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Transport Accessibility as a Factor for Tourist Flow Augmentation. Case Study: The Romanian Health Resorts

George GAMAN[1], Bianca RĂCĂŞAN[1]

[1] Babeş-Bolyai University, Faculty of Geography, Centre for Research on Settlements and Urbanism, Cluj-Napoca, ROMANIA

E-mail: gaman.george07@yahoo.com, bianca_racasan@yahoo.com

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ABSTRACT

Romanian health tourism represents a major chance of economic increase because it has all the necessary premises for development and for registering some of the most efficient revenues. Therefore, by using a complex methodology, we first aimed to reveal the current situation of each of the Romanian health resorts in terms of transport accessibility. Each type of transport communication system (road, railway and aerial) was analyzed by taking into account the connections to the European and national roads, primary and secondary railways, airports, aiming to pinpoint to what extent the level of accessibility of a resort influences the tourist flow. The second goal was to reveal if transport accessibility could condition the tourist flow towards the Romanian health resorts, by operating several correlations between accessibility situation and tourist arrivals, overnights, tourist traffic density, and the net use index of accommodation capacity of every Romanian health resort. The results highlighted that health resorts situated in the Carpathian area presented the lowest level of transport accessibility. However, the influence on the tourist flow of Romanian health resorts proved very low, since the development of these resorts depended entirely on the health factors provided by the area and the historical circumstances, since the specific nature of health tourism requires a more secluded placement. The exceptions enumerate the resorts situated on the seaside of the Black Sea, Prahova Valley, Transylvania and Crişana areas.

1. INTRODUCTION

The main purpose of this paper is to investigate if transport accessibility has any influence on the tourist flow of Romanian health resorts. In order to achieve this result, using several indicators (road quality, distance from a European road, railway station, the annual number of passengers and destinations served by an airport) we revealed the transport accessibility of each health resort taken under study. The next step was to perform several correlations between the values resulted from transport accessibility and indicators concerning the tourist flow, such as arrivals, overnights, tourist traffic density and the net use index of accommodation capacity. A similar study published in 2014, approached the influence of transport accessibility on accommodation structures of each Romanian resort [1]. Like the actual one, we outlined a method for revealing the level of transport accessibility by road, rail and air, then several correlations were made between the values resulted from level of accessibility and indicators regarding tourist accommodation structures (total number of accommodation units, total number of accommodation places, three and four star facilities, total number of hotels). The results showed that transport infrastructure has insignificant influence over the accommodation infrastructure of a resort.

Regarding the actual situation of natural potential of Romania, namely the local bioclimate and mineral water springs diversity, landscape attraction, favourable location of health resorts, the motivations and

preferences of patients as tourists and the actual lifestyle, health tourism holds the major chance of development [1].

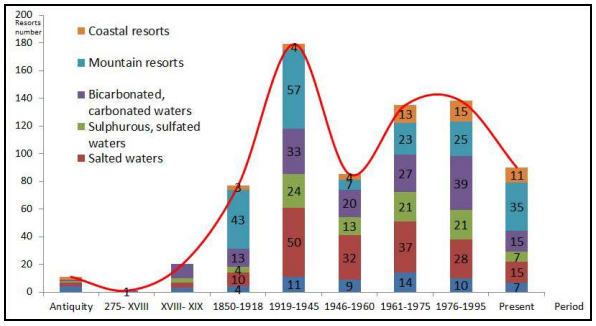

Fig. 1. Numerical evolution of Romanian health resorts, considering the therapeutic factor [1].

Observing the history of Romanian health tourism, we learn that the Romans planned the tourism development very well, 11 health resorts being developed in their period. The affirmation is reinforced by the disappearance of these resorts, after the Aurelian withdrawal, until the 18th century, Băile Felix being the single exception [2]. Most of the health resorts were established in the interwar period (179), then after 1960 (138), when Romania met the last significant economic development [3], [4].

Nowadays, according to the Government Decision no. 852/2008, with the latest updates, there are 41 national and 49 local resorts in Romania, the latest additions being Petroşani-Parâng, Târgu Neamţ, Piatra-Neamţ, Râşnov among national resorts and Vişeu, Baia Sprie within the category of local ones [5].

Analysing the territorial distribution of the Romanian health resorts, we can note a concentration along the Carpathian Mountains (48), in Transylvanian Plateau (7), Western Plain (8), Getic Sub-Carpathians (8), Moldavia Sub-Carpathians (5), the north-west part of the Romanian Plain (4) and the Black Sea (10) [1].

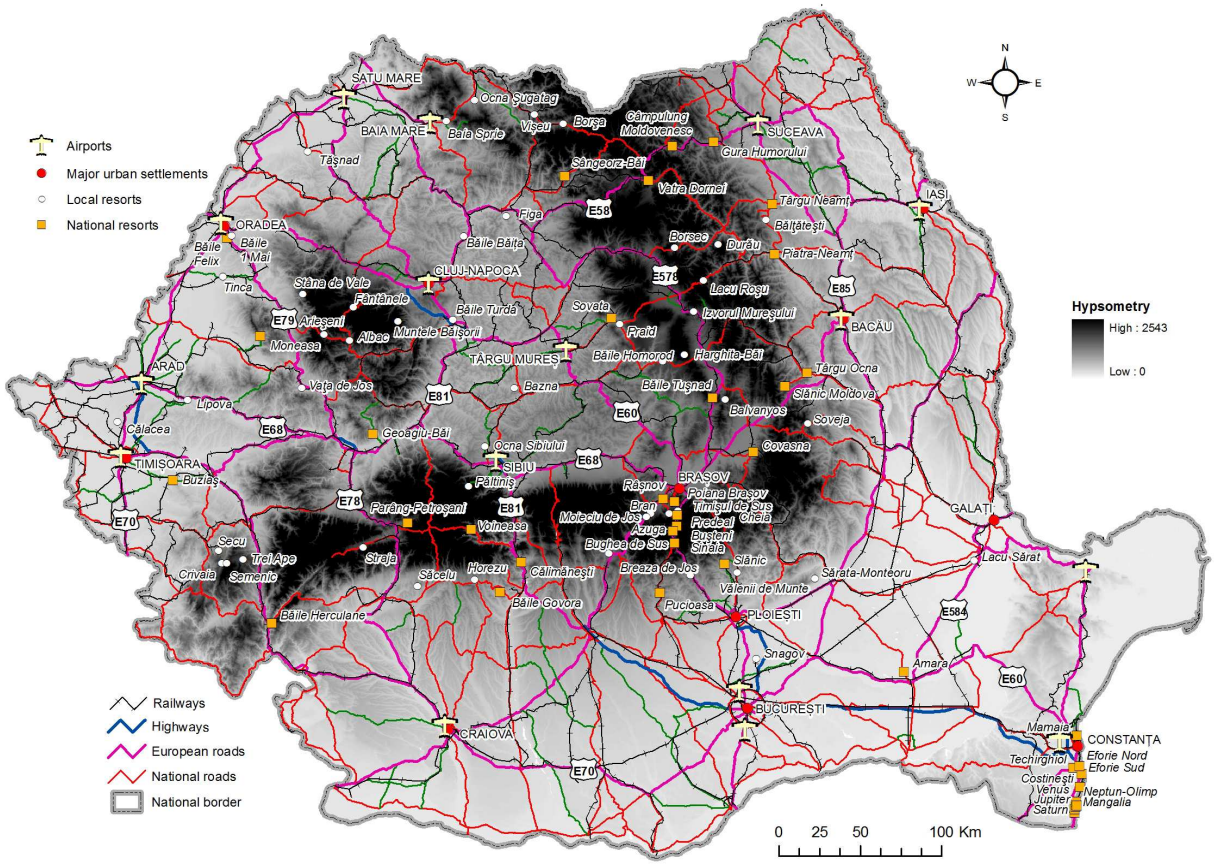

Fig. 2. Territorial distribution of Romanian health resorts.

A common problem of the Romanian health resorts is that most of this kind of settlements from the Carpathian Mountains are climate-related, fully based on therapeutic valences of the local bioclimate, where patient-tourists have the chance to practice aero-therapy, heliotherapy and terrain cure, but the health resorts which also benefit from therapeutic values of mineral and thermal water springs (Băile Felix, Băile 1 Mai, Geoagiu Băi, Băile Herculane) therapeutic lakes (Lacul Sărat, Lacul Amara), mofettas (Slănic Moldova), saline microclimate (Praid, Târgu Ocna) are not focused on climatic features, therefore they cannot be shaped into the best efficient and diverse curative offer for patient-tourists [1].

Table 1. Administrative situation, major transport infrastructure, population, tourist arrivals and tourist overnights of every resort in Romania [6].

No.	Resort name	Freestanding or Urban/rural settlement belonging	Crossing street level	Population	Tourist arrivals (2004-2013)	Tourist overnights (2014-2013)
1.	Albac	Rural	National	2,089	616.6	1,745.6
2.	Albeştii de Muscel	Rural	County	1,578	201.0	330.0
3.	Amara	Urban	National	7,345	20,355.0	220,143.2
4.	Arieşeni	Rural	National	1,565	5,253.0	13,889.3
5.	Azuga	Urban	European	5,213	7,670.9	17,909.1
6.	Balvanyos	Freestanding	National	-	4,688.6	9,494.1
7.	Bazna	Rural	County	3,911	9,381.7	31,083.8
8.	Băile 1 Mai	Rural	European	9,572	118,992.2	847,549.7
9.	Băile Băiţa	Urban	European	20,982	2,853.4	4,905.0
10.	Băile Felix	Rural	European	9,572	118,992.2	847,549.7
11.	Băile Figa	Freestanding	County	-	1,037.7	3,710.6
12.	Băile Govora	Urban	County	2,449	15,057.2	148,556.3
13.	Băile Herculane	Urban	National	5,008	60,929.9	534,664.9
14.	Băile Homorod	Rural	National	73	3,869.3	10,312.2
15.	Băile Olăneşti	Urban	National	4,186	40,163.7	365,470.8
16.	Băile Turda	Urban	European	47,744	10,532.5	34,885.4
17.	Băile Tuşnad	Urban	European	1,641	17,315.8	112,282.0
18.	Bălţăteşti	Rural	National	4,182	6,782.9	81,201.8
19.	Borsec	Urban	National	2,585	1,210.7	2,865.5
20.	Borşa	Urban	National	27,611	6,654.7	12,457.8
21.	Bran	Rural	European	5,181	37,772.0	80,365.2
22.	Breaza	Urban	European	15,928	6,270.8	13,314.2
23.	Buşteni	Urban	European	8,894	49,219.3	141,157.5
24.	Buziaş	Urban	County	7,023	13,235.9	130,575.1
25.	Câmpulung Moldovenesc	Urban	European	16,722	16,658.9	27,938.3
26.	Cap Aurora	Freestanding	European	-	252,517.9	1,520,765.0
27.	Călacea	Rural	County	674	1,892.4	13,121.2
28.	Călimăneşti-Căciulata	Urban	European	7,622	78,606.9	464,115.4
29.	Cheia	Rural	National	362	19,347.1	26,612.3
30.	Costineşti	Rural	European	2,866	22,447.4	98,328.0
31.	Covasna	Urban	National	10,114	34,622.7	396,375.1
32.	Crivaia	Freestanding	County	-	6,008.6	12,385.4
33.	Durău	Freestanding	County	-	19,307.4	30,941.8
34.	Eforie Nord	Urban	European	9,473	123,342.7	621,934.0
35.	Eforie Sud	Urban	European	9,473	123,342.7	621,934.0
36.	Geoagiu Băi	Freestanding	County	-	22,812.0	129,064.6
37.	Gura Humorului	Urban	European	13,667	24,396.0	43,156.2
38.	Harghita Băi	Freestanding	County	-	32,271.9	63,973.5
39.	Horezu	Urban	National	6,263	2,274.6	3,035.0
40.	Izvorul Mureşului	Rural	European	801	3,834.8	13,486.7
41.	Jupiter	Freestanding	European	-	252,517.9	1,520,765.0
42.	Lacu Roşu	Freestanding	National		10,855.5	20,853.3
43.	Lacu Sărat	Rural	European	1,179	56,060.0	232,846.1
44.	Lipova	Urban	County	10,313	1,453.1	2,471.3
45.	Mamaia	Freestanding	European	-	-	-
46.	Mangalia	Urban	European	36,364	252,517.9	1,520,765.0
47.	Moieciu	Rural	European	4,892	28,484.0	64,948.6
48.	Moneasa	Rural	County	864	32,584.6	106,305.7
49.	Neptun-Olimp	Freestanding	European	-	252,517.9	1,520,765.0
50.	Ocna Sibiului	Urban	County	3,562	6,880.5	18,183.8
51.	Ocna Şugatag	Rural	County	3,853	5,318.7	33,754.1
52.	Pârâul Rece	Rural	County	560	146,145.1	314,073.3
53.	Păltiniş	Freestanding	County	-	-	513.5
54.	Poiana Braşov	Freestanding	National	-	-	601,088.6
55.	Praid	Rural	National	6,502	3,370.3	9,943.1
56.	Predeal	Urban	National	4,755	146,145.1	314,073.3
57.	Pucioasa	Urban	National	14,254	12,793.2	117,885.7
58.	Sângeorz-Băi	Urban	National	9,679	9,232.1	113,448.5
59.	Saturn	Freestanding	European	-	-	1,520,765.0
60.	Săcelu	Rural	County	1,542	1,862.1	15,582.3
61.	Sărata Monteoru	Rural	County	863	11,819.7	67,997.6
62.	Secu	Freestanding	-	-	6,008.6	12,485.4
63.	Semenic	Freestanding	-	-	-	-

64.	Sinaia	Urban	European	10,411	188,141.5	451,245.5
65.	Slănic	Urban	County	6,034	6,774.8	67,073.7
66.	Slănic Moldova	Urban	National	4,198	28,960.9	116,987.6
67.	Snagov	Rural	National	7,272	2,733.4	3,953.9
68.	Sovata	Urban	National	10,385	73,926.4	294,969.7
69.	Soveja	Rural	National	2,159	810.7	3,476.1
70.	Stâna de Vale	Freestanding	County	-	4,968.3	11,240.2
71.	Straja	Freestanding	County	-	2,890.6	5,428.8
72.	Târgu Ocna	Urban	National	11,300	6,597.5	54,793.5
73.	Târșnad	Urban	National	8,631	6,455.6	10,451.6
74.	Techirghiol	Urban	European	7,292	9,202.0	104,704.6
75.	Timișu de Sus	Freestanding	European	-	146,145.1	314,073.3
76.	Tinca	Rural	County	7,793	1,279.5	20,794.4
77.	Trei Ape	Freestanding	County	-	3,680.8	10,897.4
78.	Vatra Dornei	Urban	European	14,429	42,757.1	204,187.3
79.	Vața de Jos	Rural	County	3,728	345.6	-
80.	Vălenii de Munte	Urban	National	12,257	3,402.5	7,409.9
81.	Venus	Freestanding	European	-	252,517.9	1,520,765.0
82.	Voineasa	Rural	National	1,455	12,584.0	54,755.1
83.	Fântânele Zone	Freestanging	National	-	6,729.8	11,860.4
84.	Muntele Băișorii Zone	Rural	County	1,940	6,364.0	14,337.6
85.	Râșnov	Urban	National	15,022	6,942.5	15,352.1
86.	Petroșani-Parâng	Urban	National	37,160	9,810.7	19,160.8
87.	Piatra Neamț	Urban	National	85,055	45,902.0	73,385.3
88.	Târgu Neamț	Urban	National	18,695	7,718.2	11,007.7
89.	Vișeu	Rural	National	15,037	3,853.8	6,377.1
90.	Baia Sprie	Urban	National	15,476	4,275.6	8,571.5

Table 1 reveals several indicators regarding the level of accessibility and tourist flow setting. Therefore, concerning the administrative situation, Romania has 28 resorts that belong to rural centres, 40 resorts that belong to urban centres and 22 that are independent. We used this indicator considering that tourist traffic density takes into account the local population of settlement, and in case of urban units, the accessibility is, most often, high.

Regarding the transport infrastructure, 25 of the Romanian resorts are crossed by county roads, 34 of them by national roads and the multidirectional penetrability of 29 resorts is provided by the European roads. It can then be easily observed that the situation is balanced; most of the resorts that are crossed by county roads are located in mountainous areas, and many of those that are traversed by European thoroughfare are located in the West Plane of Romania, Prahova and Olt Valleys.

In order to estimate the tourist traffic density, it was necessary to highlight the population of each settlement to which the resort belongs. Hence, Piatra-Neamț has the largest number of inhabitants, followed by Turda, Petroșani, Mangalia. The opposite values we found in Călacea, Pârâul Rece, Cheia, and Băile Homorod. It is obvious that those resorts administratively included in the territory of large localities, can provide tourist services for a larger group of tourists.

For a complete analysis of tourist flow, it is recommended to highlight the tourist arrivals and overnights. Thus, for each indicator we took into account the period between 2004 and 2013, then, we calculated the average values. The resorts that registered a high number of tourist arrivals are Băile Felix and Băile 1 Mai, Predeal, Eforie Nord and Eforie Sud, Mangalia, Costinești, Poiana Brașov, on the opposite end finding the resorts, such as Albeștii de Muscel, Arieșeni, Soveja, Lipova and Vața de Jos.

Tourists who spent more nights, chose resorts such as: Vatra Dornei, Sovata, Poiana Brașov, Geoagiu Băi, Covasna, which are acknowledged for winter sports and for mineral and thermal water treatment. The less number of overnights was registered in Horezu, Albeștii de Muscel, Praid, Baia Sprie, Vișeu, Straja, Soveja, mainly because the tourist offer is not diversified and does not present same quality level as compared to the first mentioned.

The socio-economic development of each urban or rural settlement depends on the quality and quantity of transport network, because it determines the direction and the quantity of material, informational and energy flows, following to be coagulated by every locality function [7].

There are plenty of scientific works that approach general aspects of transport infrastructure. For explaining the actual situation of this type of network and local, zonal, regional, national [8], [9], economic divergence [11], several authors insists on the development of roads, railway and airports, investments and their systematic nature [10].

An eloquent scientific paper, which reveals the importance of transports in the socio-economic development of territory, is *The theory and method of design and optimization for railway intelligent transportation systems (RITS) (2001),* where Wang Zhuo and Jia Li-min present the latest railway network that appeared in Japan, then in China, which utilizes synergistic technologies and system concepts for achieving high security and efficiency, high safety and

high-quality service, with the help of information technologies [12].

Once with the development of transport network, congestion, security and safety problems also appeared. This aspect was analysed in 2015 by Kjell Hausken and Jun Zhuang, the attention being focused on motorways and urban networks. Authors created a distributed model predictive control (DMPC) which seemed to be a feasible alternative for traffic control [13].

Besides these changes, the spread of transport corridors made researchers also focus on the environmental impact [14] or on the environmental assessment [15]. On the effects of transportation networks, we mention the works of Quintana et al. (2010) who emphasized on the provision of information, authorities and local community collaboration [16] and Groote et al. (1999), who underlined the economic issues implied by the extension of transportation networks [17].

2. THEORY AND METHODOLOGY

For reaching efficiency in tourism, we need a qualitative transport infrastructure, especially nowadays when tourists travel long distances to destinations, because this represents the link between tourists and journey place. Unfortunately, this relationship is approached in few studies, because it is poorly understood and the attention of researchers is not focused on it [18], [19].

Even though the number of these studies is limited, they enriched the theoretical view of this phenomenon, analyzing not only the endogenous elements of tourism (primary and derived offer), but also the exogenous ones which condition it: geology (spa resorts' cases), soils, hypsometry, urban technical infrastructure (transports network, sewerage, electricity, water supply) [1].

The first scientific papers that approached transport and tourism appeared at the late of the 19th century and at the early of the 20th century: *The theory of Transportation* by Cooley H. [20], *History and Economics of Transport* by Kirkcaldy A. and Dudley Evans [21], and *Imperial air routes* by Sykes F. A great notoriety have enjoyed scientific papers like *The Tourist Movement* by Ogilvie (1933), *The tourist industry of a modern highway* by Eiselen (1945) [22], *The Geography of Air Transport* by Sealy (1966), and *On some patterns of international tourism flows* by Williams and Zelinsky (1970) [23]. Then, beginning with 1987, researchers highlighted the unprecedented development of these two indicators, which led to a stronger interdependence, transport services in tourism product becoming the most important, given the fact that tourists showed preferences on increasingly distant destinations [24], [25], [26], [27]. Therefore, in general, it was demonstrated that the infrastructure base of a country is a determinant of the attractiveness of a tourism destination [28], [29], *"transport playing an important role in the successful creation and development of new attractions as well as the healthy growth of existing ones"* [30].

Lately, the attention focused on aerial transport, because it became a habit for tourists to travel by airplane, due to cheaper expenditure and the modernization of this conveyance type. Once with these changes, the environment issues also appeared, because airplane represents the most polluting means of transportation [31].

The development of air travel has led to the emergence of another impact, related to quality of visitors. Reducing transportation costs, the shaping of mass tourism and the raising of living standards could direct to a decreasing of visitors quality even in privileged destinations [32].

This globalization of transport network causes environment issue, not only in terms of aircraft flight, but also at destinations, because the number of tourists becomes too high for carrying capacity of journey place. When carrying capacity is exceeded, the territory in cause cannot cope with all tourists' needs, the best solution being rationalizing the number of visitors. Likewise, it is expected that the main means of transportation should be aircraft and private car [33].

Weston and Davies (2007) used Delphi method within which were identified 90 experts in tourism and transports (bus and train companies, walking groups, cycling associations and motorcycle federations), from North-West of England, for giving details about their employment and professional interests in transport and tourism. For that, they had to respond to 66 questions regarding the predicted number of tourist trips, future preferences of mode of transport used by tourists, effect of fuel prices and congestion, environmental issues. Responses showed that the number of inbound trips for holiday/pleasure will moderately increase alike the number of business trips made by visitors into the region from other parts of the UK, train will represent the main mode of transport for tourists, the following transport infrastructure will provide integrated facilities like Park and Ride [34]. A paper that investigates the significance of transport infrastructure as a factor in destination development was elaborated by Khadaroo and Seetanah in 2007, through which total number of tourist arrivals were modelled, the island of Mauritius being the case study. If in 1977, about 10,300 arrivals were registered, in 2005, a number of 761,000 tourists arrived on the island, mainly from Europe (65%), Africa (25%), Asia (6.5%), Australia (1.7%), America (1.2%). Regarding the major source country for Mauritius, France is on the first place (30%), followed by UK (15%), Reunion (13%), Germany and South Africa (7%). The tourism

phenomenon had such a development because local authorities understood that transport infrastructure is an important component for Mauritius. Through an equation, the authors identified the transport infrastructure being the main determinant of arrivals into the island, especially for tourists from Europe and US, followed by the distance coefficient. Therefore, transport infrastructure of the island contributed positively to tourist number, but indicators like relative prices, distance and income in the origin countries had large influence on the decision of tourists [35].

The same authors employed a gravity framework to evaluate the importance of transport infrastructure in determining the tourism attractiveness of destinations, through a case study of 28 countries over the decade 1990-2000, analysing the tourist arrivals per annum, income of origin (average real income per capita), relative prices (CPI of a destination country adjusted by the $ exchange rate), distance in kilometres between the capital cities of the origin and destination county, tourism infrastructure (number of hotel rooms available in the country), size of population, common language, common border, number of alternative destinations in proximity. At the same time, the transport infrastructure, three separate proxies were included: length of paved roads divided by the size of the country, number of terminals of each country's international airports, respectively the number of ports in each country.

Results showed that Australia and Oceania registered the highest coefficient that illustrated the importance of roads airports and ports for tourism flows [36].

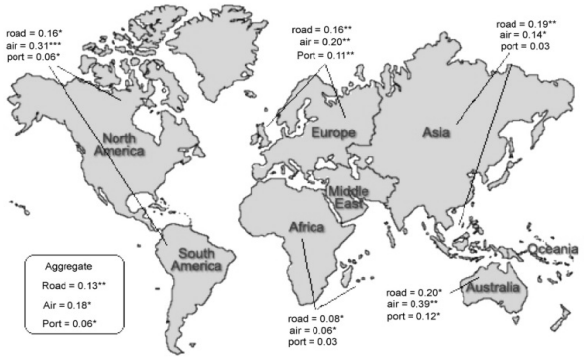

Fig. 3. Summary of estimated coefficients illustrating the importance of different types of transport for tourism flows to various continents [36].

For reaching the goal of this paper, several methods were used, including cartographic, graphic, comparative, mathematical and statistical analyses.

The analysis method focused on the quantitative and qualitative aspects of transport and tourism flow (2004-2013) of each resort (road, railway, air, respectively tourist arrivals, tourist overnights, tourist traffic density, and the net use index of accommodation capacity), on the territorial distribution of the Romanian resorts;

The cartographic method has a role which is becoming more and more important in the research and presentation of the tourist phenomenon, representing a its spatial and temporal synthesis. In this paper, the cartographic method was used for showing the territorial distribution of the Romanian resorts, at local and national level, of transport infrastructure and for highlighting the accessibility level of every resort in Romania, by using a different interpolation operation from the previous study, (IDW - Inverse Distance Weighted), in ArcGis 9.3 software, which estimates cell values by averaging the values of sample date points in the neighbourhood of each processing cell.

The graphic method holds an analytical character and usually highlights the evolution and structure of tourist phenomenon. By using Microsoft Excel 2013 software, through the charts, we showed the correlation between the level of accessibility and tourism flow, the accessibility influence on tourist arrivals, tourist overnights, tourist traffic density, and the net use index of accommodation capacity.

The comparative method has an important role in the purpose of this paper, which aims to the examination of accessibility level and tourist flow of every resort. Consequently, we highlighted the resorts that are most accessible by road, railway, respectively by air, the tourist flow indicator having the highest influence on the level of accessibility, and the resorts whose tourist flows are mostly influenced by accessibility.

The mathematical method was used for calculating several distances, namely from a resort to the closest European road, National road, railway station, airport, for highlighting the total number of accommodation units, places and hotels of each resort and for calculating the final score representing the level of accessibility.

The statistical method consisted in revealing, the average number of tourist arrivals, tourist overnights, tourist traffic density, respectively net use index of accommodation capacity between 2004-2013 by using data provided by the National Institute of Statistics.

3. RESULTS AND DISCUSSION

As the references concluded, the accessibility of a resort could influence its performance. Therefore, the present paper tries to calculate the level of accessibility for each Romanian resort and to investigate if quantity and quality aspects of transport network have any influence on tourist flow. Besides previous study [1], the new method used to identify the transport accessibility of a health resorts took into account the roads quality, as well [2].

3.1. Determination of accessibility level

3.1.1. Road accessibility level

In this case, the main analyzed component is represented by European roads but the analysis of the entire network considered county and national roads. Therefore, it was agreed that the level of road accessibility of each resort must be directly proportional with the distance of the closest European road and conditioned by the other roads that are linked with these routes recognized at continental level.

Table 2. The road, railway, aerial, general accessibility situation of each Romanian health resort.

No.	Resort name	RA	RWA	AA	GA	No.	Resort name	RA	RWA	AA	GA
1.	Albac	1.25	0.00	0.00	0.40	46.	Mangalia	3.00	3.00	3.00	3.00
2.	Albeştii de Muscel	2.00	0.50	0.00	0.80	47.	Moieciu	3.00	1.00	0.00	1.30
3.	Amara	2.00	0.50	0.00	0.80	48.	Moneasa	1.00	0.00	0.10	0.40
4.	Arieşeni	2.25	0.00	0.00	0.70	49.	Neptun-Olimp	3.00	3.00	3.00	3.00
5.	Azuga	3.00	3.00	0.00	2.00	50.	Ocna Sibiului	2.50	2.00	3.00	2.50
6.	Balvanyos	1.75	0.00	0.00	0.50	51.	Ocna Şugatag	1.25	0.00	2.10	1.10
7.	Bazna	2.00	0.75	2.10	1.60	52.	Pârâul Rece	1.50	0.00	0.00	0.50
8.	Băile 1 Mai	3.00	2.00	3.00	2.70	53.	Păltiniş	1.50	0.00	3.00	1.50
9.	Băile Băiţa	3.00	2.00	2.50	2.50	54.	Poiana Braşov	2.25	1.00	0.00	1.10
10.	Băile Felix	3.00	2.00	3.00	2.70	55.	Praid	2.50	2.00	2.10	2.20
11.	Băile Figa	1.75	0.75	0.50	1.00	56.	Predeal	3.00	3.00	0.00	2.00
12.	Băile Govora	2.50	1.00	0.10	1.20	57.	Pucioasa	1.50	2.00	0.50	1.30
13.	Băile Herculane	3.00	3.00	0.00	2.00	58.	Sângeorz-Băi	2.25	2.00	0.00	1.40
14.	Băile Homorod	2.50	1.00	0.10	1.20	59.	Saturn	3.00	3.00	3.00	2.80
15.	Băile Olăneşti	2.25	0.00	0.10	0.70	60.	Săcelu	2.00	0.50	0.00	0.80
16.	Băile Turda	3.00	2.00	2,50	2.50	61.	Sărata Monteoru	2.50	0.50	0.50	1.20
17.	Băile Tuşnad	3.00	2.00	0.00	1.70	62.	Secu	0.50	0.00	0.10	0.60
18.	Bălţăteşti	2.50	0.00	0.10	0.90	63.	Semenic	0.50	0.00	0.00	0.20
19.	Borsec	2.50	0.00	0.00	0.80	64.	Sinaia	3.00	3.00	0.00	2.00
20.	Borşa	1.00	0.50	0.00	0.50	65.	Slănic	1.75	2.00	0.50	1.40
21.	Bran	3.00	1.00	0.00	1.30	66.	Slănic Moldova	2.50	0.00	0.25	0.90
22.	Breaza	3.00	3.00	0.50	2.20	67.	Snagov	2.50	3.00	3.00	2.80
23.	Buşteni	3.00	3.00	0.00	2.00	68.	Sovata	2.50	2.00	2.25	2.30
24.	Buziaş	2.00	2.00	2.25	2.10	69.	Soveja	0.75	0.00	0.00	0.30
25.	Câmpulung Moldovenesc	3.00	2.00	0.10	1.70	70.	Stâna de Vale	0.75	2.00	0.10	1.00
26.	Cap Aurora	3.00	3.00	3.00	3.00	71.	Straja	0.75	0.00	0.00	0.30
27.	Călacea	2.00	0.50	3.00	1.80	72.	Târgu Ocna	3.00	2.00	2.25	2.40
28.	Călimăneşti-Căciulata	3.00	2.00	0.10	1.70	73.	Tăşnad	3.00	2.00	3.00	2.70
29.	Cheia	1.50	0.00	0.00	0.50	74.	Techirghiol	3.00	3.00	3.00	3.00
30.	Costineşti	3.00	3.00	3.00	3.00	75.	Timişu de Sus	3.00	3.00	0.00	2.00
31.	Covasna	1.50	0.00	0.00	0.50	76.	Tinca	1.00	2.00	2.10	1.70
32.	Crivaia	1.75	0.00	0.00	0.60	77.	Trei Ape	0.75	0.00	0.00	0.30
33.	Durău	0.25	0.00	0.00	0.10	78.	Vatra Dornei	3.00	2.00	0.10	1.70
34.	Eforie Nord	3.00	3.00	3.00	3.00	79.	Vaţa de Jos	3.00	2.00	0.00	1.70
35.	Eforie Sud	3.00	3.00	3.00	3.00	80.	Vălenii de Munte	2.50	2.00	0.50	1.60
36.	Geoagiu Băi	2.00	1.00	0.10	1.80	81.	Venus	3.00	3.00	3.00	3.00
37.	Gura Humorului	3.00	3.00	2.10	2.70	82.	Voineasa	2.25	0.00	0.10	0.80
38.	Harghita Băi	3.00	3.00	0.00	2.00	83.	Fântânele Zone	2.00	0.00	2.50	1.50
39.	Horezu	2.25	0.00	0.10	0.80	84.	Muntele Băişorii Zone	2.00	0.00	2.50	1.50
40.	Izvorul Mureşului	3.00	2.00	0.00	1.70	85.	Râşnov	3.00	2.00	0.00	1.60
41.	Jupiter	3.00	3.00	3.00	3.00	86.	Petroşani-Parâng	2.00	0.00	0.00	0.60
42.	Lacu Roşu	2.50	0.00	0.00	0.80	87.	Piatra Neamţ	2.25	2.00	2.10	2.10
43.	Lacu Sărat	3.00	3.00	0.00	2.00	88.	Târgu Neamţ	2.25	2.00	2.10	2.10
44.	Lipova	3.00	3.00	3.00	3.00	89.	Vişeu	1.00	2.00	0.10	1.00
45.	Mamaia	3.00	3.00	3.00	3.00	90.	Baia Sprie	2.50	2.00	3.00	2.50

(RA=road accessibility; RWA=railway accessibility; GA=general accessibility).

For calculating the road accessibility of each Romanian resort, were accounted several conditions. According to the distance between resorts and the closest European road, the ratings were given as follows: three points (0 km), two points (1-50 km) and one point (>50 km).

Regarding the connection with the European road, there were given 0.5 points for those resorts connected to an European road through a national one of a good quality, 0.25 points for acceptable quality and 0 points for poor quality, only in case if the distance between the health resort and the European road measures 15-50 km.

At the same time, 0.5 points were subtracted for those resorts linking through a county road of poor quality, 0.25 points for acceptable quality and 0 points for good quality. In case of the link through national and county roads, the score remains the same.

The threshold of 50 km was chosen in most cases because it is equivalent with almost one hour of

travelling in Romania. Moreover, the methodology proved to be more severe in case of county roads, because, in most cases, a European or national road of acceptable quality is better than a county road with the same attributes.

After reckoning those results, we used the ArcGis 9.3 software to create a point theme, which consisted in digitizing all Romanian resorts, followed by inserting these results for each this kind of settlements. Afterwards, using this information through IDW interpolation GIS, we created a map showing the areas of resorts presenting a low or a high level of road accessibility.

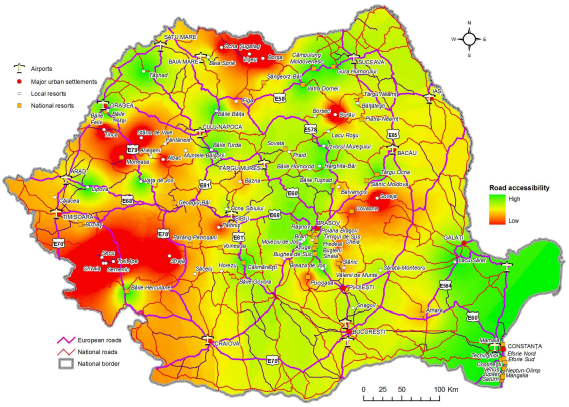

Fig. 4. Road accessibility of the Romanian health resorts.

Analyzing the map above, the health resorts that present a low road accessibility are situated in Maramureş Depression, in the west part of Romania, except for the West Plain (Apuseni, Poiana Ruscă, Banat Mountains), in Curburii Sub-Carpathians, Ceahlău Massif in the Eastern Carpathians and in the western part of Meridional Carpathians.

The health resorts that dispose of a high degree of road accessibility are located in Prahova Valley, the Romanian Plain, east Transylvania, north of West Plain and Black Sea seashore.

3.1.2. Railway accessibility level

In order to estimate the railway accessibility of each resort, we considered several features. We set up a system of scoring as follows: three points for the resorts that have access to a primary railway; two points for those having access to a secondary railway; one point for resorts that are less 15 km away from a railway and if the road connection is European or national one; 0,75 points if the connection road is European or national of good quality; 0.5 points for those resorts that are less 15 km away from a railway and if the connection is made through a county road in poor conditions; and 0 points for resorts that do not have access to any kind of railway.

We chose the limit of 15 km for railway accessibility level, because after a train travel, a higher mileage by another transportation means could lead to dissatisfaction.

After obtaining the results of the mathematical analysis, alike the previous component, we created a map in which we revealed the current situation through the same IDW interpolation operation.

Analyzing the map above, the resorts presenting low railway accessibility are located in Apuseni, Poiana Ruscă and Banat Mountains, west of Meridionali Carpathians, the north part of Oltenia region, Eastern Carpathians, Moldavia Plateau, Transylvania and Maramureş Depression, Curburii Carpathians and Sub-Carpathians, and the south-west part of Romania.

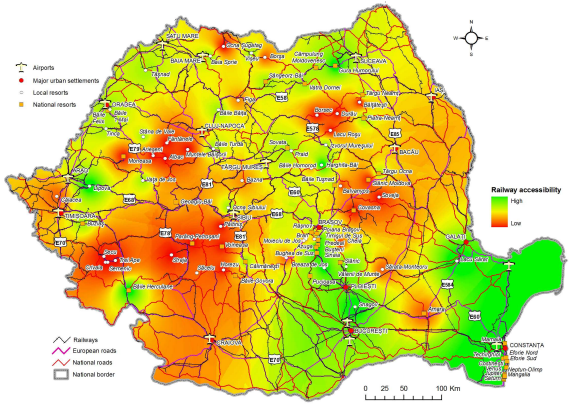

Fig. 5. Railway accessibility of the Romanian health resorts.

The resorts disposing of a high degree of railway accessibility are situated in Western Plain, Prahova Valley, the central part of Romanian Plain and Dobrogea.

3.1.3. Air accessibility level

The air accessibility level consists in the distance of the closest airport and in the connection with that airport by road type. In order to calculate the air accessibility of each resort, we took into account several conditions. We then scored them as follows: three points for the resorts situated at a distance of 0-30 km from the closest airport; two points for those situated at a distance of 31-60 km, and 0 points for a distance larger than 60 km.

If the distance between a health resort and the closest airport is less than 60 km, and that airport registers annually at least 1 million passengers and has at least 30 served destinations, we added 0.5 points; if the airport receives annually at least 500,000 travellers and has at least 15 served destinations, we added 0.25 points; if the airport counts annually at least 100,000 passengers and has 1-9 served destinations, we added 0.1 points.

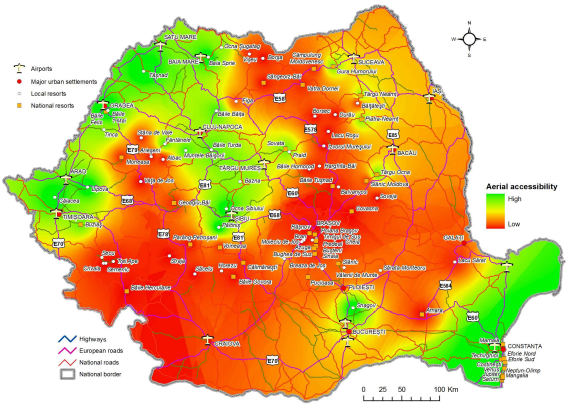

Fig. 6. Aerial accessibility of the Romanian health resorts.

In this case we chose a limit of 30 km, because the flight duration is shorter and the travel time with another transport means to the destination can be longer than in railway's case. Therefore, all these aspects summarize at tourist's time travel. The longer time transportation is, the higher level of dissatisfaction could appear.

Analyzing the map above, the health resorts that present low air accessibility are located in the central part of Apuseni Mountains, Poiana Ruscă and Banatului Mountains, the western and eastern part of Meridionali Carpathians, the north part of Oltenia, Maramureş Depression, Eastern Carpathians, Curburii Carpathians and Sub-Carpathians, Bărăgan Plain. Practically almost the entire territory of Romania possesses a low aerial accessibility.

The resorts disposing of a high degree of air accessibility are positioned in the West Plain, North-West part of Romania, west of Transylvania Depression, the West part of Moldavia Plateau, the central part of Romanian Plain and the seashore of Black Sea.

3.1.4. The general accessibility level

The general accessibility level of each Romanian resort was obtained by using the arithmetic mean between road, railway and air accessibility values.

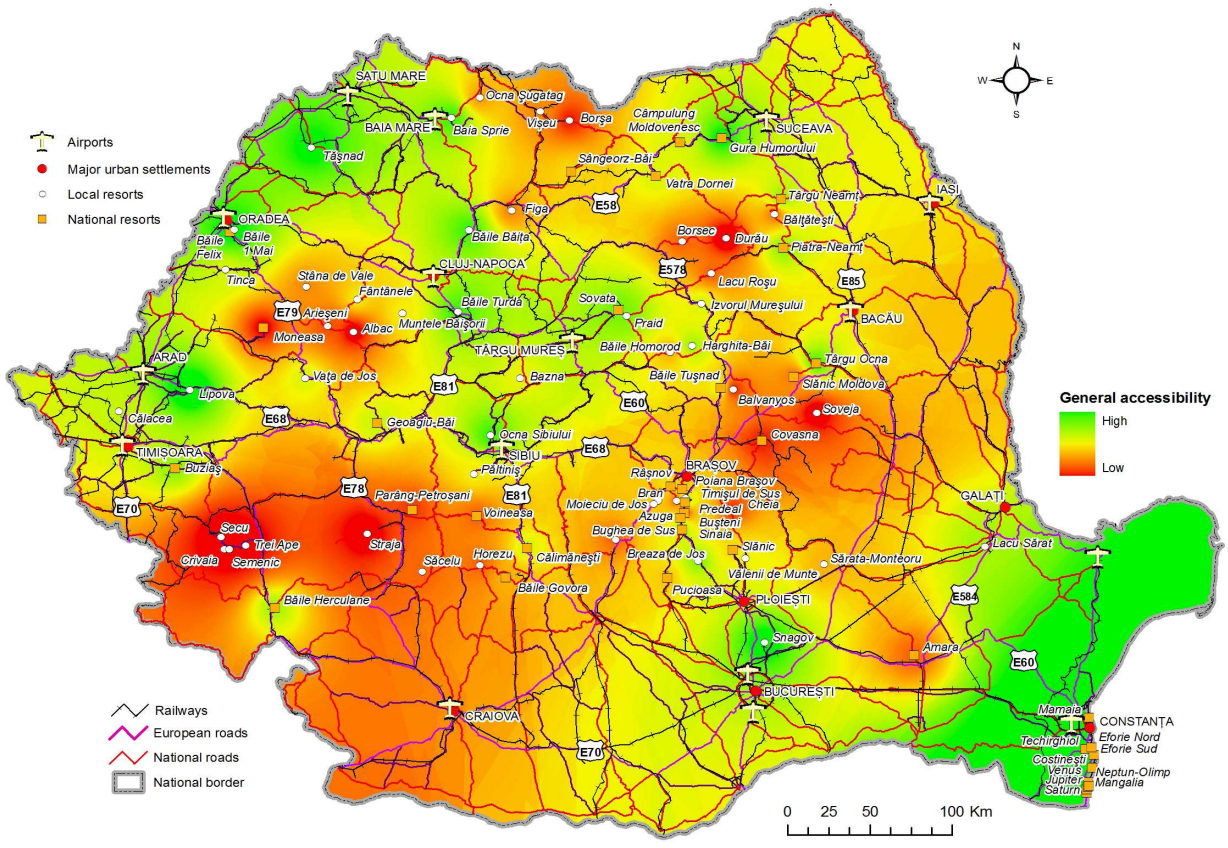

Fig. 7. General accessibility of the health resorts in Romania.

When analysing the situation evidenced by the map above (fig. 7) we found that the low-accessible resorts are positioned in Apuseni, Poiana Ruscă, Banat Mountains, in the west and east parts of Meridionali Carpathians, in Curburii and Moldavia Sub-Carpathians, central part of Eastern Carpathians, west part of Romanian Plain, and the west part of Moldavia Plateau.

The resorts with a high transport accessibility level are located in West Plain, in the west part of

Transylvania Plateau, in the north part of Moldavia Plateau, in centre and east of Romanian Plain, and in Dobrogea.

3.2. The influence of accessibility level on the tourist flow in the Romanian resorts

Logically, the accessibility level of each resort should be one of the decisive elements affecting the tourist flow. Therefore, the present study aimed to highlight every connection that could exist between tourist flow indicators (tourist arrivals, tourist overnights, tourist traffic density, and the net use index of accommodation capacity) and the general level of accessibility of each resort.

3.2.1. Tourist arrivals

According to the data provided by the National Institute of Statistics with reference to tourist circulation for each resort in the period of 2004-2013, the average number of tourist arrivals in the Romanian resorts is of approximately 23,932 visitors, Sinaia being the resort registering the highest average number of tourist arrivals (188,141), while Snagov, Săcelu, Tinca, Lipova Voineasa, Tinca, Lipova resort were at the opposite end. We found almost the same ranking in the case of accommodation units, as well.

By using the graphic method, and Microsoft Excel 2010 instrument, we attempted to establish a correlation between the results of accessibility level and the average number of tourist arrivals for each resort.

By processing this information, numerically and graphically, we noted a correlation coefficient of 0.3305, from which we learn that in Romania it is almost no relationship between resorts, general accessibility and the number of tourist arrivals.

Nevertheless, there are some exceptions such as Eforie Nord, Costineşti, Mamaia, Sinaia, Predeal, Băile Felix, Bran, Câmpulung Moldovenesc, Lacul Sărat, Vatra Dornei, Slănic Moldova, Târgu Ocna.

For example, between 2004-2013, both resorts of Eforie Nord and Eforie Sud registered an average number of 123,342.6 tourist arrivals and their accessibility level is maximum, these seaside resorts being crossed by E87 road, 800 main railway and having the nearest airport at a distance of 30 km.

In contrast, Băile Băiţa holds an average number of 2,853.4 tourist arrivals for the same period, even if it is crossed by the European road E576, by the 401th railway and the closest airport is situated at a distance of 30 km.

Therefore, there are resorts in Romania with low accessibility level but registering high number of tourist arrivals (Durău, Pucioasa, Geoagiu Băi, Amara), but at the same time with high accessibility level and low number of tourist arrivals (Băile Băiţa, Horezu, Vălenii de Munte, Praid, Râşnov).

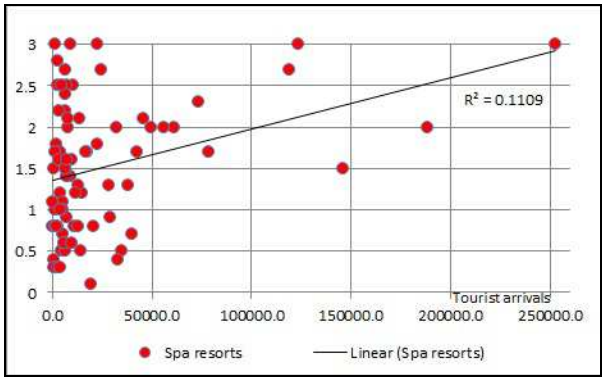

Fig. 8. The correlation between health resorts, general level of accessibility, and the average number of tourist arrivals (2004-2013).

According to the chart above (fig. 8) the coefficient of determination between the level of transport accessibility and tourist arrivals of each health resort is 0.1109; this means that only 11.1% of health resorts that have a favourable accessibility level receive a larger number of tourists than the national average; also those health resorts that have a low accessibility level also registered a low number of tourists than the national average.

3.2.2. Tourist overnights

We calculated that the average number of tourist overnights of all Romanian health resorts between 1994 and 2013 is of approximately 120,035. We also learned that Băile Herculane is the most visited resort, registering 534,664 tourist overnights. At the opposite end, we find Albeştii de Muscel, Păltiniş, Snagov, Horezu, Lipova, Băile Figa.

After processing data, we calculated the correlation coefficient obtaining a value of 0.2952, which was lower than in the first case; both of them however, register too modest values in the case of the Romanian resorts. As in the case of tourist arrivals, there are some exceptions, namely the seaside and Prahova Valley resorts, Băile Turda, Gura Humorului, Târgu Ocna, Sovata.

A positive example is represented by Băile Felix and Băile 1 Mai, which registered an average number of 847,549 tourist overnights, and their accessibility level has a value of 2.7 (it is crossed by E79 road, the 314 main railway and the nearest airport is situated at a distance of 8 km). A negative example is Băile Băiţa, registering only 4,905 tourist overnights.

Regarding the value of the determination coefficient, it resulted that only 8% of the health resorts in Romania record a high accessibility level and tourist overnights at the same time; and an unfavourable

accessibility level and less tourist overnights than the national average.

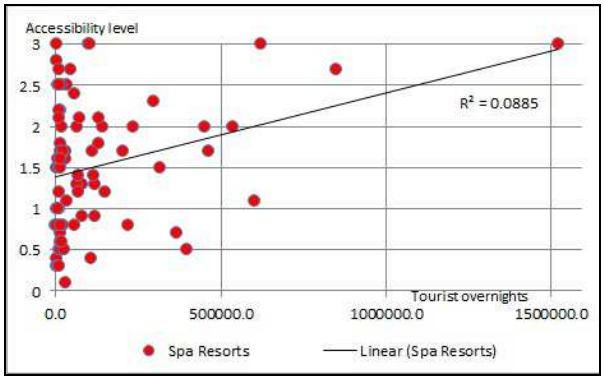

Fig. 9. The correlation between each health resort, general level of accessibility, and the average number of tourist overnights (2004-2013).

3.2.3. Tourist traffic density

We selected this indicator to demonstrate whether the density of tourist traffic in the Romanian health resorts is directly proportional with their level of accessibility.

After a rigorous analysis, we learned that the average percent of tourist traffic density in the Romanian spa resorts is of about 637%, Băile Homorod (5.300%) and Albeştii de Muscel (13%) being situated at opposite ends.

We also calculated a correlation coefficient of -0.1235, showing that the total number of accommodation units is the indicator that is the most influenced by the level of accessibility in what concerns the Romanian resorts, but regarding its share, it is insignificant. In this case, the situation is different.

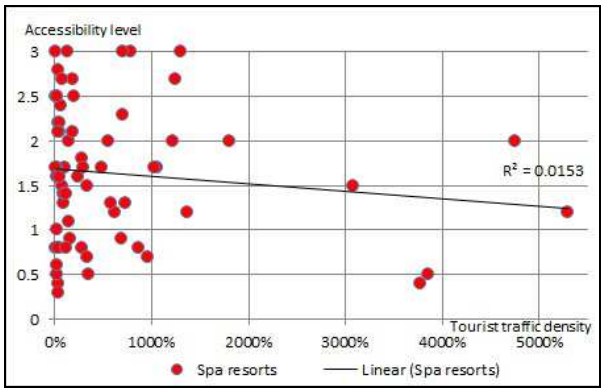

Fig. 10. The correlation result between each health resort, general level of accessibility and the average number of tourist traffic density (2004-2013).

There are only a few health resorts whose tourist traffic density is influenced by accessibility level, namely those located at the seaside and Băile Băiţa. At the same time, the health resorts that meet a high tourist traffic density, despite their low accessibility, are as follows: Horezu, Călacea, Câmpulung Moldovenesc, Băile Govora, Băile Figa, Pucioasa.

As we can see from fig. 10, the determination correlation is of about 1%, which shows that tourist traffic density is not influenced by the level of accessibility.

3.2.4. Net use index of accommodation capacity

The average net use index of accommodation capacity of Romanian resorts is of 26%; the highest values are registered by Băile Tinca (88%), Covasna (58%), Slănic Prahova (54%), Bălţăteşti (53%) while the lowest values are registered by Borsec (3%), Horezu (4%), Albac (5%), Băile Băiţa, Praid (6%), Moieciu (7%).

We calculated the correlation coefficient of 0.152071, thus being the second indicator as importance until now, but insignificant like the others. Like in the other cases, we found some exceptions namely the seaside resorts, Buziaş, Sovata, Băile Herculane, Băile Felix and Băile 1 Mai. More specifically, there are many health resorts in Romania that despite of low transport accessibility, they registered a high net use index of accommodation capacity between 2004-2013, eloquent in this sense being Bazna, Băile Govora, Bălţăteşti, Călimăneşti, Covasna, Geoagiu Băi, Lacul Sărat, Moneasa, Pucioasa, Sângeorz Băi, Slănic Prahova, Tinca, Soveja, Vişeu.

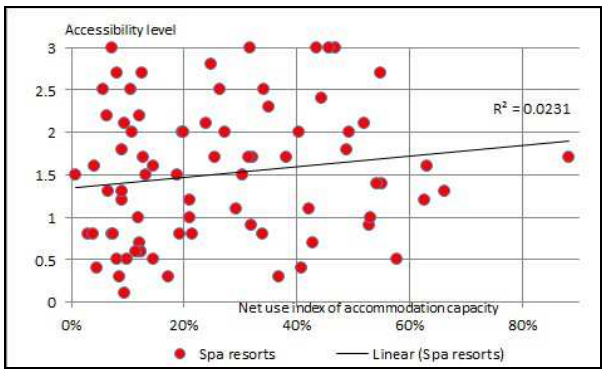

Fig. 11. The correlation result between each health resort, general level of accessibility, and the average net use index of accommodation capacity (2004-2013).

From all indicators, this one seems to be the most conclusive for the particular character of health resorts, given the fact that their appearance accounted for the contextualization of natural therapeutic factors.

4. CONCLUSION

The study regarding transport accessibility as a factor for accommodation base development showed that indicators such as the number of accommodation places, number of hotels, and number of three and four stars units were not influenced by transport

accessibility, demonstrating that health resorts are particular by their appearance.

The present study continued the research of the first one, revealing the fact that tourist flow was also not influenced by level of transport accessibility.

Regarding the similarities of these two studies, an example is that most of health resorts that present deficits regarding general accessibility are located in the Carpathian Mountains (Apuseni, Banat, Poiana Ruscă Mountains, Eastern Carpathians, Curburii Sub-Carpathians, Maramureş Depression) due to the land morphology, and in the Moldavian, Getic Plateau, north and south parts of Oltenia because of the ineffective distribution of transport infrastructure. On the other side, health resorts that recorded a high level of accessibility are situated in the West Plain because they are crossed by the 200th, 900th main railways and E70 European Road, in Prahova Valley due to E60, E68, E578, E574 European roads and to 200, 300, 400 main railways, in at the seashore due to the 800 main railway and E87 major road. Moreover, the correlation results emphasized on the idea that the quality of transport infrastructure was not a decisive factor for the development of health resorts. The differences between these studies, after several changes regarding the method of transport accessibility setting, showed that Bărăgan Plain, south-east and north parts of Transylvania, the east part of the Romanian Plain were also included in the category of low accessibility areas.

Through this paper we concluded that the aerial accessibility represented the major lack of integrity of the Romanian transport infrastructure, because most of resorts presenting low aerial accessibility have the largest territory spread, namely the Carpathian Mountains, the Moldavian Plateau, the entire Romanian Plain, except for Bucharest area, the entire Sub-Carpathians except for the Moldavian ones.

Analyzing the results, a strong argument is that Romanian health resorts were established and have developed differently than other type of resorts. In many cases, the development of a health resort determined the construction of a transport link, better-located health resorts being able to develop faster. Therefore, health resorts usually developed due to high values of their therapeutic resources.

Therefore, the present study achieved his goal, highlighting the influence of accessibility level upon infrastructure base of each health resort.

Even if quality and quantity of transport infrastructure does not represent a decisive factor over accommodation base and tourist flows, an eventual modernization process should not be abandoned, because in the future, transport services will have a larger influence on tourists' decisions, due to the fact that the travelling on long distances and to hardly accessible places will become a priority in their preferences.

Therefore, the obtained results regarding the accessibility level of each Romanian resort and the correlation coefficient with tourist flow, correspond to reality and present a logical structure following the observations on cartographic materials and correlation charts realised.

These studies reflected also the health priority for patient-tourists and the therapeutic values of treatment factors of the health resorts, which are more important than infrastructure base or level of accessibility.

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