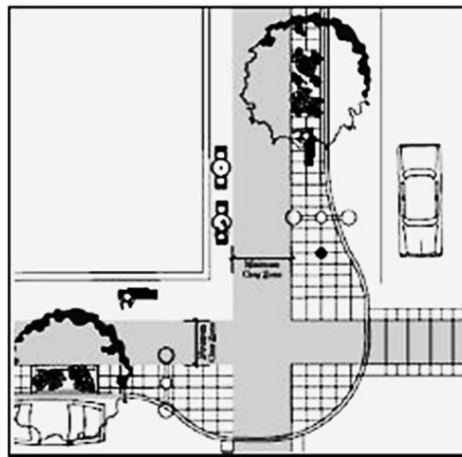
Fig. 3. Schematic street corners
Source: Realised by the authors in https://www.giraffe.build/

3. RESULTS AND DISCUSSIONS

For better organisation and clarity, the research results are structured into two subchapters:
I. Urban street design and functionality
II. Applying the Concept of 3D Interactive and Interconnected Streets;

I. Differences Between Street and Boulevard (table 1)
Street: A public road in a city or town, typically lined with buildings and designed for vehicle and pedestrian movement (Baker, 2015).
Public thoroughfare in a city or town, typically with buildings on one or both sides (Merriam-Webster, 2025).
Boulevard: A wide, multi-lane road often featuring landscaped medians, designed for both vehicle traffic and pedestrian use (Fitzgerald & Johnson, 2020).

Table 1. Comparison between dimensions and functionality

Feature	Street	Boulevard
Width	Typically ranges from 20 to 60 feet (6 to 18 meters) (Nguyen & Patel, 2019)	Generally wider, often 60 to 120 feet (18 to 36 meters) or more (Thompson & White, 2022)
Lane Count	Usually has 1 to 2 lanes in each direction (Wang, 2017)	Often has 2 to 4 lanes in each direction, plus turn lanes (Zhang & Lee, 2023)
Design	Basic design, primarily functional (Baker, 2015)	Enhanced design often includes landscaping and aesthetics (Fitzgerald & Johnson, 2020)
Traffic Volume	Lower traffic volume (Nguyen & Patel, 2019)	Higher traffic volume, accommodating more vehicles (Thompson & White, 2022)
Usage	Primarily for local traffic (Wang, 2017)	Designed for regional traffic and often connects major areas (Zhang & Lee, 2023)

Source: aggregated by the authors

Street Typology in the Urban Axis: Bistriţa – Beclean – Năsăud – Sângeorz-Băi

The urban axis formed by the cities of Bistriţa, Beclean, Năsăud and Sângeorz-Băi represents an area of socio-economic and cultural interaction in Bistriţa-Năsăud County, Romania.
This analysis explores these towns' street typologies, highlighting boulevards and main streets, their lengths, street types and pedestrian traffic characteristics.
Bistriţa, as a county seat, has a complex street network, with main and secondary streets that facilitate access and circulation.
The city has streets of varying widths, with well-defined sidewalks facilitating pedestrian circulation. The central areas are busier, while the peripheral neighbourhoods have less pedestrian traffic.

Republicii Boulevard

➢ Type: Central Boulevard;
➢ Length: Approximately 1.8 km;
➢ Width Dimension: 60-80 feet (18-25 meters)
➢ Pedestrian Traffic: Heavy, with multiple points of interest (shops, public institutions);
➢ Commercial areas: Crosses major commercial areas with shops, restaurants and cafes;
➢ Number of bus stops: 5.

Urban design elements include wide sidewalks, street furniture (benches, litter bins), modern street lighting, and green areas (trees and flowers) (fig. 4).

Decebal Boulevard

➢ Type: Central Boulevard;
➢ Length: Approximately 1.5 km;
➢ Width Dimension: Approximately 60-80 feet (18-23 meters);
➢ Pedestrian Traffic: Moderate, with access to commercial and residential areas;
➢ Commercial areas: Includes shops and shopping centres on both sides of the boulevard;
➢ Number of bus stops: 3.

Urban design elements: Landscaped sidewalks, parking lots, ambient lighting, green spaces (fig. 5).

Independence Boulevard

➢ Type: Central Boulevard;
➢ Length: About 1.2 km;
➢ Width Dimension: approximately 60-100 feet (18-30 meters);
➢ Pedestrian Traffic: Heavy, being a main artery connecting different areas of the city.
➢ Shopping areas: Close to shopping centres and markets.
➢ Number of bus stops: 4.

Urban design elements: Boulevard with bicycle paths, pedestrian sidewalks, benches and seating areas (fig. 6).

General Grigorie Bălan Boulevard

➢ Type: Boulevard;
➢ Length Approximately: 2.2 km;
➢ Width: 60-80 feet (18-27 meters);
➢ Heavy pedestrian traffic with wide, landscaped sidewalks;
➢ Number of bus stops: 5;
➢ Commercial areas are prevalent, with shops, restaurants and cafés.

Urban design elements: Trees, benches, street lighting, bicycle routes (fig. 7).

Dornei Street

➤ Type: Secondary (residential) road ;
➤ Length: Approximately 1.2 km ;
➤ Width Dimension: approximately 20-30 feet (6-9 meters);
➤ Pedestrian Traffic: Moderate, with access to residential and commercial areas;
➤ Commercial: Access to some local shops and residential areas.
➤ Number of bus stops: 2.

Urban Design Features: Narrower sidewalks, street-side trees, simple street lighting (fig. 8).

A special aspect of Bistriţa's street typology is the system of rigorous streets that converge towards the Central Square.

This precise geometric organisation is influenced by medieval German colonisation and gives the city a distinct character, similar to cities in Central and Northern Europe.

One specific and special aspect of the link between the main boulevards and the historic centre of Bistriţa is the harmonious integration of modern infrastructure with medieval architecture. This connection allows easy access to the historical centre, while preserving the charm and authenticity of the old area.

For example, the Republicii Boulevard is connected to the medieval historical centre through Dornei Street and to the Independence Boulevard through Gheorghe Şincai Square.
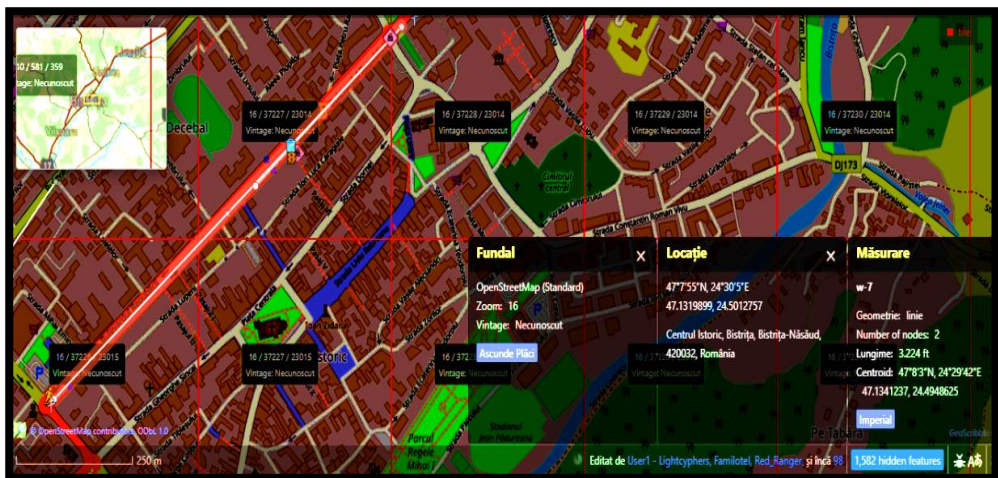
Fig. 4. Republicii Boulevard in Bistriţa.
Source: Realised by the authors in https://www.openstreetmap.org/edit
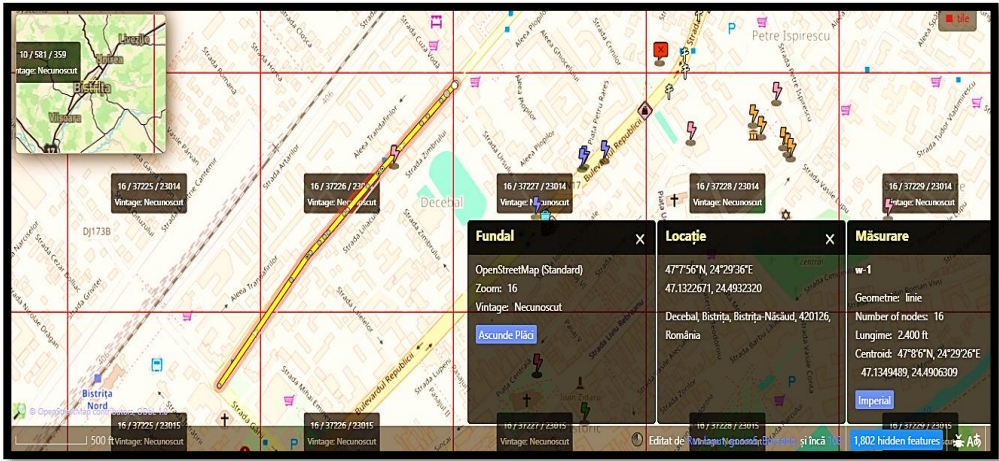
Fig. 5. Location of Decebal Boulevard.

Source: Realised by the authors in https://www.openstreetmap.org/edit
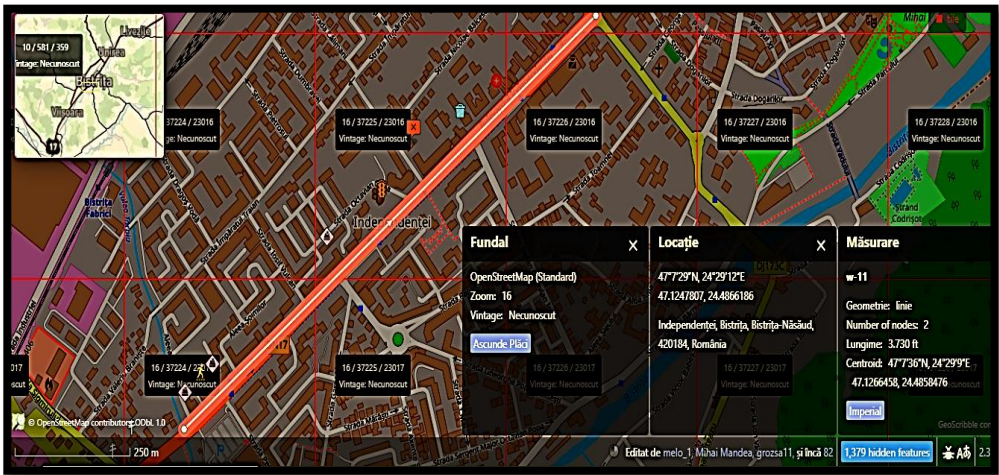
Fig. 6. Delineation of Independence Boulevard.

Source: Realised by the authors in https://www.openstreetmap.org/edit
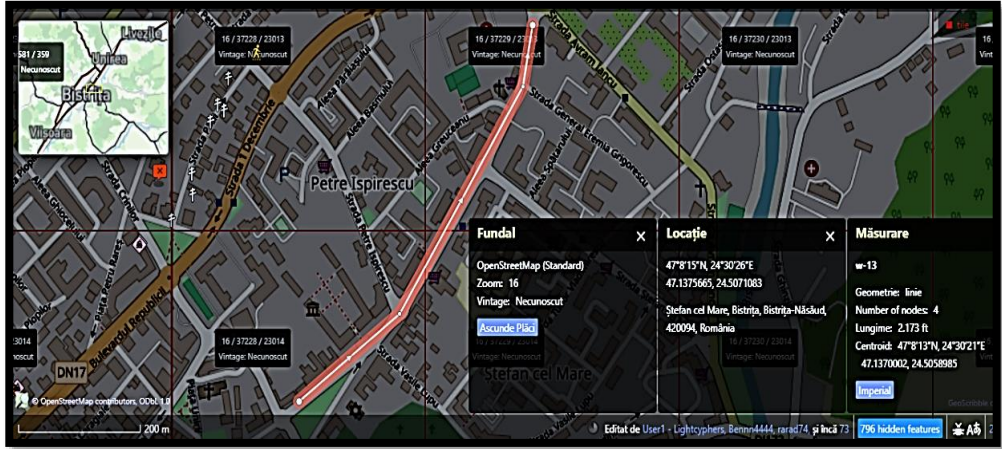
Fig. 7. Location of General Grigorie Bălan Boulevard.
Source: Realised by the authors in https://www.openstreetmap.org/edit
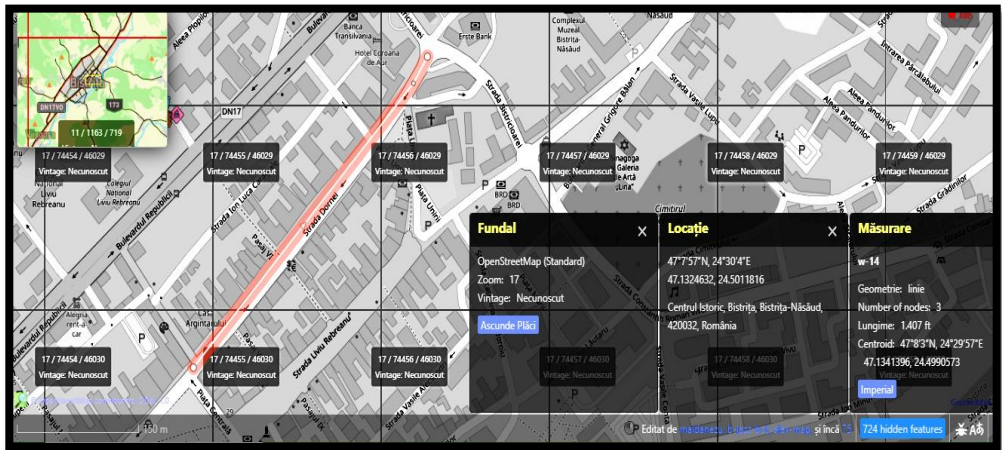
Fig. 8. Dornei Street.
Source: Realised by the authors in https://www.openstreetmap.org/edit

Beclean, a smaller town, has a street network that reflects its recent urban development. Beclean's streets are narrower than those in Bistrița, but benefit from sidewalks and green areas, promoting a pedestrian-friendly environment.

Someșului Street

➢ Type: Main artery;
➢ Length: about 1 km;
➢ Width Dimension: approximately 10-12 meters;
➢ Pedestrian Traffic: Moderate;
➢ Commercial areas: Prevalent, with shops and services along the street;
➢ Number of bus stops: 3;

Urban design elements: rest benches, modern street lighting, trees and green spaces along the street, and paved sidewalks for pedestrians.

It connects the centre of Beclean with the South, on the banks of the Someșul Mare River. Development project: bridge and promenade for tourism development (fig. 8).

1 December 1918 Street - Mihail Kogălniceanu Street, a major artery crossed by national road no. 17

➢ Type: Commercial street, in the city centre, close to the Central Square.
➢ Length: about 2 km;
➢ Width: approximately 8-10 meters;
➢ Pedestrian Traffic: Heavy;
➢ Number of bus stops: 2;
➢ Shopping areas: Various shops, cafes and restaurants.

Urban design elements: Benches and seating areas, efficient street lighting, decorative trees and flowers along the street, parking lots (fig. 9, fig. 10).
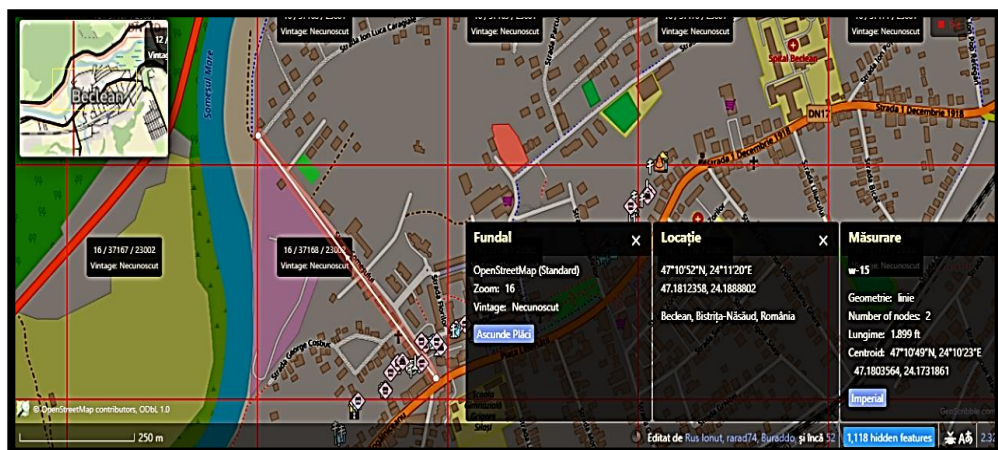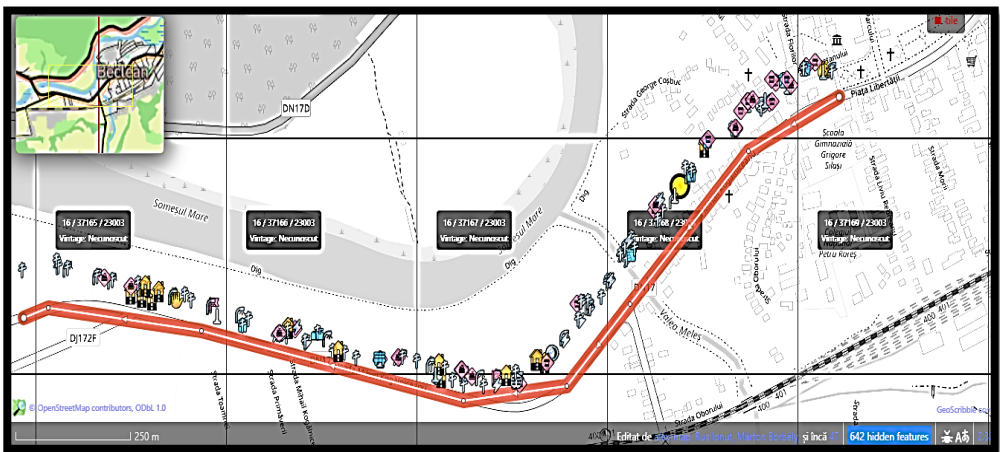

Fig. 9. Location of Someșului Street
Source: Realised by the authors in https://www.openstreetmap.org/edit
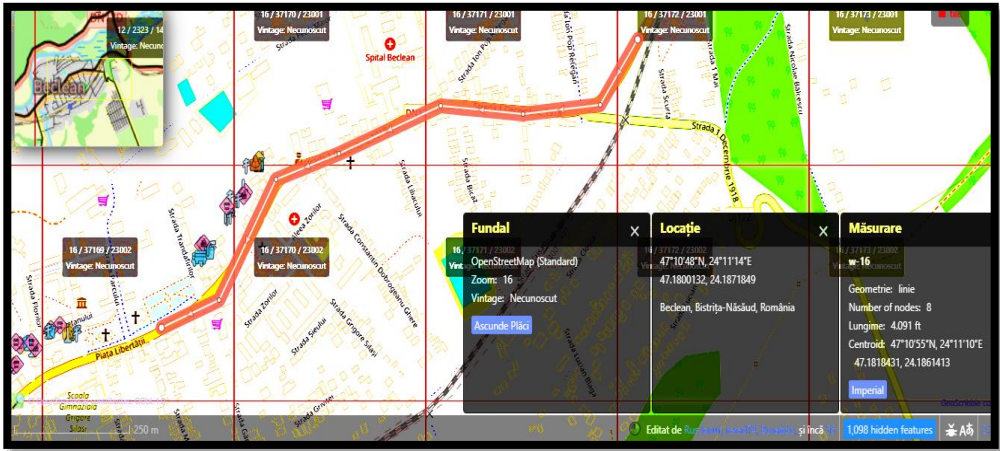
Fig. 10. 1 December 1918 Street.
Source: Realised by the authors in https://www.openstreetmap.org/edit

Fig. 11. Mihail Kogălniceanu Street
Source: Realised by the authors in https://www.openstreetmap.org/edit

Năsăud is a city with a street network that reflects its historical tradition, with streets that combine modernity with historical elements. The streets of Năsăud are well maintained, with wide sidewalks, facilitating pedestrian circulation, especially in the central areas.
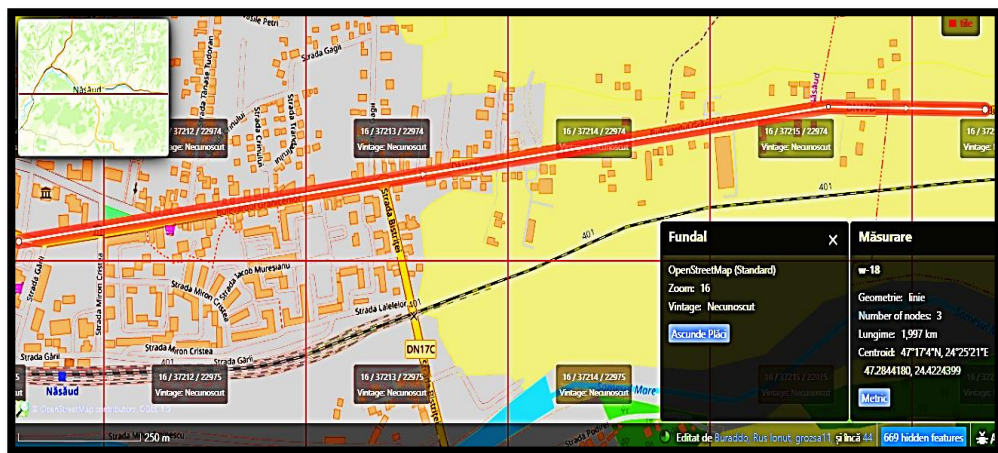
Grănicerilor Boulevard

- ➢ Type: Central Boulevard;
- ➢ Length: approximately 2 km;
- ➢ Width Dimension: 60-80 feet (19-23 meters);
- ➢ Pedestrian Traffic: Intense, with many points of cultural interest;
- ➢ Commercial areas: Cross areas with shops and public institutions;
- ➢ Number of bus stops: 3.

Urban design elements: Wide sidewalks, benches, green spaces, modern street lighting (fig. 12).

George Coşbuc Street

- ➢ Type: Main, crossed by national road 17 C (residential);
- ➢ Length: approximately 1.9 km;
- ➢ Width Dimension: 20-30 feet (5-9 meters);
- ➢ Pedestrian Traffic: Moderate, predominantly residential;
- ➢ Commercial: Close to residential areas with commercial access;
- ➢ Number of bus stops: 2.

Urban design elements: Narrow sidewalks, vegetation, and simple lighting (fig. 13).

The city's main streets are laid out radially, starting from the city centre and extending to the outskirts. This facilitates access and connectivity between different areas of the city.

Fig. 12. Grănicerilor Boulevard.

Source: Realised by the authors in https://www.openstreetmap.org/edit

Fig. 13. George Coşbuc Street.
Source: Realised by the authors in https://www.openstreetmap.org/edit

Sângeorz-Băi is a town known for its spa resort; it has a street network adapted to tourism. The streets of Sângeorz-Băi are equipped with wide sidewalks and green areas, well adapted to the flow of tourists and locals.

Izvoarelor Street

➢ Type: Street, near the thermal springs, an important tourist resource for Sângeorz-Băi;
➢ Length: about 1.2 km;
➢ Width Dimension: 60-100 feet (18-30 meters);
➢ Pedestrian Traffic: Heavy due to tourist attractions;
➢ Commercial areas: Includes shops and tourist facilities;
➢ Number of bus stops: 4.

Urban design elements: Wide sidewalks, street furniture, seating areas, and ambient lighting (fig. 14).

Main Street – Republicii Street

➢ Type: Commercial street, Main artery;
➢ Length: Approximately 2.5 km;
➢ Crossed by the national road 17 D;
➢ Width Dimension: 20-30 feet (4-8 meters);
➢ Pedestrian Traffic: Moderate, with access to accommodation facilities;
➢ Shopping Areas: Access to various accommodation facilities and restaurants.
➢ Number of Bus Stops: 2.

Fig. 14. Izvoarelor Street
Source: Realised by the authors in https://www.openstreetmap.org/edit

Urban Design Features: Well-landscaped sidewalks, street-side trees, and street lighting (fig. 15).

Fig. 15. Main Street – Republicii Street
Source: Realised by the authors in https://www.openstreetmap.org/edit

It should be mentioned that Figure 15 is a segment of the road under research.

II. Digitalisation and the future city paradigm are becoming a trend in recent research and practices (Saeed, Z. O. *et al*, 2022).

The literature discusses digitalisation and its applications as the main gear in the transformation to the ideal future city vision (Saeed, Z. O. *et al*, 2022). Yet the concept of digitalisation is articulated in many interpretations and presented in different applications in the built environment (Saeed, Z. O. *et al*, 2022).

The 21st century imparted novel advances in technologies, changing the way we think, perceive and interact with our cities, the urban realm and the built environment. (Sassen, S., 2015, p. 706). Digitalisation is one of the major advances of the 21st century that emerged and developed with the advancement of the information, communication and technology (ICT) industry (Eremia *et al*, 2017, p. 12).

In the context of the built environment, the concept of digitalisation is depicted as the restructuring of the physical setting of a physical environment into a digital, intangible and virtual environment (Bloomberg, J., 2018, p. 28).

The principles of digitalisation are built around the transformation of the physical built environment into an interactive, responsive and interconnected digital system that is accessed, monitored and facilitated virtually.

It is worth mentioning that the application of the concept of interlinked streets in the current phase of the study is realised at the boulevard level.

We analysed concrete solutions in researching the concept of interactive and 3D interconnected streets:

- Digital Interaction: Installation of interactive panels providing information about the history of the boulevard, tourist attractions and local events;
- Interactive Green Zone: Creating a green zone with digital screens showing information about local biodiversity and green projects.
- 3D Connectivity: Integrating 3D elements such as interactive sculptures or LED lighting to create a modern and attractive urban environment;
- Communication Platforms: Installing digital platforms for residents to provide feedback and express their views on urban development.
- 3D Recreation Areas: Creating recreation areas with 3D elements such as interactive games or virtual adventure parks;
- Interactive Mobility: Implementing an interactive navigation system that provides real-time bus route information and travel options.

We analysed in detail the solutions for interactive and 3D interconnected streets on the main boulevards of Bistrița and Năsăud:

Republicii Boulevard

Digital Interaction:
• How many: 5 interactive panels;
• Where: Every 200 meters along the boulevard;
• How: Interactive panels mounted on street light poles provide information about the avenue's history, tourist attractions and local events.

Interactive Green Zone:
• 3 interactive green zones;
• Where: At major intersections and near parks;
• How: The green zones will include digital screens displaying information about local biodiversity and green projects, as well as charging stations for electric vehicles.

3D Connectivity:
• How many: 4 3D elements;
• Where: At the beginning and end of the boulevard and major intersections.

Independence Boulevard

Communication Platforms:
• 4 digital platforms:
• Where: At main intersections and near administrative buildings;
• How: Digital platforms for residents' feedback and to express their views on urban development, with the possibility to participate in surveys and questionnaires.

3D Recreation Area:
• 3 interactive recreation zones;
• Where: Near parks and shopping centres;
• How: Recreation areas with 3D elements such as interactive games and virtual adventure parks, with fitness equipment and digital playgrounds.

 Interactive Mobility:
• 6 interactive information points;
• Where: At every bus stop and major intersection;
• How: Interactive navigation systems provide real-time bus route information and travel options, with digital displays and interactive maps.

Decebal Boulevard

Digital Interaction:
• 6 interactive billboards.
• Where: Every 300 meters along the boulevard.
• How: Interactive panels mounted on street light poles, providing information about the history of the boulevard, tourist attractions and local events.

Interactive Green Zone:

• How: 4 interactive green zones.

• Where: At major intersections and near parks.

• How: The green zones will include digital screens displaying information about local biodiversity and green projects, as well as charging stations for electric vehicles.

 3D Connectivity:

• 5 3D elements.

• Where: At the beginning and end of the boulevard and major intersections.

• How: Interactive sculptures and LED lighting to create a modern and attractive urban environment with 3D screens displaying information about the city.

General Grigore Bălan Boulevard

Communication Platforms:

• How many: 5 digital platforms.

• Where: At main intersections and near administrative buildings.

• How: Digital platforms for residents' feedback and to express their opinions about urban development, with the possibility to participate in surveys and questionnaires.

 3D Recreation Zones:

• 4 interactive recreation zones.

• Where: Near parks and shopping centres.

• How: Recreation areas with 3D elements such as interactive games and virtual adventure parks, with fitness equipment and digital playgrounds.

Interactive Mobility:

• 8 Interactive Information Points.

• Where: At every bus stop and major intersection.

• How: Interactive navigation systems provide real-time bus route information and travel options with digital displays and interactive maps.

Grănicerilor Boulevard

 Digital Interaction:

• How many: 6 interactive panels.

• Where: Every 300 meters along the boulevard.

• How: Interactive panels mounted on street light poles provide information about the avenue's history, tourist attractions and local events.

 Interactive Green Zones:

• 4 interactive green zones.

• Where: At major intersections and near parks.

• How: The green zones will include digital screens displaying information about local biodiversity and green projects, as well as charging stations for electric vehicles.

3D Connectivity:

• How many: 5 3D elements.

• Where: At the beginning and end of the boulevard and major intersections.

• How: Interactive sculptures and LED lighting to create a modern and attractive urban environment with 3D screens displaying information about the city.

We estimated the number of interactive panels, green zones and 3D elements based on factors such as the length and importance of each boulevard, the flow of people and urban density.

These proposals are designed to create a modern, interactive and sustainable urban environment on Republicii Boulevard, Independence Boulevard, Decebal and General Grigore Bălan boulevards in Bistrița and Grănicerilor Boulevard in Năsăud. A secondary urban axis, Bistrița-Beclean-Năsăud-Sângeorz-Băi, is thus formed within the urban axis Bistrița-Năsăud.

The development of a secondary urban axis, Bistrița-Beclean-Năsăud-Sângeorz-Băi, within the Bistrița-Năsăud urban axis is part of a long-term strategic planning. It aims to create an integrated urban network to support regional development and improve the quality of life for all inhabitants of the county.

This is why the 3D projects are initially concentrated in Bistrița and Năsăud, and as resources and experience accumulate, they will be extended to other towns such as Beclean and Sângeorz-Băi.

4. CONCLUSION

Streets are the most plentiful and dispersed urban open spaces. They are the place where a significant part of the life of a city happens. The configuration of avenues and the three-dimensional environments that surround them—collectively known as streetscapes—play a crucial role in shaping urban livability.

Streetscapes are the "open-air Romos" one experiences when turning the corner or venturing out of the entryway into the road. While streetscape configuration is influenced by horizons, the general extent and size of these spaces are controlled by the geometry of structures, and at times, trees, which are the largest and most visually prominent elements in urban settings.

Thus, green streets differ from conventional streets because they include stormwater treatment facilities and emphasise multiple benefits such as the promotion of pedestrian safety and aesthetic qualities of the environment by

incorporating larger (permeable) landscape areas and narrower roads. Types of stormwater treatment facilities vary according to the needs of specific locations and the available space in the right-of-way. Thus, green streets can be considered as a sustainable development approach, fulfilling a variety of environmental, social, and economic objectives so that cities may be more apt to implement green streets with a reduced concern for overconsuming resources and digital interconnections, the streetscape 3D.

They also maintain all functions of conventional streets by forming the image of a city, connecting destinations, and improving the flow of water. This naturally leads to the study of urban livability at the street level.

Green streets should be understood as an approach with multiple visions which include stormwater treatment, green infrastructure, and sustainable development strategies.

Openness to the larger sense of what green street projects entail will enable planners and citizens to realise the potential benefits to surrounding communities and help in the planning and promotion of successful green street applications.

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CONVERGENCE BETWEEN THE WINE SECTOR AND RECREATIONAL TOURISM IN SUPPORT OF SUSTAINABLE LOCAL DEVELOPMENT IN THE REPUBLIC OF MOLDOVA

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ABSTRACT. – Convergence Between the Wine Sector and Recreational Tourism in Support of Sustainable Local Development in the Republic of Moldova. The morphological, climatic, and sociological conditions characteristics of the Republic of Moldova are favourable to the development of viticulture as a key component of the national economy. In the current context, the economic importance of viticulture can be enhanced through agritourism, rural tourism, gastronomic tourism, and leisure tourism. This new dimension of viticulture has the potential to contribute to the sustainable development of human communities by enabling the multifunctional use of local resources. One possible pathway to achieving this goal is the promotion of nature-friendly activities (such as ecotourism and farm-to-fork initiatives), in line with the principles of the circular economy.

Keywords: *favourability, viticulture, economy, ecotourism, resources, sustainable development.*

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1. INTRODUCTION

The tradition of vine cultivation and winemaking in the Republic of Moldova is a deeply rooted element of national culture, transmitted from generation to generation and contributing to the international recognition of Moldovan wines. The prestige enjoyed by Moldovan wines and grapes on regional and global markets stands as proof of the sector's quality and competitive potential. In addition, the added value of viticultural and oenological products serves as an incentive for investors, thereby stimulating the development of prosperous and sustainable businesses.

The presence of grapevines on this territory dates back to ancient times. The domestication and cultivation of wild forest grapevines most likely occurred during the Cucuteni–Trypillia culture (6th – 4th millennium BCE), which also encompassed present-day Moldova. The Greek colonies along the entire northern coast of the Black Sea (8th – early 7th century BCE) played a significant role in the development of viticulture and winemaking in the region, introducing new grape varieties - including those obtained through cross-breeding with local ones - and new techniques for vine cultivation and grape processing (Alexandrov & Găină, 2015).

With the spread of Christianity, wine became part of the Eucharistic ritual, and by the early medieval period, the first vineyards were established. In the 18th century, Dimitrie Cantemir, in the chapter „On the Plains and Forests of Moldova" from *Descriptio Moldaviae*, identified vine plantations as one of the greatest assets of Moldovan land (Găină, 2000, p. 7).

Following the annexation of Bessarabia by the Tsarist Empire, a large-scale colonisation process took place, especially in the southern part of the region, where settlers were granted preferential conditions (agricultural land, tax exemptions, etc.). As a result, the area attracted Germans, Bulgarians, Gagauz, Greeks, Armenians, and French settlers, who introduced new grape varieties and different cultivation and processing technologies. By 1861, colonists owned 11.8% of the total vineyard area in Bessarabia.

A major role in the development of the sector was played by the Bessarabian College of Viticulture, established in 1842 as a horticultural school and later transformed in 1891 into a college specialising in viticulture and winemaking. The experimental station attached to the college was the only scientific research centre for viticulture and winemaking in Bessarabia (Wine of Moldova, Wine of Moldova, 2024).

The political and social events of the first half of the 20th century – World War I, the Russian revolutions, the formation of the Moldovan Democratic Republic, the integration into a new socio-economic framework after unification with Romania, and World War II – had a negative impact on the development of viticulture (Găină, 2000, p. 7).

After World War II, the USSR invested in the establishment and development of viticultural research centres subordinated to the Academy of Sciences. The Moldovan Scientific Research Base, which began operations in 1947, initially had only one institute – History, Language, and Literature (dating from 1938–1939) – alongside seven research sectors, including botany, geology, viticulture, and fruit-growing. In 1950, the Institute of Fruit Growing, Viticulture and Winemaking was founded (Academia de Științe a Moldovei, n.a.).

Until 1991, research, breeding, and production activities were oriented toward the preferences of the Soviet Union, both in terms of grape varieties and the quantity and quality of production. Table grape varieties and sweet or semi-sweet wines – predominantly white – were favoured. During this period, hybrid grapevines were gradually replaced with noble varieties, leading to increased diversity, quality, and market appeal. This transition also stimulated the emergence of numerous nurseries and viticultural research centres dedicated to grafting, acclimatisation, and the development of new varieties.

By the early 1980s, the Moldavian Soviet Socialist Republic (MSSR) ranked sixth globally – after Spain, Italy, France, Portugal, and Romania – in terms of vineyard area, total grape production, and wine output. On 16 May 1985, the Supreme Soviet of the USSR issued a decree titled On Measures to Eradicate Drunkenness and Alcoholism, and the Production of Surrogate Alcohol. As a result, between 1985 and 1987, 30% of Moldova's vineyards were destroyed – more than were lost during military operations in World War II.

Following the dissolution of the USSR and the attainment of independence, this vital economic sector of the Republic of Moldova underwent numerous reforms and faced significant challenges. Its fluctuating evolution can be attributed to unstable markets and shifting consumer preferences. In 1992, Moldova became a member of the International Organisation of Vine and Wine (OIV), and in 1994, the Moldovan Parliament adopted the Law on Vine and Wine. Later, in 2013–2014, the National Office for Vine and Wine (ONVV) was established (Wine of Moldova, 2024b).

Currently, research in viticulture is conducted under the National Institute for Applied Research in Agriculture and Veterinary Medicine (Government Decision No. 668 of 25.09.2024), which includes the Department of Food Industry and Winemaking and the Centre for Implementation and Production in Winemaking.

A historical overview of Moldovan viticulture reveals that vines and wine have always played a vital role in the territory's cultural and socio-economic development, consistently contributing to local prosperity.

2. THE WINE SECTOR IN THE REPUBLIC OF MOLDOVA

In 2024, Moldova's vineyard area stood at 120.2 thousand hectares, representing a 53% decrease compared to 1985—a loss of 135.8 thousand hectares. However, an analysis of the past five years indicates a slight recovery and increase in vineyard area in 2024 compared to 2021, 2022, and 2023.

Table 1. Evolution of vineyard areas

Year	1980	1985	1990	1995	2000	2005	2010	2015	2020	2021	2022	2023	2024
Area, 1000 ha	256	220	201	186	149.1	148.2	144.9	135.4	121.2	117.5	116.5	115.1	120.2

Data source: Statistical Yearbook of the Republic of Moldova, 2024
(National Bureau of Statistics of the Republic of Moldova, 2024)

An analysis of the fluctuations in vineyard surface area over time reveals four distinct stages.

Stage I (1980–1995) coincides with the decline and collapse of the USSR and the onset of the transition toward a market economy. During this period, the main causes of the reduction in vineyard area were:
- Gorbachev's anti-alcohol campaign, which led to the dismantling of large areas of vineyards;
- The shift to a market economy and the loss of traditional sales markets following the dissolution of the USSR;
- The privatisation of agricultural land, which resulted in the fragmentation of vineyard holdings and a drop in production, with many vineyards—particularly those owned by private individuals—being abandoned.

Stage II (1995–2000) was marked by the transition from a centrally planned economy to a market economy, structural reforms, economic crises, and gradual integration into the global economy. The main factors behind the continued decline in vineyard area included:
- Economic downturns, high inflation, and rising unemployment, which triggered the emigration of skilled labour previously engaged in vineyard maintenance;
- The 1998 economic crisis in the Russian Federation, which severely affected the Moldovan economy by reducing exports—Russia being the main importer of Moldovan wines.

Stage III (2000–2020) was characterised by moderate economic recovery and market diversification. Key developments affecting the viticulture sector during this stage included:

-   The Russian embargoes of 2006 and 2013–2014, which resulted in the loss of major export markets, economic losses, abandonment of some vineyards, repurposing of land, and a shift toward other agricultural sectors;
-   The redirection of wine exports toward new markets, particularly within the European Union. During this period, Moldova signed trade agreements with the EU, culminating in the 2014 EU–Moldova Association Agreement;
-   The modernisation of the wine sector and increased investment in infrastructure. A process began of replacing ageing, low-quality vineyards with more productive grape varieties, albeit on smaller plots of land;
-   The development of wine tourism (Government Decision No. 554 of 24 May 2004 on the approval of the National Tourism Programme *„The Wine Route in Moldova"*, Official Gazette No. 88–90, Article 700, dated 4 June 2004).

Stage IV (2020–2023) corresponds to the COVID-19 pandemic, during which wine demand fell significantly while maintenance costs rose, leading to a further reduction in cultivated vineyard areas.

Starting in 2024, a noticeable increase in vineyard surface area has been recorded, rising from 115.1 thousand hectares in 2023 to 120.2 thousand hectares. This growth can be attributed to several key factors: the implementation of European and local agricultural support programmes aimed at vineyard replanting; the expansion of exports to the European Union and the diversification of target markets; increased domestic and foreign investment in the sector; the introduction of new grape varieties, particularly table grapes in high demand for export; and, not least, the growing popularity of wine tourism.

At present, the Wine Register of the National Office for Vine and Wine lists 249 registered viticultural units, which together account for 61,054 hectares of vineyards, including table grape varieties (Wine of Moldova, n.d.). The remaining vineyard area is held by unregistered enterprises and private individuals, who generally show limited interest in the touristic valorisation of these resources.

In this context, viticulture in the Republic of Moldova exerts a significant influence on major economic indicators. This sector not only contributes to the growth of national GDP but also plays a key role in regional development by attracting investment and generating employment opportunities. Owing to its

specific nature, viticulture is closely linked to a range of other economic sectors. Complementary areas that support viticulture in the context of local development include: agriculture (particularly livestock and apiculture), industry, transportation, tourism, education, training and research, as well as marketing and branding.
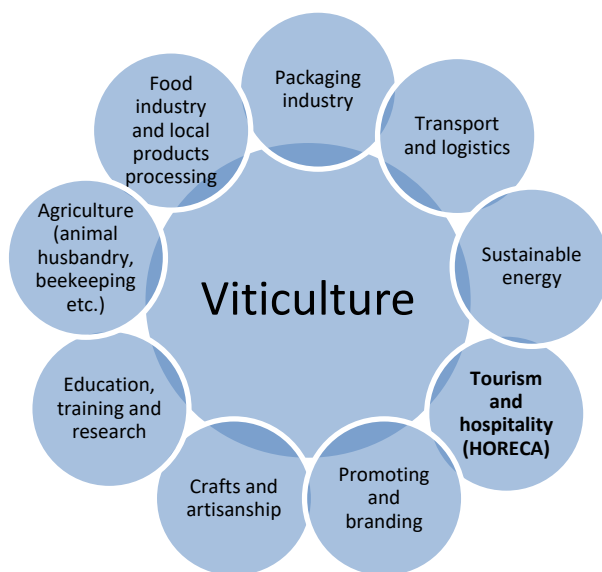
Fig. 1. Fields of activity complementary to viticulture.
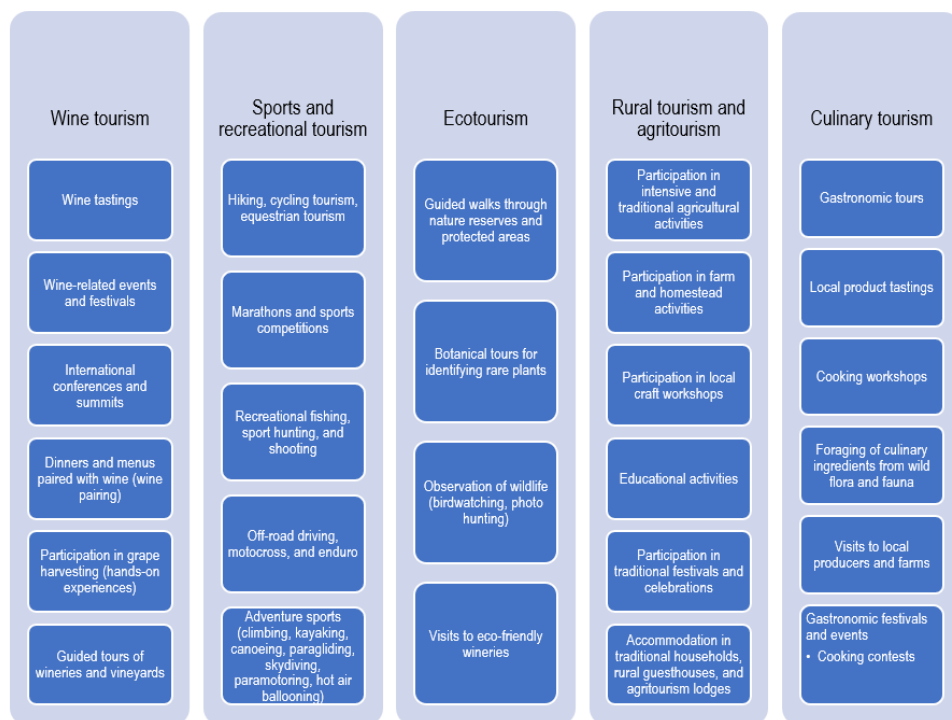*Source: the authors.*

For sustainable and efficient local development, as many of the aforementioned sectors as possible should be integrated, depending on local specificities and available resources. Viticulture and winemaking play a crucial role in supporting and advancing rural communities by providing a stable source of income for populations living in vine-growing areas and by enabling the valorisation of local products and potential through short supply chains.

Sustainable local development through viticulture—and, by extension, through tourism anchored in this sector—requires the balanced use of local resources to foster economic growth, improve the living standards of local communities, protect the environment, and preserve cultural identity.

Viticulture and tourism are inherently compatible and can function together as drivers of sustainable economic development, with each reinforcing the growth of the other. In this context, modern wineries do more than produce quality wines—they also contribute to the economic and cultural development of their regions by attracting visitors.

A viable strategy for the sustainable development of rural agricultural regions involves combining wine tourism with sports tourism, rural tourism, and ecotourism. A successful winery visit should not be limited to wine tasting alone, but should offer a broader range of recreational activities, including guided vineyard tours, wine tastings, outdoor activities, events, and festivals.

**Fig. 2.** Sustainable tourism-related activities.
Source: the authors.

Combining these various forms of tourism has the potential to transform wine-growing regions into fully developed tourist destinations. To ensure the successful implementation of such an integrated strategy, the following actions are required:
- Development of comprehensive tourism packages, which involves collaboration between wineries, tour operators, and local public administrations;
- Creation and expansion of tourism infrastructure, including environmentally friendly facilities such as marked trails, camping areas, and eco-friendly guesthouses;

- Support for eco-friendly local producers through fiscal policies and subsidy schemes;
- Promotion and branding of destinations and sustainable tourism activities to enhance visibility and attract responsible visitors;
- Promotion of sustainable development through education and awareness campaigns targeting both tourists and local communities, emphasising environmental protection and responsible consumption.

An important factor in the development of tourism is the availability of accommodation in various regions of the Republic of Moldova. An analysis of the map below reveals that accommodation facilities are not evenly distributed, being concentrated mainly in the Chişinău metropolitan area (Centre), the Autonomous Territorial Unit of Gagauzia, and Cahul District (South). Most of these are large-scale establishments, such as hotels.

To ensure more balanced tourism-driven economic development, it is essential to invest in small-scale accommodation facilities, such as rural guesthouses and rural tourism lodges, which are far more suitable for ecotourism and recreational activities than large hotels.
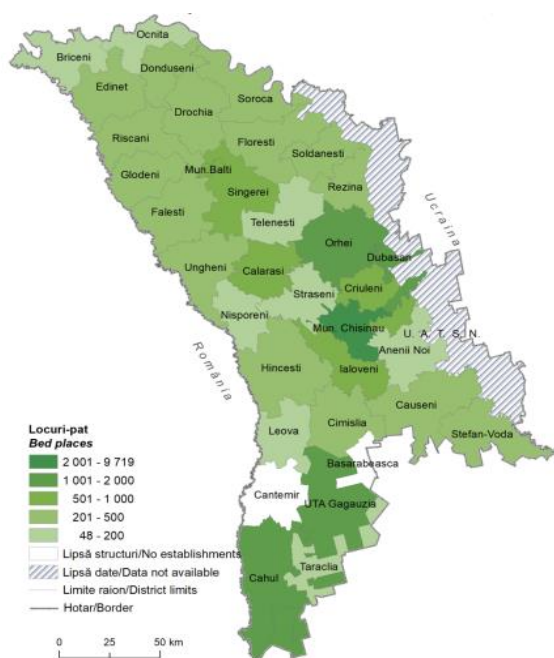
Fig. 3. Number of bed-places in accommodation facilities, in 2023
(map source: *https://statistica.gov.md/ro/numarul-de-locuri-pat-in-structurile-de-cazare-9947_60207.html#gallery-1)*

3. WINERIES IN THE REPUBLIC OF MOLDOVA

In the present study, a sample of 52 wineries and vineyards was selected, all of which, in addition to their wine production activities, exhibit genuine and exploitable tourism potential. The selection criteria included: the existence of visitor facilities (tasting rooms, guided tours, accommodation or food services); involvement in themed events (festivals, wine tours, cultural initiatives); and inclusion in regional or national tourism networks or routes, such as the *Wine Route* (*Drumul Vinului*).

This selection is aligned with the study's main objective: to investigate how wineries can contribute to local development not only through production, but also by integrating into the rural tourism, agritourism, and ecotourism economy. The chosen wineries represent relevant examples of convergence between tradition, local entrepreneurship, and tourist appeal, and most effectively illustrate the potential for sustainable development in the rural areas of the Republic of Moldova.
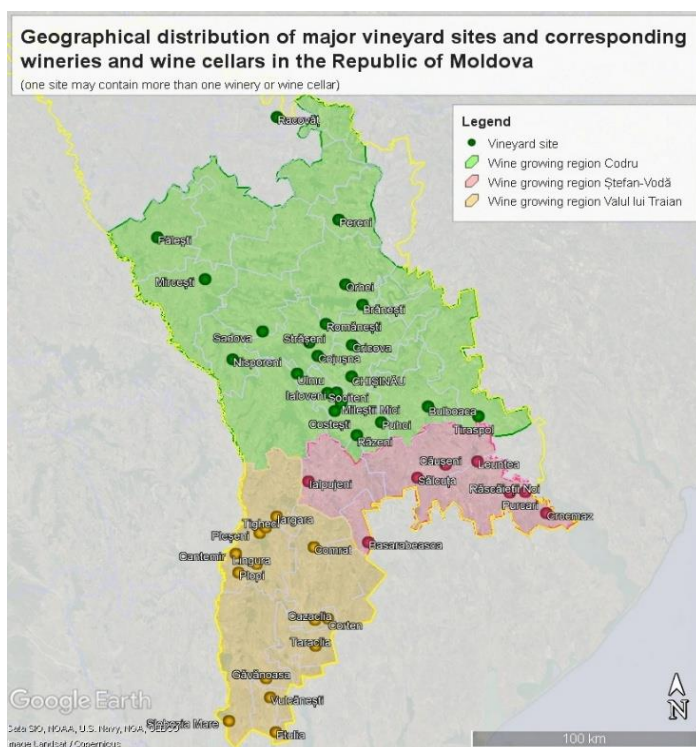
Fig. 4. Wine regions in the Republic of Moldova.
(Data source: *https://rvv.gov.md/homepage.jsf*)

97

The subsequent analysis focuses on these 52 wineries as representative case studies, offering a clear perspective on the contribution of the wine sector to the diversification of the local economy, job creation, and the promotion of Moldova's image as a wine tourism destination.

The wineries included in the study are located within the three officially recognised viticultural regions of the country. As one notices, the largest number is concentrated in the Codru wine region, situated in the central part of the Republic of Moldova.

As illustrated in the chart below, the emergence of wineries has evolved over time in response to various socio-economic and political contexts. Specifically, 10 wineries were established during the Tsarist Empire, 9 were founded during the Soviet era, and 33 have emerged since 1991. This significant growth in recent decades can be attributed to new market opportunities and increased access to distribution channels.
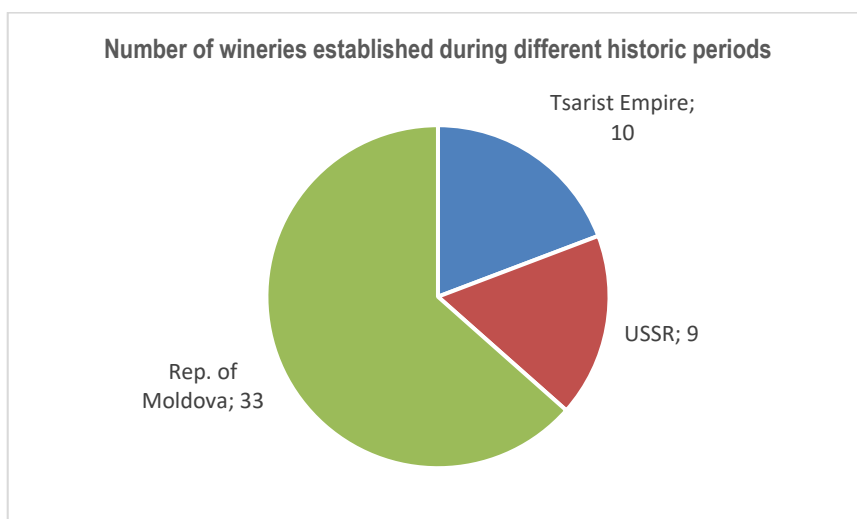
Fig. 5. Most wineries in the Republic of Moldova have been established after the country became an independent state.
(Data source: *https://wineofmoldova.com/ro/vinariile-din-moldova/*)

The chronological evolution of winery establishment in the Republic of Moldova during the post-Soviet period reveals a remarkable consistency, with at least one new winery founded each year (with few exceptions). This trend reflects a sustained interest in viticultural entrepreneurship and stands as evidence of the country's enduring potential in the wine sector.
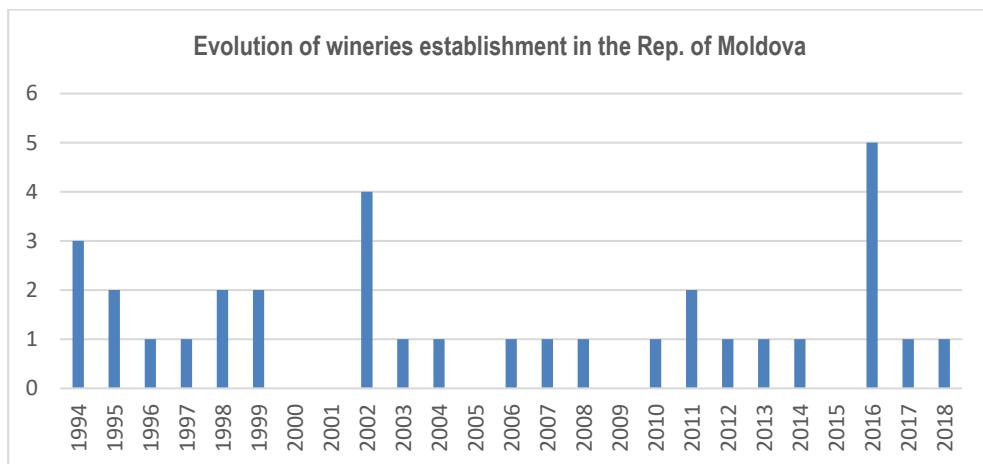
Fig. 6. The establishment of new wineries in the Republic of Moldova is linked to
political decisions and economic trends.
(Data source: *https://wineofmoldova.com/ro/vinariile-din-moldova/*)

However, several annual peaks or particularly prolific periods can be
observed within this evolution. The first surge followed the privatisation and
liberalisation of the economy, which led to the acquisition of former state-
owned production facilities and their re-launch as private enterprises. These
new entities continued to benefit from access to external markets within the
post-Soviet space, particularly the Commonwealth of Independent States (CIS).

The second peak, recorded in 2002, coincided with a period of moderate
recovery across Moldova's economic sectors and growing market diversification.
However, the orientation remained largely eastward, with the first Russian
embargo occurring only in 2006.

The third notable peak in the establishment of new wineries occurred in
2016, following the 2014 signing of the Association Agreement between the
Republic of Moldova and the European Union, along with the accompanying Deep
and Comprehensive Free Trade Area (DCFTA). These agreements encouraged the
revitalisation of economic sectors affected by the Russian embargo, including
viticulture, by granting Moldovan producers access to the EU single market.

An analysis of vineyard surface area cultivated by the wineries included
in this study reveals a clear prevalence of medium-sized vineyards, with
holdings between 100 and 500 hectares (19 wineries). These are followed—at
a considerable distance—by small-sized vineyards (10–50 hectares, 10
wineries). Together, these two categories account for more than half of the total

cultivated vineyard area. The remainder of the vineyard stock is distributed among very small vineyards (0–10 hectares, 6 wineries), small-to-medium vineyards (50–100 hectares, 4 wineries), large and very large vineyards (500–1000 hectares and over 1000 hectares, 6 and 7 wineries, respectively).
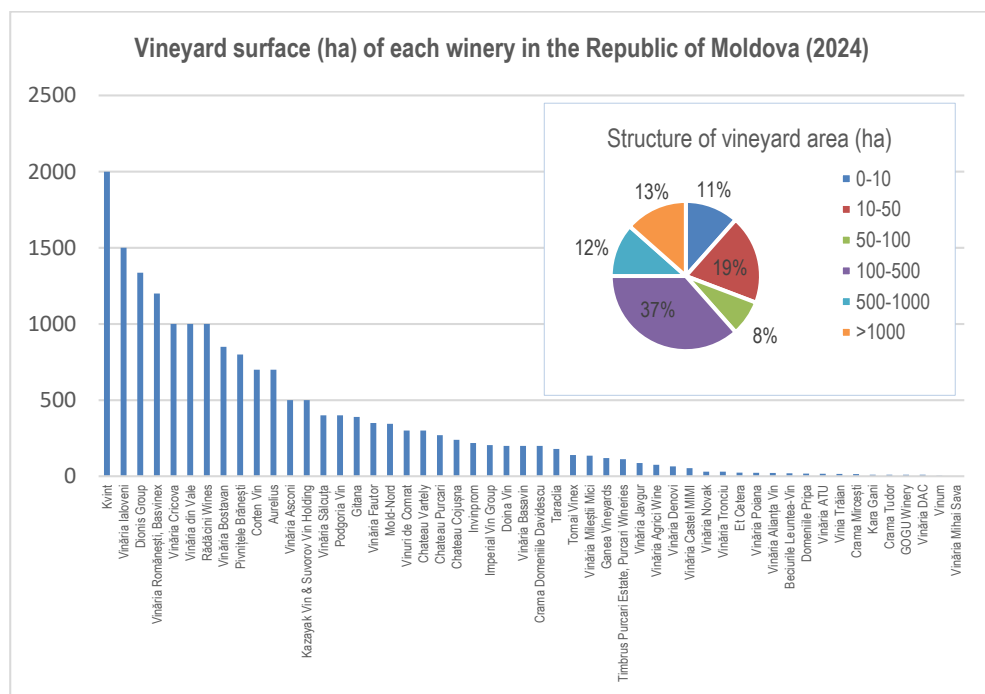

Fig. 7. A relative majority of vineyards in the Republic of Moldova consists of medium-sized plantations (37%) which, together with large and very large vineyards, represent roughly two thirds of all wineries.
(Data sources*: https://wineofmoldova.com/ro/vinariile-din-moldova/*)

It is also worth noting that the general trend in vineyard surface area per production unit is one of growth. At the same time, recent years have seen an increase in the number of wineries with very small and small holdings, indicating a marked expansion of family-based entrepreneurial ventures in the wine sector.

From a geographical perspective, all large and very large vineyards are located in the Codru (8 vineyards) and Valul lui Traian (5 vineyards) wine regions. Meanwhile, the majority of medium-sized vineyards are found in Valul lui Traian (9 vineyards), with the other two regions—Codru and Ștefan-Vodă—each hosting 5 vineyards in this category.

At the regional level, Codru displays the most balanced distribution across vineyard size categories, with proportions ranging from 8% to 21%, and three size categories each representing approximately one fifth of the total cultivated surface. This balanced distribution is partly due to the significantly larger size of the Codru wine region. By contrast, in the smaller regions of Ștefan-Vodă and Valul lui Traian, vineyards with areas between 100 and 500 hectares account for 50% of the total cultivated area in each region.
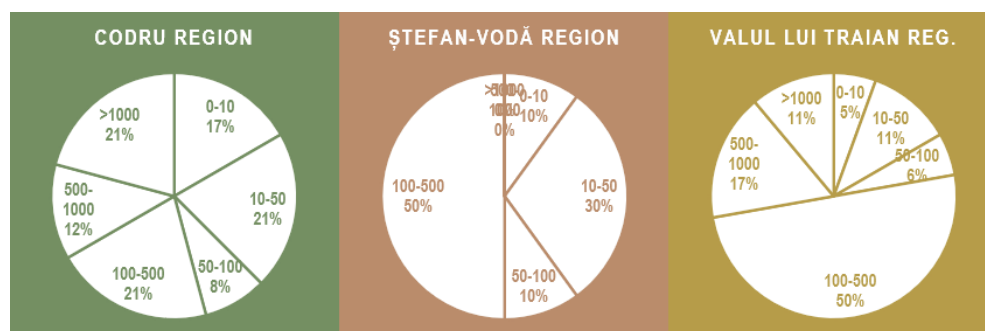
Fig. 8. Structure of vineyards by size (ha) in the main three vinegrowing
regions of the Republic of Moldova.
(Data source: *https://wineofmoldova.com/ro/vinariile-din-moldova/*)

The diversity of wine assortments offered by the 52 analysed wineries constitutes a key factor in enhancing their tourist appeal. In addition to white and red wines—which make up the core offering for most producers—a significant number of wineries have expanded their portfolios to meet the varied preferences of consumers and, by extension, potential visitors.

Specifically, 40 wineries produce rosé wines, valued for their freshness and light character, making them ideal for tastings during the warmer seasons and for younger or international audiences. Additionally, 18 wineries offer sparkling wines, which lend a festive and refined dimension to the visitor experience, often associated with special events and themed tours. A smaller yet noteworthy group of 9 wineries produce wine-based spirits (certified nationally under the name *"divin"*), thereby appealing to tourists interested in more complex products. Also notable is the case of one winery that produces orange wine, a niche, innovative product that may attract visitors seeking authentic and rare experiences.

This product diversification enhances the tourism potential of wineries by offering a broader range of personalised tasting experiences, thus increasing their competitiveness within the wine tourism sector in the Republic of Moldova.

Another important factor in the development of wine tourism is the availability of leisure and recreational opportunities, which may either be offered directly by the wineries themselves or be present in the surrounding area—complementing the oenological experience and contributing to the overall attractiveness of the destination. These activities may be integrated into the wineries' own tourism concepts or exist independently in their vicinity, forming additional points of interest for visitors.

For wineries that have invested in tourism infrastructure, recreational activities include guided vineyard tours, bicycle or carriage rides through the vineyards, outdoor picnics, creative workshops (such as traditional cooking, wine painting, or souvenir making), open-air concerts, vineyard film screenings, and even yoga or wellness sessions set in vineyard landscapes. Such experiences elevate simple wine tasting into memorable events with added recreational and cultural value.

Furthermore, the picturesque locations of many wineries—near natural, historical, or cultural landmarks such as monasteries, fortresses, caves, nature reserves, or villages with traditional architecture—offer additional opportunities for developing leisure routes for tourists. Collaboration between wineries and other local stakeholders (such as tour guides, guesthouses, and cultural centres) can lead to the creation of integrated tourism packages, which help extend visitors' stays and increase the economic impact on local communities.

As shown in Table 2, approximately half of the wineries included in the study offer specific, industry-related tourism services (restaurant, wine tasting, guided tours), with several including also lodging facilities. The table also highlights the leisure opportunities available in the vicinity of each winery, serving as a reference point for winery managers who have yet to develop tourism-related activities, as well as for prospective visitors. Regarding these opportunities, cycling, hiking, and free fishing are, unsurprisingly, the best-represented outdoor activities, as they require basic infrastructure and can be performed in a variety of landscapes. Other activities, on the other hand, while still practicable, necessitate a more complex infrastructure (waterjet, swimming, horseback riding, paragliding) or particular geographical features (motocross, climbing, kayaking, photo-hunting).

Table 2. Facilities, services and leisure possibilities in each winery

	Name (established)	Facility type	Tourist services offered	Local leisure possibilities
1	**Vinăria Agrici Wine** (1958)	Wine production		
2	**Vinăria Alianța Vin** (1994)	Wine production		
3	**Vinăria Asconi** 1994	Wine cellar		
4	**Vinăria ATU** (2016)	Wine cellar, restaurant		
5	**Aurelius** 2018	Wine cellar		
6	**Beciurile Leuntea-Vin** (1817)	Wine cellar, restaurant, wine tasting room, showroom		
7	**Vinăria Castel MIMI** 1893	Wine cellar, restaurant, showroom, pool		
8	**Chateau Vartely** (1996)	Wine cellar, restaurant, showroom, sauna		
9	**Crama Mircești** (2011)	Wine cellar, showroom, restaurant		
10	**Crama Tudor** (2007)	Wine cellar, showroom, restaurant		
11	**Vinăria Cricova** (1952)	Wine cellar, restaurant, showroom		
12	**Chateau Cojușna** (1995)	Wine cellar, restaurant, showroom		
13	**Domeniile Pripa** (2016)	Wine cellar, showroom, restaurant, playground		

	Name (established)	Facility type	Tourist services offered	Local leisure possibilities
14	Et Cetera (2002)	Wine cellar, hotel, showroom. restaurant, playground, pool		
15	GOGU Winery (2011)	Wine cellar, restaurant, showroom, wine tasting room		
16	Kara Gani (2006)	Wine cellar, lodging, restaurant, showroom		
17	Kvint (1897)	Wine cellar, showroom, restaurant		
18	Vinăria Mihai Sava (2016)	Wine cellar, restaurant, showroom		
19	Vinăria Mileştii Mici (1969)	Wine cellar, restaurant, showroom		
20	Vinăria Novak (2004)	Wine cellar, restaurant		
21	Podgoria Vin (1999)	Wine cellar, restaurant		
22	Vinăria Poiana (1975)	Wine cellar, restaurant, lodging		
23	Chateau Purcari (1827)	Wine cellar, showroom, restaurant, lodging		
24	Pivniţele Brăneşti (2016)	Wine cellar, wine shop, restaurant, wine tasting rooms		
25	Vinăria din Vale (2002)	Wine cellar, wine tasting rooms		
26	Vinăria Javgur (1957)	Wine cellar, wine tasting rooms, showroom, restaurant, gazebo		

	Name (established)	Facility type	Tourist services offered	Local leisure possibilities
27	**Vinăria Tronciu** (2017)	Wine cellar, restaurant, showroom		
28	**Vinia Trăian** (1975)	Wine cellar, restaurant, showroom		
29	**Vinuri de Comrat** (1897)	Wine cellar, showroom, restaurant		
30	**Vinăria Basavin** (1913)	Wine cellar, restaurant, lodging		
31	**Corten Vin** (2003)	Wine cellar		
32	**Dionis Group** (1998)	Wine cellar		
33	**Doina Vin** (1875)	wine cellar		
34	**Crama Domeniile Davidescu** (2002)	wine cellar		
35	**Vinăria Fautor** (1997)	wine cellar		
36	**Gitana** (1999)	Wine cellar, showroom		
37	**Ganea Vineyards** (2014)	wine cellar		
38	**Imperial Vin Group** (1977)	Wine production		
39	**Invinprom** (1978)	Wine production		
40	**Holding Kazayak Vin and Suvorov Vin** (1958, 1998)	Wine production		
41	**Mold-Nord** (1994)	Alcoholic and non-alcoholic beverages production		
42	**Rădăcini Wines** (2010)	Wine cellar		
43	**Vinăria Sălcuța** (1995)	Wine cellar, showroom		

	Name (established)	Facility type	Tourist services offered	Local leisure possibilities
44	**Timbrus Purcari Estate, Purcari Wineries** (2008)	Wine production		🚴 🚶 🎣 🛶 📷 ⛵
45	**Tomai Vinex** (1903)	Wine production		🚴 🚶
46	**Vinăria Bostavan** (2002)	Wine production, showroom, wine tasting centre	👥 🍷	🚴 🚶 🎣 🛶 📷 ⛵
47	**Vinăria DAC** (2013)	wine cellar		🚴 🚶 🎣
48	**Vinăria Romaneşti, Basvinex** 1887 (1996)	wine cellar		🚴 🚶 🎣 🛶 📷
49	**Vinăria Denovi** (2012)	Wine production, showroom		🚴 🚶 🎣 🛶 📷 ⛵
50	**Vinum** (2016)	Wine production		🚴 🚶 🎣 🛶 📷 ⛵
51	**Taraclia** (1955)	Wine production		🚴 🚶
52	**Vinăria Ialoveni** (1857)	Wine production		🚴 🚶 🎣 🛶 📷 ⛵

(Data source: *https://wineofmoldova.com/ro/vinariile-din-moldova/*)

LEGEND: Tourist services offered

🛏	Accommodation	⛵	Water recreational activities
🍴	Restaurant	🚌	Trips
👥	Guided tours	🚴	Cycling (own tracks)
🍷	Wine tasting	🔲	Personalized offers
🍇	Educational activities (production and harvesting)		

LEGEND: Local leisure possibilities

🚴	Cycling	🛶	Waterjet riding	🪂	Paragliding	🎈	Hot air ballooning
🚶	Hiking	🏍	Motocross	🔫	Shooting	🔫	Hunting
🎣	Fishing	🧗	Climbing	🍄	Foraging	🚙	Off-roading
🛶	Kayaking	🏊	Swimming	🛸	Drone racing	⛵	Pedal boating
📷	Foto hunting	🐎	Horseback riding	🌾	Farming	🏄	Windsurfing

Therefore, the leisure component is not merely optional, but a strategic pillar in strengthening the tourism supply of wineries. The integration of recreational activities within an authentic rural and viticultural setting transforms a winery visit into a multisensory experience and lays the groundwork for the sustainable development of wine tourism in the Republic of Moldova.

4. CONCLUSIONS

To ensure sustainable and efficient local development in the Republic of Moldova, it is essential to integrate viticulture with other forms of tourism— namely rural, ecological, sports, and gastronomic tourism—tailored to local specificities and available resources. Viticulture and winemaking not only support rural communities economically through stable incomes and short supply chains, but can also generate an amplified positive impact when combined with tourism.

The development of wine tourism requires the balanced use of local resources to support the economy, protect the environment, and preserve cultural identity. In this context, modern wineries are transforming into multifunctional destinations, serving not only as production centres but also as tourism hubs actively contributing to the revitalisation of rural regions. A viable strategy involves the diversification of visitor activities, ranging from tastings and guided tours to cultural events and outdoor experiences—creating well-rounded, memorable experiences for tourists.

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SUSTAINABLE TOURISM AND CULTURAL LANDSCAPE OF OCNA MUREŞ. OPPORTUNITIES FOR CAPITALIZING ON LOCAL RESOURCES

Ileana-Cristina VASILIȚĂ-CRĂCIUN[1]

ABSTRACT. – Sustainable Tourism and Cultural Landscape of Ocna Mureș. Opportunities for Using Local Resources. Ocna Mureş is an urban settlement notable for its long-standing history and natural salt resources, which have distinguished it within the surrounding cultural landscape. These characteristics offer significant and specific potential for the development of sustainable tourism. This paper aims to analyse the main elements of the local cultural landscape and explore how these – either individually or as an integrated whole – can be leveraged for tourism development. The goal is to promote economic growth and social development within the local community in an environmentally responsible manner, while also preserving cultural heritage for future generations.

Keywords: sustainable tourism, cultural landscape, sustainable development, Ocna Mureș, valorisation, resources.

1. INTRODUCTION. SUSTAINABLE TOURISM – CULTURAL LANDSCAPE. GENERAL CHARACTERISTICS

In order to highlight the fundamental features of the aforementioned theme, it was deemed necessary to examine the concepts of *sustainable tourism*, *sustainable development* and *cultural landscape.*

According to the World Tourism Organisation (2025), sustainable tourism is defined as "*tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry,*

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the environment and host communities". This form of tourism "*not only meets the needs of tourists and local populations in destination areas, but also contributes to safeguarding and enhancing future development opportunities. Resources are utilized to satisfy economic, social, and aesthetic needs, while simultaneously preserving cultural integrity, essential ecological processes, biological diversity, and life-supporting systems*" (World Tourism Organisation, 2025; Funck, 2020).

The implementation of the form of tourism defined above requires careful planning and execution, aligned with its specific demands and impacts.

"*The concept of sustainable development must be regarded as a continuous process of quality improvement, applicable equally to tourism in cities, resorts, rural and coastal areas, mountains, and protected zones, and relevant to all forms of tourism*" (Minciu *et al.*, 2010, p. 86).
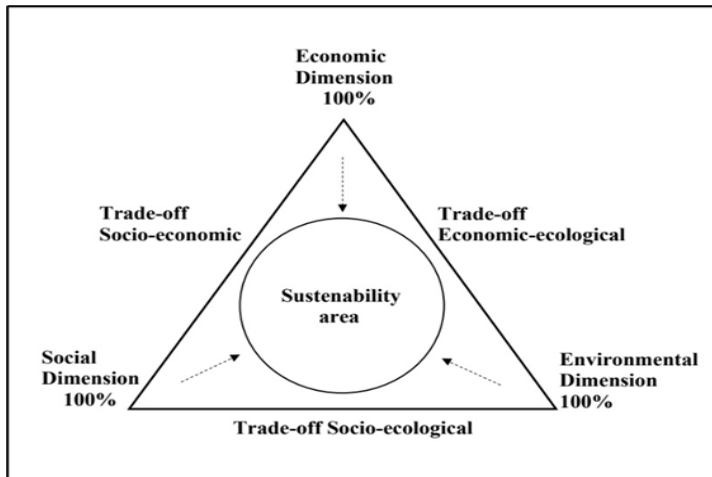
Fig. 1. The durability triangle.
Source: Dragulanescu Irina-Virginia and Dragulanescu Natalia, 2013, p. 49

Thus, sustainable tourism is intrinsically linked to the broader framework of sustainable development, which, according to the official website of the European Union for legislation (European Union, 2025) "was first defined in the **1987 Brundtland Report by the World Commission on Environment and Development**, entitled *Our Common Future*, as *development that meets the needs of the present without compromising the ability of future generations to meet their own needs*". This implies that "achieving sustainable development depends on the capacity of governance to ensure economic growth – where appropriate – that is compatible with social equity and the conservation of ecosystems, through a balanced compromise between economic, social, and environmental dimensions (Dragulanescu and Dragulanescu, 2013, p. 48) (fig. 1).

This approach highlights the fact that tourism development in a region inevitably generates certain changes, and to ensure that sustainability objectives are achieved, these must be monitored and adapted.

Achieving sustainable tourism requires optimal strategic planning and careful management of tourism activities, based on a set of principles, which according to the World Tourism Organization (2025) "*relate to the environmental, economic and socio-cultural aspects of tourism development, and it is essential to strike the right balance between these three dimensions to ensure long-term sustainability. Thus, sustainable tourism should:*

• make optimal use of environmental resources which are an essential element in tourism development, maintaining fundamental ecological processes and contributing to the conservation of natural heritage and biodiversity.

• Respect the socio-cultural authenticity of host communities, preserve the built and living cultural heritage, traditional values and contribute to intercultural understanding and tolerance.

• ensure long-term viable economic operations, providing socio-economic benefits to all stakeholders, equitably distributed, including stable employment, income opportunities and social services for host communities, thus contributing to poverty reduction".

At the same time, by developing a sustainable tourism management and promotion policy, tourism can help preserve the natural and economic stability of the environment. Furthermore, it makes rational use of the resources of local cultural landscapes, ensuring that they remain available for future generations.

Moreover, "*to this end, it is and will be in harmony with the environment, the people and the culture of the place, in such a way that its development is for their benefit and not to their detriment*" (Mazilu, 2007, p. 64). A fundamental paradigm shift is recommended: contemporary tourism has a responsibility to implement sustainable principles to ensure a positive long-term impact.

If we analyse the cultural landscape-tourism nexus, it is "*a complex relationship, the links between them manifesting themselves in both directions. On the one hand they represent the basic resources of tourism, and on the other hand tourism activity has an influence on the ecological environment, modifying its component elements*" (Boghean and Boghean, 2006, p. 44), whether natural or cultural.

A detailed examination of the cultural landscape reveals that it results from "*the successive alteration over time of the material habitat of a sedentary human society, which responds with increasing power and variety to the dynamic challenges of nature, the needs and desires of the society itself, and the historical circumstances of various regions in different periods. The origins of the concept lie in the landscape as a territorial descriptor, and later as a pictorial view and representation of a scene. The scientific concept of the cultural landscape developed*

111

from debates in academic geography in the early 20th century, offering a framework for understanding the changes humanity has made to the physical environment of the earth's surface" (Conzen, 2001, p. 3086-3092).

Consequently, "*cultural landscapes are considered a construct for describing the relationship between humans and nature in relation to space*" (Kühn and Danielzyk, 2006, p. 288). Thus, pragmatically, sustainable tourism, which plays a vital role in preserving and valorising natural and cultural resources, logically leads to the recognition of the cultural landscape's importance as the outcome of the human-nature interaction. This is essential for the harmonious development of local communities. Considering the direct relationship between these two concepts (cultural landscape and tourism), "*it can be stated that the cultural landscape is, in fact, a fundamental resource for tourism development, and that tourism always occurs in a space containing certain natural and cultural attractions*" (Mrda, 2015, quoted by Mrda, Bojanic and Scitaroci, 2016, p. 377), which must be preserved for prolonged and efficient capitalization.

2. OCNA MUREŞ – GEOGRAPHICAL CONTEXT

A careful analysis of the topographic map highlights the location of the town of Ocna Mureş on a hilly and floodplain area, in the north-eastern part of Alba County, on the left bank of the middle course of the Mureş River.
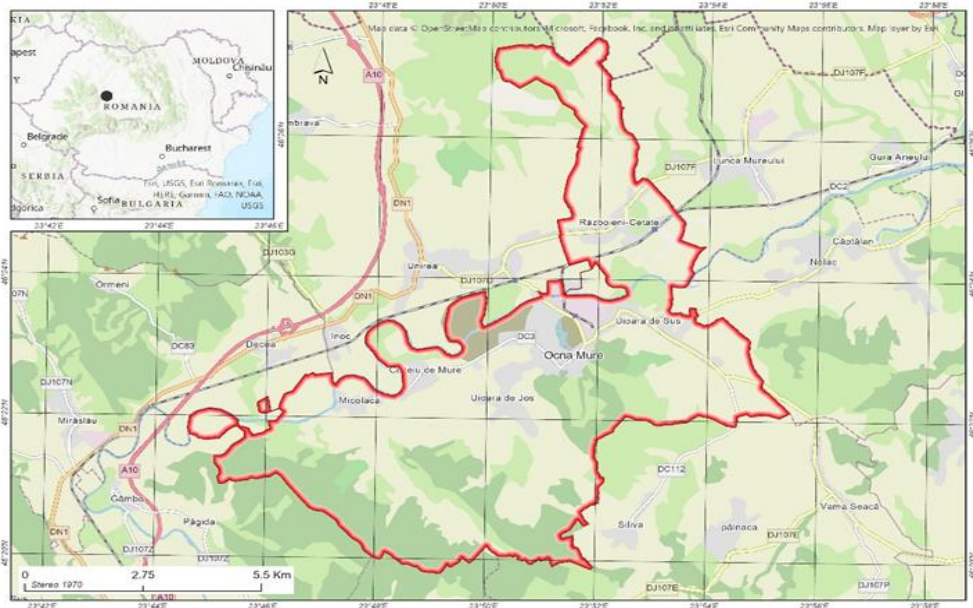
Fig. 2. Map of Ocna Mureș.
Source: the author

The western boundary of the city is defined by the Alba Iulia-Turda Corridor, the northern boundary by the Mureş Corridor, the southwestern boundary by Ciungi Hills (Nejoapa Hill), and the southern boundary by the summit of Banța Hill.

Administratively, in addition to the urban area itself, the city includes the following villages: Uioara de Sus, Uioara de Jos, Cisteiu de Mureş, Micoşlaca, and Războieni-Cetate.

2.1. Short history

The considerable salt resources in the crust were the main factor in the early anthropisation of this area.

Ocna Mureş has been known as a settlement since the Dacian-Roman era, when it was called *Salinae* and was established as one of the largest salt mining settlements in Dacia. In medieval times, the settlement was first documented in 1280. After a period of reduced activity, it became the most significant salt mining settlement in Transylvania during the 18th and 19th centuries (Vlăsceanu and Ianoş, 1998, p. 386).

This area was "*by the end of the 19th century, the centre of the chemical industry with the creation of the Chlorosodic Products Enterprise, one of the first of its kind in Europe*" (Morariu, Bogdan, and Maier, 1980, p. 110).

Additionally, the utilization of natural resources, represented by concentrated saline waters, contributed to the diversification of the urban functions, with the development of its balneoclimatic component, which fostered the growth of Ocna Mureş resort. This evolved into an important treatment centre, relying on the therapeutic use of saline waters.

2.2. Natural setting

From a geological perspective, the Ocna Mureş area "*is located in a highly folded region with a sequence of anticlines and synclines. A fault approximately 20 km long, situated beneath the Mureş floodplain, running parallel to the river's course, specifically N 70°–80° E, has been highlighted through geological research*" (Bican-Brişan and Petrescu, 2006, p. 26). Thus, the visible morphology is characterized by a relative variety, expressed through the range of surface irregularities typical of the hills and plateaus extending nearby in the form of the Transylvanian Plain and the Târnave Plateau. This is complemented by the fluvial microforms, developed over time by Mureş River.

The latitudinal location of the Ocna Mureş urban area dictates the manifestation of a temperate continental transition climate, within which the permanent westerly winds give the western circulation a dominant presence.

"*There are slight local nuances, characterized by moderately warm summers and less severe winters. The wide Mureș River Corridor favours the penetration of air from both directions, depending on the season and the air circulation type*" (Vigh, 2013, p. 15).

Additionally, local foehn winds, "*specific to the Alba Iulia-Turda depression corridor, cause temperature increases, reduce precipitation to below 600 mm annually, and lead to early spring thawing throughout the Mureș Floodplain*" (Capar Roxana Aybuke, 2017, p. 7). As a consequence of the manifestation of the aforementioned local warm wind, "*there are situations, however, when, due to abundant precipitation, rapidly melting snow in the mountains, and the slight slope of the drainage, the Mureș River overflows, flooding the minor and major floodplain*" (Mocean and Cenar, 1980, p. 21).

The thermal regime of the area is characterized by "*an average annual temperature that oscillates around +9°C; the average temperature for July is around +20°C, and for January, it is -4°C*". (Vigh, 2013, p. 16).

The hydrology is dominated by the Mureș River, with "*a low average flow slope (0.5–0.7 m/km), which causes it to meander and create small sandy beaches. The annual discharge at Ocna Mureș is 71 m³/s*" (Dobra, 1996, p. 8), with significant variations depending on the pluviometric regime and the snowmelt from the upper drainage basin. "*The absolute maximum discharge was recorded during the flood of 1970, when it reached 1580 m³/s, while the minimum discharge was 5 m³/s (January 1954)*" (Arghiuș and Ozunu, 2005, p. 185).

Regarding the existing lakes, "*the genesis of the Ocna Mureș lake complex is of anthropogenic nature, with the lakes here being the result of repeated collapses and sinkings of the ceilings of the old mining galleries, followed by the filling of the formed voids with water*" (Toma, 2012, p. 11).

From a pedological perspective, "*on the right bank of the Mureș River, as well as in the neighbouring Fărău area, 'regosols' are found, while the actual urban area of the city consists of brown soils and clay soils; in the Mureș Valley, alluvial soils are encountered, which have formed through repeated flooding*" (Petcu, Călin, and Vich, 2009, p. 117). The main resources "*include clay, bentonite, and salt*" (*Județele României Socialiste*, 1972, p. 31). After the flooding that led to the submersion of the salt mine and the inability to exploit the resource further, salt "*is now extracted in the form of brine through wells, with the salty water being transported via salt tubes to the processing site*" (Mocean and Cenar, 1980, p. 25).

The local biodiversity is strictly influenced by the relief and climate of the temperate zone. The presence of shrubs is notable: blackthorn (*Prunus spinosa*), hawthorn (*Crataegus monogyna*), wild rose (*Rosa canina*). There are also deciduous trees: carob (*Ceratonia siliqua*), oak (*Quercus robur*), walnut (*Juglans regia*), at higher altitudes and in combination with conifers, such as Scots pine

(*Pinus sylvestris*), and shrubs: blackthorn (*Prunus spinosa*), hawthorn (*Crataegus monogyna*), and wild rose (*Rosa canina*). Furthermore, the diverse fauna of the area offers favourable conditions for practicing forms of sports tourism, such as hunting and fishing. It also represents a natural setting that can add value to the natural landscape and the tourism function in general.

2.3. Local Resources – Elements of the cultural landscape relevant for tourism

The cultural landscape of Ocna Mureş, like any local cultural landscape, "*reflects the story of the people who have shaped it, not only in the past but also in the present. Therefore, both natural and cultural elements of that place must be considered as a whole*" (Sirisrisak and Akagawa, 2007). As a result, "*researching the cultural landscape in its entirety represents a way to better understand human settlements and economic activities, the spatial behaviour of these settlements and activities, and the changing landscape associated with them*" (Lowenthal 1990; Bičík 2004; Kupka 2010; all quoted by Jakub, Santruckova, and Komarek, 2021, p. 245). These definitions highlight the complex interaction of natural and cultural factors that have shaped the landscape over time.

In this context, as a defining element for tourism, the local salt resources play an important role, particularly the concentrated chlorosodic mineral water. This resource, with exceptional potential, preserves the heritage of salt mining and contributes to the revitalization of the area. Currently, it is used in the Ocna Mureş Treatment and Leisure Complex, which was reintegrated into the spa circuit in 2023, thus continuing its cultural and tourism history.

Fig. 3. Ocna Mureş salt spa.
Source: the author

Ocna Mureș also includes a valuable architectural and historical heritage, reflecting the cultural diversity of the area with buildings that highlight fragments of local history. Among the most representative are "*the ruins of the Romanesque Church* (1300), *the Roman Catholic church* dedicated to Saint Charles Borromeo (18th century), declared a historical monument in 2004; *the Banffy Castle – "Teleky"*, built in 1742 in the neo-Gothic style, with some modifications from 1850–1860, and in the village of Cisteiu de Mureș there is a *wooden church* dedicated to the Archangels Michael and Gabriel, built in 1750, with alterations in 1870, destroyed by the catastrophic floods of 1975 and later rebuilt on the same spot, on a concrete foundation, now declared a historical monument" (Ghinea, 2025).

Other attractive elements are related to the natural environment, which complement or provide a suitable framework for the cultural elements. In this sense, we mention the *Oak of Union*, planted at the end of the 20th century, and *Banța Forest*, an ideal setting for recreational activities due to its ecological diversity.

Also significant are the elements represented by *cultural and folkloric activities*, whose diversity and originality reflect a rich intangible heritage, in which millennia-old traditions related to customs, music, and dance are preserved and passed down from generation to generation. This folkloric dynamic offers the chance to understand the culture and way of life of the locals.

The above-mentioned elements involve various opportunities for tourism development through recreation, therapy and treatment, cultural and educational tourism, playing a decisive role not only in capitalizing on the cultural landscape of the area but also in preserving it. This contributes to the development of sustainable tourism through the responsible and environmentally friendly use of resources.

3. OPPORTUNITIES FOR CAPITALIZING ON LOCAL RESOURCES

The local cultural landscape, with all its specific elements related to natural salt resources (salt baths, salt lakes), cultural-historical resources (architectural and historical monuments, traditions, and customs materialized through various characteristic events), and natural landscapes supporting them, constitutes valuable tourism resources. Each of these enhances the practice of certain types of tourism, such as health and wellness tourism, recreational tourism, cultural tourism, and so on, especially when they are well-preserved and highlighted.

The opportunity to capitalize on these resources is subordinated to sustainable tourism development, in this context adhering strictly to the *Integrated Urban Development Strategy 2021-2030*, through which the local community aims to leverage the tourism potential of the cultural landscape. This represents

"*an opportunity that the area must seize in its economic diversification and in overcoming the economic decline caused by the closure and restructuring of several mining operations and chemical industries*" (Petcu, Călin and Vich, 2009, p. 121).

In close correlation with the points mentioned above, we highlight the secondary objective which focuses on developing the town of Ocna Mureş as "*a local interest health resort that sustainably and competitively capitalizes on the therapeutic and natural salt potential of the community*" (p. 148). In response to the need for local economic revitalization through the sustainable exploitation of its rich natural and cultural heritage, tourism activities can contribute to the strengthening of the local identity and of the socio-economic balance. The following are the main specific objectives (according to the source mentioned above, pp. 148, 149) necessary for its implementation:

• Operationalizing the Salt Baths complex – Treatment and Leisure Unit in the town of Ocna Mureş, based on economic efficiency, curative impact, and recreational attractiveness.

• Acquiring and capitalizing on the status of a balneoclimateric resort.

• Sustainable exploitation of the economic potential related to the historical, cultural, and natural tourism resources, both local and in the functional urban area.

• Development of accommodation infrastructure and provision of tourism and related services.

• Furthermore, it is proposed to integrate the anthropogenic salt lakes (formed as a result of the collapse of salt mine ceilings), according to the *Integrated Urban Development Strategy of Ocna Mureş 2014-2023*, p. 61, "*into the local landscape by developing them as leisure lakes, surrounded by pathways and piers, willows and linden trees, playgrounds, floral areas, sandy zones for games, cafes, and wooden terraces*".

• An outdoor *Salt Museum*, a unique local project "*currently under development since 2020*" (Ghinea, 2025), aiming to capitalize on the long-standing tradition of salt exploitation by creating an open-air exhibition space.

• Collaboration between the local administration, the private sector, and specific non-governmental organizations that can contribute to supporting the development of sustainable tourism projects.

• Cooperation with other nearby settlements to develop a common strategy that includes potential existing tourist objectives.

• Implementation of community education programmes to involve and promote sustainable tourism.

The objectives presented constitute *opportunities for the valorisation*, growth, and socio-economic development of the town by enhancing the cultural landscape elements. Thus, sustainable tourism in the aforementioned area aims to develop a tourism sector designed to generate long-term economic benefits

without negatively impacting the existing cultural landscape. Currently, the local community is focused on protecting its resources and creating an environment that is favourable for both tourists and residents.

Therefore, the spa complex and the development of spa, cultural, and historical tourism play an important role, as they can generate multiplier effects at economic and social levels – by increasing employment rates, attracting investments, modernizing local infrastructure, and strengthening intercultural exchanges. Additionally, the income generated can support programmes dedicated to the protection of the cultural landscape.

4. CONCLUSIONS

The town of Ocna Mureș, with its long-standing history and natural salt resources, offers a unique potential for the development of sustainable tourism within a distinctive cultural landscape.

The implementation of initiatives outlined in the local strategic plans grants this urban settlement the opportunity to establish itself nationally as a top-tier tourist destination, leveraging its favorable assets by integrating its balneary tradition into a modern concept based on innovation and sustainability principles.

Tourism is inherently connected to the environment; therefore, protecting it is essential to maintaining the setting – and, by extension, the cultural landscape elements – necessary for tourism to thrive. In turn, tourism significantly contributes to economic development and enhances the quality of life for residents.

ACKNOWLEDGMENT

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GUEST SATISFACTION AND DISSATISFACTION WITH POOL ATTRIBUTES AT FIVE-STAR HOTELS IN DUBAI

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ABSTRACT. – Guest Satisfaction and Dissatisfaction with Pool Attributes at Five-Star Hotels in Dubai. This study investigates the influence of hotel amenities on guest satisfaction, with particular emphasis on swimming pool facilities in luxury hotels. The research employs a mixed-methods approach combining quantitative and qualitative content analysis of guest reviews from Booking.com to identify the key attributes of five-star hotel pools that most significantly affect guest satisfaction levels. The study focuses on Dubai as its research context, selected for its prominence in the global luxury tourism market. The emirate boasts 168 five-star hotels offering approximately 145,000 rooms and serviced apartments, including world-renowned properties such as the Burj Al Arab that serve as both accommodations and tourist destinations in their own right. The research revealed three primary dimensions of pools: "staff & service", "pool environment" and "quality of pool", alongside "overall impression", each comprising multiple attributes. The results show that guests were the most satisfied with the quality of "staff and service" and the least satisfied with the "ambiance" (an attribute of the "pool environment") and with the "quality of the pool". These results have meaningful implications for hotel management practices and facility design considerations in the luxury hospitality sector.

Keywords: guest satisfaction, pool attributes, 5-star hotels, Dubai, hotel reviews.

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1. INTRODUCTION

Customer satisfaction has been an important topic in tourism and hotel management studies (Hui et al., 2007). When guests are satisfied with their experience at a hotel, they are more likely to return in the future, leave positive reviews, and recommend the hotel to others (Jawabreh et al., 2020; Kim et al., 2009a; Li et al., 2013).

Additionally, customers often select a hotel based on factors such as location, brand reputation, available amenities (such as swimming pools), service quality, pricing, loyalty programs, and ratings or reviews from previous guests (Serra Cantallops & Salvi, 2014). Consequently, hotel owners are increasingly prioritizing the quality of services they provide, aligning them with the expectations and desires of their guests (Jawabreh et al., 2020).

Numerous studies focusing on customer satisfaction have preferred to evaluate five-star hotels because these hotels are expected to offer a wide range of facilities, such as pools, health spas, and beauty and barber salons (Xie, 2014; Jawabreh et al., 2020). However, most research has focused on western, developed countries and relatively fewer studies have been conducted in non-Western countries (Padman & Ahn, 2020).

In the past, research on hotel customer satisfaction primarily relied on methods such as surveys, interviews, or case studies (Deng, 2008; Choi & Chu, 2001). However, in recent years, there has been a shift toward analyzing online reviews to assess customer satisfaction (Dong et al., 2014; Egresi, 2017; Egresi, 2015; Guo et al., 2007; Li et al., 2013). This trend is driven by the intangible nature of tourism and hospitality services, which inherently involve higher perceived risks for consumers. As a result, potential guests increasingly depend on online reviews to make informed decisions (Litvin et al., 2008; Yang et al., 2018). By analyzing and acting on insights from online reviews, hotels can make informed decisions to meet guest expectations and drive success.

This study aims to further explore the significance of certain hotel amenities, particularly swimming pools, in influencing guest satisfaction. Specifically, the research will identify the key attributes of 5-star hotel pools that contribute most to guest satisfaction and dissatisfaction. To achieve these objectives, we employ both quantitative and qualitative content analysis of reviews posted on Booking.com.

The proposed approach is innovative, as it leverages social media data to analyze the preferences and expectations of luxury hotel guests. Dubai was selected as the study area due to its prominence in luxury tourism, with 168 five-star hotels offering approximately 145,000 rooms and serviced apartments[3].

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[3] Statista.com

Additionally, the city is home to iconic hotels, such as the Burj Al Arab, which are themselves major tourist attractions.

This paper is structured as follows: First, we conduct a comprehensive review of the existing literature. Next, we outline the methodology for data collection and analysis before presenting our key findings. Finally, we summarize the study's contributions, highlighting the practical implications, while also addressing its limitations.

2. LITERATURE REVIEW

Hotel service quality and customer satisfaction

Service quality can be defined as the difference between the perception of the service received and the service expected (Parasuraman et al., 1985). In contrast, customer satisfaction is viewed as an attitude (Oliver, 1980) or a subjective judgment of the quality of a product or service based on expectations and actual performance (He et al., 2020).

Based on these definitions, the two concepts may appear synonymous. However, although there is a clear relationship between them (Marković & Janković, 2013), many researchers argue that there are distinct differences between service quality and customer satisfaction. For instance, some researchers describe satisfaction as a more specific, short-term evaluation (e.g., assessing a single service encounter), whereas quality is considered a more general and long-term evaluation (Parasuraman et al., 1985). As we will demonstrate, the quality of hotel facilities, amenities, and services plays a significant role in guest satisfaction (Zhou et al., 2014; Calheiros et al., 2017).

Customer satisfaction at luxury hotels

Determinants of guest satisfaction may vary depending on hotel type and star rating (Radojevic et al., 2015; Rhee & Yang, 2015; Xu & Li, 2016). Numerous studies have examined customer satisfaction with various hotel attributes at five-star or luxury hotels in countries such as Malaysia (Padma & Ahn, 2020; Lau et al., 2005), Ghana (Allan, 2016), Turkey (Cetin & Walls, 2016; Ak & Dinçer, 2019), India (Mohsin & Lockyer, 2010), and Pakistan (Mohsin et al., 2011), often using online customer reviews as a data source. For instance, Alrawadieh and Law (2019) analyzed 400 English-language reviews on TripAdvisor for top-rated hotels in Istanbul, Turkey, and found that customer satisfaction is primarily influenced by perceptions of room size and quality, as

well as the quality of staff services. Similarly, Zhou et al. (2014) investigated factors influencing customer satisfaction at four- and five-star hotels in Hangzhou, China, identifying 23 attributes grouped into six categories that significantly impact satisfaction. One of these attributes was the size and quality of swimming pools (Zhou et al., 2014), which is particularly relevant to our study. Other research has compared hotel guest satisfaction across countries. For example, Khozaei et al. (2016) conducted a content analysis of online reviews for 1,800 hotels in 40 Asian countries on Agoda.com to better understand customer satisfaction at three- to five-star hotels.

Satisfaction with the size and quality of swimming pools at hotels

Previous studies have shown that customer satisfaction is generally influenced by multiple factors (Guo et al., 2007). However, in many cases, satisfaction with a single hotel attribute can significantly impact overall customer satisfaction (Oh, 1999). Guests tend to evaluate their general satisfaction with hotel facilities and services based on their perception of the attributes they consider most important (Guo et al., 2007). Satisfaction with key attributes can also influence guests' willingness to pay (Heo & Hyun, 2015), making it crucial for hotel managers to identify which attributes guests prioritize when evaluating their experience. This knowledge can help hotels classify (Lu & Stepchenkova, 2012; Shanka & Taylor, 2004) and prioritize attributes based on their impact on overall customer satisfaction (Albayrak & Caber, 2015).

One classification system was proposed by Ryan and Huimin (2007), who categorized hotel attributes into three main types: core, additional, and ancillary. The first category, *core attributes*, encompasses the fundamental features expected in any hotel, irrespective of its star rating. These include essentials such as a comfortable bed with clean linens, a hygienic bathroom, and courteous staff. The *additional attributes* vary based on the hotel's classification and may involve factors like room and bathroom size, as well as the quality of furnishings. Finally, *ancillary attributes* are typically associated with higher-tier hotels and include amenities such as swimming pools, fitness centers, spas, business facilities, and similar offerings.

The factors guests prioritize when evaluating their satisfaction with a hotel often vary depending on their travel purpose and the nature of their stay. For example, business travelers may emphasize the quality and functionality of the business center, while leisure travelers are more likely to prioritize amenities that enhance relaxation and entertainment for themselves and their families, such as the availability and condition of a swimming pool (Ryan & Huimin, 2007).

Indeed, previous research has consistently highlighted the significance of swimming pools as a key attribute in higher-ranked hotels (Marić, 2016). For instance, the term "pool" emerged as the most frequently mentioned word in guest reviews of five-star hotels in both Turkey and Greece (Çatır & Ören, 2021). Similarly, Dong et al. (2014) analyzed reviews on a Chinese affiliate of TripAdvisor for 4- and 5-star hotels in Sanya, Hainan, People's Republic of China, and found that "swimming pool" ranked among the top ten most commonly used words. In another study, "pool" was listed as the 9th most frequent word out of 40 in online reviews of luxury hotels (Padma & Ahn, 2020). Additionally, a literature review by Dolnicar and Otter (2003), which examined studies published between 1984 and 2000, revealed that 38% of these articles referenced swimming pools, underscoring their importance. This finding is further corroborated by Cherapanukorn and Charoenkwan (2017) and Alanazeh (2017), reinforcing the prominence of swimming pools in the hospitality industry.

Hotel attributes can also serve as sources of dissatisfaction, which often differ from those that drive satisfaction (Gu & Ryan, 2008). For example, while swimming pools ranked fourth among the key attributes of suite hotels, issues related to food and beverage services were identified as significant contributors to customer dissatisfaction (Xu & Li, 2016). In online reviews, swimming pools were frequently criticized for being dirty or in poor condition, highlighting maintenance and cleanliness as common concerns.

Online reviews, guest satisfaction, and the hotel industry

Online reviews play a crucial role in generating electronic word-of-mouth (eWOM) (Egresi & Prakash, 2019; Xu & Li, 2016). eWOM is defined as "*all informal communications directed at consumers through Internet-based technology related to the usage or characteristics of particular goods and services or their sellers*" (Litvin et al., 2008, p. 461). This encompasses interactions between producers and consumers, as well as among consumers themselves. eWOM can take various forms, including forums, blogs, social networks, and customer reviews (Cheung & Lee, 2012), and it has the potential to reach a broader audience more quickly than traditional word-of-mouth (WOM) (Serra Cantallops & Salvi, 2014). As a result, online reviews have emerged as one of the most valuable and influential sources of information, significantly impacting customers' purchasing decisions (Guo et al., 2007; Kim et al., 2016; Filieri et al., 2018). In this context, customer-generated reviews on online platforms may have a stronger influence on purchasing behavior than reviews written by experts (Park & Kim, 2008).

One of the economic sectors most significantly impacted by online customer reviews is the travel and tourism industry, particularly the hotel sector (Serra Cantallops & Salvi, 2014). Research has shown that 75% of travelers rely on online reviews as their primary or sole source of travel information (Gretzel & Yoo, 2008), with a vast majority making accommodation decisions based on these reviews (Gretzel & Yoo, 2007). It is, then, no wonder that Ye et al. (2011) found that a 10% increase in customer review ratings can increase online bookings by more than 5%.

Online reviews also serve as a valuable tool for hotels, offering a wealth of cost-effective and unbiased data to better understand guest satisfaction (Egresi et al., 2020; Zhou et al., 2014). Hoteliers can leverage this information to boost consumer demand (Guo et al., 2007; Wen, 2009; Xu & Li, 2016), enhance their hotel's reputation (Vermeulen & Seegers, 2009), and improve overall business profitability (Guo et al., 2007; Sun & Kim, 2013).

Both positive and negative electronic word-of-mouth (eWOM) play significant roles in influencing customer decisions. Depending on their priorities, some customers are swayed by positive feedback, while others are more affected by negative reviews (Zhang et al., 2010). Positive comments can enhance potential guests' perceptions of a hotel (Vermeulen & Seegers, 2009) and increase the likelihood of online bookings (Sparks & Browning, 2011; Torres et al., 2015; Ye et al., 2009). For instance, Verma et al. (2012) found that positive guest reviews raised the probability of making a hotel reservation to 70-80%.

Other scholars have found that negative reviews tend to have a stronger influence on potential customers (Sparks & Browning, 2011), significantly reducing the likelihood of booking a room at the hotel (Zhang et al., 2010). For instance, Verma et al. (2012) suggest that the probability of making a reservation drops to 40% for hotels that consistently receive negative feedback.

It is evident from the above discussion that a thorough analysis of online reviews can provide valuable insights into how specific hotel attributes contribute to customer satisfaction or dissatisfaction. This information can be instrumental for hoteliers in their efforts to attract more guests and enhance the financial performance of their businesses (Sparks & Browning, 2011). However, to date, there has been limited research focused on understanding how different hotel attributes influence guest satisfaction or dissatisfaction based on online reviews (Dong et al., 2014).

3. METHODOLOGY

For this study, we compiled reviews published in English by users on the Booking.com hotel reservation platform between November 1, 2021, and October 31, 2022. We selected this platform because it is the largest in the world, and most five-star hotels are represented on it. We consider the reviews posted on this platform to be reliable, as only guests who have actually stayed at a hotel can post reviews. Additionally, users are encouraged to share both positive and negative aspects of their hotel experiences in their comments. The research sample includes a number of 42 hotels, which represents approximately one-quarter of all five-star hotels in Dubai (table 1).

Table 1. The 5-star hotels included in the study

Hotel		
Address Beach Resort	Atlantis The Palm	Jumeirah Beach Hotel
Sofitel Dubai the Obelisk	Grand Millenium Business Bay	Rove Downtown
Raffles The Palm Dubai	Rixos Premium Dubai JBR	Swissotel Al Murooj Dubai
Fairmont The Palm	Centara Mirage Beach Resort Dubai	Premier Inn Dubai International Airport
The Retreat Palm Dubai	Studio M Atabian Plaza	The First Collection at Jumeirah Village Circle
MGallery by Sofitel	Sofitel Dubai The Palm	Gevora Hotel
The Ritz-Carlton Dubai	Four Points by Sheraton Downtown	The H Dubai
Anantara World Islands Dubai Resort	JW Marriott Marquis Hotel Dubai	Anantara Dubai The Palm Resort & Spa
The St. Regis Dubai	First Central Hotel Suites	Raffles Dubai
The Dubai Edition	Five Palm Jumeirah Dubai	Citymax Hotel Bur Dubai
Address Sky View	Taj Exotica Resort & Spa The Palm	Palace Downtown
Paramount Hotel Midtown	Hilton Dubai Jumeirah	Avani Palm View Dubai Hotel & Suites
Taj Dubai	Novotel Suites Dubai Mall of the Emirates	Address Dubai Mall
Shangri-La Dubai	Dukes The Palm, A Royal Hideaway Hotel	Grand Cosmopolitan Hotel

Once all reviews were downloaded into an Excel sheet, we searched for duplicates and carefully removed any that were identified. Ultimately, 736 reviews remained for further analysis. The next step involved filtering the

reviews to retain only comments related to swimming pools. As a result, many reviews were condensed to a single sentence. The entire dataset consisted of 10,970 words, with an average of 15 words per review. We also conducted a spelling check on the comments and corrected any misspelled words.

Next, we used a free platform (www.wordclouds.com) to create a word cloud based on the most frequently used words in the online guest reviews. Verbs appearing in different tenses were merged, as were nouns in singular and plural forms, along with synonymous words. Finally, to make the word cloud more relevant and readable, we removed words that appeared fewer than 20 times in the comments. The final word cloud was generated using the remaining 45 words.

A sentiment analysis was also conducted. Sentiment analysis is the process of evaluating a text to determine the emotional tone of the message (Vetinev et al., 2021). Based on this, the writer's attitude toward a particular subject or product can be classified as positive, negative, or neutral (Wu et al., 2024). Nowadays, sentiment analysis is typically performed using artificial intelligence. However, in this case, we opted to manually analyze the sentiment of the reviews because the entire text was relatively short and because experts consider the results of machine learning to be less accurate than manual processing (Kirilenko et al., 2018).

In the second part, the reviews were subjected to content analysis. Content analysis is a scientific method that enables the qualitative and quantitative examination of a text, allowing for the identification of key themes and patterns (Hsieh & Shannon, 2005). First, the two researchers manually coded the text. Following Neuman's (2003) recommendation, the coding process was conducted independently by each researcher. The results were then compared, and any discrepancies in assessment were discussed until a consensus was reached. During this process, some themes were eliminated, while others were merged.

Findings

Word cloud

First, a word cloud was generated based on the most frequently used words in the reviews (fig. 1). As expected, the most used words were "swimming" (mentioned 155 times) and "pool" (105 times), along with "area" (107 times). Most guests described the pool area as "clean" (63 times), "beautiful" (28 times), and either "large" (27 times) or "small" (24 times). Additionally, descriptors such as "helpful" (39 times), "friendly" (37 times), and

"attentive" (21 times) likely referred to the qualities of the "staff" (97 times). The "experience" (mentioned 27 times) was most often characterized as "great" (100 times), "nice" (100 times), "good" (72 times), "amazing" (71 times), "lovely" (50 times), "well" (45 times), "excellent" (44 times), "best" (35 times), "fantastic" (31 times), and "perfect" (26 times)—all positive descriptors. These assessments were based on the "service" (69 times), "facilities" (41 times), "views" (61 times), and "ambiance" (25 times). Ultimately, we conclude that most guests "enjoyed" (51 times) and "liked" (25 times) their "stay" (35 times) at the "hotel" (66 times) swimming pool area in "Dubai" (20 times).

Fig. 1. Word cloud with the most frequently used words in hotel reviews.
Source: the authors

Sentiment analysis

The next step was to analyze the 736 comments related to swimming pools to determine their sentiment polarity. Out of the 736 reviews or review excerpts, we identified three in which the authors merely mentioned the existence of swimming pools without expressing any opinion about them. As a

result, sentiment analysis was conducted on the remaining 733 comments. The vast majority of these comments (650, or 88.68%) were classified as positive, while only 59 (or 8.05%) were negative. The remaining 24 (or 3.27%) were neutral, containing both positive and negative aspects.

Quantitative and qualitative analysis of the reviews

Upon analyzing the 736 guest comments, we identified twelve codes, which were further grouped into four dimensions: pool environment, quality of the pool, staff and service, and overall experience (table 2). In total, the twelve codes were referenced 979 times, with 89% of these references being positive (table 2).

Table 2. Main dimensions and codes resulting from the qualitative analysis of the reviews

Dimension	Code	Positive count	% positive of code	Negative count	% negative of code
Pool environment	Ambiance	63	64.3	35	35.7
	Views	65	98.5	1	1.5
	Facilities	46	73	17	27
	Activities	2	66.6	1	33.4
	Total env.	176	76.5	54	23.5
Quality of the pool	Size of the pool	29	52.7	26	47.3
	Quality of the water	41	83.7	8	16.3
	Amenities in the pool	15	78.9	4	21.1
	Total quality	85	69.1	38	30.9
Staff & service	Staff attitude & behavior	160	98.8	2	1.2
	Quality of service	42	95.4	2	4.6
	Products served	12	92.3	1	7.7
	Extra services	21	87.5	3	12.5
	Total staff	235	96.7	8	3.3
Overall impression	Quality of the pool area	277	98.9	3	1.1
	Experience	100	97.1	3	2.9
	Total	377	98.4	6	1.6
All		873	89.2	106	10.8

Staff and service

The staff and service dimension received the most comments (243, of which 97.7% were positive and only 3.3% were negative). The vast majority of these comments were related to staff attitude and behavior (162, of which only two, or 1.2%, were negative). One of the many positive reviews regarding staff attitude reads as follows:

"The service at the pool is amazing. As I was walking to the pool, [name of the staff member] already had towels and cold water ready for us. [He] was always keeping an eye on the water, making sure everyone is safe. [He was] super friendly and outgoing" [31].

As we can see, the primary responsibility of the staff working in the pool area is to act as lifeguards. This is why one of the two complaints recorded in this section was about the insufficient number of lifeguards ensuring guests' safety [446].

Next, almost all guests agreed that the quality of the service was very high (95.4% left positive comments). For example, one guest wrote the following review:

"The staff at the pool was super attentive. Always checking what we need before we even knew we needed it. We loved the glass cleaning and the ice cream service. Made our pool experience so extra special" [157].

Another user, referring to the quality of the service by the pool area, exclaimed:

"At the pool, hospitality [is] at its best. You receive complementary ice bucket with water (no plastic, recyclable bottles [and], not to forget, the complementary fruit slices and lollies throughout the afternoon" [395].

Most of the time, the service was described as excellent [for example, cases 40, 53] or amazing [case 31, among others]. Many guests also praised the poolside staff for their prompt and friendly service [for example, 34]. Only two comments regarding the service were negative. For example, one guest complained that the staff did not answer their call, and they had to walk to the bar to get what they wanted [595] while another guest expressed dissatisfaction with the high price of the drinks [436]. One guest framed their critique of the service as constructive feedback, suggesting areas where the staff could improve:

"The only recommendation I would make is to provide water at the beach/pools for Imperial Club guests as we didn't want to be going back into the lounge for water frequently. I think this should be part of the Imperial Club package" [147].

Only 13 comments referred to what was served to the guests, of which twelve were positive. For example, one review mentioned "*the relaxing pool area [which] features an in-pool bar, with a nice selection of drinks and food*" [84]. Another overall positive comment mentions hookah as being served by the pool:

"*The pool lounge is a nice place to sit in the night with a drink or hookah. Kids are not allowed near the deck seating area, though! Overall, a great place to stay with family and spend quality time in Dubai*" [55].

Finally, 24 reviews addressed the provision of extra services, with the overwhelming majority being positive (table 2). Most of these comments praised employees for offering complimentary amenities—such as cold towels and water—which guests greatly appreciated, especially in Dubai's intense heat. For example, one guest praised the poolside service, stating: "*The service at the pool is amazing. As I was walking to the pool, [employee's name] already had towels and cold water ready for us [...] Great place—I'll definitely visit again!*" [31]. Another guest appreciated the "*cold towels brought when you're just getting a little warm*" [35].

Pool environment

Three-quarters of all references to the pool environment are positive (table 2). This dimension consists of four codes: ambiance, views, facilities, and activities. Apart from one review, all mentions of the views from the pool were positive. The views of iconic landmarks such as the Burj Khalifa [cases 18, 28, 37, 48, 51, 607], Burj Al Arab [505, 512, 623], other buildings in Dubai Downtown [21], and The Palm [693] were described as incredible [21, 684, 734], amazing [28, 60, 345, 353, 410], fantastic [248, 683], impressive [501], magnificent [252], sensational [735], and even "out of this world" [11].

Nearly three-quarters of the reviewers who mentioned this attribute expressed satisfaction with the facilities in the pool area. For example, one reviewer noted, "*The pool area [...] offers a combination of sun loungers and more private cabanas. The cabanas give an added degree of privacy, and I was rather impressed with the fact they were fully air conditioned*" [73]. Another guest added, "*The pool area was spacious, with plenty of sun loungers. As soon as we arrived, staff escorted us to our loungers and asked if we wanted the umbrella up or down*" [724]. However, in some cases, the facilities appeared "*much older,*" making the pool area seem "*lacking in atmosphere*" [77]. Another negative review referred to the pool area as "*run down and so old and not what it looks like in the pictures*" [433]. Similar issues were also brought in a few other reviews such as 403 and 507.

Other travelers were impressed by the presence of a "kids' area" and "kids' pool" [57, 162]. The children apparently "*enjoyed the pool and the play area around the pool and had a wonderful time*" [503; similar description in 342]. Another reviewer highlighted the availability of pool facilities catering to all age groups: "[*there were] several pools to cater for every age. The pool with the slides was a favorite for children. Main pool has a lovely outdoor jacuzzi too!*" [253]. Further, another guest contended that although his family enjoyed them, pool facilities were "*more suitable for couples than families*" [204].

Ambiance was mentioned almost one hundred times in the reviews, with almost two-thirds of these being positive. Most comments were variations of the following quote: "*There is a nice atmosphere at the pool. Different types of cultures and people together that makes it diverse. I definitely feel comfortable*" [197]. Another user added that "*the pool site is amazing especially at night when you can see the beautiful lights of the surrounding buildings*" [617].

One important factor that added to the good/fabulous vibe [394, 546] was the choice of music played in the background [37, 212. 340, 388, 394]. However, some guests complained that "*The pool area was playing loud and obtrusive music, and did not provide a relaxing poolside atmosphere*" [606]. To some, "*the noise level is very disturbing*" [70] and concluded that the "*pool area is targeted to partying, not relaxing and resting*" [195]. These critics characterized the pool area as having a "cheap vibe" [336]. Also on the downside, some guests complained that "*there is not much shade at the pool*" [200].

Another negative aspect brought to our attention by the reviewers was that the pool area was "a little crowded" [162; 647] and "*especially during the weekend, it was a bit difficult to find available space*" [187] and "*beds at the pool*" [336]. This may be because "*they let outsiders have priority [at the pool]*" [336]. However, others contended that the pool area was "spacious" [508] and "*never crowded and there are always beds to sunbathe on and fresh towels as you enter the pool area*" [506]. Also, "*since [the pool area] is not crowded at all, you can enjoy privacy and cleanliness for sure*" [179; other positive references to this aspect could be found in cases 400 and 582].

Only three comments referred to the activities that are organized around the pool, of which two were positive and one negative. On one hand, guests visiting the pool with their families tend to appreciate the activities organized by the hotels because "The resort will keep you and kids engage in various activities like pool, water park, lazy river, Spa (for both kids and adults)" [232]. On the other hand, solo travelers or couples seeking to enjoy a quiet day by the pool frequently find these noisy disruptions frustrating. For example, one particularly displeased guest described the scene in the pool and by the pool as follows:

"*Kids jumping in the pool, which for safety reasons is not allowed anywhere else, people throwing balls over your head, again dangerous. Nobody cares, awful!!!! 5 star turned into 2-3 star Benidorm including the skyscrapers, but not the price*" [49].

Quality of the pool

More than two-thirds of the comments related to the quality of the pool were positive (table 2). Of the three codes comprising this dimension, pool size received the fewest positive reviews, with just over half of guests expressing satisfaction. Many guests described the pools as "big" or "large" [22, 89, 114, 121, 129, 146, 341, 353, 369, 400, 438, 444, 638, 691, 727] or even "huge" [298, 299, 388]. For example, one guest commented that "*the pool is amazing, and you can do laps. It is over 35 meters long and very well-maintained*" [34].

However, many tourists criticized some 5-star hotels for having unexpectedly small pools [72, 282, 425, 457, 463, 485, 511, 535, 664, 720]. One visitor remarked, "*The swimming pool is incredibly small for a property this size and the only one they have*" [286; a similar view in review 303]. Others, however, found the small size unproblematic. For instance, one review stated, "*The pool is a little small and not really a place to hang out for a long time, but great for a dip*" [421]. Others, mentioned that although the pool was quite small, they still enjoyed the morning [536] and even recommend it "100%" [432].

Another issue raised in the reviews was the water quality of the pools. Nearly 84% of the 49 reviews addressing this topic were positive (table 2). The vast majority of guests described the pools as clean [32, 36, 158, 170, 171, 175, 176, 181, 243, 274, 287, 320, 372, 399, 409, 419, 440, 485, 519, 539, 541, 543, 549, 566, 590, 537, 675, 692, 723]. However, a small number of visitors reported issues such as dirty water [289, 429] or unpleasant odors [670, 715]. One guest suggested that infrequent water changes might explain these problems [302], while another warned of potential health risks, noting that *children can get sick* [300].

Water temperature was another frequently mentioned aspect of pool quality in guest reviews. Generally, hotel pools were described as having "cool" water, which many guests appreciated given Dubai's hot climate [218, 338, 382]. As one guest noted, *"The chilled pool is the best thing needed when the sun is beating down on you"* [178]. However, during cooler periods, some visitors found the water temperature uncomfortably cold [429], with one remarking they *"wished it could have been a few degrees warmer"* [64]. The contrast between the cold water and Dubai's extreme heat was also highlighted as problematic, with one reviewer explicitly stating, *"the pool is not warm enough for Dubai"* [510]. Despite these concerns, most guests felt the pools maintained the *"right temperature"* [74, 342, 394, 465, 676].

The availability of pool amenities was addressed in only 19 reviews, with nearly 80% offering positive assessments (Table 2). Guests particularly appreciated hotels featuring multiple pools designed *"to cater for every age"* [253]. Several properties offered aquatic features such as slides [5, 250] - described as *"a favorite for children"* [253] - along with dedicated play areas for water games [5, 250]. Some establishments also provided outdoor jacuzzi [253]. However, a minority of reviewers reported malfunctioning amenities, with one noting critically: *"The hot tub attached to the private pool didn't work; it wasn't heated, and the jets did not function"* [339].

Overall impression

Overall, guests employed a wide range of positive descriptors to characterize the pools and pool areas, with terms ranging from simple appreciations like *"nice"* and *"lovely"* to more enthusiastic evaluations such as *"good," "great,"* and *"excellent".* Some visitors offered even stronger praise, describing the pools as *"fantastic"* (or *"beyond fantastic"*), *"wonderful,"* or *"amazing"* (table 3).

Our analysis identified only three reviews (approximately 1% of the total sample) that expressed negative evaluations (table 2). These critical assessments primarily stemmed from discrepancies between guests' expectations and their actual experiences. One particularly illustrative comment noted: *"The pool appears significantly more impressive in the hotel's promotional materials than in reality"* [498], highlighting this perception gap.

The overall experience with the pool facilities at these 5-star hotels received overwhelmingly positive evaluations, with only three exceptions among all reviews. A substantial majority of guests reported highly satisfactory experiences [52, 91, 245, 275, 711], exemplified by comments such as: *"The swimming pool was a great experience. The separate children's pool allowed kids to enjoy themselves fully, which was fantastic"* [613]. Many praised specific features, with one guest noting: *"The beachfront infinity pool was wonderful - every moment there was enjoyable"* [732].

While most visitors sought relaxation at the pools [59, 245, 275, 711], others primarily sought recreational activities [60]. This occasionally led to conflicts between these groups, as highlighted by one dissatisfied guest: "*Pool area is targeted to partying not relaxing and resting. […] it was a bad stay*" [195]. Despite these occasional tensions, the consensus remained strongly positive, with many guests expressing intentions to return [41, 561], affirming the overall quality of their pool experiences.

The findings highlight "staff & service" as the most critical dimension, appearing in 243 reviews. This underscores the significance of service quality in luxury hotels, aligning with prior research (Alrawadieh & Law, 2019; Khoo-Lattimore & Ekiz, 2014; Padma & Ahn, 2020). Notably, the attribute "staff attitude and behavior" was the most frequently mentioned within this dimension, reinforcing the importance of effective human resource management (Khozaei et al., 2016; Padma & Ahn, 2020). The overwhelmingly positive feedback in this category suggests that hotel managers recognize its value and prioritize high-quality service. Thus, investing in well-trained, courteous staff remains essential.

Consistent with Guzel & Guzel's (2016) study, another key dimension for guests was pool environment, particularly ambiance. However, this attribute received the highest proportion of negative feedback (35 out of 98 comments), indicating a need for improvement to enhance guest satisfaction. Additionally, guests highlighted facilities as an area where some luxury hotels fell short, with 27% of reviews criticizing outdated or inadequate offerings.

The third dimension, pool quality, garnered the fewest mentions. Among these, pool size was the most contentious issue—nearly half of the reviewers deemed it too small for a luxury hotel, echoing Guzel & Guzel's (2016) observations.

Finally, the overall impression of Dubai's 5-star hotel pools was overwhelmingly positive, suggesting that their quality contributes to the city's appeal as a luxury destination.

Managerial implications

The findings of this study carry significant implications for luxury hotel managers. They must recognize that guests prioritize service quality and exceptional human interactions over mere facilities or amenities. As Padma & Ahn (2020) also emphasize, luxury hotel guests expect staff to "go the extra mile"—delivering personalized, attentive service that makes them feel valued. For instance, small yet thoughtful gestures, such as offering cold towels or bottled water poolside, significantly enhance guest satisfaction. Ultimately, 5-star hotel customers seek a pampering experience, where every detail reflects a commitment to excellence.

Another key finding of this study highlights the critical importance of pool area ambiance. Hotel managers should conduct targeted research to better understand their guests' preferences. The study reveals that the primary motivation for using pool facilities is rest and relaxation. While families with children may appreciate dedicated play areas or activities, the majority of guests prefer a tranquil atmosphere – potentially enhanced by subtle background music.

Finally, while mentioned less frequently, guests also expressed a strong preference for larger pools that avoid overcrowding and allow for lap swimming. Several reviewers framed this as a prestige issue, suggesting that larger pools align with the expectations of a true five-star experience. Interestingly, some guests even noted envy toward nearby residential complexes that offered more extensive pool facilities than the luxury hotels they visited. While spatial constraints may limit renovations of existing pools, these findings highlight the importance for architects and developers to prioritize generous pool dimensions when designing new five-star properties, ensuring they meet guest expectations for both functionality and exclusivity.

Limitations and future research

As with all social science research, this study has several limitations that should be acknowledged. First, while our sample encompassed numerous five-star hotels, we restricted our analysis to guest reviews posted within a single calendar year. This temporal constraint resulted in a relatively modest sample size (though sufficient for our research objectives) and makes our findings inherently time-bound. A longitudinal analysis spanning multiple years (e.g., a decade) might yield significantly different results, as guest preferences and industry standards evolve over time.

Additionally, our cross-sectional design captures only a snapshot of consumer perceptions. Future research employing a longitudinal approach could not only address this limitation but also track evolving guest expectations regarding luxury hotel pool amenities. Such studies would provide valuable insights into temporal trends in hospitality preferences.

Our analysis revealed significant heterogeneity in guest preferences across different hotels in our sample. This variation indicates that our generalized recommendations may not be equally applicable to all properties. To address this limitation, we suggest two promising avenues for future research.

First, following the methodological approach of Wei and Kim (2022) in their case study of Atlantis The Palm, property-specific analyses could yield more targeted operational recommendations. Such focused examinations would account for unique guest demographics and property characteristics that may influence satisfaction levels.

Second, we propose a market segmentation approach that classifies five-star hotels based on key pool area attributes. This categorization could reveal meaningful patterns in guest expectations and satisfaction across different hotel types, enabling more nuanced management strategies.

Another consideration when analyzing review-based studies is that not all customers leave reviews. Some may lack awareness of the review process, others may not have time, and some may be unsure what to write. Typically, only guests who were either highly satisfied or highly dissatisfied submit reviews, with little representation from those with moderate experiences. Even among reviewers, they tend to comment only on aspects that elicited strong reactions. This explains why not all guests who stayed at the studied hotels mentioned the pool area in their reviews. Consequently, our findings should be interpreted as representing only partial insights into guest perceptions.

These limitations, however, do not diminish the value of this study.

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HOSPITALITY ON A LEASH: A STUDY OF THE ONLINE VISIBILITY, AVAILABILITY AND DISTRIBUTION OF PET-FRIENDLY ACCOMMODATIONS IN ROMANIA

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ABSTRACT. – Hospitality on a Leash: a Study of the Online Visibility, Availability and Distribution of Pet-Friendly Accommodations in Romania. The present paper explores the growing phenomenon of pet travel within contemporary tourism, focusing on the preferences of dog owners and the operational implications for hospitality and destination management. Drawing on interdisciplinary literature and empirical data from Romania, the paper examines the emotional, logistical, and structural factors shaping pet-inclusive travel, emphasizing both opportunities and challenges. A central theme is the disconnect between increasing demand and the pet-friendly infrastructure in destinations. The study provides an analysis of the spatial distribution of pet-friendly accommodations across Romanian counties using publicly available data from major travel platforms. Uneven patterns are revealed: while urban centers and major tourist destinations dominate in absolute numbers, true inclusivity remains rather localized and fragmented. Four county typologies emerge based on the intersection of total accommodation numbers and promoted pet-friendliness, pointing to both strategic opportunities and infrastructural gaps. Despite Romania's rising domestic pet travel demand, it still lags behind many EU countries in terms of online-listed pet-friendly options. The paper concludes by advocating for a systemic, ethical approach that balances economic potential with environmental sustainability and animal welfare, framing pet travel as part of broader cultural geographies of mobility, inclusion, and human-animal relations.

Keywords: tourism, pet, dog owner, pet-friendly, accommodation unit, mobility.

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1. INTRODUCTION

In recent decades, societal perceptions of companion animals have undergone a significant transformation. Once mostly confined to the private space and receiving limited recognition, pets are now widely regarded as integral members of the family (Carr and Cohen, 2009; Ying et al., 2021; Hidalgo-Fernandez et al., 2023; Ramos-Ruiz et al., 2024) and, in many cases, even compared to children, as several scholars have previously noted (Mlakar and Korže, 2022; Buhalis and Chan, 2023).

This cultural shift is reflected in both the rising global rates of pet ownership and the rapid expansion of pet-related consumer markets, a trend that has accelerated further since the COVID-19 pandemic, and is still anticipated to grow further. For example, projections made in 2020 for the United States estimate that the dog population will increase from 85 million to over 100 million by 2030, with the share of households owning at least one dog expected to rise from 38% to 45% over the same period (AVMA, 2020). This growth parallels the expansion in the pet industry. According to the American Pet Products Association (2025), total pet-related expenditures in the U.S. (including food, supplements, veterinary care, grooming, boarding, training, walking services, insurance, and other services) reached $151.9 billion in 2024.

This trend is not confined to the United States; according to a report by the European Pet Food Industry Federation (FEDIAF), 166 million households in Europe have at least one pet, with 25% of all households owning at least one dog; thus, the dog population across Europe stands at approximately 106.4 million, with a population of 68.6 million located within the EU member states. The pet food sector alone represents a market of €29.2 billion, with an annual growth rate of 9% (FEDIAF, 2024).

According to the same report, Romania ranks eighth among EU countries in terms of total dog population, with 4.24 million dogs. It follows Germany (10.6 million), Spain (9.31 million), Italy (8.76 million), Poland (8.11 million), and France (7.6 million). However, when considering the proportion of households owning dogs, the situation is a bit different, Romania being in third place, with 45% of households owning at least one dog. It is surpassed only by Hungary (50%) and Poland (49%), and it is followed by Czechia (42%), and Portugal and Slovenia (both at 39%).

The rise in dog ownership in Romania can be observed through official veterinary and registration data. According to the national Registry of Dogs with Owners (RECS), the number of dogs receiving the (mandatory) rabies vaccine increased from 2,549,558 in January 2018 to 3,656,725 in 2024. This trend is further supported by data on newly registered dogs within RECS, which

show a steady annual increase beginning in 2019. Notably, the number of dogs registered in 2023 nearly doubled compared to the previous year, 631,445 dogs being registered in 2023, compared to 332,185 in 2022. Early figures from March 2024, with 212,855 dogs already registered, suggest this upward trend has most probably continued. It is important to contextualize these figures as a historical peak in dog registrations had occurred in 2015, when 1,105,908 dogs were recorded. However, this surge was largely driven by the enforcement of regulations issued in 2014 by Romania's National Sanitary Veterinary and Food Safety Authority (ANSVSA), which made the identification and registration of owned dogs via microchipping mandatory. The 2015 figures most probably reflect a one-time adjustment, as many pre-existing dogs were microchipped and brought into compliance. Despite the legal requirement, underreporting and non-compliance remain relevant challenges, particularly in rural areas, where many dogs still go without being chipped. Since a dog cannot legally receive a rabies vaccine unless microchipped, these figures offer a strong, though still approximate, indicator of the dynamics of the dog population in Romanian households.

The shift in the perception of companion animals to the point that they "are playing a central role" in their owners' lives (Dotson and Hyatt, 2008), has also been accompanied by a growing interest in including pets (especially dogs, and to a lesser extent cats) in a wide range of human activities, including leisure and travel. As a result, traveling with pets has become more mainstream, more increasingly visible, and is in the process of being socially normalized. Pets are now often regarded as "important travel partners" (Ying et al., 2021).

Until the late 2000s, the role of pets in their owners' travel plans was rarely acknowledged in tourism research or industry practice (Ying et al., 2021). Kirillova et al. (2015) were among the early scholars to highlight a growing number of individuals who wished to travel with their pets, particularly dogs. Despite this emerging demand, the authors noted that pet-friendly tourism offerings remained relatively limited at the time.

Drawing on previous studies, Kirillova et al. (2015) also observed that hoteliers (particularly in the luxury and economy segments) had begun to experiment with pet-friendly services, though such efforts were less common in midscale and upscale establishments. Their findings also revealed a rather wide range of pet-friendly practices, from simply allowing pets in rooms to more comprehensive services such as offering treats, providing additional amenities, or employing trained staff capable of walking pets on request.

Later, Mlakar and Korže (2022) emphasized that "pet owners who travel with their pets have become one of the fastest growing tourism segments". The evolution of pet-friendly tourism from a niche, or underserved segment, to a more structured and marketable offering has been further documented by

Müller et al. (2024). The authors note that as pets became increasingly recognized as part of their owners' lifestyles, the tourism sector began adapting to this demand by developing more specialized services and experiences. Müller et al. (2024) also cite earlier surveys conducted in the United States and the United Kingdom, which found that over 40% of pet owners expressed a desire to bring their pets along on holiday. Higher figures appear in their own case study involving 553 Hungarian dog owners that showed that 79% of respondents reported usually traveling with their dogs (Müller et al., 2024). Moreover, Carr and Cohen's (2009) study of Australian dog owners found that only 4.2% of its respondents would rather not bring their dog on holiday with them.

The present paper explores the phenomenon of pet-accompanied travel in Romania, a topic that has received little to no academic attention to date, with a particular focus on accommodations as a key for understanding how this trend is developing. This study focuses exclusively on pet dogs and does not include service dogs, which, at least in theory, are governed by different regulations and are typically granted broader access rights in different public settings and facilities.

While Romania mirrors the broader European rise in pet ownership and increasing integration of pets into everyday life, there is a notable absence of studies examining how this shift translates into tourism behaviours, specifically, the motivations and preferences of travellers who wish to include pets in their journeys.

Grounded in a geographical approach to tourism studies, this research investigates how accommodations in Romania respond to and shape pet-friendly travel, treating companion animals not as passive accessories but as active co-travellers. Their inclusion can reconfigure related spatial practices and the very notion of hospitality. By shedding some light on this underexplored segment, the study aims to contribute to a growing body of literature that examines human-animal relations in tourism, while also laying groundwork for future research on the experiences and needs of tourists traveling with pets in Romania, as well as in the field of spatial planning, addressing the need of *shared spaces* at tourist destinations.

2. MATERIALS AND METHODS

This study adopts a mixed-methods approach to examine the geographic and touristic dimensions of pet-accompanied travel in Romania, focusing on pet dogs. The research integrates targeted literature review and data acquiring to explore how Romanian tourism infrastructures, particularly accommodation units, shape the feasibility of traveling with companion dogs.

Tourism accommodation data were collected from major online booking platforms, including booking.com, tripadvisor.com, and travelminit.ro. The use of such platforms in this study not only reflects current market realities but also allows for the collection of geographically disaggregated data, supplementing official tourism statistics and offering some nuanced insights. These platforms were selected due to their growing role as primary mediators between tourists and service providers, particularly in the post-pandemic era, which has seen a notable shift toward digital planning of travels. As noted by Hoy et al. (2023a), 66% of global travel and tourism revenue in 2021 was generated through online sales sites, with online hotel bookings growing at an annual rate of 10.3%.

Data were retrieved manually at the national and subnational level, focusing on Romania's counties and their major municipalities. Accommodations were selected based on the availability of pet-friendly services as advertised on these platforms, allowing for a comparative assessment across counties.

Booking.com was chosen as the primary data source due to its wide coverage and functionality (capacity to filter accommodations by specific amenities such as pet allowance). While official tourism statistics provided by the Ministry of Economy, Entrepreneurship, and Tourism enumerate the total number of licensed accommodation units by county, they do not register amenity-level data such as pet accessibility (or such data is just not publicly available online). A comparison between the number of listings on Booking.com and the Ministry's registry reveals a relatively strong alignment in terms of regional distribution – suggesting that the platform provides a reasonable proxy for the overall accommodation supply. In contrast, other platforms such as Travelminit, while important in the local market, displayed notable regional discrepancies (e.g., Harghita listed more than twice the number of accommodations as Bucharest), likely due to platform-specific registration patterns. Booking.com offers a sufficiently representative base for assessing the availability of pet-friendly accommodations *as encountered by typical users planning a holiday* in Romania.

It is important to acknowledge though that the number of accommodation units listed as pet-friendly on such platforms is inherently dynamic (figures fluctuate depending on the date of search, seasonal closures, changes in property status etc.). Thus, the numbers cited in this study reflect specific snapshots of the platform, collected in two moments, April and May, 2025. The search was performed without being logged in, for one room, for a flexible date in July, August or September 2025.

In addition to platform-based data, a literature review was conducted. While not exhaustive, the review focused on international studies that examine the motivations and behaviors of pet-owning tourists, the evolution of pet-

friendly services, and the spatial implications of traveling with animals. These studies, some originating from contexts with similar socio-economic and cultural trajectories, and some performed in countries from which tourists travel to Romania, help address gaps in the Romanian tourism literature, particularly given the apparent absence, to the best of my knowledge, of domestic studies on this topic.

Together, these methods provide a framework for analyzing the pet travel phenomenon, situating accommodations not only as service nodes but as critical geographic markers that reflect broader trends in inclusion, hospitality, and mobility. After all, in the context of pet travel, mobility is *not just about movement* but about *who or what is allowed to move or stay*, how, and under what *constraints*. Accommodation infrastructure plays a key role in mediating the possibilities of pet travel as the ability to move with a companion dog is shaped not only by rules and regulations, or by cultural beliefs or mentality, but mostly by the mere availability of pet-friendly lodging services. Thus, the presence or absence of pet-friendly accommodation infrastructure is often the decisive factor in shaping the geography of where and how pet travel is possible.

3. DISCUSSION

3.1. Motivations and constraints in traveling with dogs

Traveling with dogs is shaped by both practical constraints and owners' motivations. The motivations within this market segment are, to a large extent, emotionally driven and straightforward: pet owners are happier when in company of their pets, and often perceive the travel experience as more rewarding/more enjoyable in their presence, hence they prefer bringing the dogs along; conversely, when unable to bring their pets, owners report feelings of guilt and worry (Carr and Cohen, 2009; Kirillova et al., 2015).

The decision to travel with one's dog is closely tied to the strength of the human–animal bond, the emotional valuation of the pet, and the pet's role within the household; Yilmaz (2023) highlights that those individuals with a stronger emotional connection to their pets (especially single people, child-free couples, and those with higher incomes) are more inclined to travel with them. Similarly, Mlakar and Korže (2022), in a survey of Slovenian pet owners, found that this demographic often "completely adapt[s] their trips or vacation to the needs of their animal" even if most participants reported traveling with their pets for leisure purposes, rather than for dog exhibitions or family visits. The distinction the authors make is worth emphasizing: when travel is motivated

by dog sport events (search and rescue trials, mondioring, agility competitions etc.) or dog shows, owners or handlers tend to invest additional effort in selecting accommodations that are convenient to the competition venue, provide a quiet environment, offer appropriate walking areas etc. In contrast, trips for family visits may be more easily managed when both the dog and owner are hosted by relatives, thus reducing the logistical burden.

Pet-friendliness becomes a key factor in choosing destinations, accommodations, and transportation modes (Yilmaz, 2023). In this context, the pet is no longer a passive travel companion, but a co-traveler that influences every layer of the travel experience. Moreover, pet well-being is very important to most pet owners, who may cancel or modify their travel plans if their pet cannot be properly accommodated or welcomed at the destination; on the other hand, when destinations prove to be welcoming and offer suitable facilities for pets, owners are likely to extend their stay (Kirillova et al., 2015).

Despite these motivations, numerous challenges still hinder pet-inclusive travel, many of which are determined or amplified by cultural, legal, and spatial planning inconsistencies. According to Ying et al. (2021), traveling with pets involves logistical and financial issues that often surpass those of conventional tourism, mostly because of animals' dependence on human care and the limited tourist infrastructure accepting their presence.

Multiple studies (Chen et al., 2014; Ying et al., 2021; Yilmaz, 2023 etc.), point to three major categories of constraints:

Pet-specific constraints: these include health issues, behavioral issues or training deficits, including lack of socialization, and safety concerns: immediate dangers (for example, in Romania, a common concern among dog-owning hikers might be encountering sheep flocks guarded by aggressive dogs) or risks of contracting diseases.

Interpersonal constraints: these include concerns about potential negative social interactions, lack of time to properly care for the pet during the trip (in the absence of extra services, such as dog walking), the added pressure from balancing leisure and responsibility etc.

Owner-related constraints can be deeply social and shaped by the cultural context in which pet tourism occurs. Pet owners may face negative social interactions, such as complaints from other tourists or unfriendly behaviour from passersby, particularly in regions where animals in public places are not widely accepted. These interactions are often rooted in cultural attitudes toward animals, which vary significantly across and within countries. In places where pets are commonly viewed as family members, mostly in Western Europe, dogs may be welcomed in restaurants, public transport, or parks. However, in societies where animals are traditionally kept outdoors or associated with "work" (not in the sense of service or dog sports), such as in some rural Romanian

communities, bringing pets into public or enclosed spaces may be seen as inappropriate or even offensive. These tensions can cause stress or discomfort for pet owners, who may feel the need to justify or attenuate their pet's presence by altering their own behaviour to avoid conflict, thereby complicating their travel experience.

Structural constraints: these are the most frequently cited concerns in the literature, including the limited availability of pet-friendly accommodations, poor diversity in types of pet-friendly accommodation, poor diversity in service offerings, inconsistent legal regulations, a lack of accessible information, or no safe places to walk the dog. In rural Romania, for instance, there are usually no designated walking areas for dogs, and local free-roaming dogs can make walks unpleasant or even unsafe. Restrictions on bringing pets into public transportation or museums, lack of short-term pet care options (such as daycare facilities) in resorts and limited access to dog-friendly urban parks further complicate the issue. The lack of information regarding such aspects is also very discouraging to dog owners, as it also makes the process of planning a vacation with the dog much more complex and stressful (Hoy, Stangl, and Morgan, 2023b)

Ying et al. (2021) also introduced the concept of *learned helplessness* in the context of pet travel. When owners face repeated obstacles (ranging from initial planning to in place experiences) they may develop this sense of frustration and anxiety; this in turn can lead to trip cancellation or reduced duration of the overall stay. However, more recent research argues that accumulating experience in traveling with dogs builds more confidence in one's ability to obtain necessary information (Hoy, Stangl, and Morgan, 2023b). Many dog owners also tend to seek direct confirmation from hosts regarding pet-related matters, mainly due to distrust in the reliability of available online information (Koufodontis and Melissourgou, 2024).

Carr and Cohen (2009) note that not finding dog-friendly accommodation may discourage dog owners from taking holidays altogether, rather than simply choosing to travel without their pets. Notably, 82.9% of their respondents reported modifying their holiday plans to accommodate their dogs. These findings underscore a clear message for tourism industry stakeholders: the pet-travel market is significant and determined, but as, Hoy, Stangl, and Morgan (2023b) note, it is frequently underestimated or overlooked.

Despite the various logistical and structural challenges associated with traveling with pets, many owners (especially those with higher incomes) are willing to invest significant effort and financial resources to include their animals in holiday plans (Kirillova et al., 2015). In fact, the willingness to pay more in order to be able to travel with dogs and to ensure their comfortable accommodation is well documented (Hoy, Stangl, and Morgan, 2023a; Buhalis and Chan, 2023; Hidalgo-Fernandez et al., 2023 etc.).

Still, as Tomassini (2022) points out, despite some progress, oftentimes the hospitality industry continues to just accept pets only for the sake of customer satisfaction, while still limiting their presence to animals that are "small, silent, and tidy". This approach prevents the sector from exploring the full potential of genuinely integrating animals into hospitality spaces which could lead to more innovative, inclusive, and enriched travel experiences for everyone involved.

3.2. Operational and market implications of pet-inclusive travel

Literature consistently reports that the growing desire to travel with pets has significantly outpaced the development of consistent and balanced regulations, accessible infrastructure, and culturally inclusive practices across tourism destinations.

Pet-friendly tourism needs more than just tolerant policies, it requires destinations to welcome the pets rather than just allow them to enter the premises (Hoy, Stangl and Morgan, 2023b), to support shared human-animal leisure through features like pet-accommodating transportation or accommodation, pet-oriented services, and "shared outdoor leisure spaces" (SOLS). As Hoy, Stangl, and Morgan (2024) note, these SOLS (e.g. dog beaches, forests or parks), are preferred by UK dog owners because of their accessibility, multisensory appeal for dogs, and opportunities for off-leash activity and socialization. These spaces foster a dual benefit: they enable dogs to "be dogs," while simultaneously supporting human activities like walking, running, or meditating (Hoy, Stangl, and Morgan, 2024). Westgarth et al. (2021) provide further insight into leisure activities with dogs, distinguishing between functional walks (driven by the pet's needs) and recreational walks (which benefit both pet and owner, typically in more scenic, natural settings). Within tourism contexts (where the environment is usually more scenic or engaging), routine walks can thus be elevated to meaningful leisure experiences, enhancing wellbeing for both parties. Accordingly, destinations that support safe, scenic, and accessible recreational walking environments are very likely to attract tourists with pets.

Despite this potential, pet-related infrastructure remains inconsistently distributed. In Romania, we can note that while cities like Bucharest and Cluj-Napoca have made efforts to integrate dog parks into urban planning, secondary cities and rural settings most often lack designated green spaces and basic pet-related amenities, such as waste stations. However, the absence of such infrastructure has not yet become a critical deterrent for most travelers, unlike the more pressing issue of accommodation, a decisive factor in enabling or discouraging travel with pets.

Turning to the perspective of accommodation providers, Kirillova et al. (2015) emphasize that implementing pet-friendly policies offers clear competitive advantages, with evidence showing increased guest loyalty (this segment tends to be more loyal to establishments that *treat their pets well*) and longer average stays (2.56 nights for pet owners versus 2.1 nights for guests without pets). This is further reinforced by the pet owners' documented willingness to spend more on pet-friendly hospitality and shared activities with their pet. Yet, as Carr and Cohen (2009) note, the tourism studies were still approaching pets as accessories to their owners and not as "potential consumers who are able to influence decision making processes".

In many cases, hospitality managers who are themselves pet owners can better anticipate and meet the nuanced needs of this market segment (Buhalis and Chan, 2023). These managers tend to implement more empathetic and balanced pet policies for both pet-owners and guests that are not traveling with pets. Pet-friendly policies that do not require any fundamental efforts from the accommodation units might include providing maps with the suitable and safe walking places, that include suggestions of activities to do with the dog, promoting a welcoming attitude among staff toward visiting dogs etc. (Hoy, Stangl, and Morgan, 2023b).

Managers of accommodation units tend to recognize the long-term potential of investing in pet-friendly services, as the request for pet friendly lodging will continue to rise (Buhalis and Chan, 2023), and in fact, the number of destinations promoting themselves as dog-friendly to attract this new market sector is steadily growing (Ramos-Ruiz et al., 2024).

Yet, accommodating pets also introduces potential challenges that must be acknowledged. Kirillova et al. (2015) point out that not all guests are comfortable with the presence of animals in hotels or restaurants; some might have concerns about hygiene (or even have allergies), or a general perception of *disrespect*. As many as 34% of respondents in a study group of tourists without pets indicated that they would prefer to avoid encountering animals at their accommodation (Koufodontis and Melissourgou, 2024).

While it is important for all guests - with or without dogs (and staff) to share the tourist space, it is the responsibility of the accommodation provider in the first place to consider all expectations of all guests and come up with feasible solutions (separate floors, pet-free elevators etc.) if deciding to function as a pet friendly unit (Koufodontis and Melissourgou, 2024). In fact, to strike a balance, some U.S. hotel chains have adopted practices such as designating specific floors for guests with pets or offering outdoor dining options to accommodate pet owners without alienating customers that are not as dog-friendly (Kirillova et al., 2015).

Another aspect that units must acknowledge is that operationally, pet-friendly status can also add expenses, as pet-friendly rooms require more intensive cleaning to eliminate allergens, and that housekeeping can become more complicated when animals are aggressive or untrained (Kirillova et al., 2015).

Still, destinations and accommodations that invest thoughtfully in pet-friendly strategies stand to gain significantly, not just financially, but in cultivating loyalty and expanding access to a growing tourism demographic. The challenge lies in finding equilibrium: maximizing appeal to pet-owning tourists while maintaining comfort and inclusivity for all guests. However, well planned regulations do help with the predicament, in Slovenia, for example, the interaction between guests and pets being formally regulated by a hospitality-specific by-law, which offers a model for regulatory clarity (Mlakar and Korže, 2022).

3.3. Distribution of pet-friendly accommodations units in Romania

This section examines the distribution and accessibility of pet-friendly accommodations in Romania, drawing on data from major online travel platforms. The analysis focuses on how pet-related "*amenities*", in this case, the *allowance* of companion animals in lodging facilities, are presented in the touristic offer across different counties, highlighting both opportunities and gaps in the current Romanian tourism supply accessible online.

Data were manually collected from major online travel platforms, primarily Booking.com, with comparative reference to Travelminit.ro and Tripadvisor.com. These sources were selected due to their accessibility to the general public and their ability to reflect the online offer most likely to influence travelers' choices, especially among pet owners seeking convenience and clarity regarding animal-related policies.

While Booking.com was chosen as the primary source for its extensive coverage and relative alignment with official tourism registration data, the temporal and algorithmic variabilities require cautious interpretation. The analysis is therefore best understood as indicative of the visible and accessible online offer rather than a fixed structural inventory.

The absolute numbers of listings varied slightly between the two data collections (April and May, 2025), reflecting the dynamic nature of Booking.com's inventory, however, the proportional distributions remained broadly consistent. This analysis therefore emphasizes percentage values, which offer a more stable comparative basis across counties. Readers should interpret the data with caution, understanding that minor fluctuations are a feature of online booking platforms rather than real shifts in the accommodation landscape.

As of the data collection period (May, 2025), 24,854 Romanian accommodation units were listed on Booking.com, of which 6,360 explicitly

allowed pets, representing roughly 25.5% of the total. Comparable proportions were observed on Travelminit.ro (2,514 out of 10,806), and significantly fewer on Tripadvisor.com (498 out of 2,989), reinforcing the need to treat these figures as indicative rather than absolute. Nonetheless, these platforms collectively offer a valuable proxy for understanding how visible, accessible, and regionally distributed pet-friendly accommodation is for domestic and international travelers alike.

The spatial distribution of pet-friendly accommodations reveals an unsurprisingly pronounced clustering in established tourist regions and urban centers. Constanța County, encompassing the Black Sea coast major resorts, leads in absolute numbers (with 809 pet-friendly listings at the time of access), followed by Bucharest (703) and Brașov County (604). In addition to the leading counties, nine others (Cluj, Sibiu, Suceava, Maramureș, Prahova, Bihor, Harghita, Mureș and Iași) each host over 200 pet-friendly accommodations, while eight more exceed 100 units, and five more exceed 50 units. The remaining counties report fewer than 50 accommodation units, indicating a strong center-periphery divide and broader socio-economic and infrastructural gaps in Romania's tourism landscape.

When evaluated in terms of the proportion of pet friendly accommodations and the total accommodations per county, four distinct typologies emerge (fig 1). The thresholds used for the diagram (and the typology) were 500 units for the total number of accommodation units and 30% for the share of pet-friendly units.

- High Availability, High Inclusivity. Suceava, Maramureș, Tulcea, Harghita, Alba, and Neamț counties demonstrate both a strong overall accommodation supply and a high percentage of units accepting pets. These destinations appear particularly well-positioned to attract pet-traveling tourists without requiring substantial additional investment.

- High Availability, Low Inclusivity. Despite boasting large numbers of total accommodation units, counties like Constanța, Brașov, Cluj, Sibiu, Prahova, Bihor or Timiș, and the city of Bucharest, exhibit percentual low pet-friendliness. These areas, anchored by major cities, may reflect institutional conservatism, lack of managerial awareness, or perceived tensions between pet-related amenities and upscale or business-oriented tourism. This cluster suggests considerable room for growth in pet accommodation services, particularly given the developed already existing tourism infrastructure.

- Low Availability, High Inclusivity. A number of less central or smaller counties, such as Iași, Caraș-Severin, Bistrița-Năsăud, and Covasna, display high rates of pet-friendliness despite having fewer total accommodation units. These areas may appeal to niche markets in this already niche market sector, like eco-tourists traveling with dogs, or domestic travelers who value inclusivity over abundance.

• Low Availability, Low Inclusivity. Counties such as Arad, Călăraşi, Galaţi, or Vaslui, currently lack both sufficient accommodation volume and pet-oriented amenities. These economically marginalized or transit-heavy regions represent the most significant infrastructural gap for pet tourism in Romania and may require targeted incentives or development programs to become more accessible.
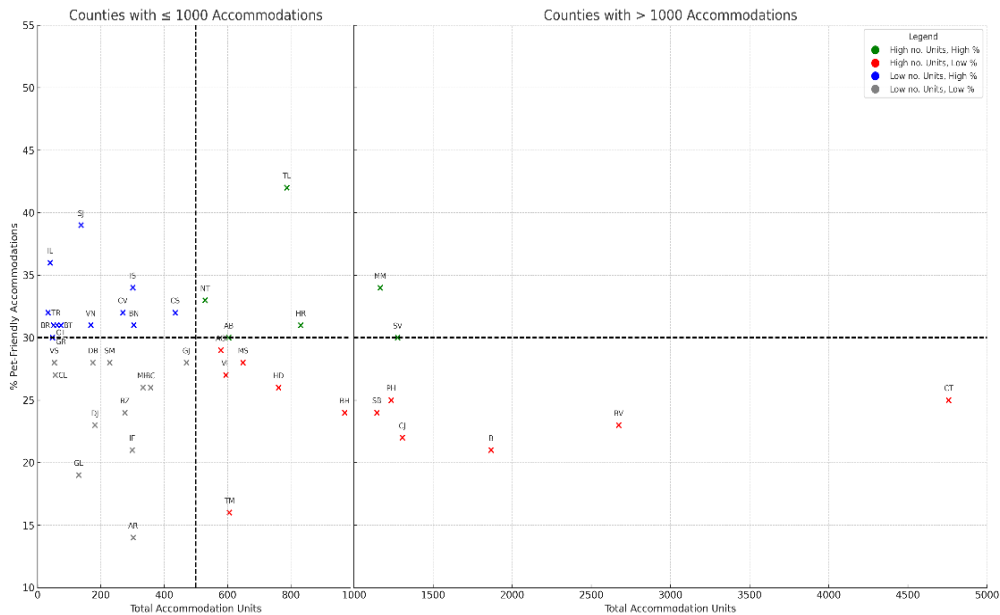
Fig. 1. Clustering of counties based on overall accommodation infrastructure
(data sourced from the Ministry of Economy, Entrepreneurship, and Tourism)
and the percentage of accommodations with a dog-friendly policy
(as listed on Booking.com, data retrieved in May 2025).
Note: data retrieved in April 2025 showed the same clustering pattern,
with the exception of just two counties: Alba and Vaslui.

This uneven geographic distribution underscores that although urban centers dominate in absolute numbers, true pet-friendliness remains patchy and highly localized. As pet-inclusive travel continues to grow, the hospitality sector has both a strategic and ethical opportunity to expand its offer more equitably, particularly in regions underserved by current infrastructure.

While the overall figures might seem encouraging, another note is necessary: Romania ranks in the lower quarter of EU countries in terms of the share of pet-friendly accommodations listed online. Its percentage of 25.5%, places Romania alongside the Netherlands and just above Cyprus, Portugal,

Ireland, and Malta. In contrast, several northern and central European countries, such as Sweden, Austria, and Finland, show pet-friendly rates of 50% or higher. Yet again, it is important to note that this data reflects a specific moment in time (May, 2025) and is based solely on online listings from Booking.com. As such, it captures the immediately visible offer for tourists rather than the full extent of pet-friendly hospitality infrastructure in each country.

4. Conclusions

This study highlights the growing significance of pet travel within contemporary tourism, underscoring the complex interplay of emotional bonds, infrastructure, cultural attitudes, and economic opportunities. While the desire to travel with pets reflects meaningful human-animal relationships, it also reveals significant challenges, ranging from logistical constraints and social acceptance to environmental and ethical considerations.

With the growing prevalence of pet tourism, its environmental impact, particularly through increased carbon emissions (most people traveling with dogs preferring to travel by car rather than train) and possible ecological disturbances in sensitive natural areas (which can however be avoided with proper management of both dogs and space), demands greater attention. However, the potentially longer stays of travellers accompanied by dogs may support sustainability by reducing the frequency and intensity of high-impact, short-term travel (Palinkas, Kinczel, and Muller, 2024). Moreover, the ethical imperative to ensure animal well-being during travel calls for a nuanced approach that respects pets not merely as companions but as sentient beings with specific needs and vulnerabilities. The uneven enforcement of regulations and cultural variability further complicate these issues, especially in regions where pet inclusivity is still emerging.

A key contribution of this study lies in its analysis of how pet-friendly accommodations are distributed across Romanian counties. Using data collected from Booking.com and other major platforms, this section goes beyond official statistics to highlight regional disparities not only in the volume of accommodations, but also in their inclusivity toward pet owners. The findings reveal a nuanced picture: certain counties with strong tourism infrastructure remain relatively exclusive, while smaller or less central counties often display higher rates of pet-friendliness. Though not a spatial analysis in the strict sense, the data-driven clustering of counties underscores an uneven and often overlooked layer of accessibility that is increasingly relevant as pet-inclusive travel becomes more mainstream.

Looking ahead, integrating pet needs into spatial planning represents a promising path toward more inclusive and sustainable mobility. Cities that prioritize pet-friendly infrastructure exemplify how human and animal welfare can jointly advance. Addressing the future of pet travel requires a systemic perspective that balances economic benefits with social, cultural, and ecological responsibilities. By fostering policies and practices grounded in ethical care and environmental awareness, tourism stakeholders can support a more harmonious coexistence between people, pets, and the places they visit.

Ultimately, pet travel is a reflection of broader cultural geographies, of how societies define inclusion, mobility, and the human-animal bond. Understanding these cultural dimensions is essential not only for pet-friendly policies but for recognizing the diversity of ways animals are made part of the mobile human world.

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THE TOURIST ACCOMMODATION INFRASTRUCTURE IN THE MOUNTAINOUS AND MARGINAL CONTACT AREA OF MUREŞ COUNTY - THE DECISIVE FACTOR FOR THE ELABORATION OF SUSTAINABLE TOURISM STRATEGIES

Andreea-Maria CRĂCIUN[1], Ştefan DEZSI[2] , Florin POP[1], Judith NYULAS[1]

ABSTRACT. – The Tourist Accommodation Infrastructure in the Mountainous and Marginal Contact Area of Mureş County - the Decisive Factor for the Elaboration of Sustainable Tourism Strategies. The analysis of the tourist accommodation infrastructure of the mountainous and marginal contact area of Mureş County is part of a larger study on tourism in the area. This paper has analyzed statistical data on tourism structures with accommodation functions and their accommodation capacity in 2024 from a triple perspective: based on data provided by the National Institute of Statistics (INS), the Ministry of Economy, Entrepreneurship and Tourism (MEDAT) and, last but not least, data obtained through our own investigation. The purpose of this work is to provide a clear and close picture of the existing tourist accommodation units in the reference area so that the results obtained can be used to carry out the following sequences of the study and to foreshadow tourism development strategies in the area. As in the case of other economic activities, tourism has had periods of decline, stagnation, and positive evolution over the years, determined either by political, natural, social or economic causes.

Keywords: *Mureş County, mountain and marginal contact area, tourist infrastructure, accommodation units.*

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1. INTRODUCTION

As a main element in tourism, the accommodation infrastructure holds a significant percentage in terms of revenues from tourism activities, being characterized by some heterogeneity compared to the other components of the technical and material base (Cocean and Dezsi, 2009).

The tourist accommodation infrastructure groups several types of tourist accommodation units, individualized according to certain criteria: size, comfort, period of use, type of tourism, functionality, etc. Thus, no less than 16 types of accommodation units operate in Romania, mentioned by the legislation in force: *hotels, apartment hotels, hostels, motels, tourist villas, tourist chalets, bungalows, holiday villages, campsites, tourist stops, camping-type cottages, apartments and rooms for rent in family homes, river and sea vessels including floating pontoons, tourist guesthouses and agro-tourism guesthouses and other units with tourist accommodation functions* (Romanian Government, 1998). These categories of tourist accommodation units are classified by comfort categories according to certain methodological norms (National Tourism Authority, 2013), as well as tourism licenses (https://legislatie.just.ro/Public/DetaliiDocument/148944). Thus, the following comfort categories are assigned to each category of tourist accommodation unit: between 1 and 5 stars in the case of hotels and tourist villas, between 1 and 5 stars or 1 to 5 daisies in the case of tourist/agritourism guesthouses; apartment-hotels (between 2 and 5 stars); hostels (between 1 and 3 stars); campsites, camping-type cabins and tourist stops (between 1 and 4 stars); motels, bungalows, cabins, apartments and rooms for rent (classified between 1 and 3 stars); holiday villages (2 or 3 stars).

2. METHODOLOGY, DATA AND MATERIALS

This paper is part of a larger study on tourism in the mountainous and marginal contact areas of Mureș County, which targets all components of the tourism sector. To prepare this paper, the relevant specialized literature for the topic has been assessed, primarily theoretical studies (Dezsi, 2006a, Ciangă, 2007; Ciangă and Dezsi, 2007; Cocean and Dezsi, 2009), as well as applied studies that treated the study area (Crăciun, Dezsi, Pop, 2022) or nearby areas (Dezsi, 2006b, Gherman-Henning, 2017). Taking into account the relevant legislation that had an impact on the development of tourism in the mountainous and marginal contact areas (Vasloban, 2008, Dezsi *et al*, 2014, Oltean and Gabor, 2016, Răcășan, 2018, Rusu, 2022), existing development strategies at the level of

the municipalities of the study area for the period 2021-2027 have been analysed (Consiliul Județean Mureș, 2021, Primăria Sovata, 2021). The next step was to collect statistical data on the existing accommodation infrastructure, thus using the online database made available by the National Institute of Statistics (http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table), the database made available by the Ministry of Economy, Entrepreneurship and Tourism (https://turism.gov.ro/web/autorizare-turism/), as well as those obtained following our own field investigations.

The analysis has focused on identifying the differences in the structure and typology of tourist accommodation units, as well as their accommodation capacity. The distribution of accommodation units at the level of the municipalities in the study area has also been analysed in order to identify possible inconsistencies between the three sources mentioned above and to establish the level of the size of the tourist accommodation infrastructure and its accommodation capacity.

3. RESULTS AND DISCUSSIONS

Regarding the study area, after reviewing the list of tourist accommodation units existing in 2024, 15 categories of tourist accommodation units have been identified according to both the INS and MEDAT. However, there is a difference between the two data sources, in the sense that, according to the INS, some of them are *tourist cottages*, while on the MEDAT, they are *camping cottages* (in the analysis, we considered them as a single type of structure). Another difference is related to *rental apartments*, respectively *rental rooms*, which appear on the INS only as *rental apartments*, and within MEDAT these represent two different categories of tourist accommodation units. Finally, MEDAT does not register accommodation structures such as *student camps* and *bungalows*, and they are found only on the INS list.

The graph below (Fig. 1) shows the number of tourist accommodation units related to each category mentioned above, made from the triple perspective. Following the analysis, one notices that the highest number of tourist accommodation units belongs to *rooms for rent*, followed by *tourist guesthouses* and *apartments for rent*. At the opposite end are the tourist accommodation units from the category of *holiday villages*, *camps* and *campsites* which comprise between 1 and 3 structures.
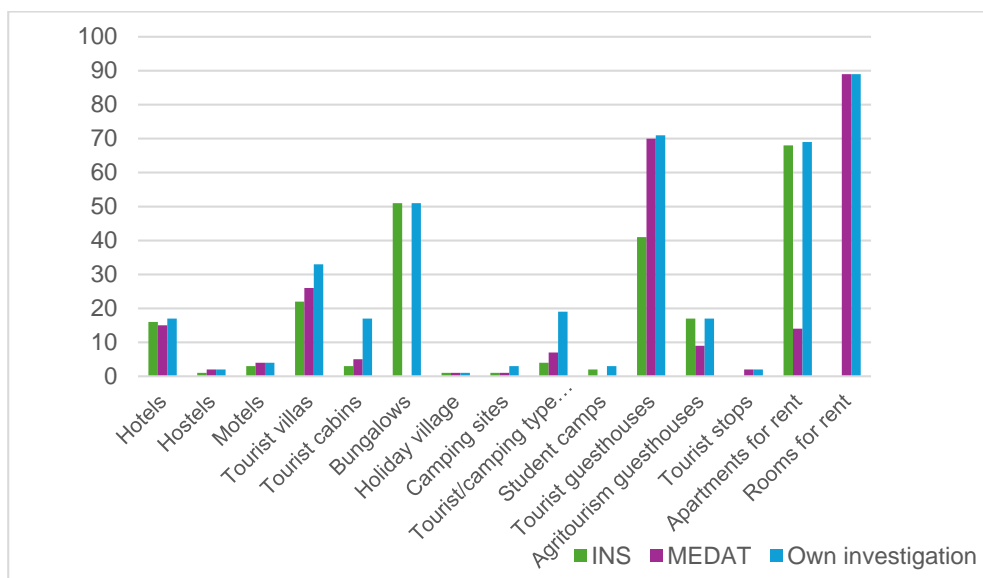
Fig. 1. Number of tourist accommodation units in the study area
Source: author data processing according to INS and MEDAT in 2024

Table 1. Numerical distribution of types of tourist accommodation units in 2024
according to different sources

Category of tourist accommodation units	INS	MEDAT	Own investigation
Hotels	16	15	17
Hostels	1	2	2
Motels	3	4	4
Tourist villas	22	26	33
Tourist cabins	3	5	17
Bungalows	51		51
Holiday villages	1	1	1
Camping sites	1	1	3
Tourist/camping type cabins	4	7	19
Student camps	2		3
Tourist guesthouses	41	70	71
Agritourism guesthouses	17	9	17
Tourist stops		2	2
Apartments for rent	68	14	69
Rooms for rent		89	89
Total	230	245	398

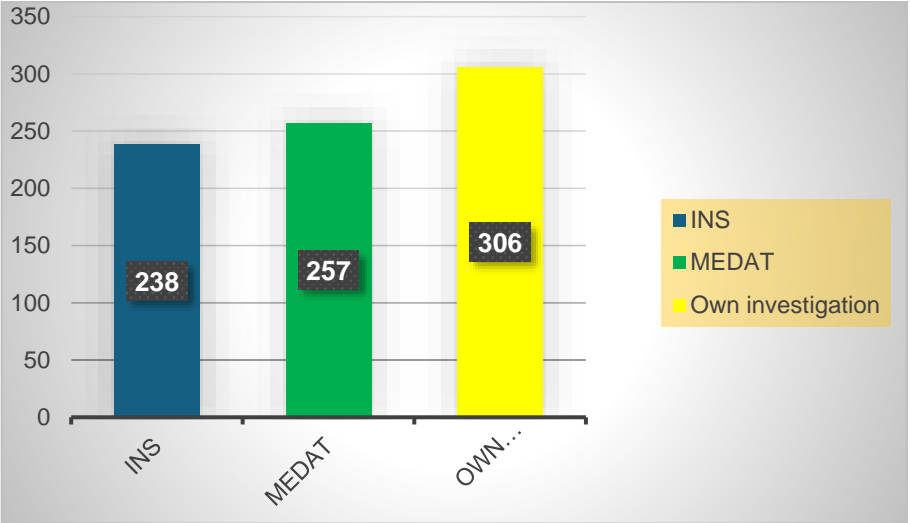*Source: author data processing according to INS and MEDAT in 2024*

Thus, it is noticeable that, although two official sources have been reviewed, there are still quite obvious differences that are not only found in the case of the types of tourist accommodation units, but also in terms of their total number in 2024 (238 units - INS, and 257 units – MEDAT respectively), as well as the number of existing accommodation beds (5401 beds - INS, and 6111 – MEDAT respectively). In addition to these two sources that have been taken into account, information has been obtained from our own investigations that have also identified other tourist accommodation structures that are not on the list of any official source mentioned above, namely 49 units identified within 12 municipalities. In the case of the existing accommodation capacity in the mountainous and marginal contact area of Mureş County, our own investigation was used, as a result of which a large difference was found between the number of beds provided by INS (5401 beds) and MEDAT, 6111 beds respectively), as we have identified 787 accommodation beds in addition to the two sources. Regarding our own investigation, one must mention that tourist accommodation units have been identified that appear registered within MEDAT with a lower number of places than in reality (e.g. Cabana Şestina - 22 beds according to MEDAT, 51 beds - our own investigation; Valea Regilor Happy Camp - 6 places MEDAT, 12 places, our own investigation).

Table 2. Number of tourist accommodation units and tourist accommodation capacity (accommodation beds) in 2024

Category	Information source	Study area
Tourist accommodation units	MEDAT	257
	INS	238
	Own investigation	306
Accommodation beds	MEDAT	6111
	INS	5401
	Own investigation	6898

Source: author data processing according to INS and MEDAT in 2024

The analysis of the capacity of tourist accommodation units shows that although hotels are not found in a high number within the study area (16 according to INS), this category of tourist accommodation units has the highest number of accommodation beds (1866 beds according to INS), followed by rooms for rent, and apartments for rent respectively. The high number of accommodation beds in hotels is explained by the fact that most hotels are located in the city - spa resort of Sovata.

Fig. 2. Distribution of the number of tourist accommodation units
(triple perspective) in 2024
Source: author data processing according to INS and MEDAT in 2024
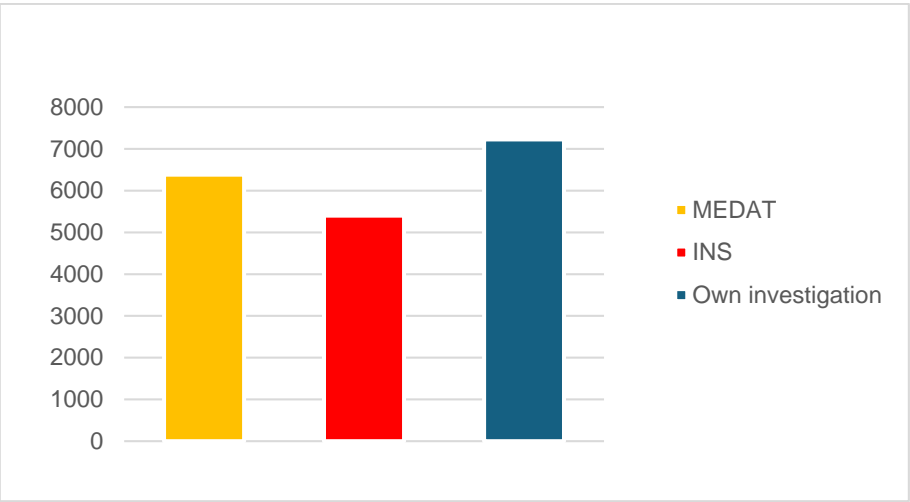
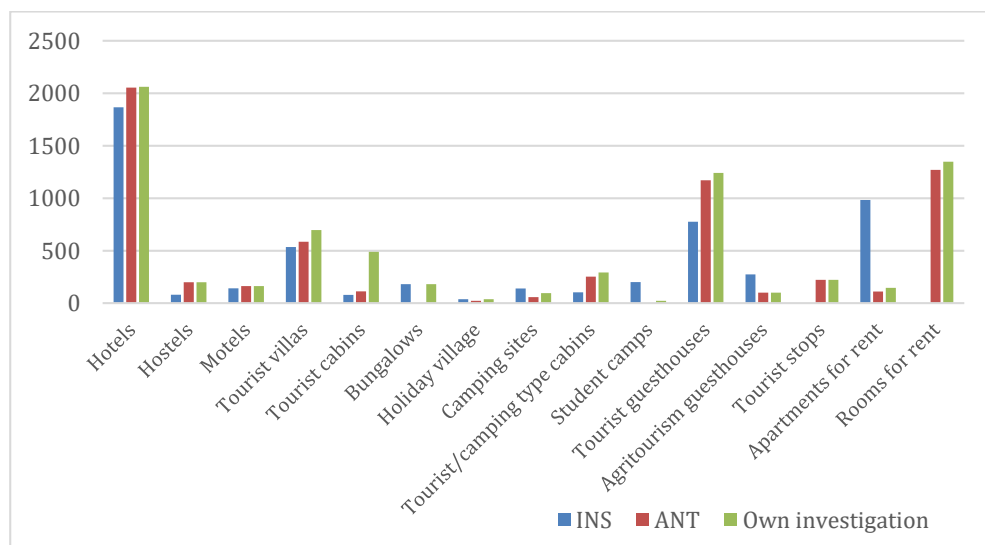**Fig. 3.** Distribution of accommodation beds in 2024 - triple perspective
Source: author data processing according to INS and MEDAT in 2024

Fig. 4. Distribution of the number of accommodation beds in the study area
by types of accommodation units in 2024 (triple perspective)
Source: author data processing according to INS and MEDAT in 2024

Table 3. Distribution of the number of accommodation beds
in the study area in 2024 - triple perspective

Type of accommodation structure	INS	MEDAT	Own investigation
Hotels	1866	2054	2062
Hostels	81	200	200
Motels	141	163	163
Tourist villas	535	585	697
Tourist cabins	79	112	490
Bungalows	182		182
Holiday villages	38	22	38
Camping sites	140	58	96
Tourist/camping type cabins	104	253	293
Student camps	201		22
Tourist guesthouses	776	1171	1241
Agritourism guesthouses	275	101	101
Tourist stops		222	222
Apartments for rent	983	111	147
Rooms for rent		1271	1348

Source: author data processing according to INS and MEDAT in 2024
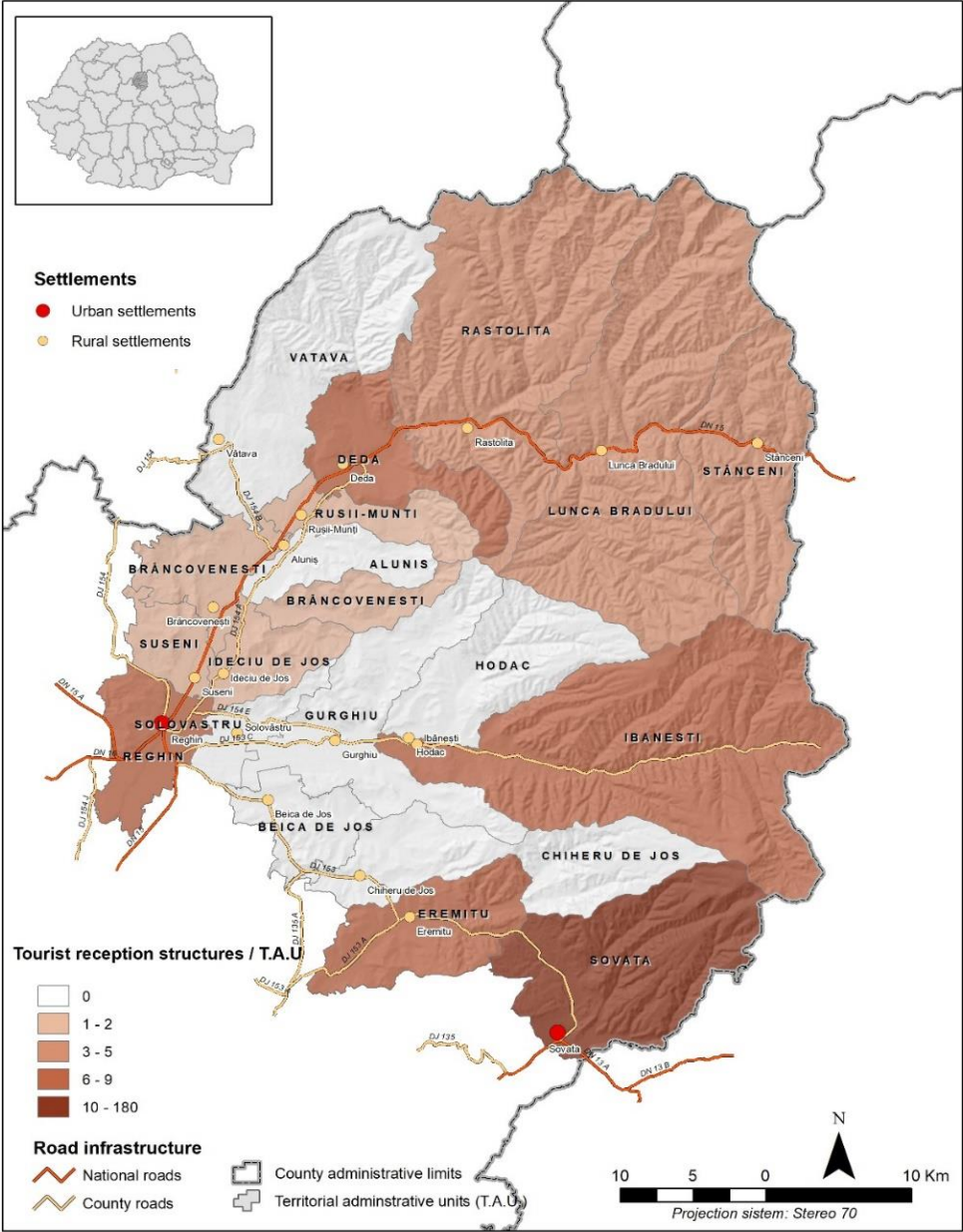
Fig. 5. Numerical distribution of the types of tourist accommodation units in 2024
Source: INS

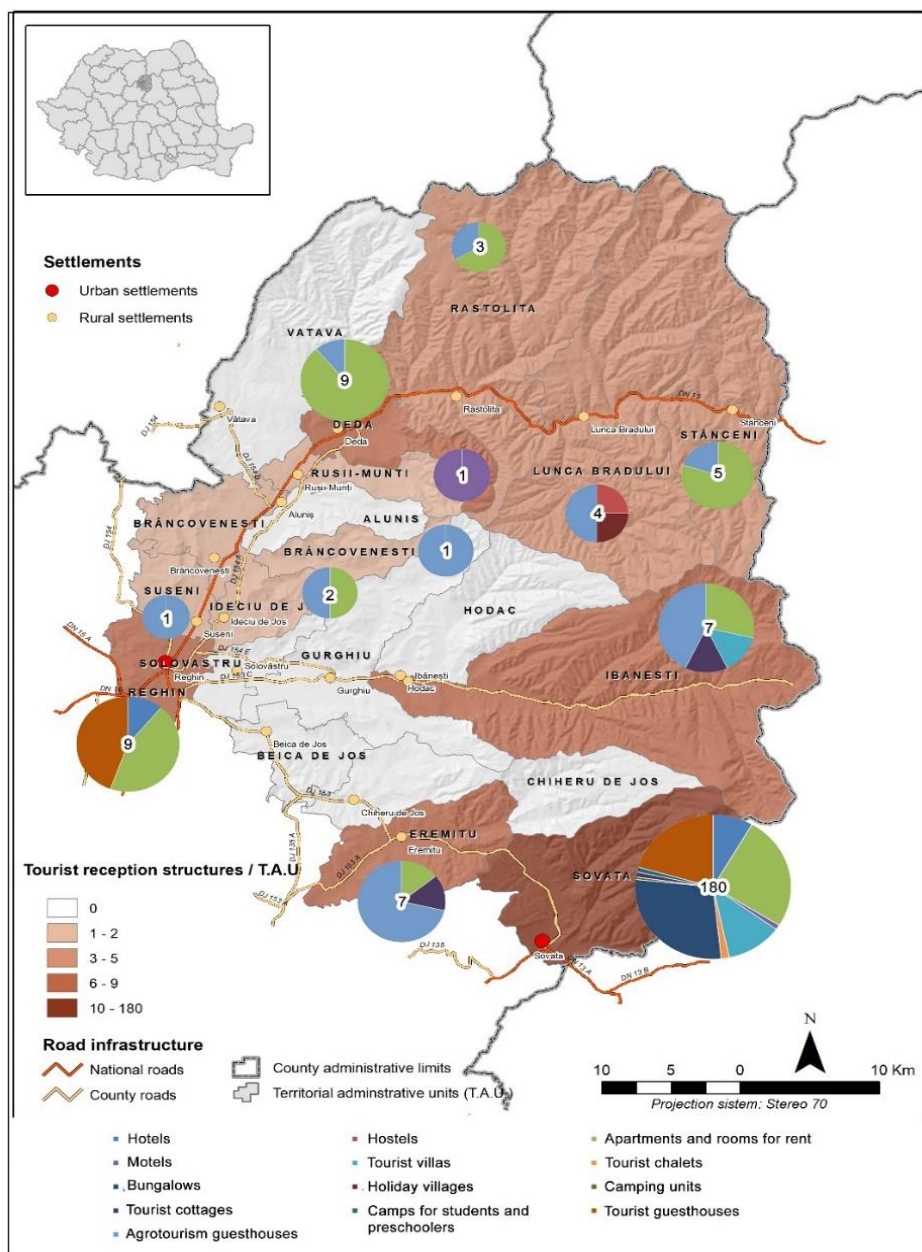**Fig. 6.** Distribution of the number of tourist accommodation units
at the level of municipalities in 2024
Source: INS

Even though at the level of year 2024, according to INS data, the study area had approximately 50% of the existing accommodation units in Mureș County, and about 42% of the capacity of existing accommodation beds at the county level, which overall places the study area in an honorable position within the county, it should be noted that not all the municipalities subject to research have tourist accommodation units (Fig. 5), so there are municipalities that do not have tourist accommodation units, and others with a low or medium number. Within the county, the high percentage of the tourist accommodation units in the mountainous and marginal contact area of Mureș County is due to the existence of the Sovata spa resort, which represents the main tourist centre of both Mureș County and the study area.

The difference in data provided by the three analyzed sources can be noticed in table 4, representative of the ranking of municipalities in the study area in terms of the size of the accommodation infrastructure.

Thus, according to INS data, three administrative units, Deda, Reghin and Sovata, are in the category of municipalities with a high and very high size of tourist infrastructure. According to data provided by MEDAT, in the two previously mentioned categories there are five municipalities: Deda, Eremitu, Ibănești, Reghin and Sovata. Finally, our own investigation placed in the category of those with a high and very high dimension of infrastructure a number of 7 municipalities: Deda, Eremitu, Ibănești, Răstolița, Reghin, Stânceni, and Sovata.

At the opposite end, in the category of municipalities without any tourist reception structure with accommodation functions, there are, according to the INS, seven UATs (Aluniş, Beica de Jos, Chiheru de Jos, Gurghiu, Hodac, Solovăstru, and Vătava), and according to MEDAT and our own investigation, there are only three UATs (Beica de Jos, Chiheru de Jos, and Vătava).

Regarding the identification of the number of existing accommodation beds in the mountainous and marginal contact area of Mureș County, the same three sources of information (INS, MEDAT and our own investigation) have been taken into account (Table 5). Thus, according to INS and MEDAT data, only the city of Sovata has a very high capacity, owing to its over 4000 beds. In the category of UATs with a high accommodation capacity, INS records five UATs (Eremitu, Ibănești, Lunca Bradului, and Reghin), and MEDAT, six UATs (Deda, Eremitu, Ibănești, Lunca Bradului, and Reghin). In terms of our own investigation, the commune of Eremitu is in the category of those with a very high accommodation capacity, while the communes of Ruşii-Munţi and Stânceni are added with a high accommodation capacity, in addition to MEDAT. At the opposite end, the communes that have no accommodation capacity are Beica de Jos, Chiheru de Jos, and Vătava, according to MEDAT and our own investigation, and Alunis, Beica de Jos, Chiheru de Jos, Gurghiu, Hodac, Solovăstru, and Vătava according to data provided by the INS.

Table 4. Size of the accommodation infrastructure of the study area
at the level of municipalities in 2024 - triple perspective

Size of accommodation infrastructure	INS	MEDAT	Own investigation
Non-existent (0 units)	Alunis, Beica de Jos, Chiheru de Jos, Gurghiu, Hodac, Solovăstru, Vătava	Beica de Jos, Chiheru de Jos, Vătava	Beica de Jos, Chiheru de Jos, Vătava
Low (1-3 structures)	Brâncovenești, Rușii Munți, Suseni - *1 structure* Ideciu de Jos- *2 structures* Răstolița- *3 structures*	Aluniș, Gurghiu, Hodac, Rușii-Munți, Suseni - *1 structure* Brâncovenești, Solovăstru *2 structures*	Gurghiu – *3 structures* Hodac- *1 structure* Rușii-Munți - *3 structures* Suseni- *1 structure* Brâncovenești- *2 structures* Solovăstru- *2 structures*
Medium (4-7 structures)	Eremitu - *7 structures* Ibănești - *7 structures* Lunca Bradului - *4 structures* Stânceni- *5 structures*	Ideciu de Jos- 4 *structures* Lunca Bradului - *5 structures* Răstolița - *4 structures* Stânceni- 5 *structures*	Ideciu de Jos- *6 structures* Lunca Bradului- *9 structures*
High (8-20 structures)	Deda - *9 structures* Reghin - *9 structures*	Deda- *14 structures* Eremitu – *12 structures* Ibănești - *11 structures* Reghin - *14 structures*	Deda - *18 structures* Eremitu - *18 structures* Ibănești - *21 structures* Răstolița - *11 structures* Reghin - 17 *structures* Stânceni- *11 structures*
Very high (over 20 de structures)	Sovata -*181 structures*	Sovata - *174 structures*	Sovata - *181 units*
TOTAL	238	257	304

Source: author data processing according to INS and MEDAT in 2024

Table 5. Size of the accommodation capacity of tourist accommodation units
in the study area at the level of municipalities in 2024 - triple perspective

Accommodation capacity	INS	MEDAT	Own investigation
Non-existent (0 places)	Alunis, Beica de Jos, Chiheru de Jos, Gurghiu, Hodac, Solovăstru, Vătava	Beica de Jos, Chiheru de Jos, Vătava	Beica de Jos, Chiheru de Jos, Vătava
Low (8-40 beds)	Brâncovenești- *8 beds* Ideciu de Jos-34 *beds* Suseni- *20 beds*	Aluniş- *2 beds* Brâncovenești - *8 beds* Gurghiu - *10 beds* Hodac- *10 beds* Suseni - *24 beds* Solovăstru - *28 beds*	Aluniş- *22 beds* Brâncovenești - *8 beds* Hodac - *10 beds* Suseni - *24 beds* Solovăstru - *28 beds*
Medium (41-100 beds)	Deda - *98 beds* Răstolița - *50 beds* Rușii-Munți - *82 beds* Stânceni - *60 beds*	Ideciu de Jos – *66 beds* Răstolița - *58 beds* Rușii Munți - *82 beds* Stânceni - *69 beds*	Gurghiu - *62 beds* Răstolița- *93 beds*
High (101-370 beds)	Eremitu - *137 beds* Ibănești - *111 beds* Lunca Bradului -*175 beds* Reghin – *243 beds*	Deda - *122 beds* Eremitu – *278 beds* Ibănești - *176 beds* Lunca Bradului - *161 beds* Reghin - *327 beds*	Deda- *191 beds* Ibănești- *348 beds* Ideciu de Jos-*276 beds* Lunca Bradului-*232 beds* Reghin- *351 beds* Rușii Munți- *107 beds* Stânceni - *148 beds*
Very high (over 370 beds)	Sovata- *4383 beds*	Sovata- *4851 beds*	Eremitu - *382 beds* Sovata – *4945 beds*
TOTAL	**5401**	**6111**	**7227**

Source: author data processing according to INS and MEDAT in 2024

Taking into account the data provided by the two official sources (INS and MEDAT), it emerges that the accommodation infrastructure of the mountainous and marginal contact area of Mureş County is of medium size and capacity. Our own investigation, however, places the study area at a higher level, which shows that the official sources do not have a picture of the reality on the ground. This leads us to also mention the fact that part of the tourist accommodation units in the mountainous and marginal contact areas of Mureş County operate "under the table", which becomes a problem for the tourist act if this "trend" continues in the future.

4. CONCLUSIONS

The tourist infrastructure in the mountainous and marginal contact area of Mureș County is under development, the general trend in recent years being to improve both the degree of comfort and accommodation capacity. The COVID-19 pandemic period affected tourism activities in Romania (Rusu, 2022), but the tourism infrastructure in the mountainous and marginal contact area of Mureș County proved to be resilient, as the number of tourist accommodation units as well as their capacity increased after 2020 (from 163 units in 2020 to 230 units in 2024, and from 4458 beds in 2020 to 5408 beds in 2024), this increase also being felt at the level of the number of municipalities including accommodation units. This positive trend is expected to be maintained in the coming period, as tourism represents a very important economic activity in terms of the economic development of the study area.

A problem noticed following the present study is related to the fact that there are some municipalities in the study area that do not have any tourist accommodation units (Beica de Jos, Chiheru de Jos, and Vătava) although they have a complex natural and anthropogenic tourist potential that can support the development of tourist activities, implicitly the emergence of tourist structures with accommodation and public catering functions. We mention that this emerged from the analysis carried out from a triple perspective, so that none of the information sources identified the existence of any tourist accommodation unit in these communes. This highlights the inability of local authorities to attract investors in tourism in the administered communes, the low level of awareness of the attractive value of tourism resources (both natural and anthropogenic) by local residents, as well as the fact that tourism activities can represent an important pillar in the economic development of the area, which will undoubtedly increase the income and living standards of the local residents.

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BOOK REVIEW

Geacu, Sorin, 2024, *Opt decenii de cercetări biogeografice la Institutul de Geografie al Academiei Române* [Huit décennies de recherches biogéographiques à l'Institut de géographie de l'Académie roumaine], Editura Universitară, Bucureşti
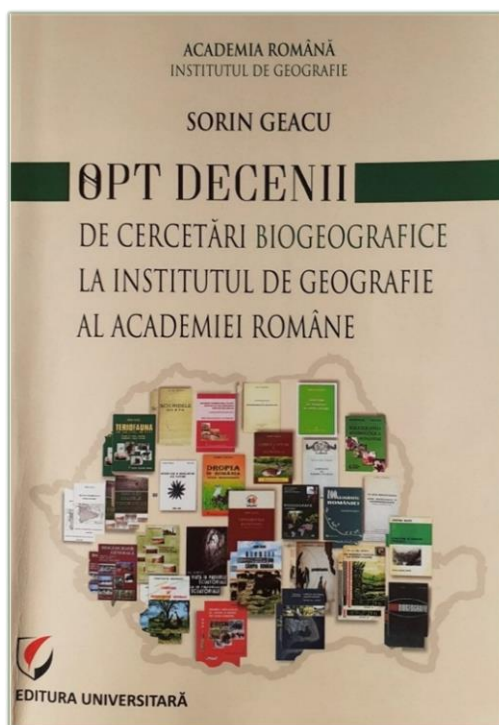
L'ouvrage du chercheur Sorin Geacu *Huit décennies de recherches biogéographiques à l'Institut de géographie de l'Académie roumaine* est paru sous l'égide de l'Institut de géographie de l'Académie roumaine à Bucarest. Il est publié en format B5 et il comprend 136 pages.

Le volume est structuré en neuf chapitres – très courts – suivis de la *«Liste des travaux de biogéographie publiés par les membres de l'Institut [de géographie de l'Académie roumaine] de 1944 à 2024».* Cet inventaire en est, à notre avis, l'un des éléments-clés, un outil de travail et de documentation salutaire! Selon l'usage, une préface, une introduction et, à la fin, un résumé en anglais complètent le tout.

La préface est signée par le directeur octogénaire de l'Institut de géographie, le Dr Dan Bălteanu, qui explique longuement que le volume est consacré au «80e anniversaire de la fondation de l'Institut de géographie de l'Académie roumaine» (p. 7) et mentionne en passant les initiateurs de la recherche biogéographique à l'Institut: Alexandra Bunescu et Raul Călinescu.

Il ne néglige pas de faire l'éloge de l'auteur, le Dr Sorin Geacu, qu'il appelle «l'un des chercheurs les plus actifs de la génération actuelle de biogéographes»! (idem). Le préfacier souligne les éléments forts de ce volume anniversaire: la synthèse de l'évolution de la pensée biogéographique à l'Institut de géographie; la grande valeur de plusieurs

travaux publiés par les chercheurs Constantin Drugescu, Cristina Muică et Ana Popova-Cucu; des aspects biogéographiques liés aux zones naturelles protégées en Roumanie; les médaillons bio-bibliographiques des membres de l'équipe de biogéographes de l'Institut; et, comme précisé auparavant, la liste des travaux publiés de 1944 à 2024.

La brève *«Introduction»* de l'ouvrage nous renseigne sur les accomplissements scientifiques de l'Institut de géographie de l'Académie roumaine, créé le 6 février 1944 sous le nom d'Institut de recherches géographiques de Roumanie. Le texte se penche aussi sur la contribution de Raul Călinescu en tant que «biogéographe formé» (*ibidem*, p. 9) au début des activités de recherche dans cette spécialité. Nous trouvons que le sujet de la création de l'Institut de géographie y est traité de manière quelque peu... télégraphique. Il aurait mérité d'être approfondi, compte tenu du contexte dans lequel l'Institut a été créé et de la mission envisagée par ses initiateurs, ainsi que de son «virage» à gauche – complètement vers... l'Est – après l'occupation de notre pays par l'URSS. Ce tournant s'est reflété y compris dans le domaine de la biogéographie, par l'abandon quasi-total des liens scientifiques avec les auteurs et l'interruption de l'accès aux articles. La relation avec l'Occident – notamment français, allemand, anglais et américain – a presque complètement cessé.

Ayant identifié deux grands volets dans l'approche de la biogéographie au sein de l'Institut de géographie, la phytogéographie et la géographie animale, l'auteur les traite séparément.

Dans le chapitre I, *«Travaux phytogéographiques»* (pp. 12-24), il précise: *«l'approche géographique de la recherche sur la végétation a été initiée par le professeur Raul Călinescu»* (p. 12), ce qui nous réjouit, ne serait-ce que parce que ce dernier s'était formé à l'École de géographie de Cluj au temps où George Vâlsan en était le directeur ! Toujours ici, sont brièvement mentionnées et décrites les études et contributions scientifiques des «pionniers» roumains dans le domaine : Alexandra Bunescu, Ion Vintilescu, Cristina Muică et Ana Popova-Cucu. L'auteur parle aussi de la structure et de la dynamique de certaines associations végétales, de l'impact anthropique sur la couverture végétale, de l'étude des espèces rares et invasives, d'aspects liés à la phénologie, de la méthodologie appliquée, des phénomènes courants de xérophytisation, de la conservation de la biodiversité et de l'éducation écologique.

Le chapitre 2, *«Études de géographie animale»* (pp. 25-39), s'articule autour d'une brève chronologie des études régionales de zoogéographie, de la répartition géographique de certains éléments fauniques et de l'approche de la *«direction génétique»* en zoogéographie (p. 29). Les conclusions en sont fructueuses; elles portent sur l'étude des espèces colonisées, réintroduites et invasives, les aspects liés à l'entomologie (intéressants et d'actualité dans la perspective des dommages que certains insectes nuisibles peuvent causer), des aspects de la dynamique chrono-spatiale chez certaines espèces d'oiseaux et de mammifères, aussi bien que sur des travaux de synthèse cartographique dans le domaine de la biogéographie.

Dans le chapitre 3, *«La contribution des biogéographes au développement des travaux représentatifs publiés par l'Institut de géographie»* (pp. 40-47), l'auteur énumère et résume des travaux d'intérêt national en soulignant la contribution des auteurs

respectifs, des travaux d'intérêt régional, ainsi que d'autres travaux notables des biogéographes de l'Institut de géographie de Bucarest. La même structure se retrouve *per membrum instituti* dans le chapitre 4 – *«Volumes de biogéographie publiés par les membres de l'Institut»* (pp. 48-53). Le Dr Sorin Geacu y reprend, de manière quelque peu répétitive, les travaux publiés par les biogéographes de l'Institut avec leurs couvertures (pp. 79-80), une action salutaire, car elle promeut efficacement les résultats scientifiques des chercheurs dans toutes leurs étapes: recherche, investigation, synthèse, publication et diffusion. Peut-être aurait-il été utile de dresser un tableau comparatif pour les rapporter à d'autres travaux similaires menés ailleurs dans le monde. Un tel diagnostic aurait démontré la place de la biogéographie roumaine dans le contexte européen/global...

Étant donné l'actualité du sujet de la préservation et de la protection de la nature, tout un chapitre est consacré aux zones protégées de Roumanie, à savoir le chapitre 5 – *«Recherches biogéographiques relatives aux zones naturelles protégées»* (pp. 54-58). L'auteur met en évidence ici les nombreuses recherches détaillées des biogéographes de Bucarest, et leur bilan pertinent concernant l'«état d'équilibre» d'une grande variété de réserves naturelles, telles que: les cirques glaciaires des montagnes Cindrel et Şureanu, la réserve botanique de Ponoare (département de Mehedinţi), la réserve forestière «Cotul cu Aluni» (département de Gorj), le Parc national Porţile de Fier, les réserves naturelles des départements de Buzău et de Maramureş etc.

Dans quelques brefs chapitres, trop brefs, j'oserais dire, rédigés comme des «rapports», le Dr Sorin Geacu ne fait que passer en revue les thèmes suivants: *«Recherches géoécologiques»* (chapitre 6, pp. 59-62), *«Travaux palynologiques»* (chapitre 7, pp. 63-64) et *«Autres travaux biogéographiques»* (chapitre 8, pp. 65-67). S'y reflètent de manière suffisamment claire, mais sans une mise en rapport avec la recherche scientifique internationale, le travail intense et la variété variés des préoccupations de l'équipe si active de chercheurs en biogéographie qui travaillent à l'Institut.

Le chapitre 9 – *«Personnalités de la biogéographie de l'Institut de géographie»* (pp. 68-78) – présente les données biobibliographiques essentielles concernant Alexandra Bănescu, Raul Călinescu, Constantin Drugescu, Cristina Muică et Ana Popova-Cucu, éminents biogéographes de l'Institut de géographie de l'Académie roumaine de Bucarest, des chercheurs d'envergure nationale et internationale!

On continue avec la *«Liste des ouvrages de biogéographie publiés par les membres de l'Institut de Géographie de 1944 à 2024»* (pp. 81-132), un outil de travail extrêmement profitable et, surtout, la vraie mesure de l'activité des membres de cet Institut ! Enfin, un résumé en anglais: *«Eight decades of Biogeographic research at the Institute of Geography of the Romanian Academy»* clôt l'ouvrage (pp. 133-136).

Chercheur assidu, Dr. Sorin Geacu a réalisé un beau volume anniversaire dans lequel il a mis en évidence les réalisations notables de l'équipe de biogéographes de l'Institut de géographie de Bucarest, peu nombreux mais avec une activité effervescente, concrétisée dans de nombreux articles, volumes, études, matériaux cartographiques qui prouvent leur passion et leur dévouement à la nature. Ce livre est un outil de travail utile, tant par le volume d'informations/données fournies que par la liste des ouvrages de spécialité publiés de 1944 à 2024, liste utile à tout passionné du domaine, qu'il soit

simple lecteur ou chercheur. C'est le cas d'autant plus que la problématique de l'environnement, avec toutes ses composantes, suscite de plus en plus d'intérêt dans un contexte où l'éducation écologique et en faveur de la nature se répand de plus en plus et préoccupe des tranches de plus en plus larges de la population dans le cadre du processus de développement durable.

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