STATISTICAL OBSERVATIONS REGARDING MOUNTAIN TOURIST ROUTES IN ROMANIA

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Abstract: *Currently in Romania there are over 950 approved mountain trails. This paper presents their statistical distribution according to certain parameters that characterize them. Direct comparisons are made between different geographical regions in order to study the homogeneity of the routes distribution. Certain economic implications that are the result of this distribution are also discussed.*

Key words*: statistics, tourism, mountain routes*

INTRODUCTION

In Romania there is a wide variety of mountain routes. The existence of low mountain formations, on the border between the hill and the mountain, but also mountain peaks over 2500 meters, allowed their development. The routes are accessible to tourists of different categories, experienced or not. The mountainous area in Romania still preserves an important cultural heritage of tourist interest. [1]

Direct observations made during the tourist season , show a large agglomerations in some mountain areas. At the same time, there are mountain areas in Romania that have similar characteristics, but are not visited by tourists. This fact induces the idea that tourist attractions are unevenly distributed.

Decisions 77/2003 and 1252/2022 [11,12] contain the legal framework that was the basis for the approval of these routes.

The aim of the paper is to statistically describe the approved mountain routes in Romania. We refer to the distribution by county in Romania, according to the year in which the route was approved, the travel time, the type of marking and the necessary equipment.

Tourist routes as a segment of the tourism industry were studied in Romania. Their role and importance are analyzed in a case study for the Arieseni area [4], the identification of some routes, their use for recreational purposes but also comparative studies in the Făgăraș Mountains [10], the evaluation of the characteristics of some routes in the Gurghiu Mountains [9], analyzes carried out with the aim of improving information on the health and safety of tourists in the Apuseni Mountains [7], proposals for the development of routes and circuits in Bihor county. [5]

MATERIALS AND METHODS

The statistical data used in the study are those reported by the Romanian Ministry of Entrepreneurship and Tourism in the List of approved mountain tourist routes. [13] The SAS Studio [15] software package was used for statistical processing. The data that contain the number of tourists per county [14] in 2023 were used to determine the ratio between the number of tourists and the number of logged routes. The statistical summary, frequency tables, diagrams with the relative deviation [2,8] were followed. The numerical indicators in the statistical summary bring information about the duration of the routes, such as average values, extremes or median values. These were determined for the entire data series in Romania, but also separated by county. The frequency tables indicate the number of routes found in different groups (counties, approval year). They also allow us to observe the number of routes according to the degree of difficulty and the equipment required. The

relative deviation charts indicate which groups have a higher or lower frequency compared to the mean value.

RESEARCH RESULTS

The average duration of the route is approximately 4 hours. About 50% of the approved routes in Romania have a travel time of less than 3 hours. The most common route duration is 2 hours. The statistical summary is presented in table 1.

Table 1.

Statistical summary for the values of the duration of approved mountain tourist routes in Romania

Mean	Std Dev	Minimum	Maximum	Median	N	Mode	Coeff of Variation
4.1	3.6	0.25	48.0	3.0	952	2.0	86.8132

Source: Own processing of data from MET [13] using SAS

The travel time for each of the counties that have approved routes is described in a statistical summary in Table 2. Neamț County includes the routes with the longest average travel time, over 8 hours. In Satu Mare county we find the routes that lead to the shortest average travel time, less than 2 hours. In all counties, however, travel time variability is high, with large differences from one route to another.

Table 2.

Statistical summary for the values of the duration of approved mountain tourist routes in the counties of Romania

County	N Obs	Mean	Std Dev	Minimum	Maximum	Median	Coeff of Variation
AB	18	5.1	4.1	0.5	15.0	4.0	81.5
AG	33	5.2	4.9	1.0	23.0	3.0	95.2
AR	45	3.7	2.8	0.5	15.0	3.0	74.6
BC	9	3.5	3.3	0.5	9.0	2.0	93.1
BH	65	4.2	3.4	0.3	21.0	3.0	82.0
BN	44	7.6	4.5	1.0	24.0	8.0	59.0
BV	139	2.7	2.1	0.5	14.0	2.0	77.1
CJ	59	3.9	2.8	0.5	12.0	3.0	70.5
CS	35	3.7	2.3	0.8	9.0	3.0	61.7
CV	53	3.3	2.3	0.5	12.0	3.0	70.3
HD	55	7.1	4.7	1.0	22.0	7.0	65.6
HG	65	3.4	2.5	0.5	10.0	3.0	73.8
MH	23	3.1	2.0	0.4	10.0	3.0	63.5
MM	44	4.2	2.4	0.5	10.0	4.0	57.2
MS	42	3.8	2.7	0.5	15.0	3.5	71.8
NT	9	8.2	15.0	2.0	48.0	3.0	182.1
PH	48	2.8	1.8	0.3	7.0	2.0	63.4
SB	55	4.3	4.3	0.5	27.0	3.0	101.0
SM	16	1.7	1.5	0.3	5.0	1.0	84.8
SV	61	5.3	3.0	1.0	19.0	5.0	56.0
VL	35	5.4	2.9	0.5	13.0	5.0	54.2

Source: Own processing of data from MET [13] using SAS

The distribution frequencies for the 21 counties where we find approved mountain trails are presented in Table 3. Most trails are located in Brașov county. There you can find 139 trails, which is more than 14% of the total trails in Romania. On the other hand, in Bacău and Neamț counties there are 9 approved mountain tourist routes. The average

number of routes in the 21 counties is 46, with a coefficient of variation of 59%. Its value is high and indicates the absence of homogeneity of the series. There are important differences regarding the distribution of routes from one county to another.

Table 3.

The distribution of the number of approved mountain tourist routes in the counties of Romania

County	Frequency	Percent	County	Frequency	Percent
AB	18	1.89 %			
AG	33	3.46 %	HG	65	6.82 %
AR	45	4.72 %	MH	23	2.41 %
BC	9	0.94 %	MM	44	4.62 %
BH	65	6.82 %	MS	42	4.41 %
BN	44	4.62 %	NT	9	0.94 %
BV	139	14.59 %	PH	48	5.04 %
CJ	59	6.19 %	SB	55	5.77 %
CS	35	3.67 %	SM	16	1.68 %
CV	53	5.56 %	SV	61	6.4 %
HD	55	5.77 %	VL	35	3.6 %

Source: Own processing of data from MET [13] using SAS

The diagram showing the relative deviation found in figure 1 shows that the counties of Alba, Bacău and Neamț are the counties where the number of routes is the lowest in relation to the average value. On the other side is the county of Brașov, where the number of approved mountain trails is much higher than the average value of the number of trails in a county.

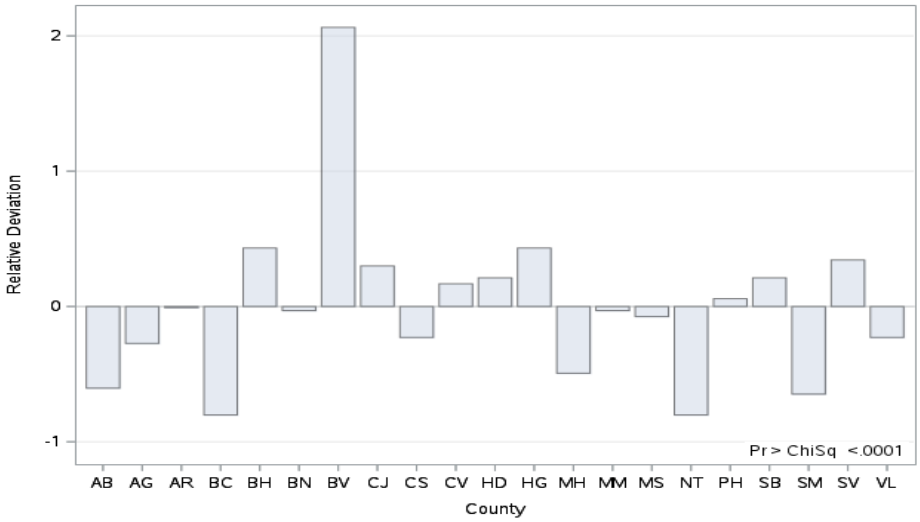

Figure 1. The relative deviation of the number of tourist routes in the counties of Romania

Source: Own processing of data from MET [13] using SAS

The ratio between the number of tourists in tourist reception structures from the year 2023 per county [NIS] and the number of routes in each county was also calculated. A possible degree of congestion of a route was thus determined. In figure 2 we find that 12 of the 21 counties are estimated to have a low degree of congestion. Less than 10,000 possible tourists for a route. 7 counties, namely Alba, Brașov, Cluj, Mureș, Prahova, Sibiu, Vâlcea have a possible congestion level of 10,000-20,000 tourists for a route. Two counties, Bacău and Neamț, have a very small number of approved routes compared to the number of tourists. This fact determines a possible very high degree of congestion, 20,000-30,000 for a route.

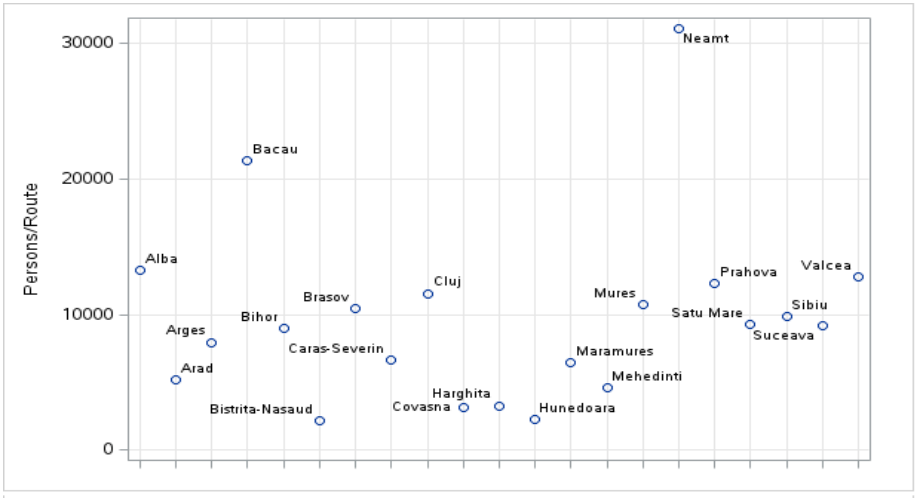

Figure 2. The ratio between the number of people and the number of routes per county

Source: Own processing of data from MET [13] and NIS [14] using SAS

Depending on the level of difficulty of the trails, the highest value is given to trails with a medium level of difficulty. There are 454 approved mountain trails, with a medium level of difficulty. The value of proportion is 47.64%. There are 351 trails with a low level of difficulty, that is 36.83%. Only approximately 15.83%, i.e. 148 of the routes have a high level of difficulty. Bucegi and Piatra Craiului mountains have multiple tourist routes with a high level of difficulty [3]. The low number of difficult routes also leads to the low value present in the relative deviation diagram in figure 3. The values are statistically significant, $p<0.0001$.

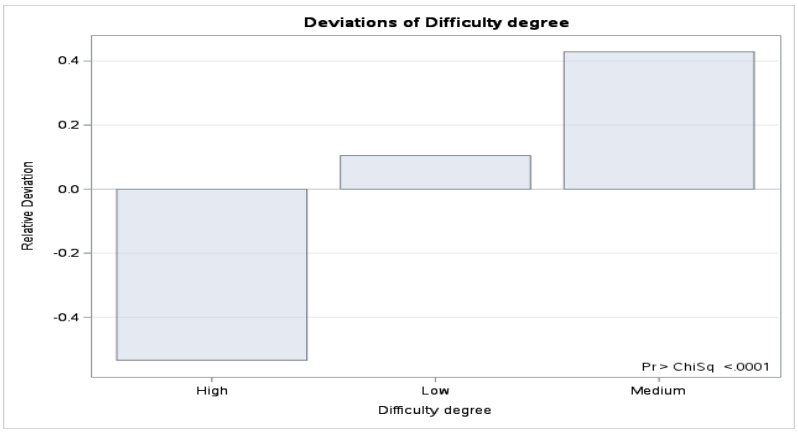

Figure 3. The relative deviation of the number of approved mountain tourist routes, in the counties of Romania

Source: Own processing of data from MET [13] using SAS

In accordance with what was previously presented, the frequency of routes that require special and complex equipment is less than 15%. Their frequency is shown in Table 4.

Table 4.

Distribution of the number of approved mountain tourist routes depending on the equipment level requested

Equipment level requested	Frequency	Percent
Hiking equipment of medium complexity	422	44.28 %
Not require special equipment	392	41.13 %
Special and complex hiking equipment	139	14.59 %

Source: Own processing of data from MET [13] using SAS

The marking of mountain trails has a concrete informational role. It is also legally regulated by Decision 77/2003 [12]. It provides information on their classification but also on their deployment in the field. The distribution of routes by markers is shown in Table 5.

Table 5.

Distribution of the number of approved mountain tourist routes depending on the marking

Marking	Frequency	Percent	Marking	Frequency	Percent
Blue circle	2	0.21%	Red dot	106	11.12%
Blue cross	98	10.28 %	Red line	88	9.23%
Blue dot	91	9.55 %	Red triangle	94	9.86%
Blue line	102	10.7 %	Yellow cross	36	3.78%
Blue triangle	104	10.91 %	Yellow dot	44	4.62%
Red circle	3	0.31 %	Yellow line	52	5.46 %
Red cross	85	8.92 %	Yellow triangle	48	5.04 %

Source: Own processing of data from MET [11] using SAS

The distribution of routes according to the year of approval is significantly different ($\chi 2$=1183.1144, p<0.0001). If the year 2006 brings a large number of homologated routes, over 250, the year 2009 with 105 routes, it is observed that in the years 2004, 2007, 2019 the situation is the opposite. Table 6 shows these details.

Table 6.

Distribution of the number of mountain tourist routes depending on the year of approval

Year	Frequency	Percent	Cumulative Percent	Year	Frequency	Percent	Cumulative Percent
2004	2	0.21	0.21				
2005	16	1.68	1.89	2014	46	4.83	64.43
2006	252	26.44	28.33	2015	9	0.94	65.37
2007	5	0.52	28.86	2016	27	2.83	68.21
2008	26	2.73	31.58	2017	24	2.52	70.72
2009	105	11.02	42.6	2018	77	8.08	78.8
2010	39	4.09	46.69	2020	51	5.35	84.16
2011	58	6.09	52.78	2021	51	5.35	89.51
2012	43	4.51	57.29	2022	99	10.39	99.9
2013	22	2.31	59.6	2023	1	0.1	100

Source: Own processing of data from MET [13] using SAS

CONCLUSIONS

In Romania, there are 21 counties where there are approved mountain tourist routes. Half of the number of tourist routes is concentrated in 7 counties: Brașov, Bihor, Harghita, Suceava, Cluj and Sibiu. Most of them can be found in Brașov county. Following the number of tourists in the counties that have mountain trails, the ratio between them and the number of trails was also studied. It was determined that 12 counties have a possible degree of low congestion, under 10,000 tourists for a route, 7 counties an average degree of congestion with 10,000-20,000 tourists for a route and 2 counties a possible high degree of congestion, of over 30,000 tourists for a route. Routes with an average degree of difficulty but also those that require an average level of equipment have the highest frequency. The number of approved routes was significantly different from one year to another.

ACKNOWLEDGEMENTS

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