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# Considerations regarding similarities and disparities of waste generation and treatment in the European Union

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**ABSTRACT:** In the development of today's society, protecting the environment is an essential element for a sustainable economy. A priority place in the activity of protecting the environment belongs to the waste reduction process, which represents the major, permanent and sustained concern worldwide. In this context, the research aims, on the one hand, to highlight the evolution of waste generation and treatment in the period 2004-2020 for the EU member states, and on the other hand, to identify the similarities and disparities between these countries at the level of 2020. Time series analysis and the cluster analysis were carried out on the basis of 12 variables selected for the study. The obtained results highlight, on the one hand, the existence of a process of reducing the quantity of waste per capita, as well as the increase in the performances of the member states regarding their recovery and recycling, and on the other hand, it highlighted the existence of significant disparities between the member states regarding more chosen waste generation, which means that there is still a lot to be done for an efficient management of this process, and for achieving the objectives set at the level of the European Union.

**KEYWORDS:** environment, waste generation, waste treatment, cluster analysis, EU

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## 1. INTRODUCTION

Ensuring a sustainable future, both at European and global level, requires paying a lot of attention to the problem of waste. First of all, it is necessary to reduce the quantity of waste, both in the ensemble and per inhabitant, a necessity highlighted since the 80s of the last century (Luttrell, 1989; Peretz et al., 1997) and becoming a first necessity in the last decade. For this purpose, both waste reduction in production processes (Bait, et al. 2020) and food waste (Jang & Lee, 2022) are required.

At the same time as the actions to reduce waste generation, when prevention is not possible, it is necessary to reuse, recycle and recover them (Năstase, 2022). For this, it is necessary to implement and develop an effective management system for them (Amasuomo & Baird, 2016; De-La-Torre-Jave et al., 2020), so as to ensure the reuse and recycling of a large percentage of the produced waste (Tocan, 2018).

The connection of these two directions of action led to the emergence of two concepts, which have become paradigms of the sustainable economy. A first paradigm is the "circular economy", which replaces the old linear concept of production-consumption-waste (Steffen et al., 2015), and which aims to reintroduce waste into the economic circuit (Tamasiga et al., 2022) and maintain the added value of products as long as possible, both to improve quality environment, as well as for waste disposal (Stankevičius et al., 2020). A second paradigm is "Zero Waste" (Awogbemi, Kallon, & Bello, 2022). This

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requires awareness and the creation of a positive attitude towards waste disposal (Zaman & Lehmann, 2011; Watson, 2020)),

Under the imperative of sustainable development, the reduction of waste generation, as well as the identification of ways to reuse and recycle them, towards a circular economy, was and is constantly in the attention of the European Commission and all the bodies of the European Union. Thus, at the level of the European Union, since 2008, through Directive 98/EC of the European Parliament and of the Council (Directive 2008/98/EC, 2008), in addition to establishing a hierarchy of waste, it highlighted the need to establish national waste management plans, as well as programs to prevent their generation. Amended by EU Directive 825 from 2018 (Directive 2018/851/EC, 2018), it strengthens the waste prevention rules and sets as objectives for the recycling of municipal waste, the minimum shares of 55% until 2025, 60% until 2030, and 65% until 2035.

In this context, the research carried out aimed at identifying the similarities and disparities between the member states of the European Union regarding both the generation and recovery of waste. Taking into account these objectives and the fact that, in the specialized literature, one of the most used ways of analyzing the positioning of states regarding the issue of waste generation and recovery is the cluster methodology (Amicarelli et al., 2021; Pocol et al., 2020), in the analyzes performed, we also used this method.

## 2. DATA SERIES AND METHODOLOGY

In accordance with the objectives of the research undertaken, two sets of main data series were selected. The first of these concerns the generation of hazardous and non-hazardous waste and contains the data series calculated at the annual level, expressed in kilograms per capita, regarding the generation of waste, by waste category and NACE Rev. 2 activity (WASGEN) (Zaharia et al., 2017). The second group of data refers to waste management operations and contains the series of data on waste treatment and recovery (WASTRT) (Eurostat, 2023 b).

Starting from these data series, the research sought to highlight the evolution of waste generation and treatment at the level of the current member states of the European Union, in the period 2004 - 2020, as well as the identification of similarities and disparities between the member states, from this point of view, at the level 2020 (the last year for which there are official data). Two cluster analyzes were performed, one on generation and the second on waste disposal. The variables included in the analysis and their meanings are presented in Table 1.

**Table 1.** The list of variables, by waste category, included in the analysis.

Variables	Significations of variables	Types
ANA	All NACE activities plus households	Generation
AFF	Agriculture, forestry and fishing	
MQR	Mining and quarrying	
MNF	Manufacturing	
EGS	Electricity, gas, steam and air conditioning supply	
WSR	Water supply; sewerage, waste management and remediation activities	
CNS	Construction	
HSH	Households	
WTR	Waste recovery (total)	Treatment
RER	Recovery - energy recovery	
RBF	Recovery - backfilling	
RCY	Recovery - recycling	

The main analysis method used to analyse the disparities and similarities between the 27 states was the Hierarchical Clustering method. For this, two shape matrices were generated:

$$Y = \left\| y_{ij} \right\|_{i=1, \overline{n}, j=1, \overline{m}} \quad (1)$$

In (1),  $n$  is the number of states subject to the analysis ( $n=27$ , both in the case of waste generation and treatment) and  $m$  is the number of variables taken into account for determining clusters

Among the variables included in Table 1, ANA (global variable in the analysis of waste generation) and ETR (global variable, in the analysis of waste treatment) were not included in the generation of clusters. Under these conditions, initially,  $m=7$  for waste generation, and  $m=3$  for waste treatment. On the elements of  $Y$  matrix, we applied  $Z$  transformation:

$$z_{ij} = \frac{y_{ij} - \overline{y}_j}{\sigma_j}, \quad \text{where} \quad \overline{y}_j = \frac{\sum_{i=1}^n y_{ij}}{n}, \quad \sigma_j = \sqrt{\frac{\sum_{i=1}^n (y_{ij} - \overline{y}_j)^2}{n-1}} \quad (2)$$

Proximity Matrix (3) was generated using, as a measure, the square of the Euclidean distance:

$$W = \left\| w_{ij} \right\|_{i=1, \overline{n}, j=1, \overline{m}}, \quad w_{ij} = \sum_{k=1}^n (z_{ik} - z_{jk})^2, \quad j = \overline{1, m}, \quad k = \overline{1, m} \quad j \neq i, \quad k \neq i, \quad w_{ii} = 0 \quad (3)$$

For distance between clusters determination, Ward's method was used. Being two clusters  $A$  and  $B$  and  $x_i$  an item (a cluster or an individual element, not included yet in a cluster) to include in a cluster, the distance between cluster  $A$  and cluster  $B$  is defined as follows:

$$\Delta(A, B) = \sum_{i \in A \cup B} \|x_i - m_{A \cup B}\|^2 - \sum_{i \in A} \|x_i - m_A\|^2 - \sum_{i \in B} \|x_i - m_B\|^2 - \frac{n_{A \cap B}}{n_{A \cup B}} \|m_A - m_B\|^2 \quad (4)$$

In (4),  $m_i$  is the centroid and  $n_i$  is the number of elements from clusters  $i$ .

Welch' Robust Tests of Equality of Means was used to test the statistical significance of the averages of the variables at the cluster level, with the following assumptions:

$H_0$ : there is no significant difference between the means of variables at clusters level (the analysed variable's belonging to the clusters is not statistically significant).

$$\exists m_i = m_j, \quad i = \overline{1, r}, \quad j = \overline{1, r}, \quad i \neq j \quad (5)$$

$H_1$ : there is a significant difference between the means of the analysed variables.

$$m_i \neq m_j, \quad \forall i = \overline{1, r}, \quad j = \overline{1, r}, \quad i \neq j \quad (6)$$

The condition for accepting the null hypothesis ( $H_0$ ) is:

$$F_{stat} < F_{\alpha, df_1, df_2} \quad \text{equivalent to} \quad Sig.F > \alpha \quad (7)$$

In (7),  $df_1$  and  $df_2$  represent the degrees of freedom of  $F$  distributed, and  $\alpha$  is the significance threshold. A confidence level of 95%, corresponding to the significance threshold  $\alpha=0.05$ , was used to test the statistical hypotheses. The tools used were SPSS and Excel with Real Statistical Resource Pack (Zaiontz, 2023).

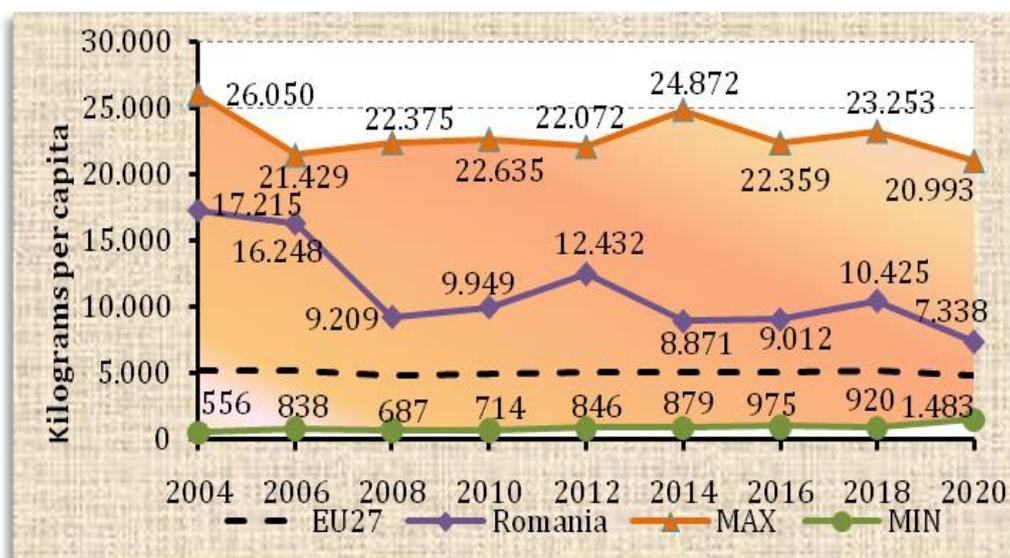
### 3. AN OVERVIEW

The evolutions of the total quantities of waste, including All NACE activities plus households (ANA), generated at the level of the European Union states, are characterized by a general downward trend. Thus, per capita, from a maximum of 26,050 kilograms, recorded in 2004, in Bulgaria, the quantities generated fluctuated with relatively small amplitudes on a downward trend, reaching 20,993 kilograms per capita in 2020, a value recorded in Finland. It is a significant reduction, of 5,057 kilograms per capita, representing a decrease of 19.41 percentage points.

It should be noted that, in the same period, due to economic and social development, the minimum level of the quantity of waste generated increased slightly, from 556 kilograms per capita, a value recorded in 2004, in Latvia, to 1,483 kilograms per capita, a value recorded in 2020, in Croatia.

These evolutions led to the reduction of the gap between the member states regarding the generation of waste, from 25,454 kilograms per capita in 2004 to 19,510 kilograms per capita in 2020, a decrease of 5,944 kilograms per capita, which represents a reduction of 23.47%. In this context, in Romania, it should be emphasized that, although during the entire analyzed period, per capita, the quantity of waste generated, although it was above the EU27 average, decreased significantly, from 17,215 kilograms per capita, in 2004, to 7,338 kilograms per capita, which represents a reduction of 58.42%.

Regarding the categories of waste, the main characteristics of this were determined (Zaiontz, 2023). The results obtained, at the level of 2020, are presented in Table 2. Analyzing the Std. Dev., compared to Mean, it results that the averages, on a general level, are not significant, which leads to the need for a clustering based on significance criteria.



**Figure 1.** The waste evolution of All NACE activities plus households in EU 27.  
Source: Prepared by the authors based on WASGEN data series.

This conclusion is also underlined by the characteristic values of the shapes of the distributions (Kurtosis and Skewness) which indicate that, except to some extent MSM, the distributions of the variables are not normal. On the other hand, the very large amplitude of the range of variation of the MQR (Mining and quarrying) values leads to the conclusion of very large differences between the analyzed states. However, taking into account that these differences are generated by objective conditions, namely by the existence and development of these industries in the analyzed states, the MQR variable will not be included in the cluster analysis regarding waste generation by category.

**Table 2.** The main characteristics of the variables corresponding to the categories of generated waste.

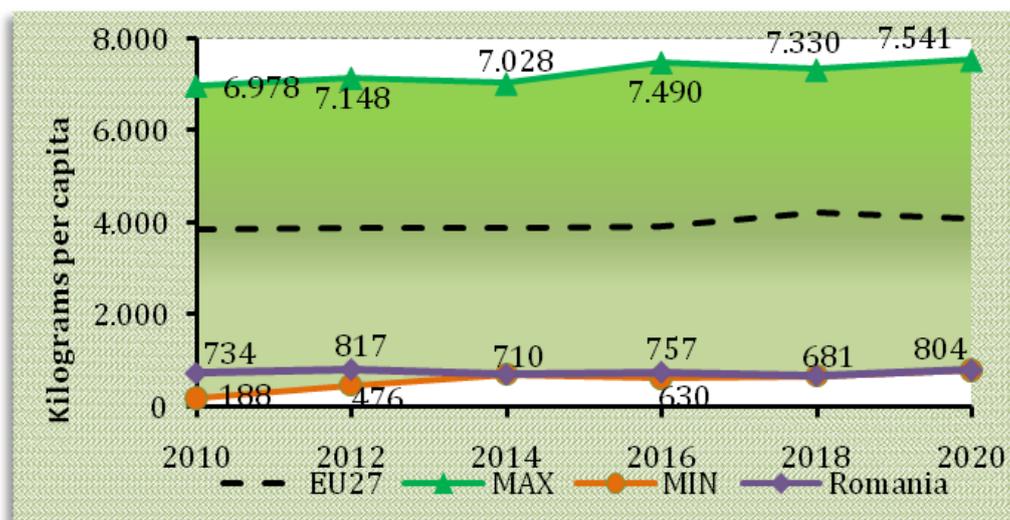
	AFE	MQR	MNF	EGS	WSR	CNS	HSH
Mean	62.93	1,938.15	629.93	282.22	440.11	1,882.96	431.07
Std. Error	12.20	848.92	114.18	156.96	63.92	492.27	17.68
Std. Dev.	63.39	4,411.12	593.29	815.58	332.16	2,557.90	91.86
Kurtosis	4.04	4.77	9.49	24.12	12.70	9.06	-0.08
Skewness	1.77	2.43	2.77	4.82	3.06	2.74	-0.26
Range	281.00	15,768.00	2,931.00	4,262.00	1,718.00	11,945.00	399.00
Minimum	0.00	1.00	59.00	0.00	135.00	63.00	221.00
Maximum	281.00	15,769.00	2,990.00	4,262.00	1,853.00	12,008.00	620.00

Source: calculated by authors using SPSS

Parallel to the measures taken to reduce the quantity of waste generated, with the effects highlighted above, more and more attention has been paid to waste management, especially waste recovery through actions aimed at energy recovery, backfilling and recycling.

The results obtained in the last decade are relatively positive, but very different from one state to another. The available data series highlighted three peculiarities. Thus, the quantities of waste recovered in Luxembourg and Finland were more than two and three times higher than the maximums recorded in the other 25 member states. However, these quantities decreased, from 24,136 kilograms per capita, a value recorded in 2010, in Luxembourg, and from 11,392 kilograms per capita, in Finland, reaching in 2020, to 17,839 kilograms per capita, in Luxembourg, and 4,017 kilograms per capita in Finland. At the same time, in Estonia, the quantity of waste recovered increased from 6,403 kilograms per capita in 2010 to 11,614 kilograms per capita in 2020.

In the case of the other 24 member states (Figure 2), in the last decade, the largest quantities of recovered waste were recorded in the Netherlands, between 2010 and 2018 (from 6,978 kilograms per capita in 2010 to 7,330 kilograms per capita, in 2018), as well as in Belgium, in 2020.



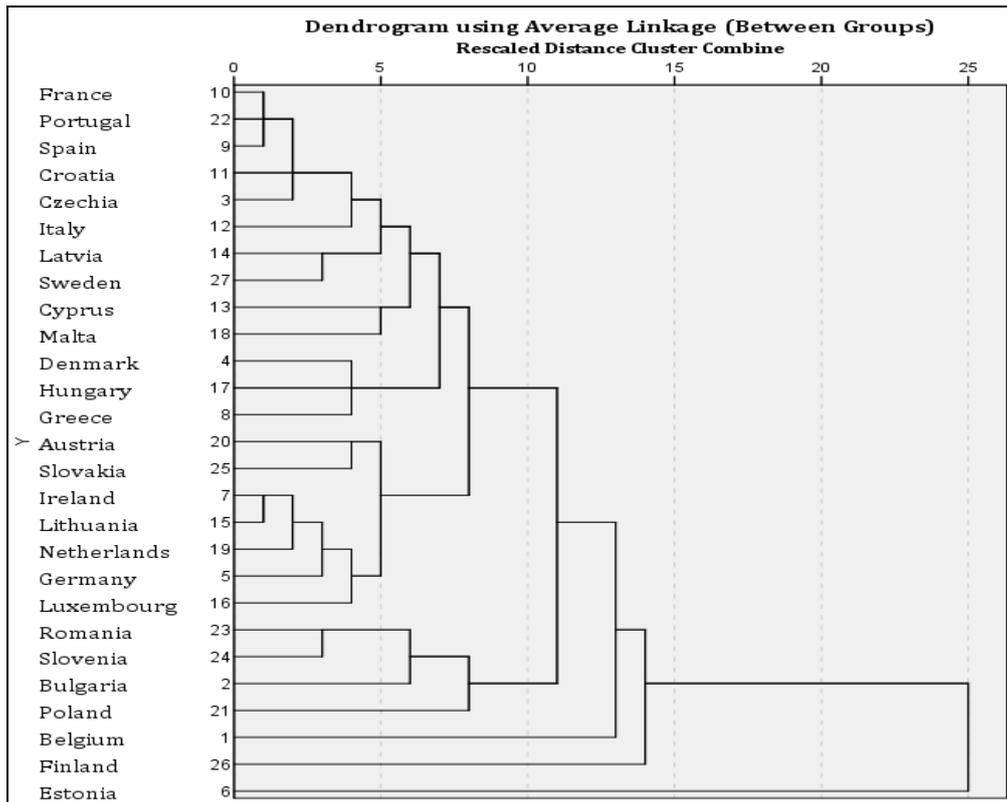
**Figure 2.** The waste evolution of All NACE activities plus households in EU 27.

Source: Prepared by the authors based on WASREC data series.

At the opposite pole, the lowest quantities of recovered waste were recorded in Croatia, between 2010 and 2012 (188 and 476 kilograms per capita), and, with the exception of 2016, in Romania, which, starting from 2018, maintains in last place among the EU member states from this point of view.

#### 4. WASTE GENERATION, SIMILARITIES AND DISPARITIES

In order to identify and analyze the similarities and disparities between the member states of the European Union regarding the generation of waste, six of the seven categories of waste were included in the analysis: Agriculture, forestry and fishing (AFF), Manufacturing (MNF), Electricity, gas, steam and air conditioning supply (EGS), Water supply; sewerage, waste management and remediation activities (WSR), Construction (CNS) and Households (HSH). The Mining and quarrying (MQR) category was not included for the reasons highlighted previously. The cluster generation dendrogram is illustrated in Figure 3.



**Figure 3.** Dendrogram of clusters generation by AFF, MNF, EGS, WAR, CNS and HSH.

As a result of the performed tests and analyses, a structure with nine clusters resulted (Table 3), four of which include only one state. From the point of view of the analysis carried out, these four states (Belgium, Estonia, Poland and Finland) are exceptions determined by certain values of the classification criteria used.

**Table 3.** Structure of clusters generated by AFF, MNF, EGS, WSR, CNS and HSH.

Cluster	Structure of clusters
A	Bulgaria, Romania, Slovenia
B	Czech Republic, Spain, France, Croatia, Italy, Latvia, Portugal, Sweden
C	Denmark, Greece, Hungary
D	Germany, Ireland, Lithuania, Luxembourg, Netherlands, Austria, Slovakia
E	Cyprus, Malta
F	Belgium
G	Estonia
H	Poland
J	Finland

The analysis of the results of testing the statistical significance of the averages of the variables AFF, MNF, EGS, WSR, CNS and HSH recorded at the level of the five clusters, which contain at least two member states (clusters A-E), highlights the fact that for five variables  $Sig.F < \alpha = 0.05$  (Table 4), which leads to the rejection of the null hypothesis ( $H_0$ ) and the acceptance of the alternative hypothesis ( $H_1$ ). Consequently, there is a significant difference between the means of the analyzed variables. Regarding the CNS variable,  $Sig.F = 0.71 > \alpha = 0.05$ . However, given that  $Sig.F = 0.71 < \alpha = 0.10$  (which corresponds to a confidence level of 90%), we will consider statistically significant the averages of the CNS variable, with a probability of 0.9.

**Table 4.** Welch' Robust Tests of Equality of Means of AFF, MNF, EGS, WSR and HSH.

Variables	Statistic <sup>a</sup>	df1	df2	Sig.
AFF	4.262	4	7.029	0.046
MNF	10.719	4	4.671	0.014

EGS	23.071	4	6.138	0.001
WSR	11.286	4	6.172	0.005
CNS	3.893	4	5.808	0.071
HSH	4.869	4	5.605	0.048

a. Asymptotically F distributed.

Source: Calculated by authors, using SPSS

The characteristics of the clusters are shown in Table 5. The similarities and disparities between the countries included in the analysis are highlighted by the attributes of the clusters in relation to the characterization indicators of the waste generation category. Considering that countries with a large volume of waste are in an unfavorable situation from the point of view of sustainability, it is necessary to adopt measures appropriate to the field, to drastically reduce them in favor of environmental protection as an important element in the economic sustainability of each country.

For the first indicator in the category of waste generation, Agriculture, forestry and fishing (AFF), it can be highlighted that the largest quantity of waste is recorded in the countries of cluster D (Germany, Ireland, Lithuania, Luxembourg, Netherlands, Austria, Slovakia). Thus, the Netherlands has the dominant position with 281 kilograms per capita, and Germany is the last with 12 kilograms per capita. Cluster B, with an average of 64.50 kilograms per capita, also includes countries with significant quantities of waste, ranging between 6 kilograms per capita (Italy) and 140 kilograms per capita (Croatia). In the middle of the waste generation ranking for AFF is cluster A, with Bulgaria in first place (129 kilograms per capita) and Slovenia in last (27 kilograms per capita). Romania ranks among them with 37 kilograms per capita. The countries with the lowest quantities of generated waste are those in cluster C (Denmark, Greece, Hungary), with a variation amplitude of 37 kilograms per capita, and those in cluster E with 23 and 24 kilograms per capita, respectively, for Malta and Cyprus. The other 4 clusters (F, G, H, I) with only one country included, the quantity of waste generated for AFF ranges from 0 kilograms per capita (Finland, cluster F) to 147 kilograms per capita (Estonia cluster G).

**Table 5.** Mean values (centroids of clusters) generated by AFF, MNF, EGS, WSR and HSH.

Clusters	Nr. of countries	Means of variables					
		AFF	MNF	EGS	WSR	CNS	HSH
A	3	64.33	563.33	512.33	255.33	183.33	284.67
B	8	64.50	317.63	46.63	486.13	1,066.25	453.63
C	3	52.33	266.00	153.33	240.67	948.33	507.00
D	7	85.14	717.29	61.57	422.29	3,828.57	451.00
E	2	23.50	147.50	1.00	165.00	3,033.50	402.00
F	1	36.00	1,233.00	86.00	1,853.00	1,796.00	463.00
G	1	147.00	2,990.00	4,262.00	561.00	1,194.00	414.00
H	1	7.00	721.00	296.00	602.00	582.00	349.00
J	1	0.00	1,719.00	173.00	204.00	2,476.00	448.00

Source: Calculated by authors using SPSS.

Regarding the generation of waste in the field of Manufacturing, the average values of the quantity of waste determined by clusters are higher than in the case of AFF, for the first five clusters (A-E). The difference consists, on the one hand, in the inversion of the places obtained by clusters A and B, and on the other hand, in the value oscillations corresponding to the countries within the clusters. In the case of cluster D, which contains the largest quantity of waste compared to the other clusters, the fluctuation is 158 kilograms per capita, higher than in the case of AFF, in first place being Luxembourg, with 953 kilograms per capita, and in last place Slovakia, with 562 kilograms per capita.

A significant quantity of waste is also recorded by the countries of cluster A, occupying the second place by: Bulgaria (710 kilograms per capita), Slovenia (639 kilograms per capita) and Romania (341 kilograms per capita). Sweden, with 454 kilograms per capita, and Croatia, with 111 kilograms per capita,

are the countries that, by the quantities of waste from the Manufacturing sector, represent the limits for cluster B, which corresponds to an average value of 317.63 kilograms per capita. The absolute amplitude of the variation of waste generated by MNF for cluster C is 161 kilograms per capita, between a maximum of 349 kilograms per capita in Greece and a minimum of 188 kilograms per capita in Denmark.

The lowest quantity of waste generated by MNF is recorded, as in AFF, also for Cyprus (236 kilograms per capita) and Malta (59 kilograms per capita). Taking into account the average values of the quantities of waste generated by MNF for all 9 clusters, it can be noted that the largest quantities are recorded by three of the four clusters that include only one country each: 2,990 kilograms per capita in Estonia (cluster G), 1,719 kilograms per capita in Finland (cluster I) and 1233 kilograms per capita in Belgium (cluster F). Among all the quantities of waste generated, regardless of the variable included in the analysis, the largest quantity belongs to Estonia (cluster G), of 4,262 kilograms per capita, for the field of Electricity, gas, steam and air conditioning supply (EGS). For the other three clusters that include only one country each, the quantity of waste generated by EGS is 296 kilograms per capita in Poland (cluster H), 173 kilograms per capita in Finland (cluster I), and 86 kilograms per capita in Belgium (cluster F).

The quantities of waste generated by EGS for the other five clusters (A-E) oscillate between an average of 512.33 kilograms per capita in cluster A (maximum of 878 kilograms per capita in Bulgaria and minimum of 225 kilograms per capita in Romania), and 1.00 kilograms per capita in cluster E (0 kilograms per capita in Malta and 2 kilograms per capita in Cyprus). Between clusters A and E, in descending order of the quantities of waste generated by EGS, there is cluster C with variation between 185 kilograms per capita in Hungary and 135 kilograms per capita, in Denmark, cluster D, with fluctuating quantities between a maximum of 128 kilograms per capita, in Slovakia, and a minimum of 26 kilograms per capita in Netherlands, as well as cluster B.

The quantities of waste generated by the Water supply field; sewerage, waste management and remediation activities (WSR) are to some extent at the level of those recorded for MNF, but the ranking of the clusters in relation to the average values recorded by clusters A-E is different. The largest quantities of WSR waste are recorded by cluster B (the maximum of 725 kilograms per capita in Italy and the minimum of 241 kilograms per capita in Croatia), then by cluster D with values ranging between 578 kilograms per capita, in Germany, and 209 kilograms per capita in Slovakia, and cluster A, with values between a maximum of 487 kilograms per capita, in Bulgaria, and a minimum of 135 kilograms per capita, in Slovenia.

At the end of the ranking, the countries with the best position in terms of the quantity of waste generated by WSR are those in cluster C, the values varying between 301 kilograms per capita, in Greece, and 162 kilograms per capita in Hungary, and those in cluster E, with an average of 165 kilograms per capita. As with the other variables (AFF, MNF and EGS), the F-I clusters are characterized by a high disparity. Belgium with 1853 kilograms per capita is the dominant of all clusters in terms of the quantity of waste generated by WSR, while Poland records 602 kilograms per capita, in Estonia, 561 kilograms per capita, and in Finland 204 kilograms per capita.

If for the four analyzed variables (AFF, MNF, EGS and WSR) cluster E had the most favorable position from the point of view of sustainability, through the smallest quantities of waste recorded, in the case of the Construction category (CNS), the situation is different, in meaning that it holds the second place, a rather unfavorable position for sustainable economic development, with values between 4,818 kilograms per capita in Malta and 1,249 kilograms per capita in Cyprus. Also, the CNS inducer highlights particularities at the level of three clusters. Thus, cluster D, occupying the first place with the largest quantity of waste generated by CNS, is characterized by the largest amplitude of 11,808 kilograms per capita (from 200 kilograms per capita, in Lithuania, to 12,008 kilograms per capita, in Luxembourg). Then, a significant disparity is given by the amplitude of 3,002 kilograms per capita that characterizes cluster B, occupying the 3rd place (with values between the maximum of 3,148 kilograms per capita, in France, and the minimum of 146 kilograms per capita, in Latvia) and the length the range of variation of cluster C, of 1,445 kilograms per capita (between 1892 kilograms per capita, in Denmark, and 447 kilograms per capita, in Hungary).

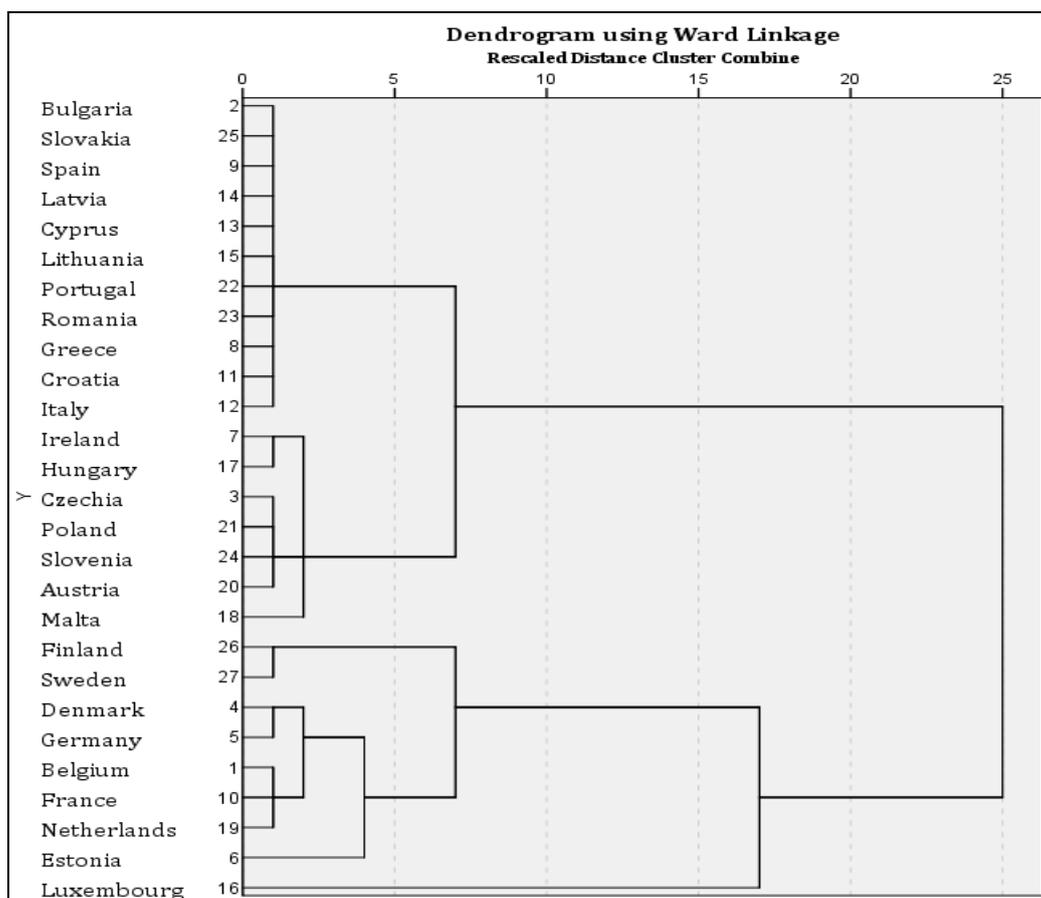
Regarding the quantity of waste generated by Households (HSH), the highest average quantity of waste belongs to cluster C, with 507 kilograms per capita (the maximum of 620 kilograms per capita in

Denmark and the minimum of 422 kilograms per capita in Greece), followed by cluster B, with 453.63 kilograms per capita and cluster D with an average of 451 kilograms per capita, the extreme values being recorded in the Netherlands (532 kilograms per capita) and Luxembourg (321 kilograms per capita).

The last two places regarding the average quantity of waste generated by HSH belong to clusters E and A. The variation in the quantity of waste generated by MSM for clusters F, G, H and I is quite small (114 kilograms per capita), the largest quantity belonging to Belgium (463 kilograms per capita), and the lowest Poland (349 kilograms per capita).

### 5. WASTE TREATMENT SIMILARITIES AND DISPARITIES

The identification and analysis of similarities and disparities between the member states of the European Union in terms of the results obtained in waste treatment was based on waste management operations, respectively: energy recovery (RER), backfilling (RBF), and recycling (RCY). The cluster generation dendrogram is illustrated in Figure 4.



**Figure 4.** Dendrogram of clusters generation by RER, RBF and RCY.

Following the tests and analyzes performed, a structure with six clusters resulted (Table 6). Among them, cluster A includes 11 states, cluster B includes 7 states, cluster C includes 2 states, cluster D includes 5 states, and clusters E and F contain only one state each.

**Table 6.** Structure of clusters by treatment of wastes (RER, RRB, RCY).

Clusters	Structure of clusters
A	Bulgaria, Greece, Spain, Croatia, Italy, Cyprus, Latvia, Lithuania, Portugal, Romania, Slovakia
B	Czech Republic, Ireland, Hungary, Malta, Austria, Poland, Slovenia
C	Finland, Sweden
D	Belgium, Denmark, Germany, France, Netherlands
E	Estonia
F	Luxembourg

Welch' Robust Tests of Equality of Means (Table 7), carried out at the level of the four clusters, which contain at least two member states (clusters A-D), highlight the fact that for all variables  $Sig.F < \alpha = 0.05$ , which leads, also in this case, to the rejection of the null hypothesis ( $H_0$ ) and the acceptance of the alternative hypothesis ( $H_1$ ). Consequently, there is a significant difference between the means of RER, RBF and RCY variables.

**Table 7.** Welch' Robust Tests of Equality of Means of RER, RRB and RCY.

Variables	Statistic <sup>a</sup>	df1	df2	Sig.
RER	20.358	3	3.772	0.008
RBF	9.562	3	3.674	0.032
RCY	8.856	3	7.081	0.009

a. Asymptotically F distributed.

Source: Calculated by authors, using SPSS.

**Table 8.** Mean values (centroids of clusters) generated by RER, RRB and RCY.

Cluster	Nr. of countries	Means		
		RER	RBF	RCY
A	11	108.45	53.64	845.18
B	7	98.86	1469.86	1,402.14
C	2	994.50	279.50	1,804.00
D	5	472.80	532.80	2,595.80
E	1	254.00	1,652.00	4,981.00
F	1	476.00	5,015.00	6,412.00

Source: Calculated by authors using SPSS.

The characteristics of the clusters are presented in Table 8. The largest quantity of waste from the energy recovery (RER) category is registered at the level of cluster C. in Finland with 1,127 kilograms per capita and Sweden with 862 kilograms per capita. The next places in the ranking of clusters are occupied by cluster F, which includes only Luxembourg, with a quantity of 476 kilograms per capita, followed by cluster D, with 472.80 kilograms per capita, with the extreme values in Denmark (605 kilograms per capita) and France (333 kilograms per capita). At a significant difference of approximately 220 kilograms per capita is cluster E, represented only by Estonia (254 kilograms per capita), then cluster A, with an average quantity of 108.45 kilograms per capita (the extreme values being 208 kilograms per capita, in Cyprus and 37 kilograms per capita in Greece). The last place is occupied by cluster B.

With regard to the treatment of backfilling waste (RBF), Luxembourg stands out with 5015 kilograms per capita (cluster F), Estonia with 1,652 kilograms per capita (cluster E) and cluster B with approximately 1,470 kilograms per capita (between the maximum of 2,970 kilograms per capita, registered in Malta, and the minimum of 830 kilograms per capita, registered in Hungary).

The other clusters are characterized by low quantities of treated waste (RBF), of approximately 532 kilograms per capita in cluster D (with extreme values between 1,197 kilograms per capita, in Germany and 441 kilograms per capita in France), of approximately 279 kilograms per capita, in cluster C (between a maximum of 380 kilograms per capita, in Sweden and a minimum of 179 kilograms per capita, in Finland) and only 53.64 kilograms per capita, in cluster A (the maximum of 185 kilograms per capita being recorded in Greece and the minimum of 5 kilograms per capita registered in Italy)

An interesting situation is recorded regarding recycling waste (RCY), in the sense that the resulting average quantities are in ascending order from the first to the last cluster. Although the average value is the lowest in cluster A, RCY oscillating between 2,059 kilograms per capita in Italy and 370 kilograms per capita in Romania. At the opposite pole. as in the case of RBF, Luxembourg with 6,412 kilograms per capita (cluster F) and Estonia with 4,981 kilograms per capita (cluster E) dominate and record the best results in waste recycling.

## 6. CONCLUSIONS

Given the need for sustainable development in all areas of economic and social life, the problem of waste represents, at the level of the EU member states, a permanent concern. From the analysis of the evolution of waste generation and management, based on the time series from 2004 to 2020, a general downward trend has emerged at the level of all European Union states regarding waste generation per capita. Romania was also included in this process, although, during the analysis period, the quantity of waste generated was above the EU average.

At the same time, there has been an increase in interest for a more efficient management of them, through actions aimed at energy recovery, backfilling and recycling. However, there are significant differences between the member states. Thus, particularly large increases, well above the EU average, regarding the reuse and recycling of waste were registered in Luxembourg, Finland and Estonia. Significant positive results were also recorded in the Netherlands and Belgium. Unfortunately, in this process, Romania is in last place with the worst performance in waste management.

The research carried out also aimed at the integrated analysis, based on several indicators, of the similarities and disparities between the EU member states regarding, on the one hand, the generation of waste, and on the other hand, their management.

The cluster analysis on waste generation revealed the existence of nine groups (four include only one country each: Belgium, Estonia, Poland and Finland). A series of disparities were highlighted between the clusters in the quantity of waste generated per capita, primarily regarding construction (CNS) as well as manufacturing (MNF). Smaller differences were recorded in water supply; sewerage, waste management and remediation activities (WSR), as well as at households (HSH).

Regarding the results of the cluster analysis regarding the performances obtained by the member states in waste management, a structure consisting of six clusters resulted, two of which contain only one state each (Estonia and Luxembourg). The most significant disparity between clusters was recorded for recycling (RCY), followed by backfilling (RBF). The smallest disparities between clusters were recorded in energy recovery (RER).

Overall, most disparities between EU member states concern the quantity of waste generated per capita. Thus, out of the nine clusters, four include only one state each, which means that they have no similarities with the others regarding waste generation, and only two clusters include a relatively large number of states (7 and 8 states, respectively), highlighting the existing similarities between these. In the case of waste recovery, the disparities between the EU member states are smaller, evidenced by the grouping into six clusters, of which only two include a single state. At the same time, the larger number of states included in three of the clusters highlights the greater degree of similarity between states regarding waste treatment than in the case of waste generation.

## 7. LIMITS AND FUTURE RESEARCH DIRECTIONS

Given that the paper provides an overview of the similarities and disparities between EU member states regarding waste generation and treatment, based on the data series available in the Eurostat databases, it has several limitations, among which the most important are volatility, fluidity and generality.

The volatility is due to the fact that the paper provides the existing image at the level of 2020, after which, certainly, changes have occurred in waste management at the level of the analyzed states.

The fluidity, as well as the degree of generality, are given by the number and content of the indicators used: 7 indicators for generating industrial waste (without distinguishing between hazardous and non-hazardous waste), only 1 indicator for generating household waste and only 3 indicators of waste treatment

On the other hand, although all EU member states have the same environmental legislation, the high degree of heterogeneity is also determined by the industrial structure, specific to each country, a fact that directly influences the amount and structure of industrial waste.

In order to remove these limitations, we intend to resume this first approach, both through a new analysis based on the new series of data that will be available, and by refining the research based on the

various types of waste, in accordance with European directives, not only through cross-sectional analyses, but also analyzes based on time series, through distinct approaches regarding, on the one hand, industrial waste, and on the other municipal waste, studies that will lead to much more consistent conclusions.

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# The development of wine tourist experience in Dealu Mare region, Romania

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**ABSTRACT:** The wine tourism developed in a growing manner in the last years contributing to the economic development of the wine regions of the world. The so called wine tourists seek for an authentic experience in the wineries based on the activities they develop during their visit and given by the region attributes. This research aims to emphasize the tourists' experience in which relates the wine region of Dealu Mare, Prahova county and identifies the main advantages that this tourist area has regarding the agrotourism potential. The data were collected by applying a questionnaire (n=600) and the results were displayed using charts that show the behavior and activities undertaken by tourists during their visit in the wineries. Hence, the tourist' behavior in which relates wine consumption and winery visitation has been outlined, also their preferences in terms of wine regions of Romania and abroad. The paper presents also some limitations in which relates the study area and the number of the respondents.

**KEYWORDS:** wine tourism, Dealu Mare, tourists' satisfaction, tourist experience, agrotourism

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## 1. INTRODUCTION

The visits to vineyards became a component of the travel destinations in the middle of nature (Hudelson, 2014) since back to the second half of the 19th century when the beginnings of wine tourism occurred. Wine tourism is the result of the interrelationship between wine region attributes, including culture, heritage, food and natural scenery (Charters & Knight, 2002). Moreover, wine tourism can be considered a means for fulfilling hedonic needs (Alant & Bruwer, 2004).

Wine tourism has been identified as a form of special interest tourism (Hall et al., 2000) that comprise visits to vineyards, wineries, wine festivals in wine tourism destinations (Hall & Macionis, 1998). The consumers named wine tourists are predominantly experiencing a "need to 'connect' with the origin of the product through visitation of the wine region where wine is produced" (Bruwer & Rueger-Muck, 2019, p. 489). To market services to wine tourists, it is very important to understand what drives and motivates tourists to travel to a region, but also what the response to their experiences are, and how these can be managed in future wine tourism marketing to ensure long-term business growth and increase of the region attractiveness (Alant & Bruwer, 2004). For the wine regions, the motivation often includes the desire to experience wine-related activities, such as tasting wine, learning about wine, meeting winemakers and be introduced more the regions' local lifestyle (Bruwer & Rueger-Muck, 2019; Kim & Bonn, 2015). Getz and Brown (2006, p. 147), emphasize that this tourism activity can be considered simultaneously "a form of consumer behaviour, a strategy by which destinations develop and market wine-related attractions and imagery, and a marketing opportunity for wineries to educate, and to sell their products, directly to consumers".

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In the last years, the researchers looked into the experiential dimension of wine tourism (e.g., Carmichael, 2005; Cohen & Ben-Nun, 2009; Pikkemaat, Peters, Boksberger, & Secco, 2009; Quadri-Felitti & Fiore, 2012). The visit of a wine region is a multi-sensory experience that engages all five of our senses (Delwiche, 2004, Brochado et al., 2019). The tourists start to make associations between the sensory attributes and the destinations they like the most, which will impact their expectations, enjoyment, and it will determine how memorable the experience becomes. Thus, in order that a destination experience to become memorable, it is necessary that a combination of sensations and emotions by engaging with a place to happen (Güzel, 2013). The multisensory experience within wine regions have influence on the overall experience of a wine tourist (Heide & Grønhaug, 2006) that can provide memorable experiences that differentiates the provenance of one wine region from another (Brochado et al., 2021).

Romania has more than 250 wine cellars, of which only approximately 200 produce bottled wine, also it has 180,000 hectares with vineyards, and it ranks 5th in Europe in terms of cultivated area. Wine tourism in Romania is ascertained by the wine heritage and the viticulture development from the past few years. There are many vineyards and wineries such as Lacerta, Ceptura, Tohani, Serve, Budureasca etc. Also, the Romanian wine map outlines as wine regions Dobrogea County with Alira, Sarica Niculitel, Rasova etc., Moldova area with Cotnari, Panciu or Girboiu Wine cellars; Transylvania – Jidvei and Banat – Recas (Pop et al., 2023).

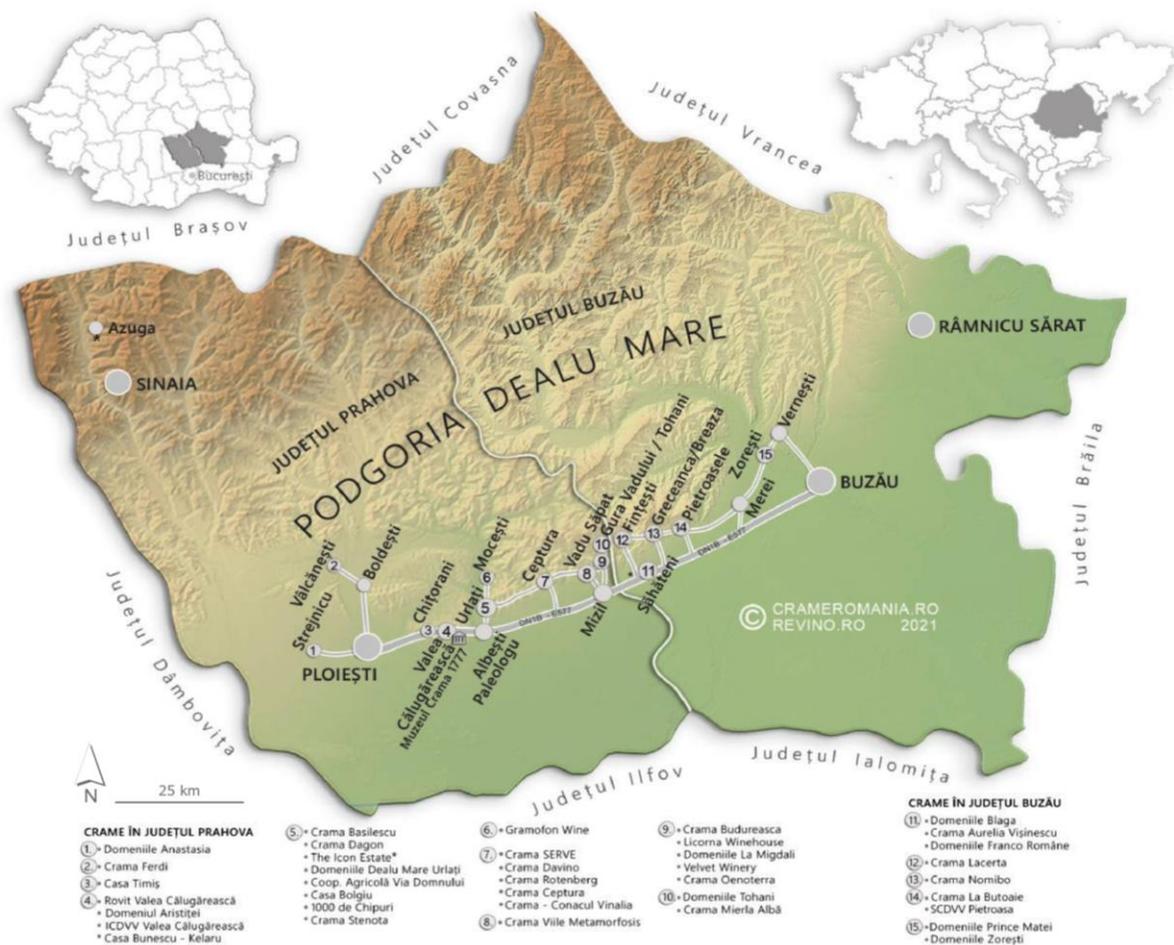


Figure 1. Dealu Mare vineyard, Prahova, Romania.

Source: <https://revino.ro/regiuni-viticole-harti/>

Dealu Mare vineyard region is recognized as “red wine country” that has a great potential to become a leading wine area in Central and Eastern Europe for its wine tourism potential. It is worthy to note the fact that the region, is on the same parallel as Tuscany and Bordeaux wine regions and it has all the natural factors to approach the best practice for this type of tourism (Nedelcu et al., 2018). In 2004 the

first “Wine Road” project is launched in Romania, in Dealu Mare region (Prahova County) which aimed to revive the countryside vineyard promoting rural tourism and agrotourism. The Wine Road in Dealu Mare includes 27 wine cellars (of which 20 are wine cellars open to tourists) plus 3 wine-producing complexes (Halewood România, Valea Călugărească and Tohani) and a research unit in viticulture and wine production nationwide at Valea Călugărească. There are some tourist activities of the theme routes in Dealu Mare region which includes visits to wine cellars and wine tasting, visits to religious buildings, adventures on the cycling route from Dealu Mare vineyard, visits to museums such as 1777 Wine Cellar in Valea Călugărească, admiring the panoramas on the top of some hills in Seciu and Stâncă Tohani (Nedelcu et al., 2018).

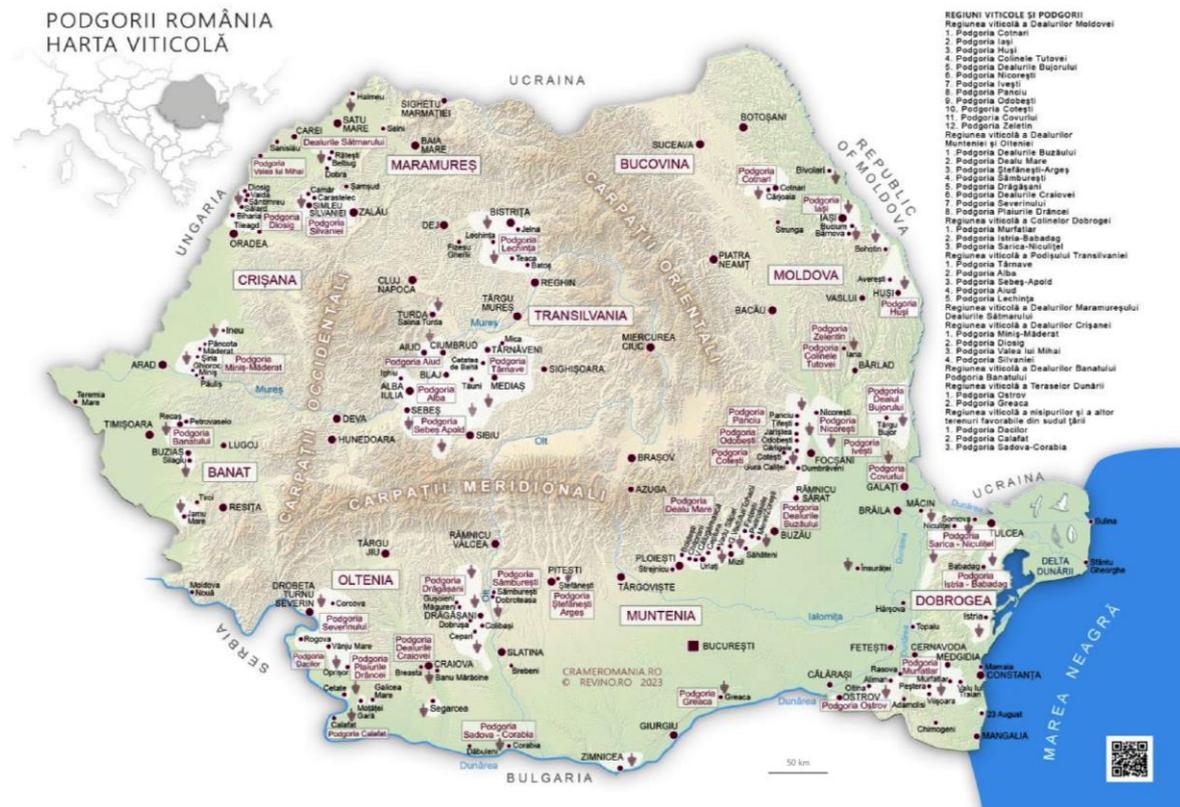


Figure 2. Wine regions and vineyards in Romania.  
Source: <https://revino.ro/regiuni-viticole-harti/>

## 2. LITERATURE REVIEW

Wine tourism experiences represent the cooperation between tourism and agriculture (Carmichael, 2005), and is commonly motivated by the destination attributes, the activities or both (Brochado et al., 2021). In order to create a connection between wine tourism and local area, some elements have to be considered such as specific food with local ingredients, prepared and served by locals (Sidali et al., 2011), knowledge about the production system and local culture (Nicolosi et al., 2016) in order to make the tourists to understand the particulars of the area.

A definition of wine tourism in Geibler, quoted in (Ungureanu, 2015, p. 85), states that wine tourism “includes a wide range of experiences built on the occasion of visits that tourists make to the wine producers, in the wine-growing regions or while participating to wine-related events and shows—including wine tastings, wine associated to food products, the pleasure of discovering the surroundings of the region, one-day trips or longer leisure trips and the experience of a range of lifestyles and cultural activities”. The development of wine tourism was studied by Dodd and Beverland (2001) analyzed the different life cycles, identifying five stages: winery establishment, winery recognition, regional prominence, maturity and decline.

Experiencing farm activities enable a visitor to participate in the rural and agricultural lifestyle, which creates the feeling of authenticity (Belhassen & Catton, 2006; Cohen & Cohen, 2012). In this case, wine

tourists look for authentic experiences they can personally relate to and stand out as unique from alternatives. Charters (2006, p. 214) points out that wine tourists seek an experience that “is a complex interaction of natural setting, wine, food, cultural, and historical inputs and above all, the people who service them.” Wine routes have been a significant tourist activity since the 1920s in Germany (on the slopes of the Rhine Valley with spectacular views over the vineyards and the wine-growing villages), in France (Alsace, Burgundy and Champagne), and later in California (The Napa Valley Wine Train), South Africa (Stellenbosch Wine Routes) or Australia (Tamar Valley Wine Route) (Manila, 2012).

The motivations of the wine tourists refer to having the opportunity to taste the wine, experience the attributes of a wine region, to have the opportunity to meet the producer, dine in the local restaurant, socialize with family or friends, attend wine festivals or events or buy quality wines (Charters, 2006). Moreover, wine tourists use their past experiences to make choices about where they travel and the activities they do. A research on the profile and the motivations of European wine tourists on the Sherry Wine Route from Spain emphasize that the tourists are very satisfied with the visits to the wineries, the relationship between the wine, the local cuisine and the growing interest of tourists related to the wine culture being identified (López-Guzmán et al., 2015). Coros et al., (2019) analysed in another study how the vineyards and the wine cellars from the old wine region (Transylvania), crossed by an attractive wine route can approach a sustainable development.

There are studies (Alebaki & Iakovidou, 2011; Atkin et al., 2007) that have found that women are more inclined to use more sources of information than men when making the decision to buy wine. Another study conducted in British Columbia, Canada (Barber, 2009) showed that wine tourists who visit vineyards were more active and engaged than other tourists. The wine tourist was initially defined as someone who has a desire to taste wine and experience the geographic space where the wine is produced (Bruwer & Alant, 2009; Bruwer & Lesschaeve, 2012). Winery tourists were found to consider the setting of the winery, presence of knowledgeable staff, and the taste of the wine as the most important elements (Charters & Ali-Knight, 2002). In another study, the top five features were found to be: “the wineries are visitor friendly; there is a lot to see and do; attractive scenery; winery staff are knowledgeable about wine; and group tours of the wineries are offered” (Getz & Brown, 2006, p. 152). In order that a winery to be successful, is better that the wines produced find a sustainable and fair market. Hence, large wineries need to attract customers through the special experiences they can offer, meanwhile smaller wineries need to demonstrate hospitality and local affiliation (Frost et al., 2020).

The concept of “winescape”, introduced for the first time by Peters (1997), it is represented by the features of a wine region offered by the presence of vineyards, the wine production activity and the wineries where the wine is produced and stored (Nedelcu, 2014). The winescape outlined by the cultural, environmental, and human improvements of the wine landscape, reflects wine tourists' esthetic motivation (Bruwer & Alant, 2009; Carmichael, 2005; Soare et al., 2010). The understanding of benefits of a winescape pull a tourist to visit, revisit, recommend the destination to others being a fundamental element of developing successful destination marketing strategies for wine regions (Chen & Tsai, 2007).

The basis of wine culture development is given by the territory with its features or “le terroir” (French term used to describe the pedoclimatic conditions where the wines grow in a certain wine region).

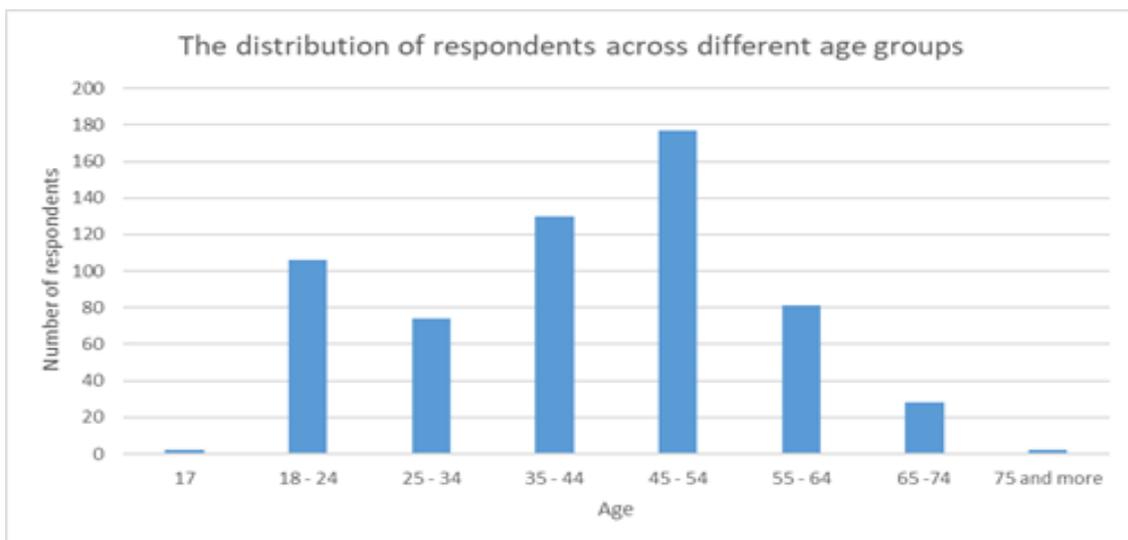
The wine tourists are a specific part of population that present motivation to visit different wineries and their motivation might differ by education, income, interests (Hall, 1996), hence a renown classification of Charters and Ali-Knight (2002) distinguishes wine lovers (which they have strong knowledge about wine), wine connoisseurs (they have deep knowledge in wine), wine interested (their main motivation is to visit a wine cellar), wine novices (their main motivation is to taste wine) and the hanger one (they visit a wine cellar as a part of a group, with not specific interest in wine tourism).

### 3. RESEARCH METHODS

Data were collected from Dealu Mare winery visitors using an online structured questionnaire. The survey questionnaire was developed based on tourists' experience after their visit in the winery. The most common questions were related to the behavior of visitation in a winery and how often they drink wine, their preferences in terms of internal or abroad experience in which relates wine tourism experience and their perception regarding the wine regions of Romania and the attractiveness of it. Hence, an overall of 600 participants have responded and the average age was between 20 and 42 years. Among the

participants, 39% were identified as male, while the remaining 61% identified as female. The questionnaire has been applied in April 2021.

Questionnaire survey research is a method for gathering information about the characteristics, behaviours of a population by administering a standardized set of questions to a sample of individuals (Clifford et al., 2010). The content of questions can range from simple questions that ask people to provide information, to opinion questions that assess attitudes. The questions should be addressed in order to find out accurate information and anticipate how the study population will interpret particular questions, the questions are open-ended and fixed-response type, the latter providing data on the demographic and household characteristic, while the first type offered insights more about life circumstances. Several advantages deserve to be outlined for the fixed-responses, such acting as a guide for respondents, making it easier for them to answer questions, being more easier to analyse and interpret it because they fall into a limited set of categories (Fink and Kosecoff, 1998).



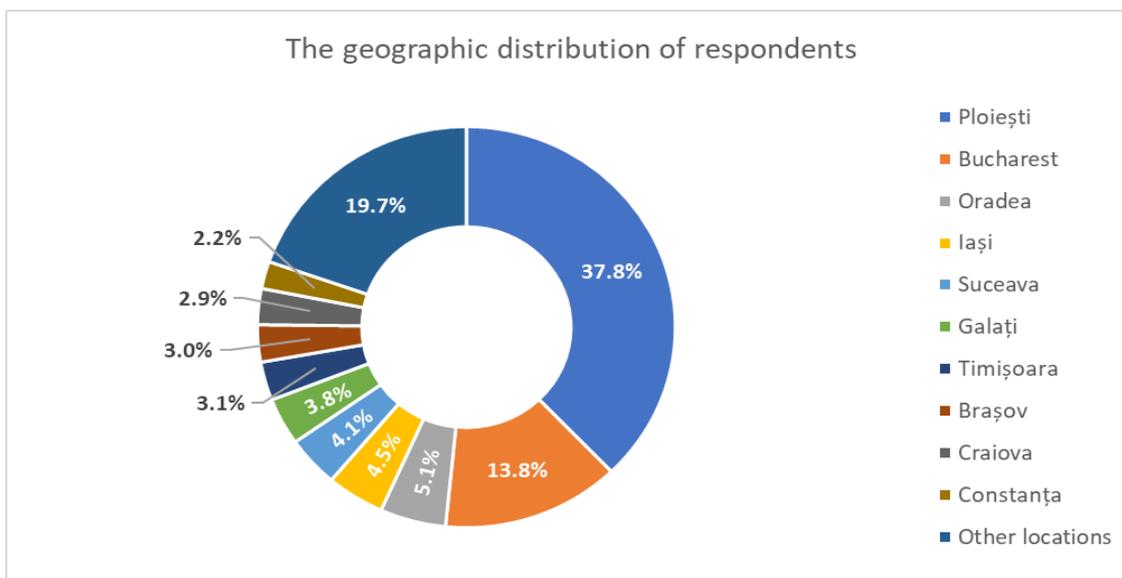
**Figure 3.** The distribution of respondents across different age groups.

The average age of the participants was found to be 42 years, which suggests a diverse range of age groups were represented in the survey. The data reveals interesting patterns and trends within the surveyed population. Among the respondents, the age group 18-24 had the highest representation, with 106 participants, comprising 17.7% of the total respondents. This suggests a significant presence of young adults in the survey. Following closely behind, the age groups 35-44 and 45-54 had substantial participation rates, with 130 and 177 respondents respectively. They represented 21.7% and 29.5% of the total respondents, highlighting a strong presence of individuals in their thirties, forties, and fifties. The age group 25-34 also had a considerable representation, with 74 participants, making up 12.3% of the total respondents. This indicates the involvement of individuals in their late twenties and early thirties. In contrast, the age groups 55-64 and 65-74 had lower but still notable participation rates. They had 81 and 28 respondents respectively, accounting for 13.5% and 4.7% of the total respondents. This suggests the inclusion of individuals in their fifties, sixties, and seventies, indicating a diverse age range. The age groups 17 and 75 and more had the lowest representation, with only 2 respondents each, constituting 0.3% of the total respondents. This suggests that the survey may have had limited reach among teenagers and individuals above the age of 75. Overall, this survey encompassed a balanced gender representation, with a larger number of female respondents. The average age of 42 years indicates a diverse age range, providing a comprehensive view of the data collected.

These data provide valuable insights into the geographical distribution of respondents, highlighting the concentrations of participants in Ploiești (37.8%), Bucharest (13.8%), and Oradea (5.1%) - Figure 4. Together, these three localities account for over 56% of all respondents, indicating significant participation from these areas. Furthermore, the data showcases the significant presence of participants from the Moldova region, with Iași (4.5%), Suceava (4.1%), and Galați (3.8%) leading the way. These

percentages underscore the active involvement of respondents from the Moldova region, emphasizing their contribution to the survey results.

The subsequent positions are occupied by Timișoara (3.1%), Brașov (3%), Craiova (2.9%), and Constanța (2.2%). These locations also display notable participation rates, further diversifying the geographical representation of the respondents. It is worth noting that the remaining respondents come from various localities in Romania or the Republic of Moldova, although their numbers were not large enough to be individually represented in this analysis. Collectively, these other locations account for 19.7% of the total number of survey participants.



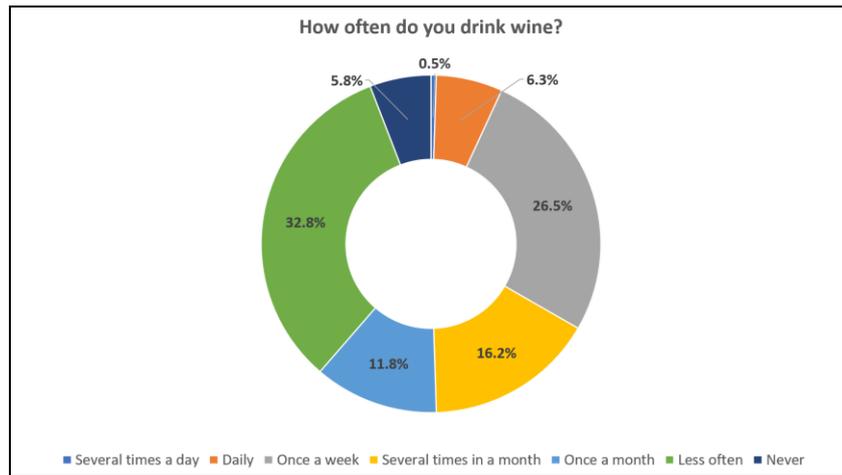
**Figure 4.** The distribution of respondents across different age groups.

This highlights the diverse range of participants and their contributions across different parts of the country. Overall, the data presents a comprehensive picture of the geographical distribution of respondents, with notable concentrations in certain cities and regions. It underscores the importance of considering the diverse perspectives and contributions from various localities in understanding the survey results.

#### 4. RESULTS AND DISCUSSION

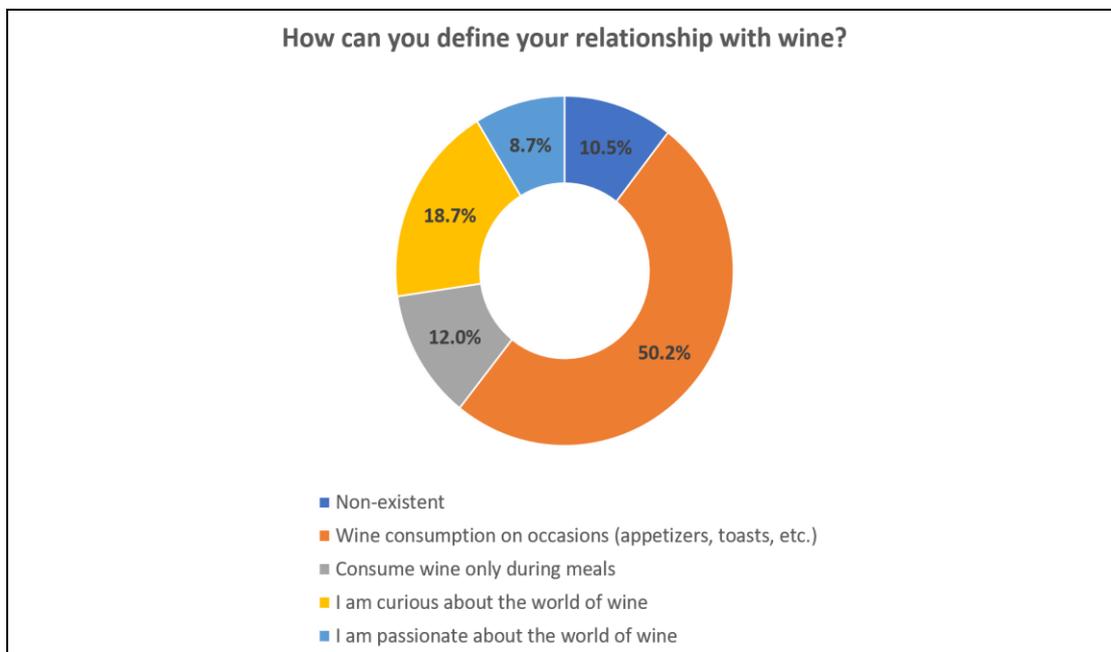
The results emphasize the tourist behavior in which relates their experience in different wine regions of Romania, but mainly in Dealu mare region of Muntenia. Thus, it has been identified their preferences regarding the consumption of wine and their perception of wine tourism form in general.

When queried about their wine consumption habits, respondents were presented with seven options. It is noteworthy to observe that there is a range of wine consumption habits among the respondents. Only a small percentage, 0.5%, reported consuming wine several times a day, suggesting a relatively rare occurrence. A slightly higher proportion, 6.3%, indicated a daily wine consumption habit, implying a more regular indulgence. Once a week, wine consumption becomes more prevalent, with 26.5% of respondents reporting this frequency. Similarly, 16.2% of participants revealed consuming wine several times in a month, demonstrating a moderate level of wine consumption. 11.8% of respondents stated that they drink wine once a month, indicating a less frequent engagement with wine consumption. A significant proportion, 32.8%, claimed to consume wine less often, suggesting occasional or infrequent enjoyment (Figure 5).



**Figure 5.** Tourists wine consumption habits.

Lastly, a small percentage of 5.8% reported never drinking wine, indicating a preference for other beverages or a lack of interest in wine consumption. Overall, these findings demonstrate a diverse range of wine consumption patterns among the surveyed individuals, with varying degrees of frequency and preference.

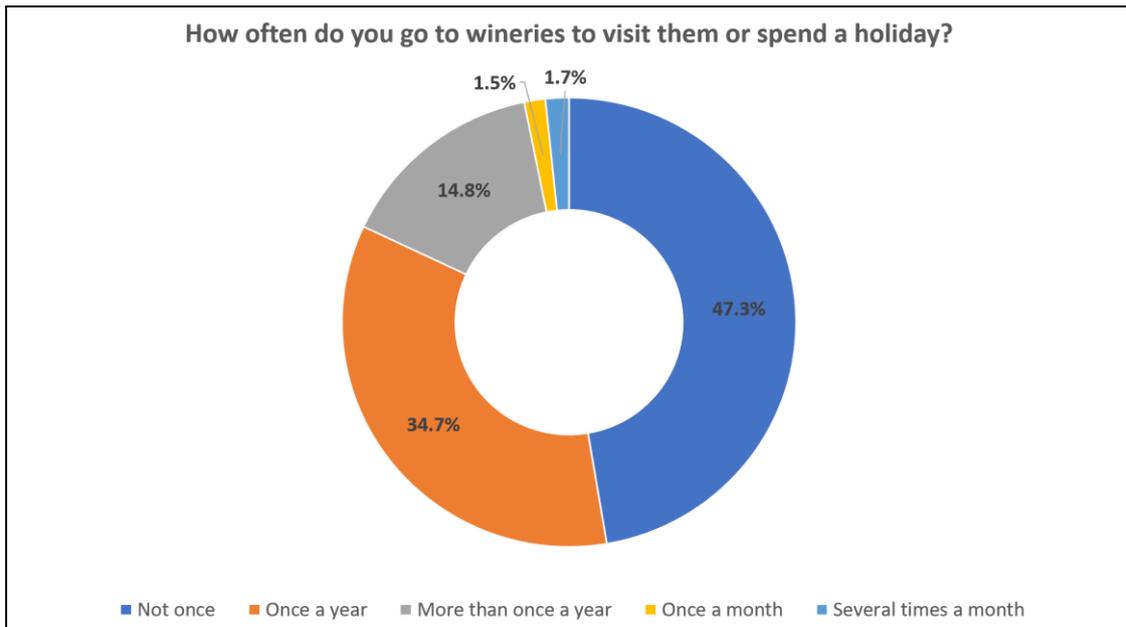


**Figure 6.** Tourists' behavior in which relates the consumption of wine.

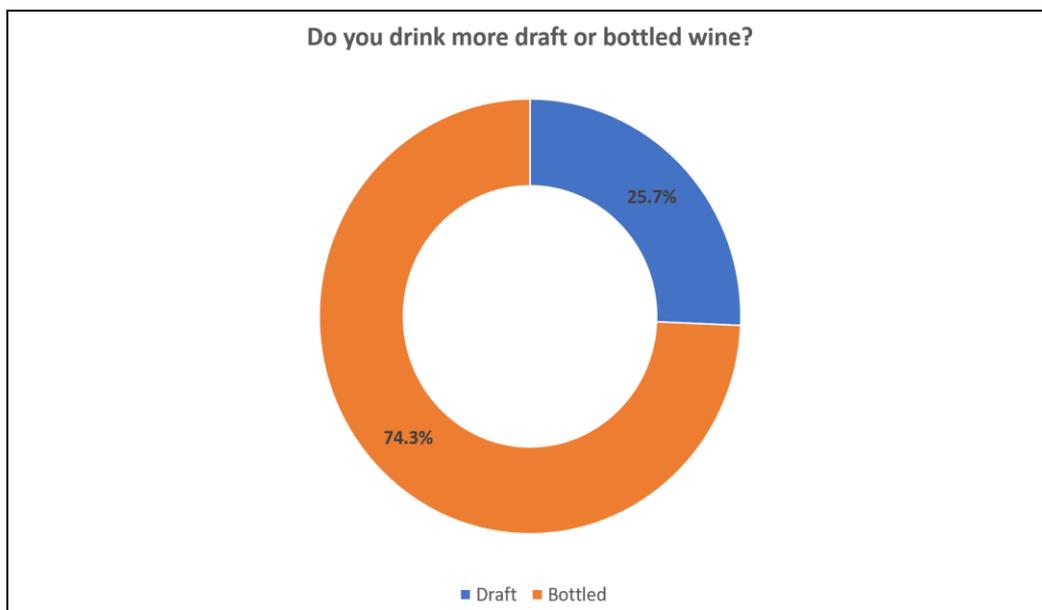
The respondents' perspectives and attitudes towards wine can be summarized as follows: 10.5% (63 individuals) indicated no relationship with wine, suggesting little to no consumption or interest in it. The most common response, chosen by 50.2% (301 individuals), revealed that wine is associated with specific occasions like appetizers and toasts, indicating it is primarily reserved for special events and social gatherings; 12.0% (72 individuals) reported consuming wine exclusively during meals, viewing it as a complementary beverage to enjoy alongside food; 18.7% (112 individuals) expressed curiosity about the world of wine, showcasing an interest in learning more and expanding their knowledge and appreciation; 8.7% (52 individuals) demonstrated a passionate attachment to the world of wine, actively pursuing knowledge and participating in wine-related activities such as tastings or collecting (Figure 6).

These findings highlight a diverse range of relationships with wine, spanning from disinterest and occasional consumption to wine as a mealtime accompaniment, curiosity, and passionate engagement. It underscores the variety of perspectives and levels of involvement individuals have with wine in their lives.

The frequency of winery visitation for tourism or holidays represents a spectrum of engagement. The data reveals diverse patterns among the respondents: 47.3% (284 individuals) have not visited wineries, indicating a lack of opportunity or interest; 34.7% (208 individuals) visit wineries once a year, suggesting a moderate level of engagement and potentially incorporating winery visits into their vacation plans; 14.8% (89 individuals) visit wineries more than once a year, demonstrating a higher level of interest and enthusiasm; 1.5% (9 individuals) visit wineries once a month, indicating a more frequent involvement, potentially driven by passion for wine or local wine regions (Figure 7). Only 1.7% (10 individuals) visit wineries several times a month, showcasing a high level of dedication and likely including wine enthusiasts, professionals, or those in close proximity to wine regions. Overall, the data showcases a range of winery visitation frequencies, reflecting diverse preferences and interests among respondents in the context of winery tourism and holiday experiences.



**Figure 7.** Tourists' preferences in which relates their visit in a winery.



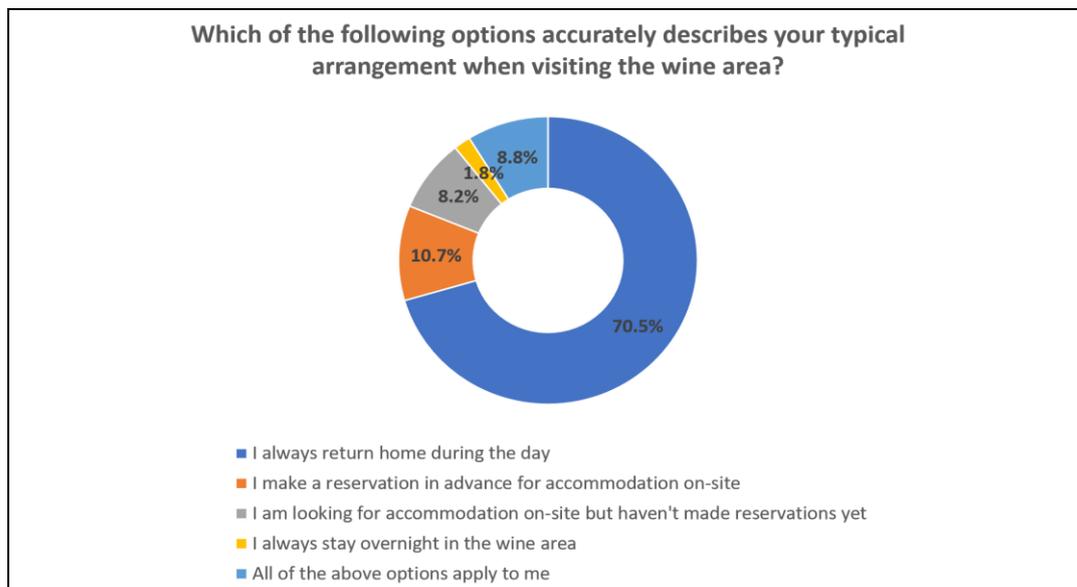
**Figure 8.** Tourists' preferences in which relates the consumption of draft or bottled wine.

In response to the question regarding the preference for draft or bottled wine, the data reveals a clear inclination towards bottled wine among the respondents. Approximately 74.3% of participants indicated a preference for bottled wine, with 446 individuals selecting this option (Figure 8). This suggests

a predominant preference for wines that come in bottled form, which could be attributed to factors such as perceived quality, convenience, or personal taste preferences. On the other hand, a smaller proportion of respondents, 25.7% (154 individuals), expressed a preference for draft wine. This indicates a comparatively lesser preference for wines served on tap, which could be due to various reasons such as limited availability, perceived freshness, or specific cultural or regional preferences. Overall, the majority of respondents favor bottled wine over draft wine, highlighting a notable preference for wines packaged in bottles.

Question number 7 delves into the typical arrangements individuals make when visiting a wine area. The data sheds light on the various preferences and practices among the respondents: a majority, 70.5% (423 individuals), indicated that they always return home during the day after visiting the wine area. This suggests a preference for day trips, where individuals reside elsewhere and commute to the wine region for the visit, allowing them to return home by the end of the day; 10.7% (64 individuals) reported making advance reservations for on-site accommodation (Figure 9). This implies a proactive approach to securing accommodation within the wine area, ensuring a convenient and immersive experience. 8.2% (49 individuals) expressed their intention to seek on-site accommodation but hadn't made reservations yet. This group demonstrates a desire to stay within the wine area but may be more flexible in their arrangements or still exploring options. Merely 1.8% (11 individuals) stated that they always stay overnight in the wine area. This suggests a preference for fully immersing themselves in the wine region, allowing for more extensive exploration and potentially experiencing the local hospitality.

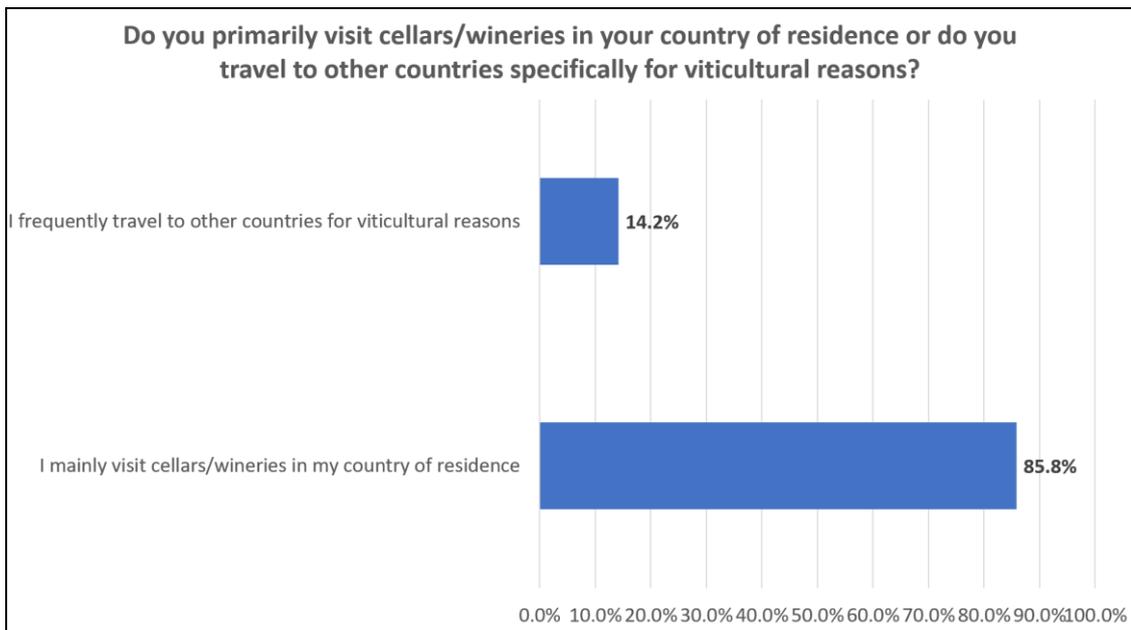
8.8% (53 individuals) chose the option "all of the above options apply to me." This indicates a diverse range of arrangements depending on the specific visit, with some individuals opting for day trips, while others choose to stay overnight or book accommodations as needed. Overall, the data reveals a variety of approaches when it comes to arranging accommodations during visits to wine areas, ranging from day trips to on-site stays. These findings highlight the diverse preferences and flexibility individuals have in tailoring their arrangements to suit their specific needs and interests.



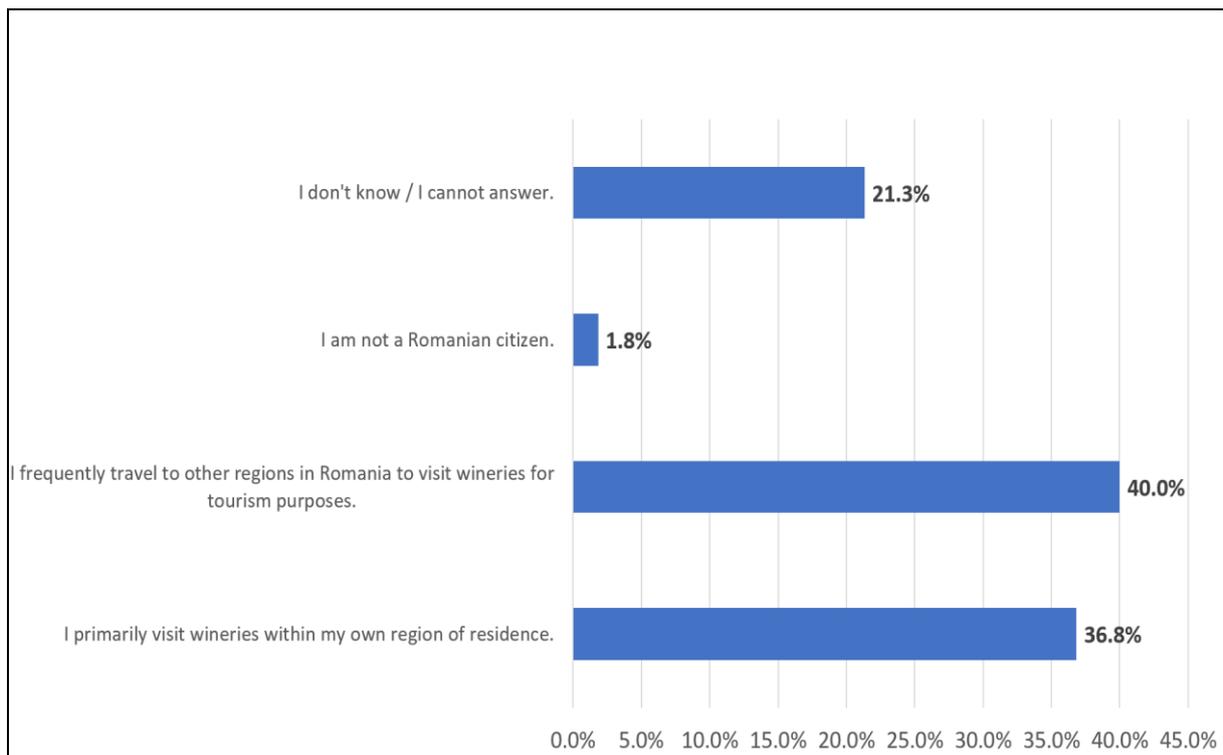
**Figure 9.** Typical arrangements tourists make when visiting a wine area.

Question number 8 explores the travel patterns of individuals when it comes to visiting cellars/wineries. The answers offer insights into the primary focus of their viticultural explorations: The majority, 85.8% (515 individuals), reported primarily visiting cellars/wineries in their country of residence (Figure 10). This indicates a preference for exploring and experiencing the offerings of their local wine regions, suggesting a strong connection and interest in the wines produced within their own country. A significant proportion, 14.2% (85 individuals), expressed that they frequently travel to other countries specifically for viticultural reasons. This group demonstrates a higher level of enthusiasm and curiosity, actively seeking out wine-related experiences and opportunities in different countries, showcasing a desire to explore the viticultural offerings beyond their own national borders. The data showcases a clear inclination towards visiting cellars/wineries in one's own country of residence, with a

smaller yet significant portion of respondents actively engaging in wine-related travel abroad. This highlights the diverse travel preferences and interests of individuals when it comes to viticultural experiences, ranging from local explorations to international wine journeys.



**Figure 10.** Tourists motivation to visit wineries in their country of residence versus other ones.

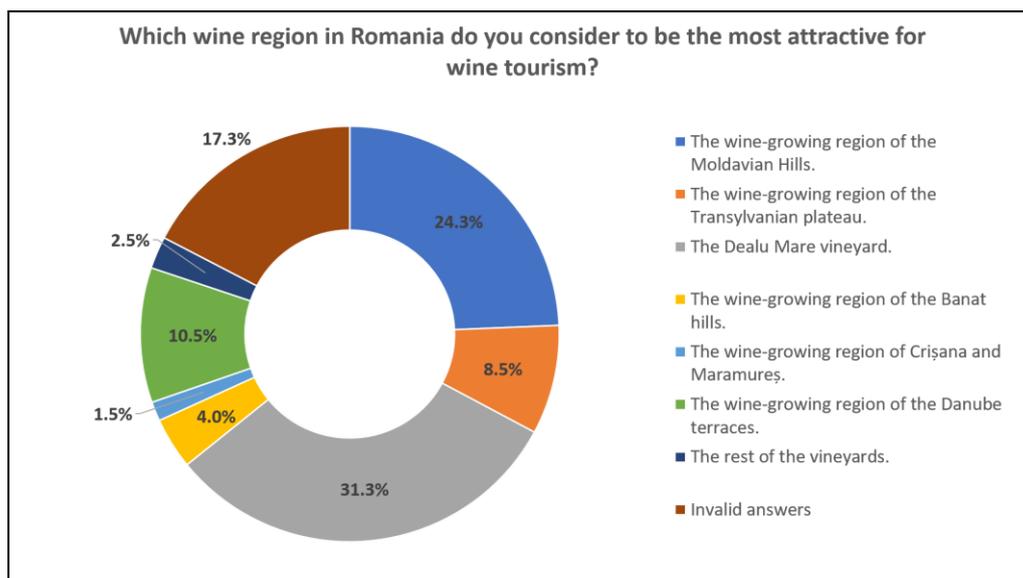


**Figure 11.** Tourists' preference in which relates the region they visit.

Question number 9 delves into the preferences of Romanian citizens when it comes to visiting wineries within their own region of residence or exploring wineries in other regions for tourism purposes. The data offers insights into the respondents' tendencies: 36.8% (221 individuals) indicated that they primarily visit wineries within their own region of residence (Figure 11). This suggests a preference for exploring and experiencing the wineries located closer to their home, potentially driven by convenience, familiarity, or a desire to support local wine producers; 40.0% (240 individuals) reported frequently traveling to other regions in Romania to visit wineries for tourism purposes. This group showcases a

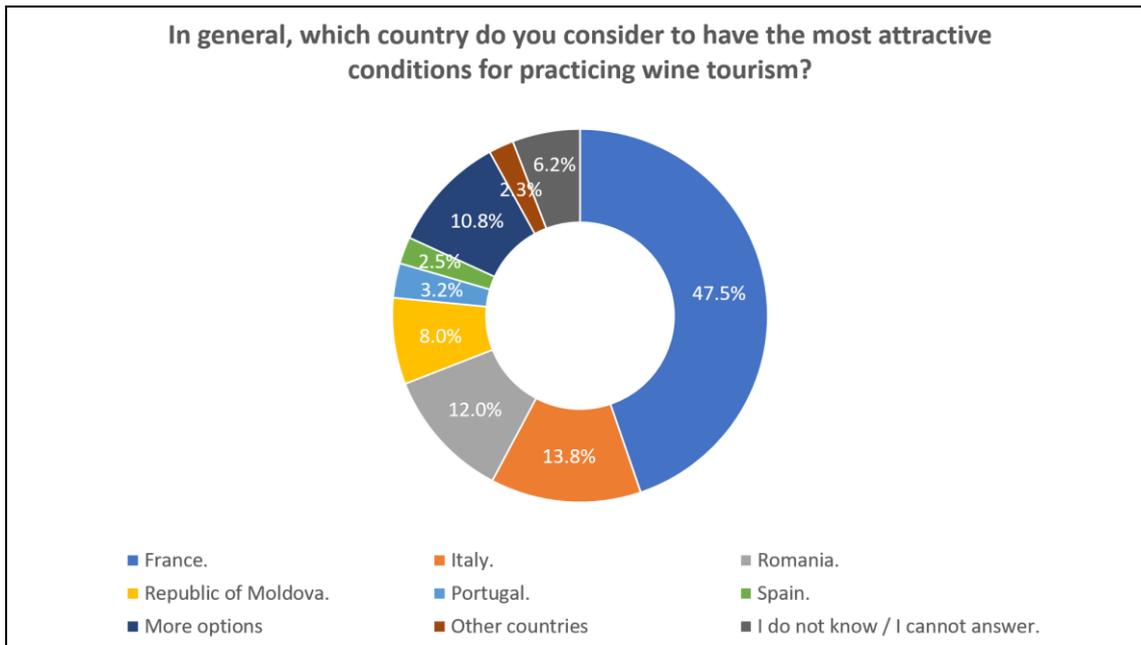
higher level of enthusiasm for wine tourism, actively seeking out different wine regions within Romania to explore and discover the diverse offerings of the country. A small percentage, 1.8% (11 individuals), mentioned not being Romanian citizens. This indicates that they may not have the same regional preferences as Romanian citizens when it comes to winery visitation: 21.3% (128 individuals) responded with "I don't know" or "I cannot answer," suggesting a lack of knowledge or uncertainty regarding their preferences for visiting wineries within their own region or other regions in Romania. Overall, the data reveals a relatively balanced distribution between those who primarily visit wineries within their region of residence and those who actively travel to other regions in Romania for wine tourism. This highlights the diverse preferences and interests of respondents when it comes to exploring wineries within Romania, with a significant portion demonstrating a willingness to travel for wine-related experiences.

Question number 10 explores the perceptions of respondents regarding the most attractive wine regions in Romania for wine tourism. The data reveals the following preferences among the respondents: The Dealu Mare vineyard garnered the highest preference, with 31.3% of respondents choosing it as the most attractive wine region for tourism (Figure 10). This region's reputation for producing high-quality wines and its proximity to major cities could contribute to its popularity. 24.3% of respondents considered the wine-growing region of the Moldavian Hills to be the most attractive for wine tourism. This region likely captures their attention due to its specific terroir, wine varieties, or cultural and historical significance. 8.5% of respondents favored the wine-growing region of the Transylvanian plateau. This region's unique characteristics, such as its elevation and climate, may contribute to its appeal for wine tourism. Other wine-growing regions, including the Banat Hills, Crișana and Maramureș, and the Danube terraces, received lower percentages of preference, ranging from 1.5% to 10.5%. These regions may have distinct qualities that appeal to specific respondents, such as unique grape varieties or scenic landscapes.



**Figure 12.** Tourists' preferences regarding their visit in different wine regions of Romania.

A small percentage, 2.5% expressed a preference for "the rest of the vineyards," indicating an appreciation for wine regions outside of the listed options (Figure 12); 17.3% of the responses were deemed invalid, possibly indicating confusion or uncertainty regarding the most attractive wine region for wine tourism. The data highlights a range of preferences among respondents for different wine regions in Romania, with the Dealu Mare vineyard, the Moldavian Hills, and the Transylvanian plateau standing out as popular choices. These preferences may be influenced by factors such as reputation, wine quality, accessibility, and personal experiences.



**Figure 13.** Tourists perception about wine tourism potential of some European countries.

Question number 11 explores the respondents' perceptions regarding the country with the most attractive conditions for practicing wine tourism. The data provided reveals the following preferences: the majority 47.5% of respondents considered France to have the most attractive conditions for wine tourism (Figure 13). France's renowned wine regions, rich history, diverse terroirs, and established wine tourism infrastructure likely contribute to its strong association with wine tourism. Italy garnered 13.8% of the preferences, highlighting its allure as a wine tourism destination, and its diverse wine regions, cultural heritage and culinary traditions make it an appealing choice for wine enthusiasts. 12.0% of respondents indicated Romania as the country with the most attractive conditions for wine tourism. This suggests a recognition of the potential and appeal of Romania's wine regions, which offer unique grape varieties, scenic landscapes and a growing wine tourism industry. The Republic of Moldova received 8.0% of the preferences, showcasing the recognition of its wine tourism potential and its reputation as an emerging wine destination. Portugal and Spain garnered 3.2% and 2.5% of the preferences, respectively, reflecting their standing as established wine countries with captivating wine regions; 10.8% of respondents expressed a desire for more options, indicating the presence of additional countries they consider attractive for wine tourism. A small percentage, 2.3%, selected "other countries," suggesting the presence of alternative wine tourism destinations that were not listed in the options. 6.2% of respondents responded with "I do not know" or "I cannot answer," possibly indicating a lack of knowledge or uncertainty regarding the most attractive country for wine tourism. The data highlights the strong association of France with wine tourism, while also recognizing the appeal of other countries such as Italy and Romania. It reflects also the diverse preferences and perceptions of respondents regarding countries with attractive conditions for wine tourism, taking into account factors such as wine regions, heritage, infrastructure, and personal experiences.

The paper has limitations in which relates the study area, giving the fact that only one wine region has been analysed and the other on the application of the questionnaire, as this was applied only for a limited number of participants.

## 6. CONCLUSIONS

Dealu Mare region has a great potential in which relates the agriculture and the wine tourism mixed, but also a viable solution for local and regional sustainable development. Tourists present their preferences regarding the wine tourism regions of Romania, particularly on the Dealu Mare region which has tourism assets to attract more tourists from our country and abroad. The results emphasize the tourists' behavior on practicing wine tourism as an overall experience and especially in some regions of Romania. During the last years, wine tourism represented a niche tourism that developed in an increased

manner in our country and became an opportunity for the agrotourism to be distinguished as an attractive type of tourism form. Despite of the wine tourism potential that Dealu mare region has, other specific products from agrotourism such as meat, milk, cheese, honey are local products that tourists taste and experience during their visit in Pravova county.

The development of agrotourism in this area represents a great benefit for the local community due to the fact that it might brings new chances to increase the citizenship quality of life, by increasing business competitiveness, preserving the cultural heritage and the natural environment.

The results of the paper reveals that wine tourist consumption habits emphasize their preferences in terms of draft or bottled wine, whether they visit frequently a winery or not, typical arrangements that tourists make when visiting a wine area, tourists' preferences regarding their visit in different wine regions of Romania and tourists motivation to visit wineries in their country of residence versus other ones. However, they present interest in the wine tourism form developed in other European countries except Romania, but also on the ones of Romania as Banat, Crisana, Transylvania, Muntenia.

Overall, Dealu Mare wine region situated on the Southern Subcarpathian Hills offer a great natural and cultural tourism heritage by the presence of 8 representative wine centers (Dealu Mare – Boldesti, Dealu Mare - Valea Calugareasca, Dealu Mare – Urlati, Dealu Mare – Ceptura, Dealu Mare – Tohani, Dealu Mare – Breaza, Dealu Mare – Meri and Dealu Mare – Zoresti). There are also some tourist attractions in the area such as „The Wine Cellar 1777” Museum, „Bellu Mansion” Museum, Sculpture camp of Naeni, The Stone church and the The Small Mud Volcanoes and also accommodation as Jardine Hills and Dacilor Farm. Dealu Mare region benefit from strong positive assets in which relates the climate conditions that foster touristic activities, the proximity of large urban centers Bucharest, Brașov, Ploiești, Buzău, Galați or Brăila), adventures on the cycling route from Dealu Mare (Nedelcu et al., 2018).

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# Reorientation of tourists to rural areas due to climate change

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**ABSTRACT:** The global warming, tourist crowds, thermal discomfort, ultraviolet radiation, ecotourism, ethnic Saxons, Saxon villages, sustainable tourism, craft and culinary art, tourist potential, UNESCO cultural objectives. In the summer season, due to the heat wave that persists in most of the country, the very high thermal discomfort, the temperature-humidity index (ITU) that exceeds the critical threshold of 80 units, more and more tourists go to the mountain areas and depression. In this sense, the Saxon settlements in Transylvania are an alternative for tourists who love nature, hiking, traditional art and cuisine. The Saxon villages in the heart of Transylvania have become a tourist attraction in recent years. His Majesty, King Charles of Great Britain, drew attention to these areas where time seems to have stood still. This research is based on a questionnaire, from which we drew conclusions about the reorientation of tourism activity in the Transylvanian region for this period, when climate change is increasingly felt. It is the first research of its kind, which tries to correlate the influence of climate change on tourism activities, for the central area of Romania, i.e. Transylvania.

**KEYWORDS:** sustainable tourism, ecotourism, climate change, economic reorientation, rural area, smart village

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## 1. INTRODUCTION

Transylvania is a geographical and historical region in the centre of Romania. The territory is surrounded by the Carpathian arc, being a high plateau, bordered by hills and depressions, with a rich hydrographic network and alternating forest and steppe vegetation. The turbulent history of this territory has brought together various ethnic communities (Romanians, Hungarians, Germans, Gypsies, etc.), and is characterised by great cultural diversity. Numerous ancient and especially medieval fortresses enhance the tourist attraction of this region. Its easy accessibility is a favourable factor for tourism. Ecotourism and rural tourism are increasingly developing, especially in recent years, when the coolness of forests and lakes, fresh air and natural food is in demand after by city residents from polluted and hot areas, or people from the increasingly arid south. Climatic factors represent the key element of attraction for tourism. Thus, warm weather, low precipitation and the absence of extreme weather phenomena are the most important factors for a vacation destination. In this way, any tourism activity, or any tourism strategy at local, regional, or national level, are directly related to climate change.

A unique land, with a special character in the Romanian landscape, the Saxon area of Transylvania is one of the very few places in Europe that still preserves unaltered the medieval air of the centuries of colonization. The cultural heritage here is huge, the heritage is still alive and the interest to conserve and protect this perfectly functioning rural ecosystem.

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These villages are located in South East, East and Central Transylvania, in the counties of Sibiu, Braşov, Mureş and Alba. The Saxon area of Transylvania amounts to about 4% of Romania's geographical territory. The character of the settlements is typical, with houses built in a characteristic style and organized around the spiritual and defensive center of the village, represented by the fortified church.

While the impact of COVID-19 has subsided, climate change is putting increasing pressure on socio-ecological systems and will continue to do so even more in the coming years. Global warming has negative effects on the environment and may affect tourism in Transylvanian villages. In general, global warming can lead to climate and environmental changes, which can affect tourism in the region. For example, climate change may lead to increased temperatures and decreased rainfall, which may affect agriculture and tourism in the region. In Transylvania there are several hundreds of villages that have no tourist infrastructure, but are often quite charming for nature, tranquility, rural life and Saxon and Romanian architecture. They are considered a refuge for those who run away from the heat wave, are in love with nature, but also for those who want privacy and protection against COVID-19. If rural tourism in Transylvania does not turn into mass tourism and continues to be practiced at a low level, it represents an important form of sustainable tourism. This means that tourism is and can be economically feasible without destroying nature the resources and environment (human and physical) of the host communities and destinations.

Further, it will try to highlight the reorientation of tourism towards the countryside, against the backdrop of climate change and global warming that has been taking place in recent years.

## 2. LITERATURE REVIEW

The Tourism research related to the Transylvanian region focuses on two main directions. One focuses on the legend of Dracula. As early as 1998, a team of researchers led by Mureşan and Smith published *Dracula's castle in Transylvania: Conflicting heritage marketing strategies*. Then Duncan Light, fascinated by the legend, published in 2007, *Dracula tourism in Romania Cultural identity and the state*. Over time, the attraction of Dracula has waned, with interest in tourism research moving in the other major direction based on studies of Saxon cultural heritage, especially after 2010 and after King Charles of Great Britain chose to have holiday homes here. The Transylvanian region has a great potential for natural tourism, but also for man-made tourism based on cultural identity, medieval heritage and contemporary amenities.

In this regard, we note the studies Tourism in Saxon communities in South-Eastern Transylvania (Brasov county) (Dinu & Ciocă, 2008), Transylvanian Saxon culture as heritage: Insights from Viscri, Romania (Corsale & Iorio, 2014), Cultural Heritage, Tourism and the Sustainable Development of the Local Communities: The Case of the Saxons' Fortified Churches of Transylvania (Vergheş & Popescu, 2018), Involvement of rural tourism operators in the project "Sibiu European Gastronomic Region" (Nicula & Popsa, 2018), Geographical features and authentic culture as attractions of Viscri community-based tourism in Romania (Voda et al., 2018), Projected Destination Images Versus Visitor-Generated Visual Content in Brasov, Transylvania (Nechita et al., 2019), Trademark potential increase and entrepreneurship rural development: A case study of Southern Transylvania (Stefan et al., 2021), Rural tourism: the evolution of practice and research approaches – towards a new generation concept? (Lane & Kastenholz, 2015), Domestic industries and foreign portfolio choice (Schumacher, 2018).

Geographical research, especially in the field of tourism, is increasingly turning to the Transylvania region, as it represents a diverse and dynamic source that needs to be analysed and known.

## 3. RESEARCH METHODS

Both quantitative and qualitative research methods were used for this study. The spatial distribution method, observation method, historical method, analysis and synthesis method, inductive-deductive method, comparison method, cartographic method were used in the development. Among the quantitative methods, the statistical method was applied, and among the qualitative methods, the survey/interview method was applied. These have led to a better knowledge of the topic debated in this study and to the correlation of tourism and climate change issues.

#### 4. RESULTS

Every year, more and more tourists go to the Saxon villages to discover the beauty of the most spectacular fortified churches, welcoming houses, traditions and culinary products specific to the area. Tourism through the Saxon villages offers a unique experience (Figure 1).



**Figure 1.** Transylvania regional map.

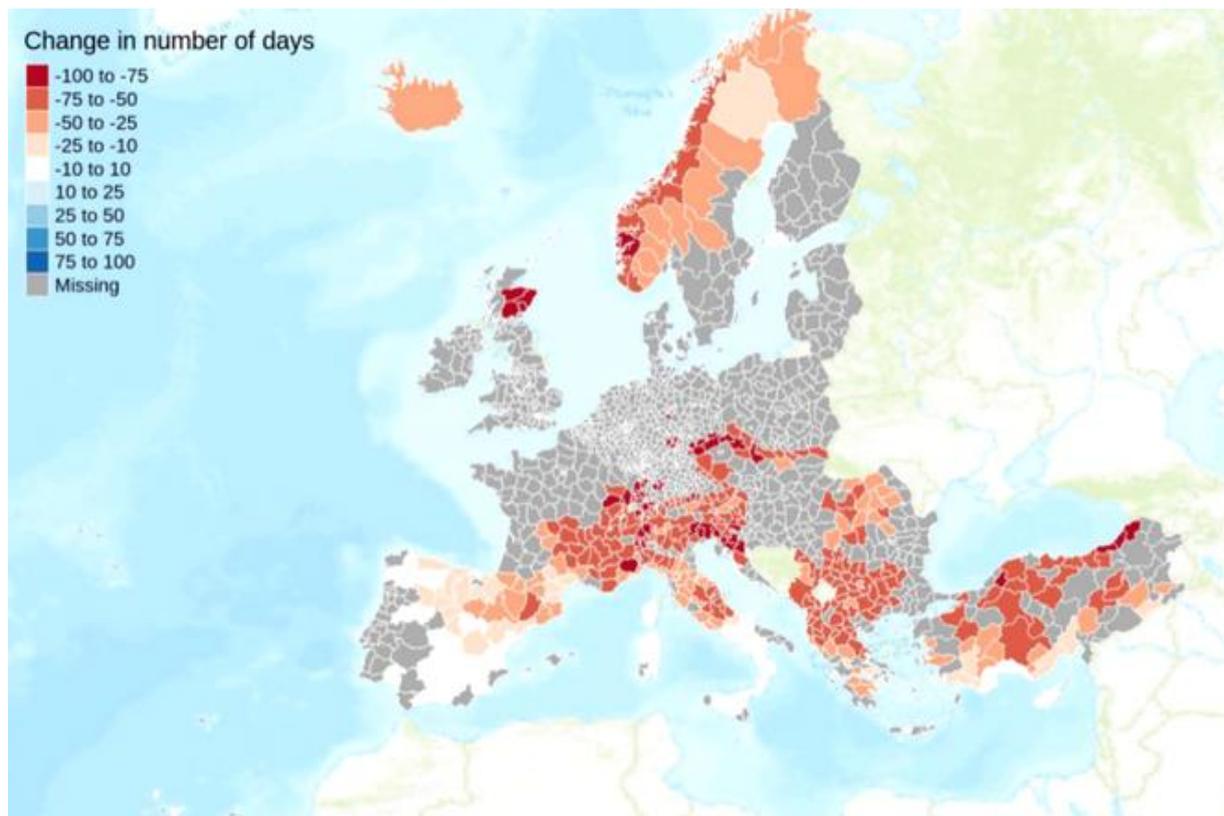
Source: [www.interferente.ro](http://www.interferente.ro)

Tourism and travels have the potential of becoming an important export sector in Romania and of ensuring workplaces and the economic increase among the vast rural population of the country (Mazilu, 2011).

Climate change has a major impact on local cultural landscapes, but also on natural ones. From the centuries-old forests to the hills and meadows of Transylvania, they are all affected by climate change. This impact on the environment constantly threatens the cultural continuity of local communities in all areas of Romania.

Throughout history, our communities have shaped the natural landscapes around them and transformed them into cultural landscapes thanks to the customs and traditions inherited from our predecessors. The richness of these places is noticeable in areas of Transylvania, but also in other areas of the country, where history, cultural and ecological identity are closely related. Transylvanian hay meadows and those with centuries-old trees are among the richest in grassland species in the world.

Forests represent other natural elements with a special value in the Romanian cultural landscape. Furthermore, in the forests of Romania live the most important populations of large mammals in Europe (bears, lynxes, Carpathian deer and wolves). These forested landscapes influence the local climate, and sometimes protect against floods. Unfortunately, these areas are also exposed to extreme natural phenomena such as wildfires and massive landslides.



**Figure 2.** Projected changes in the number of snowy days (at least 30 cm of snow) annually at altitudes higher than 800 m towards the end of the 21st century according to the pessimistic scenario (RCP8.5), based on data provided by Copernicus.  
Source: Morin et al., 2021.

The lack of snow in recent years influences the cultural traditions associated with winter holidays in the countryside but also mountain tourism. In recent years we have experienced the driest winters. Climatologists warn that winters with snow will be fewer in the future, even at higher altitudes where the glaciers are melting. These things change the cultural landscape and prompt people to adapt their old customs to fewer common times and conditions.

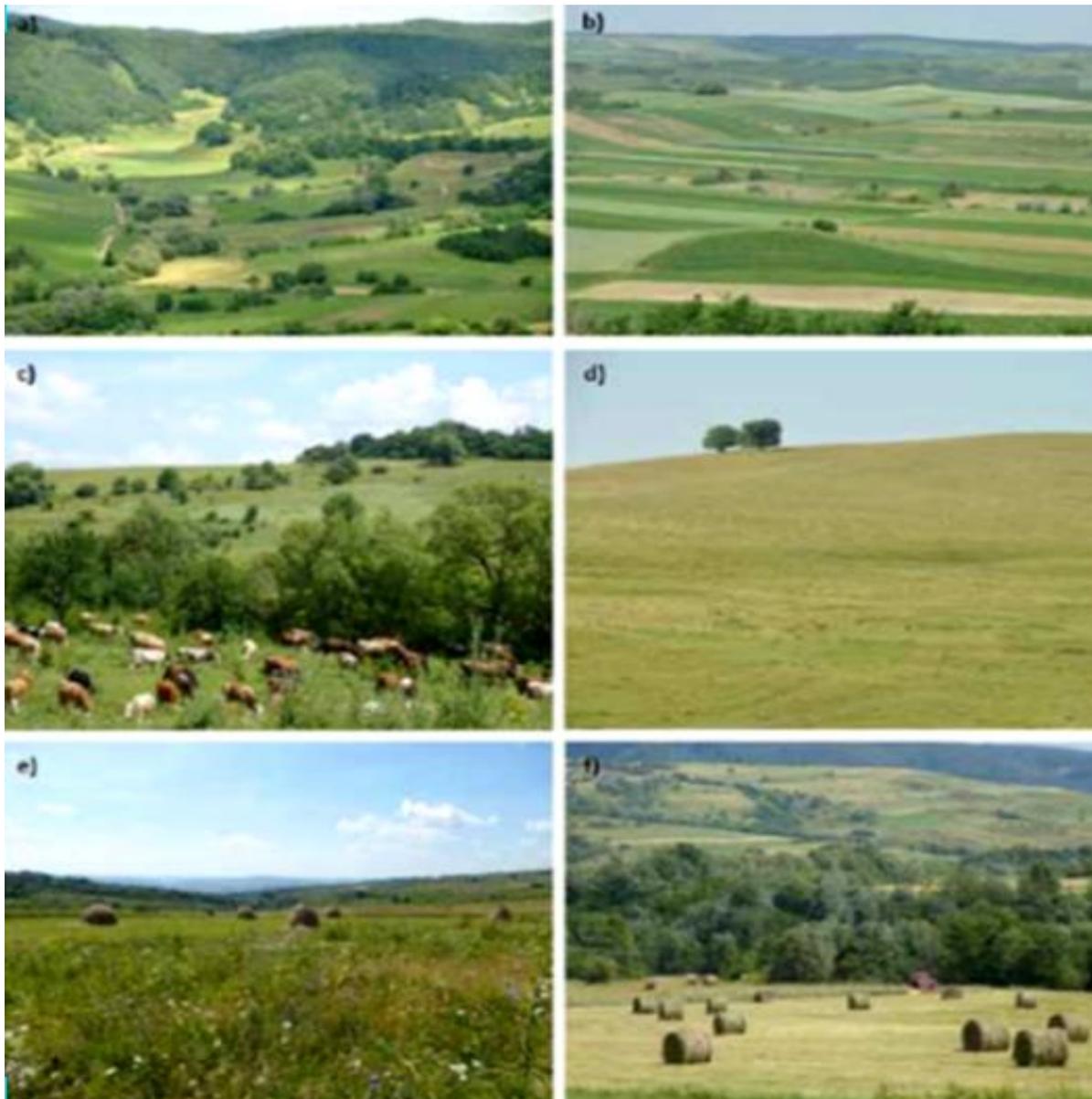
Copernicus data show that if we do not act to reduce the rate of global warming, we can "lose" on average between 25 and 75 snowy days per year (Figure 2).

In Transylvania, but also in other areas of the country, the tradition of mowing, collecting hay and drying it represented a local tradition, often completed with a rural celebration of great spiritual and social value. But with the intensification of agriculture and the simultaneous increase in average temperature, the geographical and ecological structure, as well as the management of these areas with meadows and hayfields, has been profoundly transformed.

These changes have transformed the dynamics of rural communities and the cultural activities they carry out in nature. Thus, many farmers have abandoned traditional agricultural practices on small plots and adopted modern practices involving increased mechanization and the forced increase of certain vegetation species (Figure 3).

These images represent different landscapes undergoing transformation in the Transylvania area, illustrating the changes from a low-intensity land use to a more intensive use (in the case of arable land – Figure 3a. and 3b and pastures – Figure 3c and 3d). It is observed how the intensive use reduces the structural diversity of the landscape by clearing both wood and meadow vegetation. Traditional land use practices such as manual mowing are increasingly being replaced by mechanized harvesting (Figure 3e and f). Climate adaptation options represent a range of alternative management approaches designed to mitigate impacts on cultural resources, but at the same time encourage communities to rethink their

activities and turn to different forms of collaboration and association. This is how the various local initiatives were formed in many of these areas of rural Romania (Loos et al., 2015).



**Figure 3.** The effect of climate change in Transylvania.

Source: Loos et al., 2015.

Smart Villages are understood as "rural communities that refuse to wait for change to happen". Such communities are made up of rural people who take the initiative to mobilize and find practical solutions to the everyday challenges they face, as well as take advantage of new opportunities to improve their quality of life and standard of living.

Starting from 2016, within the European Union, the smart village concept was launched under the name "A better life in rural areas" in the Declaration from Cork, Ireland.

The smart village is a relatively new concept in the EU policy-making process. The emerging concept of the smart village refers to rural areas and communities that build on their existing strengths and resources, as well as developing new opportunities. The concept involves the participation of the local population in improving economic, social or environmental conditions, cooperation with other communities, social innovation and the development of smart village strategies.

Digital technologies can be applied to many aspects of life and work in rural areas. The smart village concept also suggests the adoption of smart solutions in both the public and private sectors in a wide

range of policy areas, such as improving access to services, developing short food supply chains and the development of renewable energy sources. The smart village concept is gaining ground on the rural development agenda, coinciding with the ongoing reform of the common agri-cultural policy (CAP). The domains of smart village are: health; education; economy; environment/sustainable development – water, air, soil, sanitation; digitization/digitalization/digital transformation; renewable energy; nutrition; awareness and civic involvement; good governance (Andrei & Simon, 2014).

For example - rural tourism in Transylvania is especially practiced in the Saxon villages. The Saxon settlements founded by the Saxon colonists are found in the area bordered by the medieval cities of Sibiu, Sighișoara and Brașov. A region with wooded hills, narrow valleys, biodiversity, fortified church towers - such a picturesque landscape as if from a painting (Popescu, Badita & Mazilu, 2014).

His Majesty, King Charles of Great Britain, who drew attention to these areas where time seems to have stood still. Every year, more and more tourists go to the Saxon villages to discover the beauty of the most spectacular fortified churches, welcoming houses, traditions and dishes specific to the area.

In addition, nature ran free in the Saxon area so that the flora and fauna were not affected by pollution or toxic substances. The Saxon settlements in Transylvania hide real tourist treasures that have impressed both Romanian and foreign tourists. A few Saxon villages in Transylvania are preserved almost intact. In this sense, the villages of Viscri, Biertan, Saschiz, Călnic, Prejmer, Valea Viilor and Dârjiu are seven villages protected by UNESCO, because here many traditions and fortified churches have been kept almost intact.

Ten years ago, guesthouses and rural tourism were very rare. But now, in many of these villages, life without tourism and cultural events has become unimaginable - in other words, what started as a vision of a few villagers has become part of everyday life and a means of existence for some entire villages (Brown, 2006).

Many new opportunities for sustainable business have emerged. The possibility of using holiday vouchers in wine destinations is an important argument in choosing where to spend your leisure time, whether we are talking about trips, weekends, holidays or vacations (Mazilu et al., 2017).

If many years ago there were few tourists, now there are several types of activities that tourists can enjoy and that provide economic support for ecologically sustainable management of the landscape. However, only a small part of the income generated by this tourism is reinvested in the development of cultural landscapes and in such new projects (Dobrescu & Mazilu, 2020).

Traditional landscapes with a distinct cultural heritage can positively influence the local economy, even if sometimes seasonal activities have to be rethought. Rural communities can benefit from ecological and cultural tourism, offering tourists handicraft products, but also foods specific to these areas (Gogonea et al., 2017).

Thus, ecotourism can ensure the widening of the spectrum of traditional economic activities, in Transylvania but also in other areas without marginalizing or replacing them, so that the local economy is not subject to external and internal changes and influences.

The tourist activities carried out under the ecotourism emblem offer specific opportunities, the local population and the tourist industry being forced to use natural resources in a sustainable manner and to appreciate the valuable natural and cultural objectives.

For this, however, strong and united communities are needed, which encourage the civic spirit of the locals and which aim to implement a vision in which all natural and cultural resources are valued and cared for.

In this sense, the code of good practices in eco-tourism recommends:

- the construction of installations for capturing biogas, resulting in the reduction of methane emissions, and the energy obtained is used for the purpose of reducing fossil fuels;
- outdoor grazing versus growing in systems with shelters;
- education, increasing the degree of awareness among farmers about the consequences determined by the effects of climate change;
- the continuous review of agricultural strategies, to ensure their flexibility in relation to the effects of climate change and adaptation measures.

## 5. DISCUSSION

A questionnaire based on 4 questions was created to collect important data regarding identifying the opinion of the inhabitants of rural villages regarding the impact of climate change on daily activities. This quiz contains questions with only one possible answer and multiple-choice questions and a Likert scale is used.

The data collection method was personal interview (face to face) and 100 questionnaires were applied, all of which were validated (100 people, 54 men and 46 women). The surveyed population is made up of household representatives, from Saxon villages in the south and southeast of Transylvania, generally over 25 years old.

The objectives of the research are the following:

- a) residents to determine the level of awareness regarding climate change.
- b) to identify the residents' perceptions regarding the effects of climate change.
- c) to determine the sources of information that provide reliable data on the effects of climate change;
- d) to identify the stakeholders responsible for addressing the effects of climate change;
- e) to identify the possibility of taking measures to combat the effects of climate change.

The research hypotheses are the following:

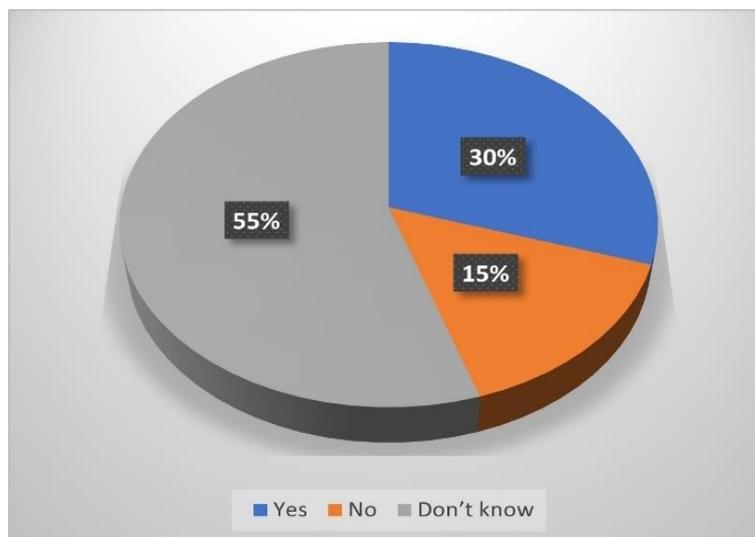
- 1) in general, the inhabitants of the Saxon villages are aware of climate change and their effects on daily activities.
- 2) in general, the inhabitants perceived these climate changes;
- 3) in general, the Saxon villages are and will be affected by climate change;
- 4) a large percentage believes that measures can be taken to combat the effects of climate changes;
- 5) the representatives of the Saxon villages are of the opinion that the local public administration is the main one interested institution that should be involved in taking measures to address the effects of climate change.

According to the results, hypotheses 1 to 4 were confirmed. And hypothesis 5 was not confirmed.

The questions focused on the following:

- the future impact of climate changes;
- the possibility to adopt measures to tackle the effects of climate changes.
- identifying the organizations responsible for adopting measures to mitigate the effects of climate change.

The analysis of data collected underlines that a relatively high percent of respondents heard about "climate change" (55%), while 15% of them declared they never heard of this phenomenon. The rural people are aware of climate change, and they are interested in this topic. This also underlines the need for awareness strategies (Figure 4).



**Figure 4.** The Distribution of respondents according to the answers of the question: "Have you ever heard about climate change?"

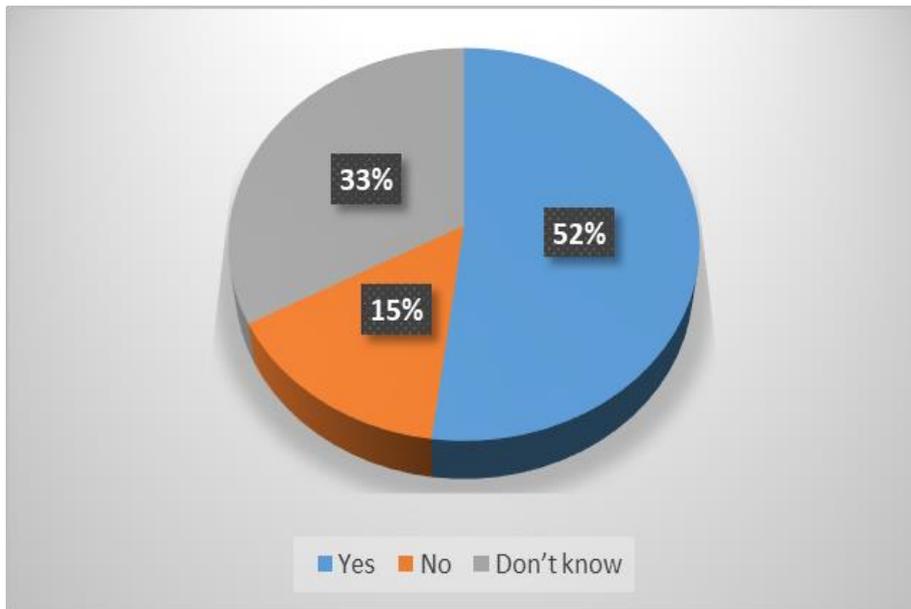
In this sense, 55% of the respondents stated that they have perceived important changes in some aspects of the weather (types of wind, the amount and type of precipitation, etc.).

At the same time, 20% of them didn't notice any important changes in the weather.

This important percentage of 55% represents the people who carry out specific activities in the rural areas and who are able to see the changes in the environment they live in.

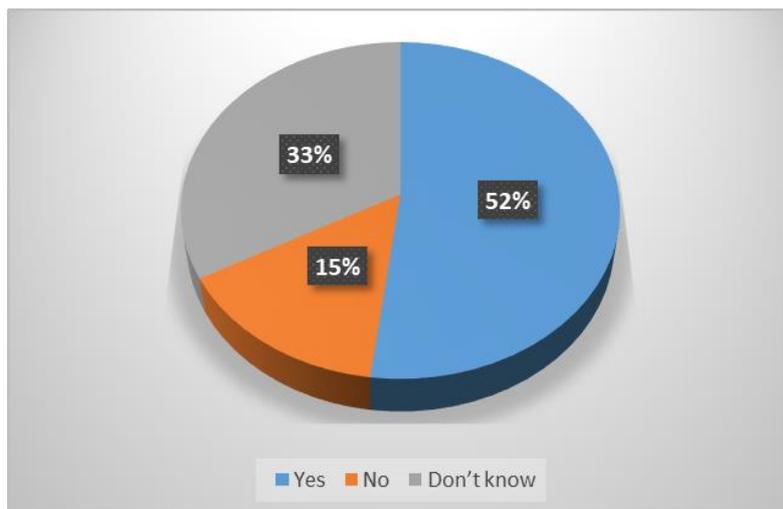
Most of the information on climate change reached the respondents via television, and to a much lesser extent via radio, the Internet, newspapers, and magazines.

The result highlights the importance of this information channel (television) for rural people, where they can easily find news about climate change (Figure 5).



**Figure 5.** The distribution of respondents according to the answers of the question: "Have you noticed an important change of some aspects of the weather?"

However, according to the respondents, they have the highest confidence in the information provided by specialists, followed by members of the local public administration, TV/radio, newspapers, and magazines.



**Figure 6.** The distribution of respondents according to the answers of the question: "Do you think the climate change affects you or will affect you in the future?"

Regarding the effects of climate change at the individual level, only 52% of the respondents declared that they are or will be affected, while 15% considered they will not experience these effects. A high proportion is represented by those who responded that they do not know if the changes in various aspects

of the weather had or will have an influence on them. This might be caused by the insufficient level of information held by rural people concerning climate change.

Unlike many other European countries, Romania still has the privilege of having preserved a good part of its natural and cultural heritage, but that does not mean that we must let things take their natural course, especially if this course turns out to be one with devastating consequences for the natural and cultural landscapes of the next generations in Romania (Figure 6).

Therefore, climate warming and human activities that degrade the environment are the problem of the entire planet, of all people. It should be the problem for each of us. These harmful effects cost lives and a lot of money.

## 6. CONCLUSIONS

Despite all the problems related to the transport and tourism infrastructure, Transylvania is a major attraction for tourists, especially for those from abroad. Against the backdrop of climate change, tourists visiting this region are increasingly moving to rural areas. We note the following types of tourism: leisure tourism, cultural tourism, ecotourism, religious tourism, rest and recreation tourism, treatment and spa tourism, sports tourism, but also shopping tourism, scientific tourism, youth tourism or business tourism, especially in recent years.

Transylvania, with its rural areas, remains one of the most attractive regions for tourism in Romania and an increasingly sought-after destination in the future, mainly as a result of the reorientation of tourists due to climate change.

## ACKNOWLEDGMENT

This study is part of my PhD thesis entitled: *The Role of Tour Operators in the Recovery of Post-Pandemic Tourism*, which is currently in progress.

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# Territorial disparities of the Human Development Index in the North Development Region of the Republic of Moldova

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**ABSTRACT:** Human development is a component part of the development of socio-economic, natural-geographical systems. Currently, the need for comparative studies of human development appears increasingly imperative, in an attempt to track the level reached by states, regions or urban and rural human habitats within them, with the goal of evaluating the effectiveness of development policies applied by governments or regional and local administrations, beyond certain indicators or statistical series that attest to certain aspects of human development. Through this study, we proposed the calculation of the HDI at the level of human habitats of the North Development Region of the Republic of Moldova, with the disaggregated indicators taken into account, compared to the indicators taken into account by the United Nations Development Program (UNDP) in the calculation of the Human Development Index (HDI) of the states. This fact would allow a more accurate analysis of human development at the locality level. The purpose of this study is to estimate and determine the spatial differences of the HDI in the localities of the North Development Region (NDR) in the context of the implementation of the Regional Development Strategy of the Republic of Moldova and the intention of European integration of the country. The main results of the study consist in the creation of a valuable cartographic set with reference to the four dimensions of human development, as well as the map of the aggregate index of human development related to the human habitats of the region, a typology that can serve as a benchmark in the argumentation of territorial, administrative and financial decentralization which is to be implemented. The main methods used in the study: comparative, statistical, direct standardization, mathematical, the GIS system. The HDI study of the North Development Region includes 315 urban and rural localities within the region, through four dimensions that attest the level of human development and 12 indicators (values), these being related to the habitats of primary rank: communes and villages.

**KEYWORDS:** Human Development Index, Territorial disparities, Socio-territorial behavior, Standard of living, Republic of Moldova.

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## 1. INTRODUCTION

The research started from the idea that development is disproportionate and territorially discontinuous, and the expansion of the larger number of social, socio-demographic, economic and infrastructure indicators at the level of the primary administrative-territorial units of the region will reflect the state and situation of human habitats with a greater precision. The implementation of the policy in the field of regional development is relatively new for the Republic of Moldova, which is in the process of development and connection to the requirements of the regional development policy of the European Union. Within the mechanisms and tools of the Regional Development Strategy of the Republic of Moldova, for the years 2016-2020 and 2022-2028, it is provided that in the regional development planning process, the main economic and social problems will be explicitly identified and analysed, which

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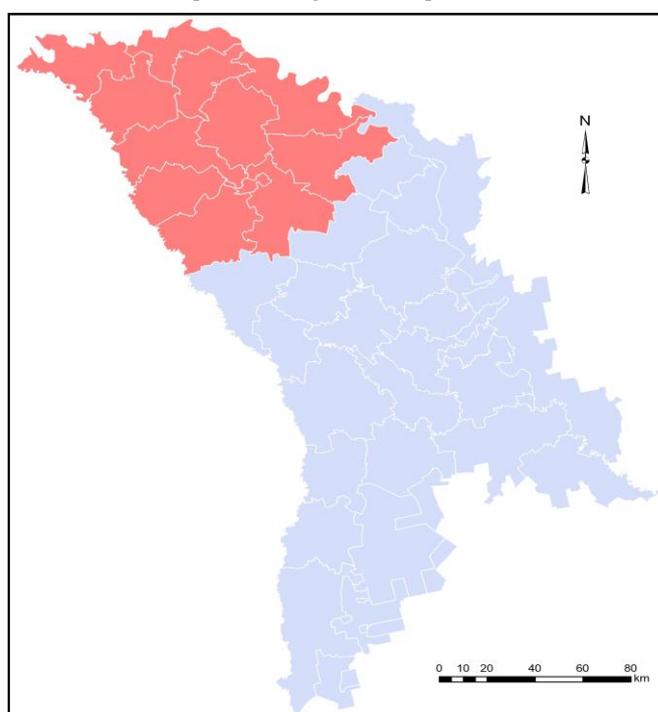
hinder development in the regions and will prioritize the necessary measures to solve them (Law No. 239 of 13.10.2016, National Regional Development Strategy of the Republic of Moldova 2022–2028). In this sense, the assessment of the level of human development for each locality can be used as a tool to guide the interventions of the authorities, eliminate discrepancies in development and ensure decent living conditions throughout the country.

Starting from the basic purpose of the study, we proposed several objectives:

- to identify of the territorial disparities of the Human Development Index (HDI) at the level of the primary administrative-territorial units of the Northern Development Region;
- to identify the problems that prevent the development of human habitats based on the analysis of the set of indicators on the demographic, sanitary, economic and infrastructure dimensions, as well as the existing opportunities for the relaunch of the localities of the region;
- to elaborate a typology of HDI that could be used as a tool for local public authorities, in the context of attracting resources for development.

It was aimed to take into account several indexes/indicators that attest to human development in order to be able to follow the differentiation of human habitats in terms of the living standards they have reached on the socio-demographic, social, economic dimensions, as an expression of quality governance of human communities, as well as highlighting problems and trends in their evolution.

North Development Region occupies the north side of the Republic of Moldova. It is the second



**Figure 1.** The North Development Region of the Republic of Moldova.

regarding in area and number of population among the six development regions (currently only 4 are functional) (Figure 1, Table 1).

The region includes 572 localities, of which: 244 villages, 295 communes, 17 cities and 3 municipalities. The number of localities in the region constitutes 34.0% of the total number of localities in the country, and the population of the region constitutes 27.6% of the total population of the Republic of Moldova (01.01.2023). The North Development Region was created in 2010, with the aim of contributing to the balanced socio-economic development in its 11 component districts and the municipality of Bălți. The activity of North Development Region was organized on the basis of Law No. 438 regarding regional development, GD no. 127 of 08.02.2008 and the Activity Regulation (Law No. 438 of 28.12.2006).

**Table 1.** Comparative characteristics of the Development Regions of the Republic of Moldova (01.01.2023).

Development Regions	The number of the population with usual residence (thousands of inhabitants) <sup>1</sup>	The share of population from total (%)	Population ratio vs. most populated region D.R. (R.D. Centre=100)	Surface (km <sup>2</sup> )	Surface from the total (%)
1. North Development Region	718.7	27.6	98.2	10,014	33.4
2. Centre Development Region	731.4	28.1	100	10,636	35.5
3. South Development Region	354.4	13.6	48.4	7,379	24.6

<sup>1</sup> Calculated for the population with habitual residence on 01.01.2022, without the administrative-territorial unit on the left of the Dniester.

4. Chisinau municipality <sup>2</sup>	677.5	26.0	92.2	123	0.4
5. Gagauzia Administrative-Territorial Unit	121.7	4.7	16.6	1,848	6.1
Total	2,603.7	100	-	30,000	

Source: National Bureau of Statistics (NBS, 2023a).

In the geographical area of the North Development Region there is a dense network of human settlements and a relatively high population density (97.3 inhabitants per km<sup>2</sup>). At the same time, North Development Region is characterized by the highest degree of fragmentation of localities at the level of the republic and the large number of small and very small localities (Hachi et al., 2021).

## 2. METHODS AND DATA

Human development is a complex phenomenon that includes various aspects of society's life. It started from the premise that the purpose of the existence of any society is development, and any evolutionary movement of a natural-geographic, social-economic, technological system falls within the term of development. From a socio-human aspect, development can be defined as a process of continuous improvement of the quality of life and living conditions of the population. In the given study, we included human development at the level of the primary territorial entities within the North Development Region, starting from the idea of evaluating development through the prism of quantitative and qualitative synthetic indicators related to territorial human communities. Starting from 1990, under the auspices of the United Nations Development Program (UNDP), a set of synthetic indicators was developed, which allow measuring the progress made by each country in areas related to human development. The main synthetic indicator, which expresses in a numerical form the level of human development, is the Human Development Index (HDI), which reflects this social phenomenon through the prism of three defining dimensions: a long and healthy life, the level of education and a decent standard of living life in terms of income.

In the last UNDP report published in the year 2021/2022, the HDI level of the Republic of Moldova was 0.767, occupying the 80th place out of 191 states of the world that were mentioned in the report (Hachi, Bunduc, Lozovanu & Răilean, 2020). Over time, the HDI value of the Republic of Moldova has fluctuated quite a lot. Despite the increase in the HDI level, the Republic of Moldova remains among the states with the lowest level of this index in the region. The transition period proceeded slowly, compared to other states in Central and South-Eastern Europe, with most states becoming members of the European Union (Hachi et al., 2021).

Increasing the number of indicators/values with reference to human development attributed to primary level territorial entities for the North Development Region of the Republic of Moldova, allows a better dimensioning of this indicator and reflects the situation of human development more precisely, the territorial discrepancies being quite accentuated, an expression of a legacies of the super-centralized system from the Soviet period (United Nations Development Programme, 2022).

The choice of indicators attesting to human development at the level of localities took into account their social, economic and scientific relevance, as well as the possibilities of current official statistics that provided us with the data requested at the level of primary administrative-territorial units (municipalities or even villages in the composition of the communes).

The methodological basis for the research of the health component with regional applicability on the North Development Region of the Republic of Moldova was carried out taking into account similar studies at the international and national level, but the results can only be achieved with a truthful and detailed basis at the regional level that allows the assessment of the state in fact, of the dynamics and distribution in territorial profile.

The direct standardization method is used when the age-specific morbidity rates in the populations compared to the standard population are known. These rates are applied to the standard population to calculate the expected number of illnesses in each age group if the age composition is the same as in the standard population. Based on this expected number of illnesses in the standard population, the morbidity index by age group is calculated.

$$\bar{x} = \frac{\sum_{i=1}^k x_i n_i}{n_j}$$

k = number of groups (intervals);

$x_i$  = individual values of the characteristic;

<sup>2</sup> The municipality of Chisinau is to be implemented as a development region.

$n_j$  = number of observed statistical units;

$n_j$  = volume of component series  $j$ .

Calculation of the morbidity rate from malignant tumors:

$$\bar{x} = \frac{\sum_{i=1}^k x_i n_i}{n_j} = \frac{1959321}{100000} \approx 20 \text{ cases}$$

$$\text{Morbidity rate} = \frac{\text{No. cases}}{\text{No. pop. com.}^*} n_j = 294.9/100,000 \text{ loc.}$$

Based on the transformation of morbidity risk rates by (malignant tumors and active tuberculosis) and the level of accessibility of the population to emergency medical services into standardization coefficients, the Health Index in territorial profile was calculated.

Following the analysis of specialized literature in the field of assessing the economic component of the HDI and based on the availability of data, 3 basic pillars were established, which will characterize the economic activity in the North Development Region:

- Pillar 1. The economic situation of the population includes: 1) Salary income by region; 2) Remuneration of work on economic activities. The primary data for this pillar were collected from the National Bureau of Statistics (NBS) by districts;
- Pillar 2. The economic situation of the private sector includes: 1) The number of economic units by type of activity and size; 2) Revenues from sales of economic units by activities. Primary data for this pillar were also collected from the NBS by districts (National Bureau of Statistics [NBS], 2023d);
- Pillar 3. The economic situation of local public authorities refers to: 1) The ratio of own revenues to total expenses; 2) The ratio of own income in total income. The primary data for this pillar are collected from the Ministry of Finance by commune (North Regional Development Agency, 2010)

In order to compare the HDI aggregate indicator at the level of primary administrative-territorial units, the method of ranks was used, as in the analysis of the geodemographic situation. The intervals in which each locality is to be reached will be calculated according to the formula:

$$X = X_{\min} / (X_{\max} - X_{\min})$$

The following methods were used: statistics, mathematics, cartography, comparison, the GIS system. A large volume of information collected from specialized institutions in the country was systematized, such as: the National Bureau of Statistics, the Public Services Agency, the Regional Development Agencies, etc. Data from the 2004 and 2014 Population and Housing Censuses were also used.

### 3. RESULTS AND DISCUSSIONS

Development can be attributed to any evolutionary movement of a system. In socio-human aspect development can be defined as "a process of improving the quality of life of a group of people" (Vaculovschi, 2022). Social development is viewed from the perspective of orientation towards "achieving a desirable state, set as an objective to be achieved through a process planned over time, through a set of combined actions" (Zamfir & Stoica, 2006). Increasing the quality of life as the purpose of the existence of a social system is conceptually identified as human development. Human development is a broad concept that knows a permanent evolution. In the specialized literature, human development is analyzed from the perspective of capitalizing on human potential through the key dimensions of human development, addressed through the international instruments for measuring the quality of human capital, such as Human Capital Index, Human Development Index; Global Competitiveness Index, Quality of Life Index, etc. (Zamfir & Stoica, 2006; Hrușcirov, 2016; Buciuceanu-Vrabie, 2019; Gutium, 2021; Vaculovschi, 2022).

In the study carried out, we examined several dimensions of human development that are both directly and indirectly included in the concept of human development, these being related to the primary communities within the Northern Development Region of the Republic of Moldova. A first measurable aspect of human development is the socio-demographic dimension. Indices and indicators were taken into account, such as: the number of the population, population dynamics, demographic aging and the demographic dependency rate, each having a special significance within the socio-demographic component (Hachi & Cujbă, 2018).

Population size has both economic and social significance. As a rule, large and very large localities are less vulnerable to the socio-economic transformations that the Republic of Moldova has gone through. Large localities are characterized by greater vitality, also having a higher degree of stabilization. They are more attractive for investments, due to the presence of a greater number of jobs, as well as from the

perspective of greater opportunities for investments in social, economic, technical-building infrastructure, etc.

Within North Development Region we distinguish 6 categories of localities according to the number of inhabitants:

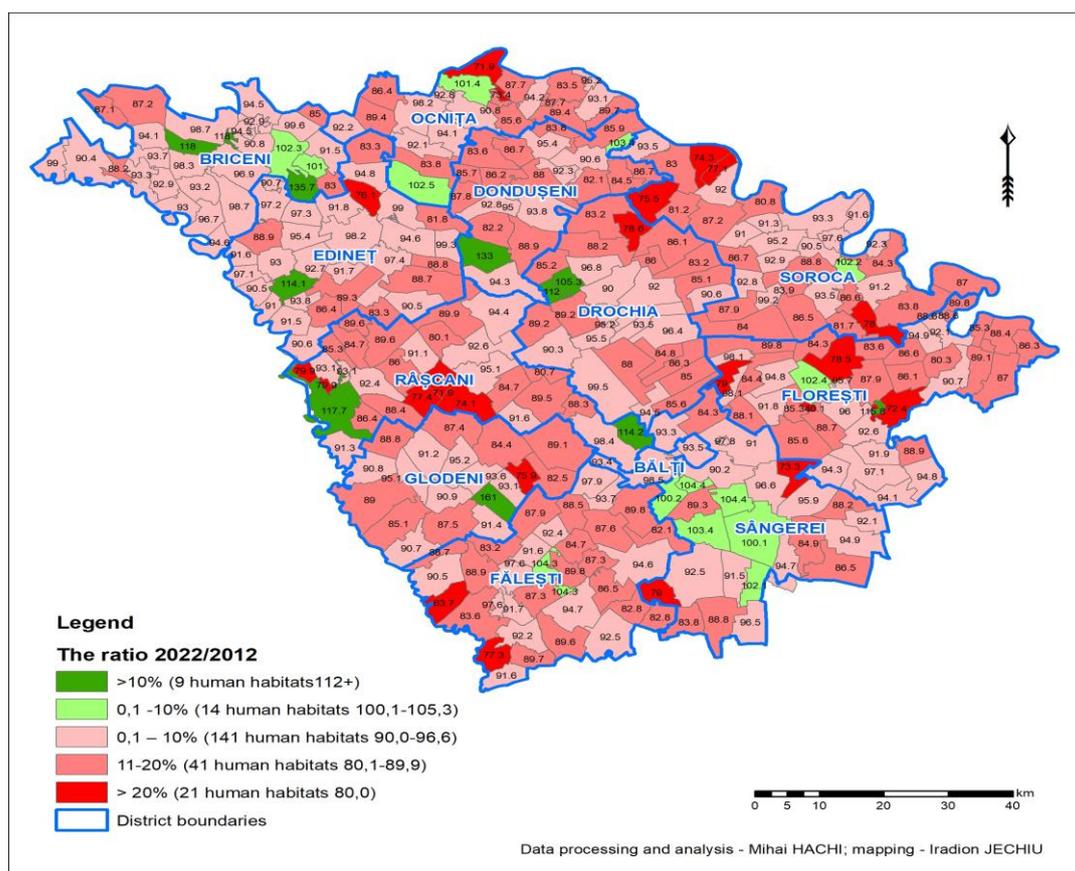
1. 7,001+ inhabitants – very large – 2 municipalities and 14 cities (5.1%);
2. 4,001-7,000 inhabitants – large – 21 municipalities and towns (6.6%);
3. 3,001-4,000 inhabitants – large averages – 42 communes and towns (13.3%);
4. 1,501-3,000 inhabitants – small averages – 142 localities (45.1%);
5. 1,001-1,500 – small – 61 localities (19.4%);
6. 453-1,000 – very small - 33 localities (10.5%) (NBS, 2023d).

Medium-sized, small and very small localities predominate - 75% of the total number of localities, these being the most vulnerable from the perspective of human development. The demographic situation is worsening in the context of the natural and mechanical decline that is currently taking place.

Another indicator taken into account referred to population dynamics. Even if the dynamic calculations were made over a longer period ((1989/1959 and 2014/1989, 1989/2004, 2004/2014), the dynamics of the last 10 years (2012-2021) were taken into account in the aggregate HDI.

The data obtained, as a result of the processing of the information regarding the entries and exits of the population, allowed us to identify the degree of stability or vulnerability of the population of the urban and rural localities of the region, as well as to create a typology of the demographic dynamics for the analyzed time interval.

Thus, out of the total number of localities, only 23 human habitats (two cities, district centers and one small town and 20 rural habitats) register an increase in the numerical population, which constitutes 7.3% of their total number. The region continued the human decline throughout the period of state independence, and in the analysed period 92.7% of the localities recorded a numerical setback (Figure 2).



**Figure 2.** Dynamics of the population of the North Development Region of the Republic Moldova in the period 2012-2021 (%).

Source: based on data from the National Bureau of Statistics (NBS, 2023a).

Thus, the decline per locality was recorded at the following rates:

- 141 human habitats (47.8%) had an insignificant decrease, varying between 0.1 – 10%;

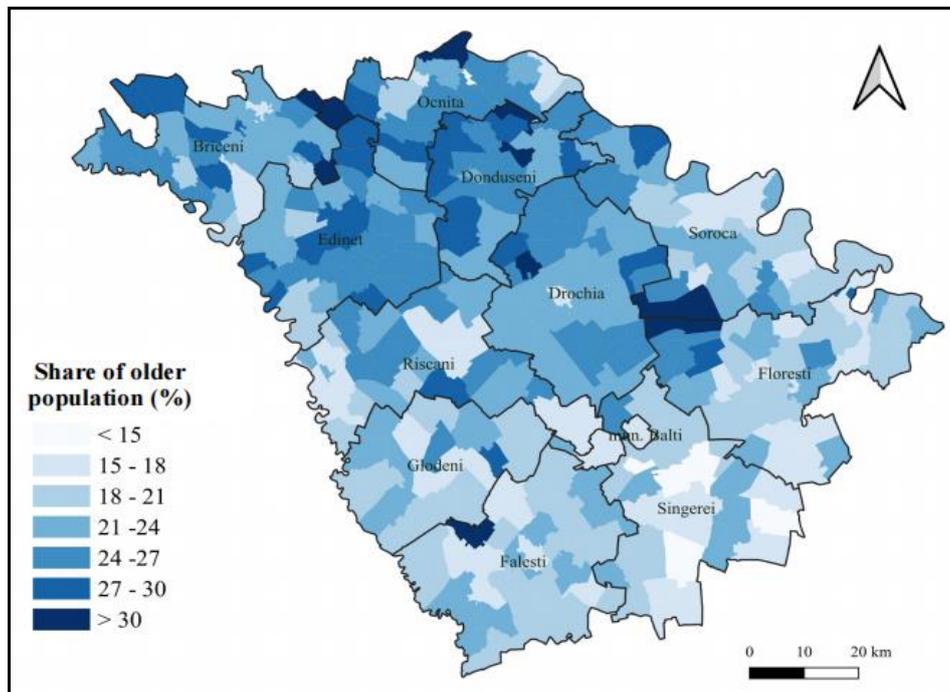
- 41 human habitats (13%) had a decline that oscillated between 10 and 20% of the numerical population;

- and 21 human habitats had a decline greater than 20%, which is very much and in most cases it is irreversible decline that can lead to the disappearance of human habitats in a future perspective.

The demographic situation at the level of human habitats in the North Development Region is more deplorable compared to other developing regions. The greatest degree of stability of the population from the point of view of its dynamics is the large and medium-sized localities, favorably positioned in relation to the city of Bălți or important regional centers such as: Sângerei, Edineț, Soroca, the vicinity of cities in Romania and Ukraine.

The third indicator taken into account was the degree of population aging has a double meaning. On the one hand, a high share of the aging population and a high life expectancy at birth can be interpreted as an expression of a high standard of living of the population, and on the other hand, a high share of the elderly population in the total population denotes increasing the economic burden and their maintenance expenses (NBS, 2022a; NBS, 2022b; NBS, 2023b).

The population aging indicator attests to the following trends and characteristics. All localities in the North Development Region have entered the phase of demographic aging, 100% exceeding the 12‰ level - considered the limit of demographic aging (Beaujeu-Garnier). The demographic transition towards narrow and simple reproductive behavior begins in the north of the republic, followed by other regions of the country. The administrative-territorial units with the oldest effective population are the districts of Edineț - 23% and Donduseni - 25.2%, and with the youngest population: the municipality of Bălți - 18.4% and the Administrative Territorial Unit (ATU), Sângerei - 17.8%, at an average demographic aging for the North Development Region of 22.9% (Figure 3).



**Figure 3.** The degree of demographic aging at the primary ATU level, North Development Region, 01.01.2022.

Source: based on NBS (2022a).

The analysis of the data on the demographic aging of the North Development Region, compared to other regions, attests:

- the aging rate of the population of the North Development Region (22.9%) is higher compared to the other development regions;

- at the same time, the rates of aging in the North Development Region in the interval (2012-2021) are slower, compared to the other regions. If in the interval 2012-2021 the aging rate of the population of the Northern Republic increased by 116%, in the country as a whole - 128%. This fact proves that the demographic transition in the Northern Republic has ended and the stabilization process in the evolution of demographic phenomena has begun;

- the increase in the aging rate is characteristic for all regions of the country, but the rhythms are different (Table 2).

**Table 2.** The degree of aging of human habitats in the North Development Region (NDR) compared to those in the Central Development Region (CDR), 01.01.2022.

Rank	Share of the aging population (%)	Degree of aging of localities (%)	Number of localities in the CDR	% from total of CDR localities	Number of localities in the NDR	% from total of NDR localities
1	< 8	Young localities	18	2.9	-	-
2	8-10	Partially young loc.	25	4.1	-	-
3	10-12	Localities on the verge of aging	71	11.6	-	-
<b>Aging localities above the 12% demographic aging threshold</b>						
4	12-14	Localities in the early phase of aging	126	20.5	2	0.3
	14-16	Localities in the middle phase of aging	128	20.8	14	2.4
5	16-18	Localities in a high aging phase	111	18.1	40	7.0
	18+	The locality in a very high phase of aging	135	22.0	516	90.3
Total or average per region			614	14.4	572	100

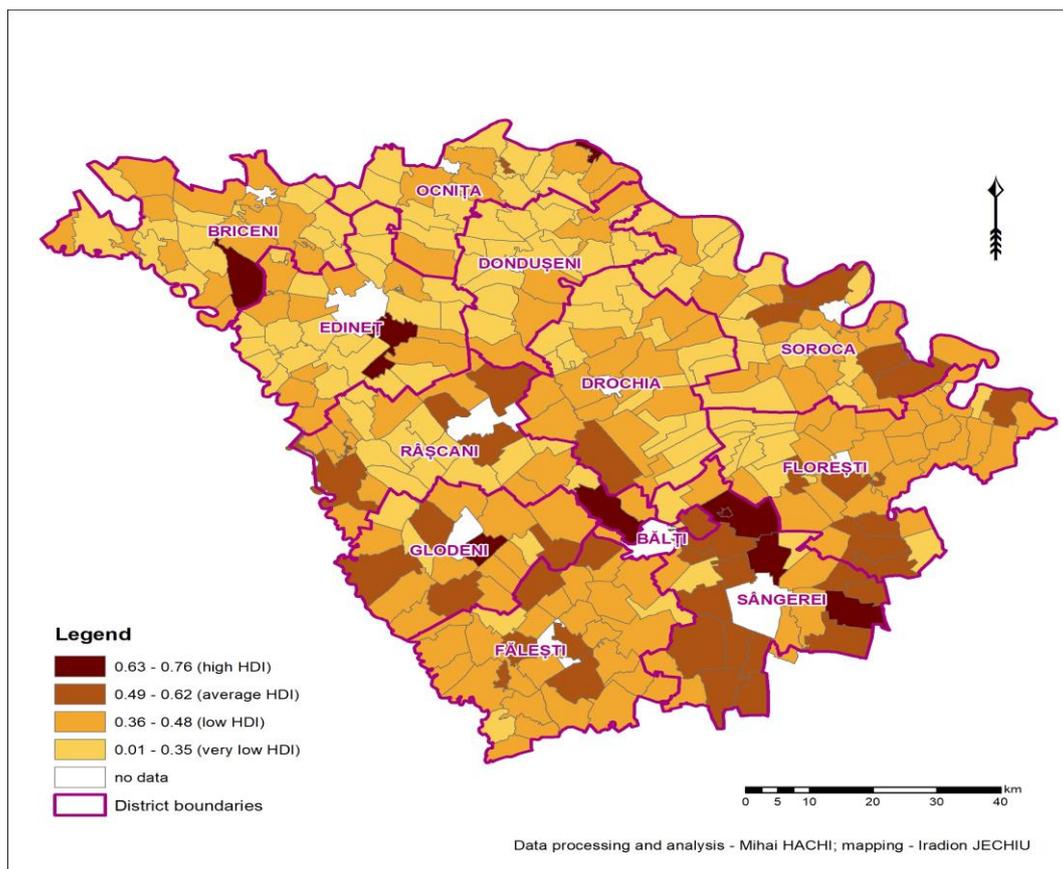
Source: calculated and adapted based on NBS data (2022b).

The comparative analysis of human habitats in the two development regions within the Republic of Moldova attests to a much more pronounced degree of aging for the North Development Region, all localities in this region being in the aging phase, and over 90% in the very high aging phase.

The demographic dependency ratio (age dependency ratio) is the ratio between the number of people of "dependent" age (people under 15 and over 58/63+) and the population of working age (16/58/63+) expressed at 100 people (%). It is used as an indicator of the "economic burden" that the working population bears relative to the dependent population (children and the elderly).

The HDI typology was created on the geodemographic dimension. Only 9 rural habitats have a high geodemographic HDI: 0.630-0.760; 36 habitats with an average geodemographic HDI: 0.490-0.620; 136 habitats a small geodemographic HDI: 0.360-0.489 and 120 habitats a very small geodemographic HDI: 0.010-0.350 (Figure 4). The population of the North Development Region has the largest decline among the development regions, the geodemographic problem being very acute at the regional level and with large disparities at the intra-regional level. The demographic indicators and values taken into account attest to a sharp decrease in the geodemographic potential and, accordingly, the HDI on this dimension.

The population of the North Development Region has the largest decline among the development regions, the geodemographic problem being very acute at the regional level and with large disparities at the intra-regional level. The demographic indicators and values taken into account attest to a sharp decrease in the geodemographic potential and, accordingly, the HDI on this dimension. Large localities near cities/municipalities/growth poles/rational centers, with more opportunities for local development, are more attractive to young families of reproductive age and, accordingly, have a better demographic situation. Localities with a higher share of the population following neo-Protestant cults, but also Orthodox Christians, as well as isolated ones, with a higher degree of "conservation" from a demographic point of view, also have a better demographic situation. Small towns are the most vulnerable from a socio-demographic point of view. Territorial development policies require a differentiated approach by categories of human habitats that have common features in demographic behavior.



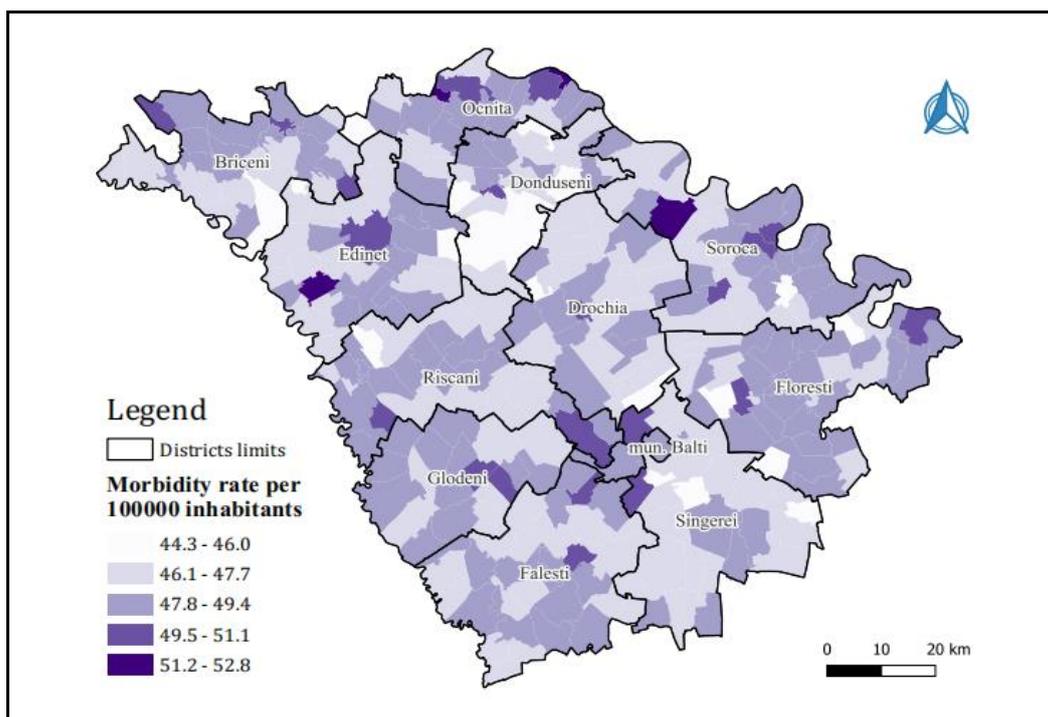
**Figure 4.** Human Development Index on the geodemographic dimension.  
Source: based on NBS data (2023c).

The World Health Organization (1948) defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity". Population health is affected by both intrinsic and extrinsic risk factors. Intrinsic factors include biological ones inherited through heredity and acquired lifestyle habits such as smoking, overeating, or other risk behaviors. Among the external factors that affect the individual's health are those of the person's environment, socio-economic and psychological (Tulchinsky & Varavikova, 2003). Modern epidemiology has focused its attention on risk assessment, using screenings to detect genetic, social factors, nutritional, ecological, professional, behavioral or other factors that contribute to the development of the disease.

In the North Development Region, the maximum values of the risk of disease with malignant tumors were recorded in the rural localities on the border of Sorocea, Briceni and Ocnița districts with rates between 437 - in the village of Oclanda (Sorocea), 450 in Naslavcea (Ocnița) and 458 per 100,000 inhabitants in the commune of Briceni (Dondușeni). The minimum rates of the risk of illness with malignant tumors in the Sângerei district are also supported by lower values of the population aging threshold compared to other districts. The minimum values were recorded in the communes of Sângerei Noi (212), Ciuciueni (214), Rădoia (225) per 100,000 inhabitants.

A major problem that has reappeared in the attention of public health is tuberculosis, which preferentially manifests itself in population groups in the middle segment of the demographic pyramid. The degree of correlation between the population between 25-64 years and the risk of tuberculosis is very high ( $R=0.858$ ).

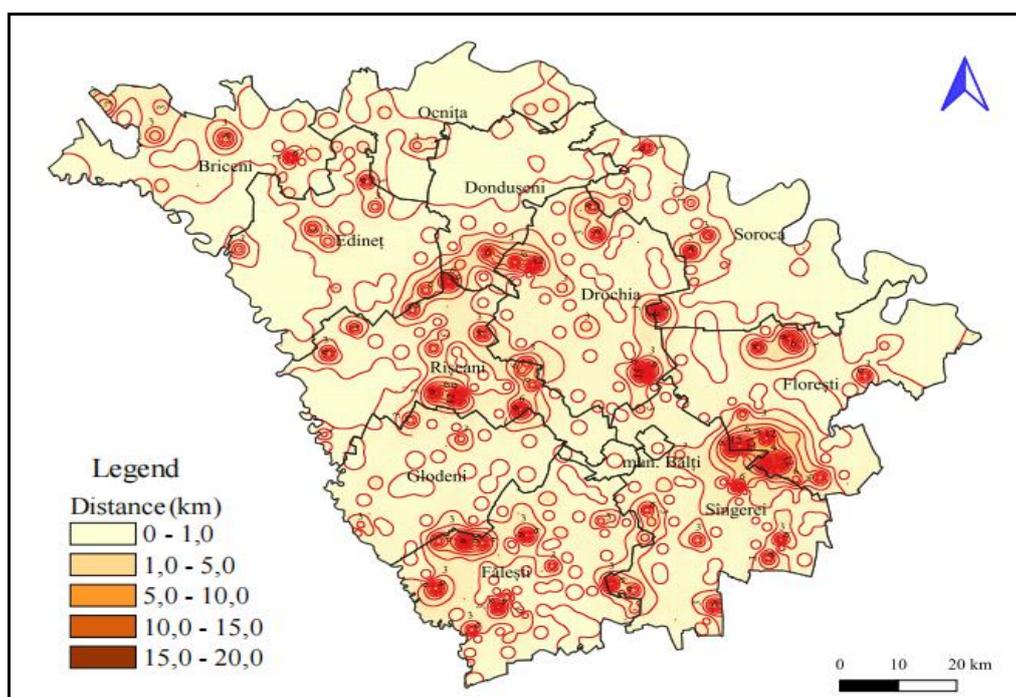
As a rule, communities with a high rate of population aged 25-64 also have a high incidence of tuberculosis. The highest values of the risk of morbidity of the population due to tuberculosis were registered, predominantly, in the urban environment with a higher level of atmospheric air pollution, including in the cities of Frunză (50.4), Sorocea (50.8), Ocnița (52.0), Otaci (52.7) per 100,000 population, as well as in rural localities in the immediate vicinity of urban areas – Corlăteni (49.6), Zastâncă (49.7), Răuțel (49.8) per 100,000 inhabitants. The minimum values were recorded in a more concentrated form in the southern area of the Dondușeni district, and isolated in the rural localities in the districts neighboring the Bălți municipality (Figure 5).



**Figure 5.** The risk of morbidity of the population through tuberculosis in the communes of the North Development Region (2020).  
Source: National Agency for Public Health, 2022.

Thus, the mortality rates for the main classes of the causes of death identify the prevalence of diseases of the circulatory system, followed by malignant tumors, diseases of the digestive system, accidents, poisoning and trauma. A particular aspect is the increase in the incidence of respiratory diseases, caused by the Covid pandemic starting in 2020, which had a major impact on the health system and the structure of the morbidity of the population in the last two years.

The accessibility of the population to service centers is a key factor in public health. According to the results of the study, the majority of the population (87.6%) is at a distance of up to 1 km from the primary medical service centers (Figure 6).

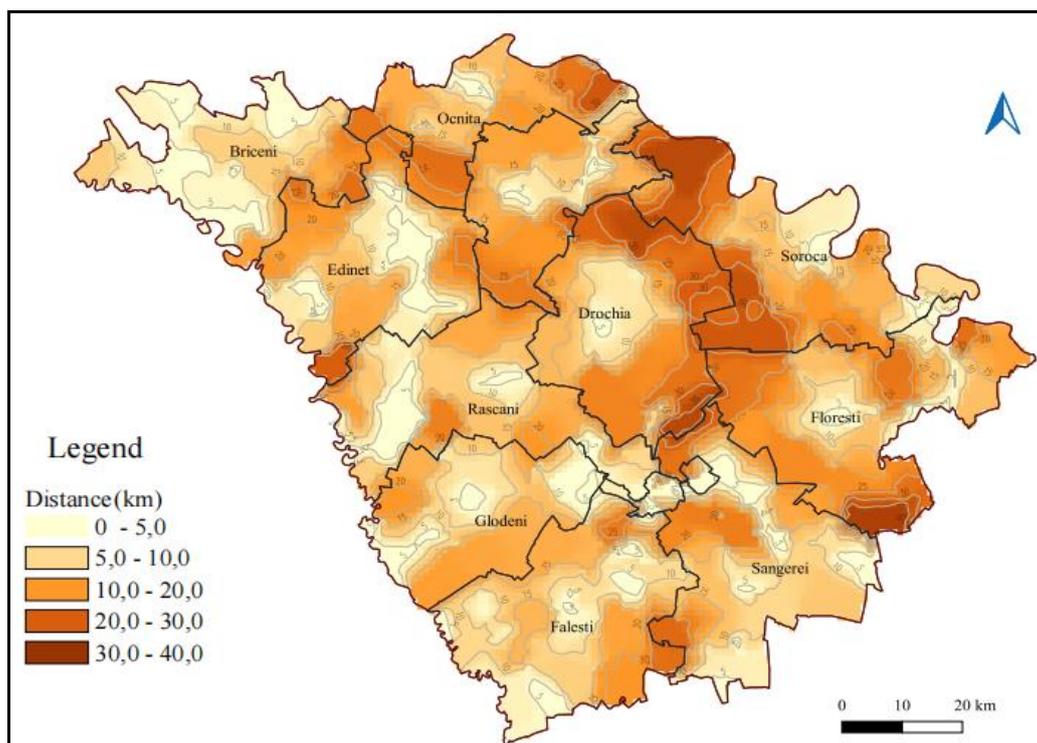


**Figure 6.** Accessibility of the population to primary healthcare.  
Source: North Regional Development Agency. Index of Deprivation of Small Areas (IDAM), 2010.

However, the most marginalized are the localities (21 villages), located at a distance of more than 9 km from the medical point. Most of these localities are located in the districts of Râșcani (Slobozia-Recea, Malinovscoe, Ciubara, Lupăria), Fălești (Hâncești, Ilenuta, Moldoveanca, Musteață, Logofteni) and Florești (Dumitreți, Mihailovca, Antonovca, Nicolaevca), etc.

The access of the population of the Northern Development Region to emergency medical services can be evaluated based on the following findings (Figure 7):

- 86% of the number of households are located at a distance of up to 20 km from the nearest emergency medical institution;
- 11.5% of households are at a distance of more than 20 km from the emergency medical point;
- About 2% of households have limited access to emergency medical services due to distance and travel time. Most isolated households are located in the communes of Căinari Vechi, Dărcăuți, Schineni, Iarova and Tătărușa Veche (Soroca district), Calarașovca (Ocnița district), and Moara de Piatră (Drochia district).
- Only 29% of households benefit from emergency medical services in the commune.



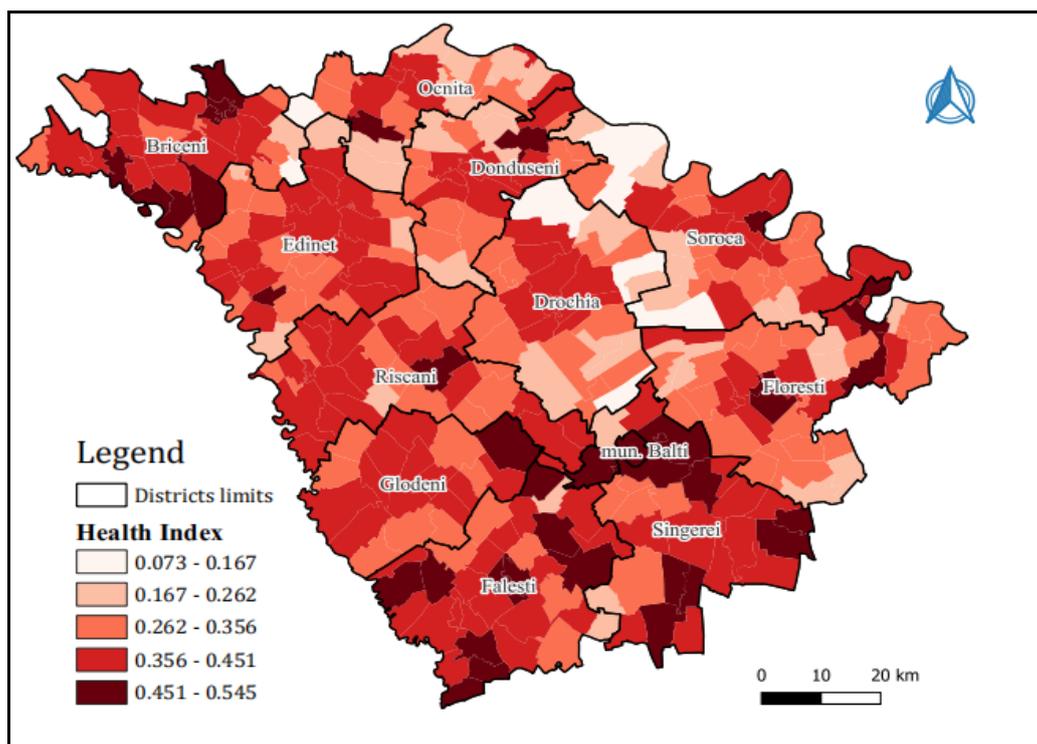
**Figure 7.** Accessibility of the population to emergency medical assistance.

Source: North Regional Development Agency. Index of Deprivation of Small Areas (IDAM), 2010.

Based on the transformation of morbidity risk rates by (malignant tumors and active tuberculosis) and the level of accessibility of the population to emergency medical services into standardization coefficients, the Health Index in territorial profile was calculated (Figure 8).

According to the indicators obtained, 5 classes of population health quality were established (figure 4.17). The value range is between the minimum of 0.073 recorded by Iarova commune (Soroca district) and the maximum of 0.545 in Rădoia commune (Sângerei district).

The state of health, infrastructure and medical services, as well as their evolution in chrono-spatial plan, have a special contribution to human development as a whole in relation to the researched region. The role of the indicators related to the health of the population conditions the morbidity and mortality indices, the provision of medical personnel, facilities and institutions in the territorial plan also determines the socio-economic development as a whole of the territorial units. The evolution of the majority of health indicators for the Northern Development Region of the Republic of Moldova shows a negative trend, of decrease and crisis of specialized personnel, also related to the general process of depopulation, aging of the population and destruction of the socio-economic system, especially in the rural environment, but and the urban one. For the analysis of the economic situation of the population, the wage income indicators of the population, by economic activities, from the study region were selected.



**Figure 8.** Population Health Index (2020).

Source: National Agency for Public Health, Statistical yearbook of the health system of the Republic of Moldova.

In the study region, the main share of population income comes from Services 37.2%, followed by Industry 33%, Agriculture and Commerce each 13.2% and Construction 4.3%.

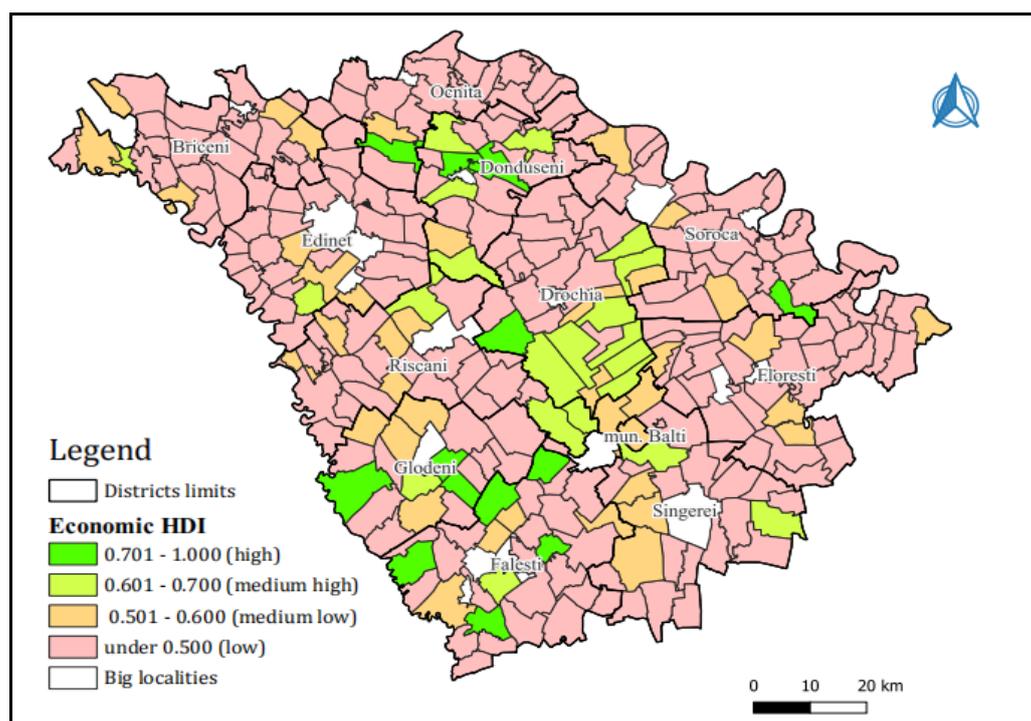
Salary incomes from agriculture, forestry and fishing in 11 districts out of 12 exceed the average for the region, only in the municipality of Bălți they constitute 0.8% of the total salary incomes. In 4 out of 12 districts, salary income from trade exceeds the regional average, namely: Bălți municipality 15.8%, district Blood 15.5%, Fălești 14.2% and Briceni 13.7% (Table 3). In half of the districts, the regional average of salary income from construction activities is exceeded, Râșcani 7.7%, Briceni 7.2%, Sorocea 6.9%, Edineț 6.2%, Drochia 5.2% and you make 5%. From industrial activities, wage incomes exceed the regional average in 4 out of 12 districts: Sorocea 58.8%, Bălți municipality 41.2%, share 36.1% and Florești 33%. In most districts, the main share of salary income goes to the economic activities Services, where at 60% it exceeds the average for the region. This fact leads us to the conclusion that services are the main economic bringing wage incomes in the study region, with the exception of Bălți municipality.

**Table 3.** Structure of average wage incomes by economic activities, %.

ATU	Agriculture, forestry and fishing	Commercial	Construction	Industry	Services
Bălți	0,8	15,8	4,0	41,2	38,3
Briceni	25,9	10,8	0,4	4,2	58,6
Dondușeni	23,8	10,4	5,2	15,8	44,9
Drochia	19,9	11,9	6,2	24,4	37,6
Edineț	19,4	14,2	5,0	36,1	25,4
Fălești	15,8	8,3	1,2	33,0	41,7
Florești	48,0	9,8	3,8	9,1	29,3
Glodeni	36,3	12,2	1,2	10,7	39,7
Ocnita	33,2	11,2	7,7	15,6	32,2
Râșcani	28,7	15,5	1,5	15,2	39,2
Sângerei	13,9	8,8	6,9	58,8	22,8
Sorocea	13,2	13,2	4,3	33,0	37,2

Source: National Bureau of Statistics of the Republic of Moldova (2023a).

In the localities with the highest HDI for the economic component, a large number of economic agents per capita are active (Figure 9).



**Figure 9.** Spatial distribution of the economic component of the HDI for the communes of the North Development Region.

The 1st place is occupied by the village of Catranic from Fălești district with a present population of 1.1 thousand inhabitants (Table 4). Out of 30 economic agents, 23 are active, 11 of them are individual enterprises, 10 - commercial companies, 1 - agricultural cooperative and 1 - municipal enterprise Apă Canal. In the village of Balatina in Glodeni district, with a population of 4.9 thousand people, in addition to individual businesses, commercial companies and agricultural cooperatives, there are also 3 savings and loan associations. The town of Cupcini in Edineț district, with a present population of 7.1 thousand inhabitants, despite the fact that it has many economic agents, some of them are not active, and the active ones do not supply enough to the local budget to be able to cover the expenses incurred by the City Hall the city.

**Table 4.** Top 10 highest ranked rural localities in North Development Region according to the economic component of the HDI

Commune	District	HDI economic	Commune	District	HDI economic
Catranic	Fălești	1.000	Stoicani	Soroca	0.749
Balatina	Glodeni	0.960	Nicoreni	Drochia	0.727
Obreja Veche	Fălești	0.849	Plop	Donduseni	0.714
Petrunea	Glodeni	0.807	Corbu	Donduseni	0.704
Călinești	Fălești	0.797	Pîrlița	Fălești	0.697

Source: calculated by the authors

**Table 5.** Top 10 rural localities in the Northern Development Region with the lowest HDI by economic component

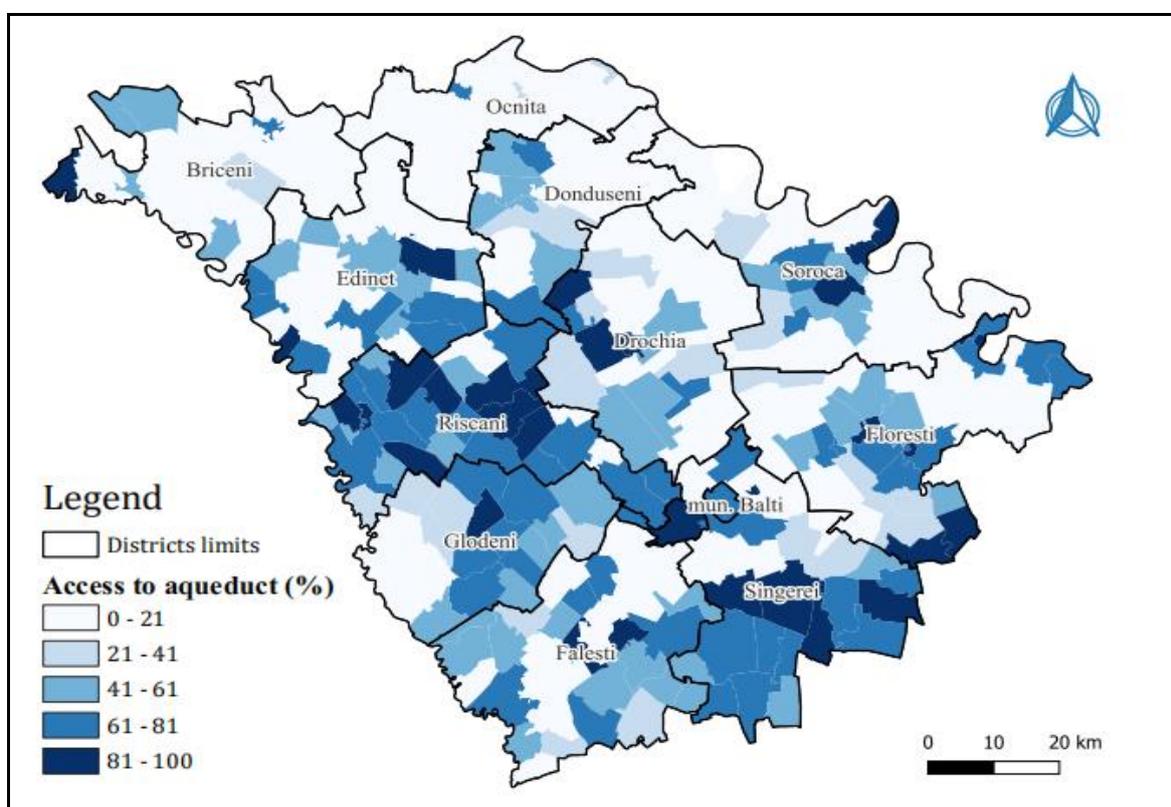
Commune	District	HDI economic	Commune	District	HDI economic
Constantinovca	Edineț	0.091	Grimăncăuți	Briceni	0,053
Tăura Veche	Sângerei	0.080	Vasilcău	Soroca	0,036
Mîndic	Drochia	0.078	Bădiceni	Soroca	0,033
Cosăuți	Soroca	0.058	Albinețul Vechi	Fălești	0,012
Gura Căinarului	Florești	0.054	Lunga	Florești	0,000

Source: calculated by the authors

As for the infrastructure component, quantitative indicators were taken per locality: the degree of access to the public water supply system and the access of households to the public sewage system. In

North DR, 454 thousand people or 51% of the present population have access to public water supply systems, including 257 thousand (83%) in urban areas and only  $\approx$ 200 thousand (34%) in rural areas (National Bureau of Statistics of the Republic of Moldova, 2023c). Despite the higher degree of industrialization and urbanization compared to Center Development Region and South Development Region, North Development Region has the lowest level of access to public aqueducts, especially in rural areas. The population's maximum access to public aqueducts can be seen in the municipality of Bălți (84%), in the districts of Râșcani (74%), Sângerei (60%) and Florești (50%), and the minimum access - in the districts of Ocnîța (17%), Briceni (25%) and Dondușeni (32%), with small sizes and peripheral – position.

In the urban environment, the number of people connected to public aqueducts is directly proportional to the actual population. Thus, the maximum number of people connected to public aqueducts is registered in the cities of Bălți (104 thousand), Soroca (31.8 thousand), Fălești (15.7 thousand), Drochia (14.2 thousand) and Florești (12.5 thousand). Also, the highest access to public urban aqueducts is observed in the municipality of Bălți and in the districts of Florești, Fălești, Râșcani, Sângerei and Soroca, and the lowest access - in the districts of the northern end of the region: Ocnîța (47%) and Dondușeni (52%). At the commune level, the highest level of access (>95%) is recorded in the localities of Egoreni and Ocolina (Soroca district), Nihoreni, Pârjota and Vărativ (Râșcani district), Prodănești (Florești district), Fântânița (Drochia district), Criva (Briceni district) (Figure 10).

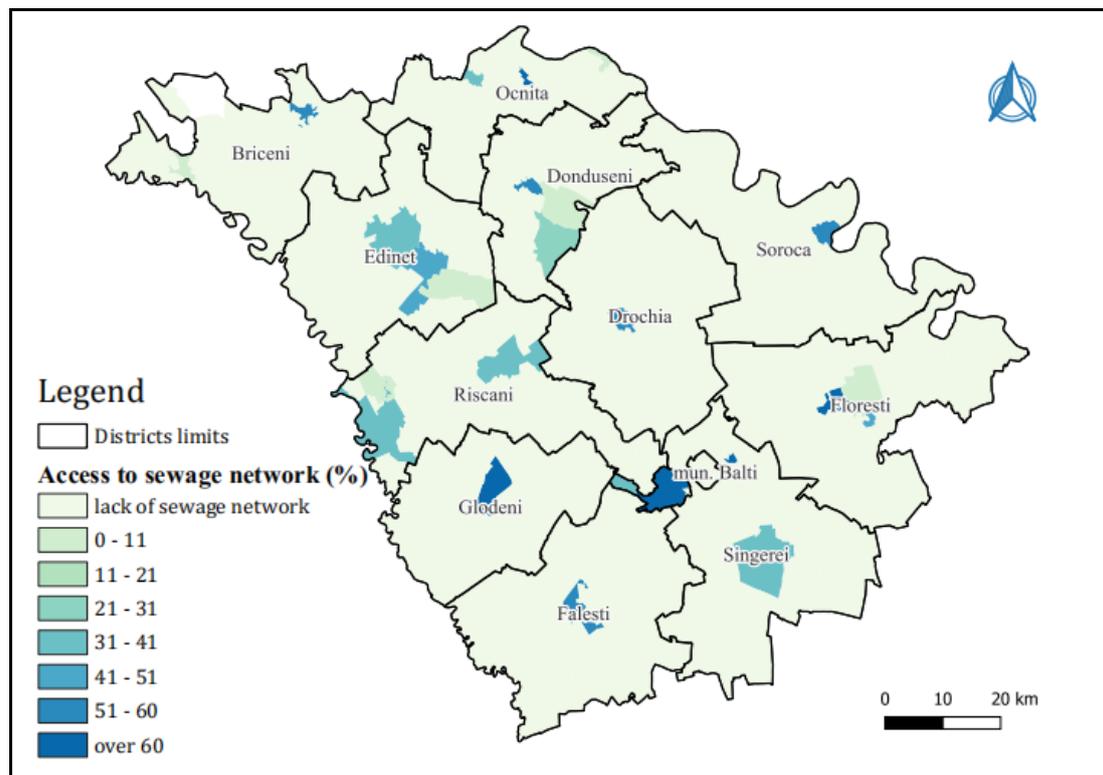


**Figure 10.** Access of the present population to aqueducts in the communes of the North Development Region (%).

Source: NBS (2023c).

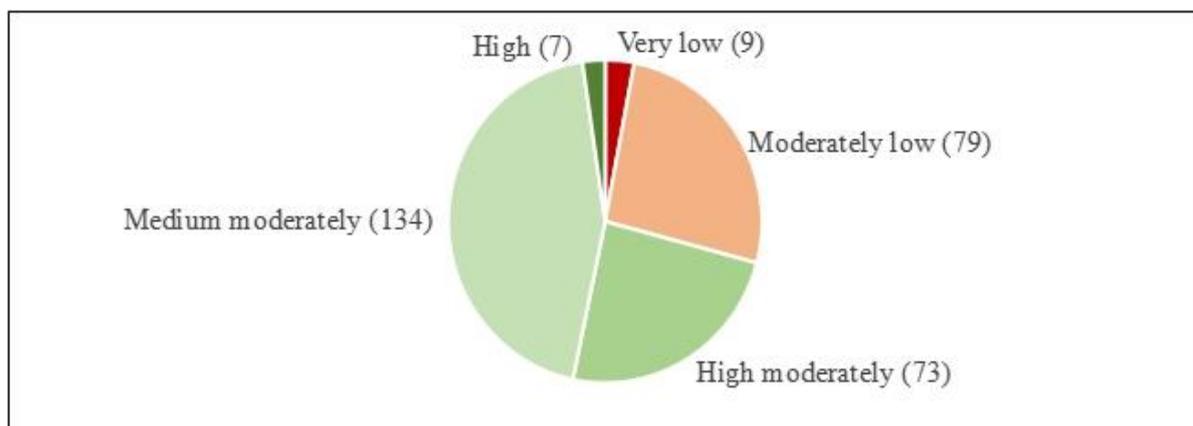
About 172 thousand people or 19% of the population of the North Development Region have access to the centralized waste water disposal services (National Bureau of Statistics of the Republic of Moldova, 2023c), including  $\approx$ 2 thousand people (0.3%) – in the rural environment and 172 thousand people or 55% – in urban area. The maximum access is attested in the municipality of Bălți (63%) and in the districts of Soroca (21%), Dondușeni (14%). There are only 52 public sewage systems in the perimeter of the North Development Region, or  $\approx$ 6 times less than the public water supply systems (Figure 11). If the number of water supply systems registers a very rapid increase, by about 2.3 times, then the number of centralized sewage systems registers an oscillating evolution against the background of a general negative trend, and the negative dynamics is found in about  $\frac{1}{2}$  of the districts of the region.

The lack of progress in the expansion of centralized sewerage systems is largely caused by the higher costs compared to water supply systems, and the majority of the population and LPA's (Local Public Authority's) do not consider this need to be a priority.



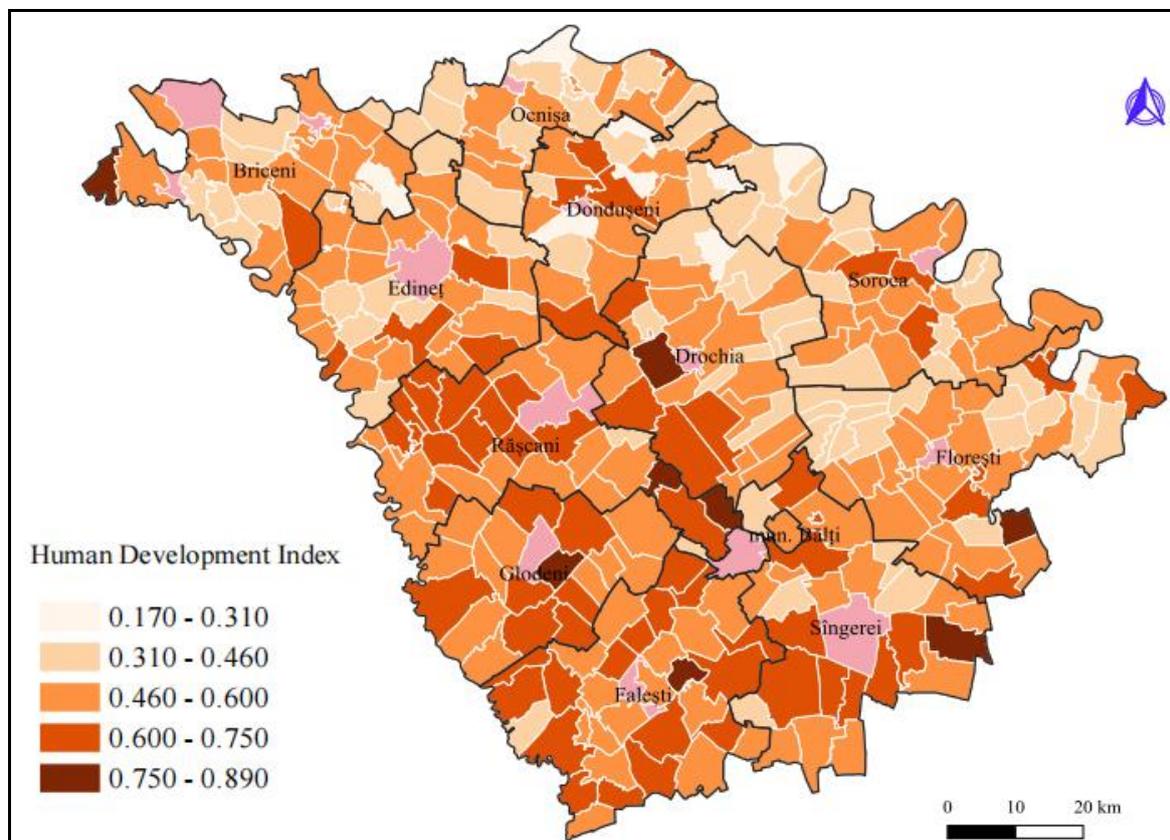
**Figure 11.** Access of the present population to public sewage systems.  
Source: NBS (2023c).

The indicators were calculated, mapped and a typology of the aggregate HDI was made for all the localities of the North Development Region. Thus, 4 indicators were taken into account on the demographic dimension, 3 each on the health and infrastructure dimensions, and one each on the economy dimension. By calculating the weighted average for each individual indicator and arguing the significance of each one in the human development of rural and urban human habitats, a typology of the aggregate HDI was made. Thus, the differentiation of the aggregate HDI at the level of human habitats was found, which presents the following situation: high HDI (7 rural localities or 2.3% with values between 0.750-0.890), moderately high HDI (73 localities or 24.2%, values 0.600-0.750), medium average HDI (134 localities or 44.4%, values 0.460-0.600), low (79 localities or 26.2%, values 0.310-0.460) and very low HDI (9 localities or 3% of the total number of localities taken into account, values 0.170-0.310). The aggregate HDI map was drawn up, which broadly reflects the hypotheses launched regarding human development at the level of each primary ATU (Figures 12 and 13).



**Figure 12.** Aggregate HDI of human habitats in the North Development Region.

The aggregate HDI map was drawn up, which broadly reflects the hypotheses launched regarding human development at the level of the communes (Figure 13). The analysis of this indicator in a spatial and temporal aspect showed the trajectory and sustainability of human habitats in the North Development Region, constituting an important support for local public authorities in arguing the need for administrative-territorial decentralization, the eligibility of municipalities for the implementation of local projects.



**Figure 13.** Aggregate HDI in the communes of the North Development Region.

The dynamic analysis and comparison of this indicator in a regional/spatial and temporal aspect showed the trajectory and sustainability of human habitats in the Northern Development Region, constituting an important support for local public authorities in arguing the need for territorial and administrative decentralization, the eligibility of habitats for the realization of local projects.

#### 4. CONCLUSIONS

1. The socio-demographic dimension of human development has a special significance in calculating the HDI, given the role and place of the population in terms of quantity and quality. The comparative study of human development at the level of primary administrative-territorial units is necessary, by trying to track the level that human habitats have reached at the level of primary administrative-territorial units, aiming to evaluate the efficiency of the development policies applied by regional and local governments or administrations, beyond certain indicators or statistical series that attest to certain aspects of human development.
2. The systematization and analysis of socio-demographic indicators in the North Development Region highlighted the trends and problems generated by the evolution of the population in time and space in the 315 commune-residence villages and 20 cities. The assessment of the geodemographic situation of the population in the North Development Region shows a more pronounced decrease at the level of the region compared to other developing regions, confirming the hypothesis that the demographic transition in the Republic of Moldova began in this region.
3. An analysis of the HDI on the socio-demographic dimension shows a better situation for large and medium-sized localities, those located in the vicinity of Balti municipality, as well as localities with a population anchored in neo-Protestant cults.
4. Regarding health and education, in general, North Development Region is still at a satisfactory level, due to the existence of a developed and varied infrastructure of medical and educational institutions. At

the same time, the dynamics of quantitative and qualitative evolution of many components related to the field of health is a negative one, mostly related to the demographic problems of population reduction, migration, aging of the population, but also the socio-economic situation and insufficient funding.

5. Morbidity and implicit mortality caused by a series of chronic diseases is increasing, especially regarding respiratory diseases. The accessibility of the population to primary and emergency medical assistance presents difficulties for a number of rural localities in the North Development Region. The indicators related to the number and ratio of medical personnel, medical institutions, coverage with medical personnel are decreasing in the last decade, but compared to other countries, the Republic of Moldova is still in the class of values with a high HDI.

6. The economy component, next to the infrastructure component, is the most vulnerable in the structure of the HDI, as a result of the reduced number of economic units in the localities of the North Development Region and the increase in dependence on transfers from the state budget.

7. As a result of the expansion of the aqueduct network, more than half of the population of the region has access to public aqueducts, including 83% in the urban localities and only 34% in the rural area. In the districts of Briceni, Ocnița, Dondușeni and Soroca is the lowest level of access throughout the Republic. The access of the North Development Region population to public sewage systems is only 19%, including 55% in cities and only 0.3% - in rural areas. In the villages of Ocnița, Briceni, Fălești, Drochia and Soroca districts there are no public sewage systems, and in the rest of the districts - only in a few localities.

8. As a result of the calculations of the Integrated Human Development Index in the communes (villages and small towns) of the North Development Region, it was found that the high aggregate HDI is specific only for 7 communes, moderately high HDI - 73 localities or  $\approx \frac{1}{4}$  (24%) of the number total, moderate HDI 134 localities or 44% of the total number, low average HDI - 79 localities (26%) and very low HDI - only 9 of them (3%).

9. Development policies applied in a spatial profile, as well as the allocation of financial and material resources, must take into account the current and prospective geodemographic situation, in order to better manage the human component.

10. The typology created allows the evaluation of the standards achieved by each individual locality and can serve as a benchmark for local public authorities, which can use the data in order to convince local or international investors about the eligibility of the investment in the social, economic, technical-building and environmental. Also, the results can be relevant as a reference point for local administrations with reference to the strengths and weaknesses of each locality, data necessary for the argumentation of local development policies and/or regional authorities for the argumentation of reforms/changes that are required in the territory according to needs local. Knowing the overall situation of human habitats allows the justification of the action plan for community development.

11. The social value of the study derives from the content of indicators and values taken into account on the social dimension that can serve as a benchmark in arguing the social component of regional development policies, family policies, demographic, migration, occupational policies, etc. whose finality is the population and which must take into account the local specifics. Ultimately, human development is the development of the people, for the people and by the people.

12. The scientific results could serve as a model for the HDI analysis of other development regions, as well as a didactic-scientific benchmark at higher education institutions.

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- **Research articles**

Research articles must describe the outcomes and application of unpublished original research. These manuscripts should describe how the research project was conducted and provide a thorough analysis of the results of the project. Systematic reviews may be submitted as research articles.

This section is peer reviewed.

- **Reviews**

A review article provides an overview of the published literature in a particular subject area.

This section is peer reviewed.

## Article size

CEJGSD has no restrictions on the length of manuscripts, provided that the text is concise and comprehensive.

## Preparing manuscript file

The manuscript must be prepared using word processing software Microsoft Word, with document format doc.

In order to ensure the anonymity of the paper, do not include any personal information about the author(s), their contact information or the funding in your manuscript. All this data can be submitted through the website. Papers that contain personal data of the authors will be rejected.

### **Software requirements**

Microsoft (MS) Word for Windows

### **File types**

You should save Your main document as a PC-compatible text format such as Word (.doc). The journal considers that DOCX files are proprietary and does not accept them in any circumstances. Sending DOCX files results into an immediate rejection of the submission. Editable documents (including the articles and responses to the reviewers) should be in a format compatible with Microsoft Office 2003 or earlier (DOC or RTF), and non-editable documents (including signed pledge forms) should be in PDF format.

### **Paper size**

The paper size have to be A4 and with margins of 2.5 cm all round.

### **Alignment**

Should be Left. Neither tabs nor spacebars should be used for alignment. The paragraphs will not have the same length, which should not worry you.

### **Space between paragraphs**

Single (1)

### **Font**

Cambria 10pt for main text and titles of tables and figures. Please, be careful not to use Spacebar morethan once between each word. Full stops and commas should follow the words immediately, no space between a word and a comma or a full stop.

### **Title**

Title of the paper Cambria16pt, Bold, centered.

### **Author List and Affiliations**

Authors' full first and last names must be provided (Cambria 11pt, Bold). Is used for affiliations standard format: complete address information including city, zip code, state/province, country, and all email addresses (Cambria 9pt, Normal). At least one author should be designated as corresponding author, and his or her email address and other details (telephone and fax number) should be identified in footnote (Cambria 10pt, Normal. As part of our efforts to improve transparency and unambiguous attribution of scholarly contributions, corresponding authors of published papers must provide their Open Researcher and Contributor Identifier (ORCID) ID; co-authors are encouraged to provide ORCID IDs. More information on the benefits of assigning an ORCID ID can be found here: <https://orcid.org/about/membership>

### **Abstract**

The abstract should be a total of about 300 words maximum. For research articles, abstracts should give a pertinent overview of the work. The abstract should contain the following elements: aim, research methods, conclusions, originality / value of the article, implications of the research (if applicable), limitations of the research (if applicable).The abstract should be a single paragraph (Cambria 10pt, Normal).

## Keywords

Five to seven pertinent keywords (separated by comma) need to be added after the abstract (Cambria 10pt, Normal).

## Main text

*The condition of reviewing the article is to follow the guidelines.*

The suggested scheme of article

Body of the paper consisting of part corresponding with steps of realization of aims of the paper should be divided into following sections: Introduction/Literature review/Research methods/Results/Discussions/Conclusions.

1. **INTRODUCTION** (Cambria, 10pt, Bold. Spacing: Before 12pt; After 6pt. Line spacing: At least; At 13pt) The introductory paragraph outlines clearly the objectives and motivation for writing the paper. The introduction should provide a context for the discussion in the body of the paper and point explicitly the purpose of the article. The checklist:
  - The introduction includes the justification for the topic importance.
  - The introduction section includes the aim/objective.
  - The introduction section includes brief information on methods.
  - The content of each section of the article is briefly described in the last paragraph of the introduction (Cambria, 10pt, Normal).
  
2. **LITERATURE REVIEW** (Cambria, 10pt, Bold. Spacing: Before 12pt; After 6pt. Line spacing: At least; At 13pt) The checklist:
  - Is the literature review properly prepared?
  - Is primary literature correctly summarized?
  - The literature review shows who dealt with similar research topic before?
  - The literature review shows what are the results of the prior studies?
  - Did the Author position himself/herself among the previous researchers?
  - Are different options/perspectives from the literature covered in the reviewed article?
  - The difference with existing studies is explicitly identified and documented.
  - The text includes references whenever necessary (Cambria, 10pt, Normal).
  
3. **RESEARCH METHODS** (Cambria, 10pt, Bold. Spacing: Before 12pt; After 6pt. Line spacing: At least; At 13pt) This section is compulsory and it should provide specific description of the methodology. The checklist:
  - The research methodology section includes the description of the material selection.
  - The research methodology section includes: the hypothesis (-es).
  - The research methodology section includes the description of the research methods.
  - The article identifies strengths and weaknesses of the methodology and its findings (Cambria, 10pt, Normal).
  
4. **RESULTS** (Cambria, 10pt, Bold. Spacing: Before 12pt; After 6pt. Line spacing: At least; At 13pt) The checklist:
  - Are the results discussed in details?
  - Is the research problem original and a kind of novelty?
  - Has the Author given the appropriate interpretation of the data and references?

- Are the pieces of information used inside the paper comes from reliable sources? (Cambria, 10pt, Normal).
5. **DISCUSSION** (Cambria, 10pt, Bold. Spacing: Before 12pt; After 6pt. Line spacing: At least; At 13pt) The checklist:
- The article assesses and critiques the findings and/or the statistical analysis.
  - Are the findings in the article compared to findings of other authors? (Cambria, 10pt, Normal).
6. **CONCLUSIONS** (Cambria, 10pt, Bold. Spacing: Before 12pt; After 6pt. Line spacing: At least; At 13pt) It should provide a neat summary and possible directions of future research. The checklist:
- Does this part include the general summary of the article, its results and findings?
  - Does this part include implications and recommendations for practice?
  - Does this part include research limitations?
  - Does this part include suggestions for future research? (Cambria, 10pt, Normal).

**ACKNOWLEDGMENTS:** (Cambria, 10pt, Bold. Spacing: Before 12pt; After 6pt. Line spacing: At least; At 13pt) Apart from the usual acknowledgements, use this section to mention sponsoring and funding information (Cambria, 10pt, Normal).

**REFERENCES** (Cambria, 10pt, Bold. Spacing: Before 12pt; After 6pt. Line spacing: At least; At 13pt) The list of references should be complete and accurate. For each work shown in the list of references, there must be a reference in the text.

Beginning with Volume 5, Issue 1 / 2023, the citation of authors in the text will follow the 7<sup>th</sup> edition of the APA style (American Psychological Association), instead of the previously used Vancouver style.

Citations in the text and the list of references should follow the referencing style used by the American Psychological Association, the latest version of the APA Publication Manual (i.e., APA 7), which released in October 2019. Details concerning this referencing style can be found at <http://www.library.cornell.edu/resrch/citmanage/apa>. Authors can also use citation machine at <http://citationmachine.net/>

References should be arranged first alphabetically and then further sorted chronologically if necessary. More than one reference from the same author(s) in the same year must be identified by the letters "a", "b", "c", etc., placed after the year of publication.

In every article there should be at least 20 references and majority of references have to be from SCOPUS/Web of Science. The authors should concentrate on the references to publications for recent years.

Authors are required to complete the reference in a list of literature used with DOI (Digital Object Identifier) if it has been assigned to the publication. To search for the DOI, please visit: <http://www.crossref.org/guestquery/>

- ***In-text citations:*** The citation of authors in the text will follow the 7<sup>th</sup> edition of the APA style.

Every use of information from other sources must be cited in the text so that it is clear that external material has been used. For every in-text citation, there should be a full citation in the reference list and vice versa. In APA style, in-text citations are placed within sentences and

paragraphs so that it is clear what and whose data or information is being quoted or paraphrased.

If the author is already mentioned in the main text then the year should follow the name within parentheses.

- Research by Posea (2005) and Ielenicz (2003) supports...

If the author's name is not mentioned in the main text then the surname and year should be inserted, in parentheses, after the relevant text. Multiple citations should be separated by semicolon and follow alphabetical order.

- The petrographic composition of the massif explains this type of relief (Ielenicz, 2003; Posea, 2005).

If three or fewer authors are cited from the same citation then all should be listed. If four or more authors are part of the citation then 'et al.' should follow the first author's name.

- (Ielenicz, Comanescu & Nedelea, 2010)
- (Ielenicz et al., 2008)

If multiple sources are used from the same author and the same year, then a lowercase letter, starting from 'a', should be placed after the year.

- (Ielenicz, 2003a; Ielenicz, 2003b)

If you are directly quoting from a work, you will need to include the author, year of publication, and page number for the reference (preceded by "p." for a single page and "pp." for a span of multiple pages, with the page numbers separated by an en dash).

You can introduce the quotation with a signal phrase that includes the author's last name followed by the date of publication in parentheses.

- According to Ielenicz (2003), "quoted text" (p. 199).
- Ielenicz (2003) found "quoted text" (pp. 199-202).

If you do not include the author's name in the text of the sentence, place the author's last name, the year of publication, and the page number in parentheses after the quotation.

- The author stated, "quoted text" (Ielenicz, 2003, p. 199), but he did not offer an explanation as to why.

Authors with the Same Last Name: To prevent confusion, use first initials with the last names.

- (D. Privitera, 2004; A.C. Privitera, 2019)

The names of groups that serve as authors (corporate authors) are usually written out each time they appear in a text reference.

- (European Environment Agency [EEA], 2018)

When appropriate, the names of some corporate authors are spelled out in the first reference and abbreviated in all subsequent citations. The general rule for abbreviating in this manner is

to supply enough information in the text citation for a reader to locate its source in the Reference List without difficulty.

- (EEA, 2018)

If the name of the group first appears in the narrative, put the abbreviation, a comma, and the year for the citation in parentheses after it.

- The European Environment Agency (EEA, 2023) state that extreme weather threat makes climate change adaptation a top priority.

When a paper has no author, use the first two or three words of the paper's title (using the first few words of the reference list entry, usually the title) as your text reference, capitalizing each word. Place the title in quotation marks if it refers to an article, chapter of a book, or Web page. Italicize the title if it refers to a book, periodical, brochure, or report.

- On climate change ("Climate and Weather", 2010) ...
- Guide to Hydrological Practices (2008)

Please do not include URLs in parenthetical citations.

(Cambria, 10pt, Normal).

- **Reference list:** References follow the 7th edition of the APA style, which includes a dedicated section to the citation of electronic resources.

We strongly recommend the use of reference management software such as [Mendeley](#) or [Zotero](#). The official APA style manual can be purchased through [their website](#). (Cambria, 9pt, Normal, Indentation, Special: Hanging; By: 1cm; Line spacing: Single).

Triple-check your references details and their correspondence with the in-text citation. Be aware that despite doing our best to remediate possible issues, authors are responsible for the accuracy of references.

**Some examples** of references in APA style (7<sup>th</sup> edition) are included below.

**Book with one author:**

Fennell, D. (2008). *Ecotourism*. Third edition. Routledge.

**Book with two authors:**

Jones, R., & Shaw, B.J. (2007). *Geographies of Australian Heritages: Loving a Sunburnt Country?* Routledge. <https://doi.org/10.4324/9781351157520>

**Book with more than two authors:**

Carter, T., Harvey, D., Jones, R., & Robertson, I. (Eds.). (2019). *Creating Heritage: Unrecognised Pasts and Rejected Futures*. Routledge. <https://doi.org/10.4324/9781351168526>

**Journal article with DOI:**

Leimgruber, W. (2021). Tourism in Switzerland – How can the future be? *Research in Globalization*, 3, Article 100058. <https://doi.org/10.1016/j.resglo.2021.100058>

**Journal article without DOI (when DOI is not available):**

Ianos, I., Sirodoev, I., & Pascariu, G. (2012). Land-use conflicts and environmental policies in two post-socialist urban agglomerations: Bucharest and Chişinău. *Carpathian Journal of Earth and Environmental Sciences*, 7(4), 125–136. <https://www.cjees.ro/viewTopic.php?topicId=276>

**Journal article with an article number or eLocator:**

Ivona, A., Rinella, A., Rinella, F., Epifani, F., & Nocco, S. (2021). Resilient Rural Areas and Tourism Development Paths: A Comparison of Case Studies. *Sustainability*, 13(6), Article 3022. <https://doi.org/10.3390/su13063022>

**Article in a magazine or newspaper:**

Benabent Fernández de Córdoba, M., & Mata Olmo, R. (2007, July 13). El futuro de la geografía. *El País*. [https://elpais.com/diario/2007/07/13/opinion/1184277607\\_850215.html](https://elpais.com/diario/2007/07/13/opinion/1184277607_850215.html)

**Edited book:**

Yang, P. (Ed.) 2018. *Cases on Green Energy and Sustainable Development*. IGI Global.

**Chapter in an edited book:**

Privitera, D., Štetić, S., Baran, T., & Nedelcu, A. (2019). Food, Rural Heritage, and Tourism in the Local Economy: Case Studies in Serbia, Romania, Italy, and Turkey. In J. V. Andrei, J. Subic, A. Grubor & D. Privitera (Eds.), *Handbook of Research on Agricultural Policy, Rural Development, and Entrepreneurship in Contemporary Economies* (pp.189-219). IGI Global. DOI: 10.4018/978-1-5225-9837-4.ch010

**Conference proceedings (published):**

García Palomares, J. C., Gutiérrez Puebla, J., Romanillos Arroyo, G., & Salas-Olmedo, H. (2016). Patrones espaciales de concentración de turistas en Madrid a partir de datos geolocalizados de redes sociales: Panoramio y Twitter. In *Aplicaciones de las Tecnologías de la Información Geográfica (TIG) para el desarrollo económico sostenible* (pp. 131-139). Actas del XVII Congreso Nacional de Tecnologías de Información Geográfica. Málaga, June 29-30 and July 1. <http://congresotig2016.uma.es/downloads/separadas/lt1/García%20Palomares.pdf>

**Working paper (more than twenty authors):**

De Stefano, L., Urquijo Reguera, J., Acácio, V., Andreu, J., Assimacopolus, D., Bifulco, C., De Carli, A., De Paoli, L., Dias, S., Gad, F., Haro Monteagudo, D., Kampragou, E., Keller, C., Lekkas, D., Manoli, E., Massarutto, A., Miguel Ayala, L., Musolino, D., Paredes Arquiola, J., ... Wolters, W. (2012). *Policy and drought responses–Case Study scale* (Technical report no. 4). DROUGHT-R&SPI project. [http://www.isa.ulisboa.pt/ceabn/uploads/docs/proyectos/drought/DROUGHT\\_TR\\_4.pdf](http://www.isa.ulisboa.pt/ceabn/uploads/docs/proyectos/drought/DROUGHT_TR_4.pdf)

**Webpage or piece of online content:**

Vasile Loghin – Geographical Works. *Volcano Island. Geological, geomorphological and volcanological features*.

<https://vasileloghin.files.wordpress.com/2015/02/insula-vulcano-cu-foto-final.pdf>

**Facebook page:**

American Association of Geographers - Home [Facebook page]. Facebook. Retrieved September 19, 2022 from <https://www.facebook.com/geographers>

Non-English references should contain, at the end, additional explanation in which language it was written. If the article contains English summary it should be mentioned. For example:

Grahovac, M., Pivac, T. & Nedelcu, A. (2018). Značaj internet prezentacije za razvoj vinskog turizma Banata (Srpski i Rumunski Banat), *SINTEZA 2017, International Scientific Conference on*

*Information Technology and Data Related Research.* (in Serbian with English abstract & summary)

Dinu, M. (2002). *Geografia turismului [Tourism Geography]*. Editura Didactică și Pedagogică. (in Romanian)

## **Language and Text**

### **Foreign concepts, proper nouns, names of institutions etc.**

If the article discusses foreign institutions or businesses, the original name should be provided in parentheses. Foreign terms and phrases should be set in italics and followed by an English translation enclosed in parentheses; for example, *griko* (the good food).

### **Spelling**

Submissions must be made in English. Authors are welcome to use American or British spellings as long as they are used consistently throughout the whole of the submission.

- colour (UK) vs. color (US)

When referring to proper nouns and normal institutional titles, the official, original spelling must be used.

- World Health Organization, *not* World Health Organisation

### **Grammar**

American or English grammar rules may be used as long as they are used consistently and match the spelling format (see above). For instance, you may use a serial comma or not.

- red, white, and blue *or* red, white and blue

Authors not proficient in English should have their manuscripts checked before submission by a competent or native English speaker. Presenting your work in a well-structured manuscript and in well-written English gives it its best chance for editors and reviewers to understand it and evaluate it fairly.

### **Font**

The font used should be commonly available and in an easily readable size. This may be changed during the typesetting process.

Underlined text should be avoided whenever possible.

The use of bold or italicised text to emphasise a point is permitted, although it should be restricted to minimal occurrences to maximise its impact.

### **Lists**

Use bullet points to denote a list without a hierarchy or order of value. If the list indicates a specific sequence then a numbered list must be used.

Lists should be used sparingly to maximise their impact.

### **Acronyms and Abbreviations**

Except for units' measurement, abbreviations are strongly discouraged. With abbreviations, the crucial goal is to ensure that the reader – particularly one who may not be fully familiar with the topic or context being addressed – is able to follow along. Spell out almost all acronyms on first

use, indicating the acronym in parentheses immediately thereafter. Use the acronym for all subsequent references.

- Research completed by the International Geographical Union (IGU) shows ...

A number of abbreviations are so common that they do not require the full text on the first instance of use. Examples of these can be found [here](#).

Abbreviations should usually be in capital letters without full stops.

- USA, *not* U.S.A.

Common examples from Latin do not follow this rule, should be lower case and can include full stops.

- e.g., i.e., etc.

### **Use of footnotes/endnotes**

Use endnotes rather than footnotes (we refer to these as 'Notes' in the online publication). These will appear at the end of the main text, before 'References'.

Notes should be used only where crucial, clarifying information needs to be conveyed.

Avoid using notes for the purposes of referencing; use in-text citations instead.

### **Symbols**

Symbols are permitted within the main text and datasets as long as they are commonly in use or an explanatory definition is included on their first usage.

### **Hyphenation, em and en dashes**

For guidelines on hyphenation, please refer to an authoritative style guide, such as The Chicago Manual of Style (16<sup>th</sup> ed.) (US English) or Oxford's New Hart's Rules (UK English). Be consistent in your style of hyphenation.

Em dashes should be used sparingly. If they are present they should denote emphasis, change of thought or interruption to the main sentence; em dashes can replace commas, parentheses, colons or semicolons.

En dashes can be used to replace 'to' when indicating a range. No space should surround the dash.

- 10–25 years *or* pp. 10–65

### **Numbers**

For numbers zero to nine please spell the whole words. Use figures for numbers 10 or higher. We are happy for authors to use either words or numbers to represent large whole numbers (i.e. one million or 1,000,000) as long as the usage is consistent throughout the text.

If the sentence includes a series of numbers then figures must be used in each instance.

- Thermal springs were found in the north of Bucharest at depths of 100, 175, and 230 m.

If the number appears as part of a dataset, in conjunction with a symbol or as part of a table then a figure must be used.

- This study confirmed that 7% of...

If a sentence starts with a number it must be spelt, or the sentence should be re-written so that it no longer starts with the number.

- Fifteen examples were found to exist... *re-written:* The result showed that 15 examples existed...

Do not use a comma for a decimal place.

- 2.56 *not* 2,56

For numbers that are less than one a '0' must precede the decimal point.

- 0.29 *not* .29

### Units of measurement

Symbols following a figure to denote a unit of measurement must be taken from the latest **SI brochure**.

### Formulae

Formulae must be proofed carefully by the author. Editors will not edit formulae. If special software has been used to create formulae, the way it is laid out is the way it will appear in the publication.

### Tables

Tables must be created using a word processor's table function, not tabbed text.

Tables should be included in the manuscript. The final layout will place the tables as close to their first citation as possible.

All tables must be cited within the main text and numbered with Arabic numerals in consecutive order (e.g. Table 1, Table 2, etc.).

Each table must have an accompanying descriptive title. This should clearly and concisely summarise the content and/or use of the table. A short additional table legend is optional to offer a further description of the table.

The title should be above the table (font 10pt) and the source of the data below (font 10pt). Example:

**Table 1.** This is a table. Tables should be placed in the main text near to the first time they are cited

Year	Number of foreign tourists (millions)	Foreign currency cashing (USD billions)	Cashing increase compared to 1950
1950	25,3	2,1	-
1990	410,4	300,4	143,0
2010	940,0	919,0	437,6
2013	1,087,0	1,159,0	551,9

Source: UNWTO, 2015

Tables should not include:

- Rotated text
- Images
- Vertical and Diagonal lines

- Multiple parts (e.g. ‘Table 1a’ and ‘Table 1b’). These should either be merged into one table, or separated into ‘Table 1’ and ‘Table 2’.

NOTE: *If there are more columns than can be fitted on a single page, then the table will be placed horizontally on the page. If it still cannot be fitted horizontally on a page, the table will be broken into two.*

## Figures

All photographs, maps and graphs have to be named as Figure. The figures have to be enclosed in the text, in their order of appearance and should be numbered consecutively using Arabic numbers. The title (font10pt) has to be below the figure. All figures (photographs and maps) have to be submitted as a separate file. All graphs have to be submitted as a separate file in MS Excel format with all the data needed for making the graph. The file should be named as the number of the figure in the main text. Example: Figure 1, Figure 2, etc. If a figure has been previously published, acknowledge the original source. Example:



**Figure 1.** This is a figure. Schemes follow the same formatting. If there are multiple panels, they should be listed as: **(a)** Description of what is contained in the first panel; **(b)** Description of what is contained in the second panel. Figures should be placed in the main text near to the first time they are cited. A caption on a single line should be centered.

Source: Adrian Nedelcu, 2014.



**Figure 1.** Sardinia. La Pelosa beach with marine abrasion forms.

Source: Adrian Nedelcu (2019).

NOTE: *All figures must be uploaded separately as supplementary files during the submission process, if possible in colour and at a resolution of at least 300dpi. Each file should not be more than 20MB. Standard formats accepted are: JPG, TIFF, GIF and PNG. For line drawings, please provide the original vector file (e.g. .ai or .eps).*

### **Reviewer Suggestions**

During the submission process, please suggest three potential reviewers with the appropriate expertise to review the manuscript. The editors will not necessarily approach these referees. Please provide detailed contact information (address, phone, e-mail address). The proposed referees should neither be current collaborators of the co-authors nor have published with any of the co-authors of the manuscript within the last five years. Proposed reviewers should be from different institutions to the authors. You may suggest reviewers from among the authors that you frequently cite in your paper.

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# CENTRAL EUROPEAN JOURNAL OF GEOGRAPHY AND SUSTAINABLE DEVELOPMENT (CEJGSD)



Invites you to submit your research paper for publishing in next issue

Submission open for Vol. 5, No. 2 – 2023

Submission deadline: November 20, 2023

**Central European Journal of Geography and Sustainable Development (CEJGSD)** invites articles that illustrate research results and projects that describe significant advances in geography, sustainable development and other related areas, focused on the Central European region and beyond.

**CEJGSD** is online open access publishing journal. The articles that are published in **CEJGSD** follow a double blind peer-review procedure to ensure originality, relevance, and readability.

The articles published in our journal can be accessed online: <https://cejgsd.org/archive>

**CEJGSD** welcomes the submission of manuscripts that meet the general criteria of significance and scientific excellence. For this purpose we would like to ask you to contribute your excellent papers in relevant fields.

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- Scientific Publishing & Information Online (SCIPIO)
- Academic Resource Index ResearchBib
- Crossref
- Directory of Research Journals Indexing (DRJI)
- Directory of Open Access Schoolary Resources (ROAD)
- Open Academic Journals Index (OAJI)
- Institutional Research Information System – University of Bari Aldo Moro
- Cosmos

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You can submit your manuscript by simply mailing on [cejgsd@gmail.com](mailto:cejgsd@gmail.com)

## Deadlines

Volume, Issue, Month	Material Deadline
5(1) June	May 20, 2023
5(2) December	November 20, 2023

For more detail log on to: <https://cejgsd.org/>

*Sincerely yours,*

Ph.D. Adrian Nedelcu,

Editor Central European Journal of Geography and Sustainable Development (CEJGSD)

\*You can forward this mail to your colleagues or friends.