

# STATISTICAL ANALYSIS OF TOURISM CIRCULATION AND ACCOMMODATION CAPACITY IN THE PERIOD 2008 – 2017 IN NEAMŢ COUNTY

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## Abstract

The evolution of the number of arrivals during the period 2008-2017 in Neamţ County shows a fluctuating evolution. The minimum value of 131 thousand tourists was recorded in 2010, with peak values being recorded towards the end of the period, 224 thousand tourists in 2016 and 239 thousand tourists respectively in 2017. The absolute and relative changes of arrivals during 2008-2017, from Neamţ County indicates an average level of arrivals ( $\bar{y}$ ) of 170.1 thousand; the absolute mean change of arrivals ( $\bar{\Delta}$ ) recorded 8.77 thousand; the average arrival dynamics index ( $\bar{I}$ ) was 1,045 or 104,5%; the average pace of arrivals dynamics ( $\bar{R}$ ) was 4.5%. The evolution of the number of overnight stays was roughly similar to the evolution of the number of arrivals during 2008-2017. The minimum overnight stays were recorded in 2011 by 274 thousand tourists. In 2016 and 2017, the highest values were registered. The absolute and relative changes of the overnight stays in the period 2008-2017 in Neamţ County indicate an average overnight stay ( $\bar{y}$ ) of 333 thousand tourists-days; the mean change of overnight stays ( $\bar{\Delta}$ ) recorded 9.77 thousand tourists-days; the average overnight dynamics index ( $\bar{I}$ ) was 1,025 or 102,5% and the average overnight dynamics ( $\bar{R}$ ) was 2.5%. The evolution of the accommodation capacity in operation in Neamţ County during the analyzed period (2008-2017) shows an increase of 47% registered in 2017 compared to the reference year (2008). The average level of accommodation capacity ( $\bar{y}$ ) was 1702.6 thousand seats/year; the average change in accommodation capacity in operation ( $\bar{\Delta}$ ) recorded 71.77 thousand days/year; the average dynamic of accommodation capacity in operation ( $\bar{I}$ ) was 1.044 or 104,4%; the average pace of accommodation capacity in operation ( $\bar{R}$ ) was 4.4%. In the tourist accommodation structures in Neamţ County, the net use index of the tourist accommodation capacity in operation had an average level of 19.60% during the analyzed period (2008-2017), the highest level being registered in 2008 (25.09%).

**Key words:** arrivals, overnight stays, accommodation capacity in operation

## INTRODUCTION

Neamţ County is among those counties of the country with a particularly rich touristic potential. The relief of Neamţ County is varied, arranged in steps from west to east, from the mountains that occupy over half of the county's surface in the west (Stânişoara, Bistriţa and Ceahlău) to the Siret Plain to the east. From the Carpathians, the Ceahlău Massif is the most impressive, both with the special beauty of the scenery offered and its imposing appearance. The karst formations in

the county are: Munticelu Cave, Toşorog Cave, Detunate Complex, Groapa with Var Cave, Fountain 3 Cave. In Neamţ County there are numerous monasteries (Agapia, Văratec, Secu, Sihăstria, Războieni, Bistriţa, Durău, Pângăraţi, Neamţ), fortresses (Neamţ Fortress, Băta Doamnei Fortress, New Fortress of Roman), museums and memorial houses "Ion Creangă", "Calistrat Hogaş" Memorial Museum, "Mihail Sadoveanu" Memorial House, Veronica Micle Memorial House, a famous inn (Ancuţa Inn) and three tourist resorts: Mirrors, Neguleşti and Durău, religious, treatment, rest and practicing winter sports [5].

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Neamț County is a very good tourist area for Romania. This position in relation to other tourist areas in Romania is also reflected by the statistical indicators referring to the tourist circulation and the accommodation capacity in operation. In this study we intend to analyze statistically the evolution of the tourist circulation and of the accommodation capacity in operation in this area during 2008-2017.

The evolution of tourist traffic is manifested under the influence of a complex of factors, some of which are essential, others with less and less significant influence [1] [6]. Therefore, in the analysis of the connections will be used nonparametric correlation models, in which the determining factor will be the accommodation capacity in operation, and the dependent factors will be total tourists' arrivals and overnight stays [2] [3].

## MATERIAL AND METHOD

The number of tourists (arrivals) accommodated in tourist accommodation establishments includes all persons (Romanians and foreigners) who travel outside the settlements where they have a stable residence for a period of less than 12 months and stay for at least one night in a tourist accommodation unit in areas visited in the country, the main reason for the trip being another if to carry out a paid activity in the visited places [7].

The day/tourist number (tourist overnight) is the 24-hour period, starting with the hotel hour, for which a person is registered in the tourist accommodation space and benefits from hosting the occupancy rate account, even if the actual stay is below that range. It is also considered the overnight stays for additional installed beds (paid by the clients) [7].

Tourist accommodation capacity in operation is the number of accommodation places available to tourists by tourist accommodation units, considering the number of days the units are opened during the period considered. It is expressed in places - days. Excluded places in rooms or units temporarily closed due to lack of tourists, for repair or for other reasons [7].

The index of the use of tourist accommodation capacity in operation is calculated by reporting the number of overnight stays made to the tourist accommodation capacity in operation during that period [7].

$$I_n = (N/C_f) \times 100$$

where:  $I_n$  - index of the use of tourist accommodation capacity in operation;

$N$  - no. of overnight stays in a given period;

$C_f$  - tourist accommodation capacity in operation.

Absolute indicators are the basic form of dynamic series, based on which generalizable indicators can be obtained [4].

Level indicators are even the terms of a series of absolute indicators ( $y_1 \dots y_t \dots y_{t-1}$ ).

Total level of terms ( $\sum_{t=1}^n y_t$ ), only for series of absolute time intervals.

Absolute changes

- fixed base ( $\Delta_{t/1}$ )

$$\Delta_{t/1} = y_t - y_1, \text{ where } t = 2, n$$

- with chain base (mobile or variable base) ( $\Delta_{t/t-1} = y_t - y_{t-1}$ )

$$\Delta_{t/t-1} = y_t - y_{t-1}, \text{ where } t = 2, n$$

Relative indicators

It is a way of presenting a percentage rule. In this situation, it is obligatory to specify in the title or outside the table what the reporting base is, so that the interpretation of the data is correct.

Dynamic index

- fixed base ( $I_{t/1}$ ):

$$I_{t/1}(\%) = \frac{y_t}{y_1} \times 100$$

- with chain base ( $I_{t/t-1}$ ):

$$I_{t/t-1}(\%) = \frac{y_t}{y_{t-1}} \times 100$$

Dynamic rhythm

- fixed base ( $R_{t/1}$ ):

$$R_{t/1} = I_{t/1}(\%) - 100\%$$

- with chain base ( $R_{t/t-1}$ ):

$$R_{t/t-1}(\%) = I_{t/t-1}(\%) - 100\%, t = 2, n$$

The adjusted trend method was used to adjust for the linear trend for the 2008-2017 timeframe.

The linear model:  $y = a + bt$ .

The scalar method was used to assess the tourist attractiveness of Neamț County.

**RESULTS AND DISCUSSIONS**

**Analysis of tourism traffic indicators**

The evolution of arrivals of tourists in the tourist accommodation structures in Neamț County, during the period 2008-2017, is presented in Table 1.

From Table 1, it can be seen that the evolution of the number of arrivals during the period 2008 - 2017 shows a fluctuating evolution. The minimum value of 131 thousand tourists is recorded in 2010, the maximum values being registered at the end of the period, 224 thousand in 2016 and 239

thousand in 2017 respectively. In 2009 there is a decrease compared to 2008 of the number of tourists arrived in Neamț County with about 11 thousand and also in 2010 compared to 2009 by about 18 thousand. After the two consecutive years of decrease in the number of tourists, the general trend until the end of the analyzed period is an increase in the number of arrivals in the tourist accommodation structures in Neamț County.

Table 1 Evolution of the total number of arrivals during 2008-2017, in Neamț County

Years	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
No. of arrivals (thousand)	160	149	131	133	146	161	176	182	224	239

Source: <http://statistici.insse.ro>

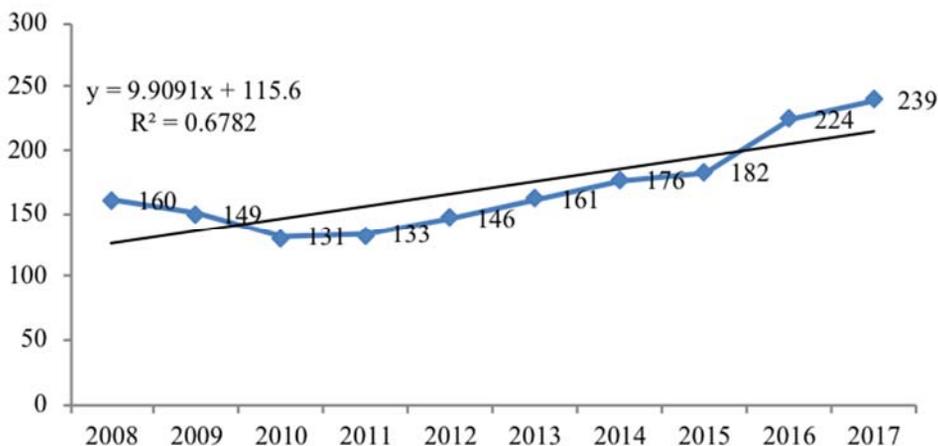


Fig. 1 Evolution of the total number of arrivals in the receiving structures tourism in Neamț County, during 2008-2017

The evolution of the number of arrivals during 2008-2017 was characterized by an alternation of decreases and relative increases (Figure 1), around an ascending trend expressed by the linear function:

$$y = 9.9091x + 115.6 \quad (1)$$

$R^2 = 0.6782$  indicates a relatively acceptable approximation of the trend by the linear function (1).

The dynamic model of the trend of the number of arrivals in the touristic reception structures in Neamț county expressed by a 4th polynomial function is (figure 2):

$$y = 0.0157x^4 - 0.5462x^3 + 8.38x^2 - 40.24x + 194.17 \quad (2)$$

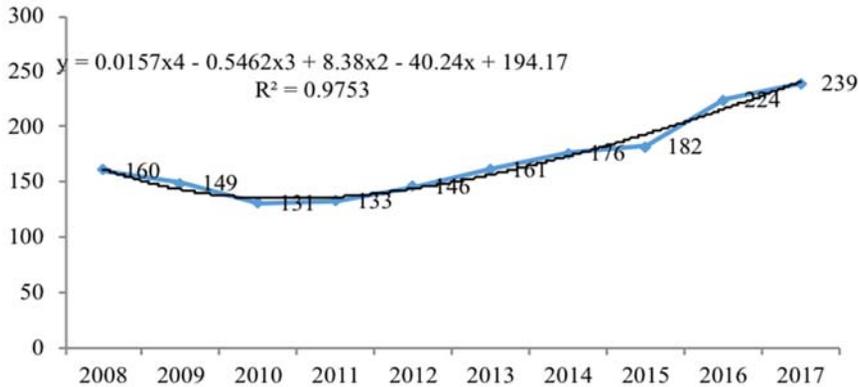


Fig. 2 Expression of the evolution of the total number of arrivals in the structures tourist reception in Neamț County, during the period 2008-2017 by polynomial trend

For a dynamic analysis of this indicator, we use the indicators of a chronological series. Analyzing the absolute and relative dynamics of arrivals, we can see that the

number of tourists increased considerably in 2017 compared to 2008 (with 79 thousand tourists). The largest increase over the base year was recorded in 2017 by 49.4%.

Table 2 Absolute and relative changes of arrivals during the period 2008-2017, in Neamț County

Years	No. of arrivals (thousand)	Absolute changes		Dynamics index%		Dynamic Rhythm%	
		$\Delta_{t/t}$	$\Delta_{t/t-1}$	$I_{t/t}$	$I_{t/t-1}$	$R_{t/t}$	$R_{t/t-1}$
2008	160	-	-	-	-	-	-
2009	149	-11	-11	93.1	93.1	-6.9	-6.9
2010	131	-29	-18	81.9	87.9	-18.1	-12.1
2011	133	-27	2	83.1	101.5	-16.9	1.5
2012	146	-14	13	91.2	109.8	-8.8	9.8
2013	161	1	15	100.6	110.3	0.6	10.3
2014	176	16	15	110.0	109.3	10.0	9.3
2015	182	22	6	113.7	103.4	13.7	3.4
2016	224	64	42	140.0	123.0	40.0	23.0
2017	239	79	15	149.4	106.7	49.4	6.7

The average arrivals level ( $\bar{y}$ ) was 170.1 thousand.

The absolute mean changes of arrivals ( $\bar{\Delta}$ ) recorded 8.77 thousand.

Average arrival dynamics index ( $\bar{I}$ ) was 1.045 or 104.5%.

The average arrival dynamics ( $\bar{R}$ ) was 4.5%.

The evolution of the total number of overnight stays in 2008-2017 expressed in thousands of tourists is shown in Table 2.

The evolution of the number of overnight stays was almost similar to the evolution of the number of arrivals during 2008-2017 (Figures 1 and 2). The minimum overnight stays are recorded in 2011 by 274 thousand tourists.

The decrease in the number of overnights in the three consecutive years 2009, 2010 and 2011 was followed by a further decrease in 2015. The highest values were registered in 2016 and 2017. The evolution of the number of overnight stays during 2008 - 2017 was characterized by an alternation of decreases and relative increases (figure 3), around an ascending trend expressed by the linear function:

$$y = 12.206x + 265.87 \quad (3)$$

$R^2 = 0.4127$  indicates a relatively acceptable approximation of trend by linear function (3).

Table 3 Evolution of the total number of overnights in the period 2008-2017, in Neamț County

Years	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
No. overnight stays (thousands of tourists - days)	346	321	275	274	291	295	333	332	429	434

Source: <http://statistici.insse.ro>

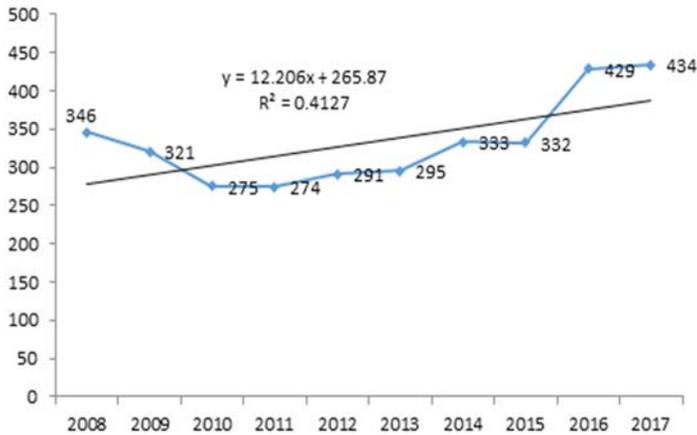


Fig. 3 Evolution of the total number of overnight stays in reception facilities tourism in Neamț County, during 2008-2017

The dynamic model of the trend of the number of arrivals in the touristic reception structures in Neamț county expressed by a 4th polynomial function is (figure 4):

$$y = -0.0597x^4 - 0.9862x^3 + 1.1267x^2 - 45.131x + 390.83 \quad (4)$$

For a dynamic analysis of overnight stays, we appeal to the chronological series

indicators. Analyzing the absolute and relative dynamics of overnight stays, we can see that the number of overnight stays increased considerably in 2017 compared to 2008 (by 88 thousand tourists-days). The highest increase compared to the base year was recorded in 2016 by 24%.

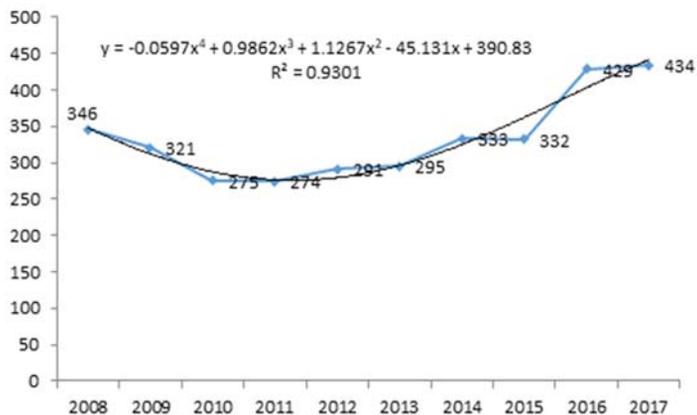


Fig. 4 Expression of the total number of overnight stays in the structures tourist reception in Neamț County, during the period 2008-2017 by polynomial trend

Table 4 Absolute and relative changes of overnight stays in 2008-2017, in Neamț County

Years	No. of overnights (thousands of tourists-days)	Absolute changes		Dynamics index%		Dynamic Rhythm%	
		$\Delta_{t/1}$	$\Delta_{t/t-1}$	$I_{t/1}$	$I_{t/t-1}$	$R_{t/1}$	$R_{t/t-1}$
2008	346	-	-	-	-		
2009	321	-25	-25	92.8	92.8	-7.2	-7.2
2010	275	-71	-46	79.5	85.7	-20.5	-14.3
2011	274	-72	-1	79.2	99.6	-20.8	-0.4
2012	291	-55	17	84.1	106.2	-15.9	6.2
2013	295	-51	4	85.3	101.4	-14.7	1.4
2014	333	-13	38	96.2	112.9	-3.8	12.9
2015	332	-14	-1	95.9	99.7	-4.1	-0.3
2016	429	83	97	124.0	129.2	24.0	29.2
2017	434	88	5	101.2	101.2	1.2	1.2

The average overnight stays ( $\bar{y}$ ) was 333 thousand tourists-days.

The average change in overnight stays ( $\bar{\Delta}$ ) recorded 9.77 thousand tourists-days.

The average overnight dynamics index ( $\bar{I}$ ) was 1.025 or 102.5%.

The average overnight dynamic rhythm ( $\bar{R}$ ) was 2.5%.

#### Analysis of accommodation capacity in operation

The accommodation capacity in operation, an essential element in the process of accommodation, is an indicator with profound implications in determining the efficiency of tourism activity.

The evolution of the accommodation capacity in operation in Neamț County in the period 2008-2017 is presented in Table 5.

Analyzing the evolution of accommodation capacity in operation in the period 2008-2017, although there is an increase of 47% in 2017 compared to the reference year (2008), this evolution cannot be attributed to a weak impact of the economic crisis but to practical its inelasticity in relation to the considerable decline in revenue caused by the crisis. The impact of the economic crisis on the evolution of accommodation capacity in operation was evident in 2011, when the value of accommodation capacity in operation was registered by about 10% lower than in the previous year.

Table 5 Accommodation capacity in operation during 2008-2017, in Neamț County

Years	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Accommodation capacity in operation (thousands of places)	1379	1563	1566	1416	1621	1773	1797	1845	2041	2025

Source: <http://statistici.insse.ro>

For a dynamic analysis of accommodation capacity in operation, we appeal to the indicators of a chronological series. Analyzing the absolute and relative dynamics of accommodation capacity in operation, we can say that the number of

thousands of places-days increased considerably in 2017 compared to 2008 (by approximately 645 thousand places-days). The highest increase compared to the base year was recorded in 2016 by 48%.

Table 6 Absolute and relative changes in accommodation capacity in operation during 2008-2017, in Neamț County

Years	Accommodation capacity in operation (thousands of places-days)	Absolute changes		Dynamics index %		Dynamic Rhythm %	
		$\Delta_{U/1}$	$\Delta_{U/t-1}$	$I_{U/1}$	$I_{U/t-1}$	$R_{U/1}$	$R_{U/t-1}$
2008	1379	-	-	-	-		
2009	1563	184	184	113.3	113.3	13.3	13.3
2010	1566	187	3	113.6	100.2	13.6	0.2
2011	1416	37	-150	102.7	90.4	2.7	-9.6
2012	1621	242	205	117.5	114.5	17.5	14.5
2013	1773	394	152	128.6	109.4	28.6	9.4
2014	1797	418	24	130.3	101.3	30.3	1.3
2015	1845	466	48	133.8	102.7	33.8	2.7
2016	2041	662	196	148.0	110.6	48.0	10.6
2017	2025	645	-17	146.8	99.2	46.8	-0.8

The average level of accommodation capacity in service ( $\bar{y}$ ) was 1702.6 thousand seats / day.

The average change in accommodation capacity in operation ( $\bar{\Delta}$ ) was 71.77 thousand places / days.

The Average Dynamic Index of Accommodation Capacity ( $\bar{I}$ ) was 1.044 or 104.4%.

The average rate of accommodation capacity in operation ( $\bar{R}$ ) was 4.4%.

#### Analysis of the evolution of indices of net use of accommodation capacity in operation

Evolution of net use indices of accommodation capacity in operation during the analyzed period is presented in Table 7.

In the tourist accommodation structures in Neamț County, the net use index of the tourist accommodation capacity in operation had an average level of 19.60% during the analyzed period (2008-2017), with the highest level being recorded in 2008 (25.09%).

Table 7 Indices of net use of the accommodation capacity in operation, in Neamț County

Years	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Indices of net use of accommodation capacity in service (%)	25.09	20.50	17.54	19.37	17.92	16.63	18.54	17.97	21.00	21.43

## CONCLUSIONS

The number of arrivals in the tourist accommodation structures in Neamț County during the analyzed period (2008-2017) showed a general trend of growth after the crisis period, reaching in 2017 the maximum value of approximately 239 thousand arrivals. The outbreak of the economic crisis in 2008 had a significant impact on the number of arrivals, so in 2010 their number decreased to 131 thousand tourists, which corresponds to a decrease of 12% compared to the previous year and a decrease of 18% compared to 2008. Analyzing the absolute and relative dynamics of arrivals, we can see

that the number of tourists increased in 2017 compared to 2008 (with 79 thousand tourists). The largest increase over the base year was recorded in 2017 by 49.4%.

Evolution of overnight stays is similar to the evolution of arrivals in 2008-2017. In 2017, the highest values are registered, and in 2011 there is a value of overnight stays of 274 thousand with about 21% lower than in 2008. Analyzing the absolute and relative dynamics of overnight stays we can see that the number of overnight stays increased 2017 compared to 2008 (with 88 thousand tourists-days). The highest increase compared to the base year was recorded in 2016 by 24%.

The accommodation capacity in operation increased continuously with small fluctuations reaching 2025 thousand places in 2017. The impact of the economic crisis and the effects of the fiscal policy elements in Romania during that period (decrease of the salaries of the budgetary personnel by 25% and increases of the VAT rate with up to 24%), on the evolution of accommodation capacity in operation, however, showed in 2011 when the accommodation capacity in operation showed a decrease of 10% compared to the previous year.

Analyzing the absolute and relative dynamics of accommodation capacity in operation, we can say that the number of thousands of places / days increased in 2017 compared to 2008 (by approximately 645 thousand places / days). The highest increase compared to the base year was recorded in 2016 by 48%.

The net use index of the tourist accommodation capacity in operation had an average level of 19.60% during the analyzed period (2008-2017), its highest level being registered in 2008 (25.09%).

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