STATISTICAL ANALYSIS OF TOURISM CIRCULATION AND ACCOMMODATION CAPACITY DURING THE YEARS 2008 – 2017 IN IAŞI COUNTY

Cristina Simeanu[1*], B. Păsărin[1], Valerica Gîlcă[1], D. Simeanu[1], C. Roşca[1]

*[1]Faculty of Animal Sciences, University of Agricultural Sciences
and Veterinary Medicine of Iasi, Romania*

Abstract

The evolution of the number of arrivals over the period 2008-2017 in Iaşi County showed an oscillatory evolution with successive decreases and increases. The minimum value of 159 thousand tourists was recorded in 2009, with peak values being recorded towards the end of the period, 299 thousand tourists in 2016 and 321 thousand in 2017 respectively. Absolute and relative changes of arrivals during the period 2008-2017, in Iaşi County, reveals an average level of arrivals ($\bar{y}$) of 211.3 thousand; an average change in arrivals ($\bar{\Delta}$) which recorded 17.11 this; the average arrivals dynamics index ($\bar{I}$) was 1.075 or 107.5% and the average upward pace of arrivals ($\bar{R}$) was 7.5%. The evolution of the number of overnight stays was similar to the evolution of the number of arrivals during 2008-2017. The minimum overnight stays were recorded in 2009 (339 thousand tourists-days). In 2016 and 2017, the highest values were registered. The absolute and relative changes of overnight stays in 2008-2017 in Iaşi County indicate an average overnight stay ($\bar{y}$) with 406.9 thousand tourists-days; the mean change of overnight stays ($\bar{\Delta}$) recorded 19.22 thousand tourists-days; the average overnight dynamics index ($\bar{I}$) was 1.043 or 104.3% and a mean overnight dynamic ($\bar{R}$) that was 4.3%. The evolution of the accommodation capacity in operation in Iaşi county in the period 2008-2017 shows an increase of more than 70% recorded at the end of the period compared to the reference year 2008. The average level of the accommodation capacity in operation ($\bar{y}$) was 1251. 9 thousand places-days/year; the average change in accommodation capacity in operation ($\bar{\Delta}$) recorded 68.22 thousand places/days/year; the average dynamic of accommodation capacity in operation ($\bar{I}$) was 1.060 or 106.0% and the average dynamic pace of accommodation capacity in operation ($\bar{R}$) was 6%. The net use index of tourist accommodation capacity in operation had an average level of 32.64% during the analyzed period (2008 -2017), with the highest value being recorded in 2008 of about 43%.

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

INTRODUCTION

The exceptional tourist potential of Iași County is mainly given by the historical and cultural tourism background that reflects its history and culture, being endowed with varied objectives, a high artistic level and great tourist attractiveness. To all these cultural-historical values we add the ethnographic and folklore tourism potential along with the natural tourist resources [5].

According to the Iași County Development Strategy 2014-2020, the tourism sector

contributed only 1.92% of the generated turnover at the county level (in 2012) from the HORECA type activity and tour operator activity. Also, only 4.82% of the active population work in these sectors. The potential and, of course, the tourist offer in Iași County must be seen both from the point of view of capitalizing on the cultural and natural heritage, as well as from the perspective of capitalizing on niche tourism, as well as the development of recreational activities [7].

Iași County is a 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

---

*Corresponding author: cristina.simeanu@yahoo.com
The manuscript was received: 05.09.2018
Accepted for publication: 25.10.2018

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 them 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 to carry out a paid activity in the visited places [8].

The days/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) [8].

Tourist accommodation capacity in operation is the number of accommodation places available to tourists by tourist accommodation units, considering the fact that 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 [8].

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 [8].

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

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, afterwards we can calculate the generalized indicators [4].

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

The totalized level of terms ($(\sum_{t=1}^{n} yt)$, for the absolute time series only.

The absolute changes
- with fixed base ($\Delta_{t/1}$)

$\Delta_{t/1} = y_t - y_1$, where t = 2, n
- with chain base (mobile or variable base) ($\Delta_{t/t/1} = y_t - y_{t-1}$)

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

Relative indicators. It is a percentage way of presenting. Dynamics index
- with fixed base ($I_{t/1}$):

$I_{t/1(\%)} = \frac{yt}{y1} \times 100$
- 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 the number of tourists by 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 Iași county.

RESULTS AND DISCUSSIONS

Analysis of tourism traffic indicators

The evolution of tourists' arrivals in the tourist accommodation establishments in Iași County, during 2008-2017 is presented in Table 1.

From table 1, it can be observed that the evolution of the number of arrivals during the period 2008-2017 shows an oscillatory evolution with successive decreases and increases. The minimum value of 159 thousand tourists was registered in 2009, the maximum values being registered at the end of the period, 299 thousand in 2016 and 321 thousand in 2017 respectively. In 2009 there was a decrease compared to 2008 of the number of tourists arrived in Iași county by about 8 thousand and also in 2013 compared

to 2012 by about 2 thousand. Thus, it can be said that the general trend is to increase the number of arrivals in the tourist accommodation structures in Iași county during the analyzed period.

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

$$y = 16.806 x + 118.87 \quad (1)$$

$R^2 = 0.783$ indicates a relatively acceptable approximation of the trend by linear function (1).

However, considering that the value of the coefficient $R^2 = 0.7873$ is relatively low in the analysis, a polynomial model it was applicate (*fig. 2*) of the form:

$$y = -0.0927x^4 + 2.3345x^3 - 16.727x^2 + 46.27x + 129.33 \quad (2)$$

Although $R^2 = 0.97$ indicates a good approximation of the evolution of arrivals during the analyzed period, model (2) can be used in good conditions only for interpolation. Its use for extrapolation of arrivals should be done with reservations.

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

Years	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
No. of arrivals (thousand)	167	159	173	182	186	183	197	246	299	321

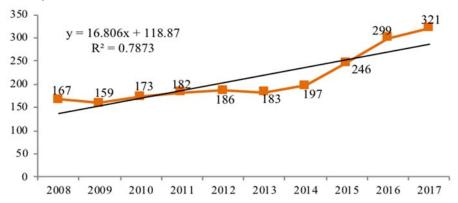*Source: http://statistici.insse.ro*

Fig. 1 Evolution of the total number of arrivals in reception facilities tourism in Iași County, during 2008-2017
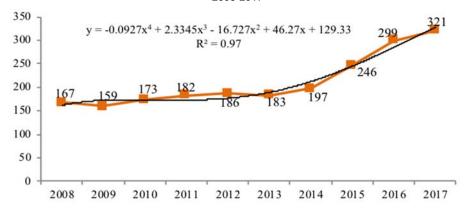

Fig. 2 Expression of the evolution of the total number of arrivals in the structures tourist reception in Iași County, 2008-2017 by polynomial trend

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 (by 154.000). The largest increase over the base year was recorded in 2017 by 92.2%.

Table 2 Absolute and relative changes of arrivals during 2008-2017, in Iași County

Years	No. of arrivals (thousand)	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	167	-	-	-	-		
2009	159	-8	-8	92.2	92.2	-7.8	-7.8
2010	173	6	14	103.6	108.8	3.6	8.8
2011	182	15	9	109.0	105.2	9.0	5.2
2012	186	19	4	111.4	102.2	11.4	2.2
2013	183	16	-3	109.6	93.4	9.6	-6.6
2014	197	30	14	118.0	107.6	18.0	7.6
2015	246	79	49	147.3	124.9	47.3	24.9
2016	299	132	53	179.0	121.5	79.0	21.5
2017	321	154	22	192.2	107.3	92.2	7.3

The average arrivals level ($\bar{y}$) was 211.3 thousand.

Average change of arrivals ($\bar{\Delta}$) recorded 17.11 this.

Average arrival dynamics index ($\bar{I}$) was 1.075 or 107.5%.

The average arrival dynamics ($\bar{R}$) was 7.5%.

The evolution of the total number of overnight stays in 2008-2017 expressed in thousands of tourists is shown in table 3.

The evolution of the number of overnight stays was similar to the evolution of the number of arrivals during 2008-2017 (fig. 3 and 4). The minimum overnight stays were recorded in 2009 (339 thousand tourists-days), compared to the previous year (2008), the decrease was 37 thousand overnight stays. In 2013 there was also a decrease in the number of overnight stays compared to 2012, by 21 thousand. In 2016 and 2017, the highest values were recorded.

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

$y = 22.248 x + 248.53$ (3)

$R^2 = 0.6933$ indicates a relatively acceptable approximation of trend by linear function (3).

The dynamic model of the trend of the number of overnights in the Romanian tourist accommodation structures expressed by a 4th polynomial function is:

$y = -0.1622x^4 + 3.4319x^3 - 18.535x^2 + 24.583x + 357.92$ (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 in 2017 compared to 2008 (by 173 thousand tourists-days). The largest increase over the base year was 46% in 2017.

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

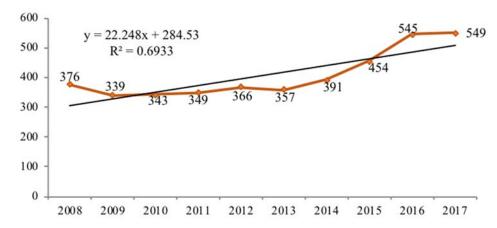| Years	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
No. overnight stays (thousands of tourists - days)	376	339	343	349	366	357	391	454	545	549

Source: http://statistici.insse.ro

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

The dynamic model of the trend of the number of overnights in the Romanian tourist accommodation structures expressed by a 4th polynomial function is:

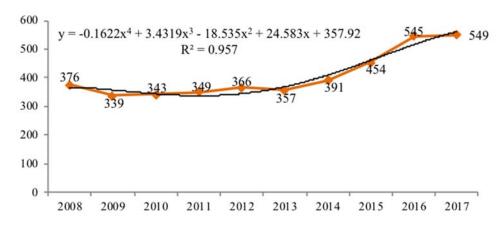$y = -0.1622x^4 + 3.4319x^3 - 18.535x^2 + 24.583x + 357.92$ (4).

Fig. 4 Expression of the evolution of the total number of overnight stays in the structure's tourist reception in Iași County, 2008-2017 by polynomial trend

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 in 2017 compared to 2008 (by 173 thousand tourists-days). The largest increase over the base year was 46% in 2017.

Table 4 Absolute and relative changes of overnight stays in 2008-2017, in Iași 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	376	-	-	-	-		
2009	339	-37	-37	90.1	90.1	-9.9	-9.9
2010	343	-33	4	91.2	101.1	-8.8	1.1
2011	349	-27	6	92.8	101.7	-7.2	1.7
2012	366	-10	17	97.3	104.9	-2.7	4.9
2013	357	-19	-9	94.9	97.5	-5.1	-2.5
2014	391	15	34	104.0	109.5	4.0	9.5
2015	454	78	63	120.7	116.1	20.7	16.1
2016	545	169	91	144.9	120.0	44.9	20.0
2017	549	173	4	146.0	100.7	46.0	0.7

The average overnight stays ($\bar{y}$) was 406.9 thousand tourists-days.

The average change in overnight stays ($\bar{\Delta}$) recorded 19.22 thousand tourists-days.

The average overnight dynamics index ($\bar{I}$) was 1.043 or 104.3%.

The average overnight dynamics ($\bar{R}$) was 4.3%.

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 the county of Iași in the period 2008-2017 is presented in Table 5. Analyzing the evolution of the accommodation capacity in operation during the period 2008-2017, although there is an increase, this evolution cannot be attributed to a weak impact of the onset of the economic crisis but basically 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, however, manifested itself in 2011 when there was a decrease of the accommodation capacity in operation by 2% compared to the previous year.

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

Years	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Accommodation capacity in operation (thousands of places)	876	1081	1175	1152	1180	1214	1375	1445	1531	1490

Source: http://statistici.insse.ro

For a dynamic analysis of accommodation capacity in operation, we use 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 seats / days increased considerably in 2017 compared to 2008 (by approximately 614 thousand places / days). The largest increase over the base year was recorded in 2016 by 74.8%.

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

Years	Accommodation capacity in operation (thousands of places-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	876	-	-	-	-		
2009	1081	205	205	123.4	123.4	23.4	23.4
2010	1175	229	94	134.1	108.7	34.1	8.7
2011	1152	276	-23	131.5	98.0	31.5	-2.0
2012	1180	304	28	134.7	102.4	34.7	2.4
2013	1214	365	34	138.6	102.9	38.6	2.9
2014	1375	499	161	157.0	113.3	57.0	13.3
2015	1445	569	70	164.9	105.1	64.9	5.1
2016	1531	655	86	174.8	105.9	74.8	5.9
2017	1490	614	-41	170.1	97.3	70.1	-2.7

The average level of accommodation capacity ($\bar{y}$) was 1251.9 thousand places / days.

The average change in accommodation capacity in operation ($\bar{\Delta}$) recorded 68.22 thousands of days/year.

The average dynamic index of accommodation capacity in operation ($\bar{I}$) was 1.060 or 106.0%.

The average rate of accommodation capacity in operation ($\bar{R}$) was 6.0%.

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 establishments in Iași County, the net use index of the tourist accommodation capacity in operation had an average level of 32.64% in the analyzed period (2008-2017), with the highest level recorded in 2008.

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

Years	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Indices of net use of accommodation capacity in service (%)	42.93	31.33	29.19	30.34	30.98	29.36	28.47	31.42	35.59	36.81

CONCLUSIONS

The number of arrivals in the touristic reception facilities in Iași County during the analyzed period (2008-2017) showed a general trend of growth, with slight fluctuations, reaching in 2017 the maximum value of 321 thousand arrivals. The outbreak of the economic crisis had an impact on the number of arrivals, in 2009 their number decreased to 159 thousand tourists, which corresponds to a decrease of 4.8% compared to the previous year. Analyzing the absolute and relative dynamics of arrivals, we can see that the number of tourists increased considerably in 2017 compared to 2008 (by

154.000). The largest increase over the base year was recorded in 2017 by 92.2%

Evolution of overnight stays is similar to the evolution of arrivals in 2008-2017. In 2017, the highest values are recorded, and in 2009 there is 10% lower overnight stays compared to 2008. Analyzing the absolute and relative dynamics of overnight stays, we can see that the number of overnight stays increased in 2017 as compared to 2008 (with 173 thousand tourists-days). The largest increase over the base year was 46% in 2017.

The accommodation capacity in operation increased steadily, with small fluctuations, reaching the maximum of 1531 thousand

places-days in 2016. Analyzing the absolute and relative dynamics of the accommodation capacity in operation, we can say that the number of thousands of places-days has increased considerably in 2017 compared to 2008 (by approximately 614 thousand places-days). The largest increase over the base year was recorded in 2016 by 74.8%.

Given that the tourist offer is not promoted on a unitary basis, but especially because most of the objectives in Iași County are not included in the integrated packages of the tour operators, the level of use of the accommodation structures registers modest thresholds. Accommodation facilities are not used at their full capacity in 2014, with a net use index of only 28.47% and fluctuating in the analyzed period (2008-2017).

REFERENCES

[1] Badita Maria, Cristache Silvia Elena, Iacob Andreea Iluzia, 2005: Statistics applied in tourism management, ASE Publishing House, Bucharest, pp. 26-70

[2] Bălăcescu Aniela, Zaharia Marian, 2011: The analysis of tourism traffic in Romania in the period 1999-2009, Annals of "Constantin Brâncuşi" University of Târgu Jiu, Economia Series, Nr. 3/2011

[3] Bălăcescu Aniela, Zaharia Marian, 2012: Statistical analysis of the tourist traffic and tourist accommodation in the period 2000-2009 in the county of Braşov, Annals of "Constantin Brâncuşi" University of Târgu Jiu, Letters and Social Sciences Series, Nr. 3/2012

[4] Merce, E., Merce, C.C., 2009: Statistics - Established paradigms and the whole paradigm, Academic Press Publishing House, Cluj - Napoca, pp. 457 – 465

[5] Neacsu Nicolae, Băltăreţu Andreea, Neacşu Monica, Drăghila Marcela, 2016: Resources and tourist destinations in Romania, University Publishing House, Bucharest, pp. 93-103

[6] Popa Victoria, 2009: The Analysis of the Chronological Indicators Evolution of the Tourists in the Rural Tourist Pensions in Alba County during 2000-2007, Agricultural Management-Scientific Works, Series I, Vol. XI (4), Agroprint Publishing House, Timişoara

[7]*http://www.anpm.ro

[8]*http://statistici.insse.ro