THE DYNAMICS OF CHANGES IN THE NUMBER OF OVERNIGHT TOURISTS IN HOTELS IN POLAND

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Keywords:
- hospitality management
- accommodation
- dynamics
- tourism

Abstract:
The article aims to examine the dynamics of changes in the number of overnight tourists in hotels in Poland between the years 2007 and 2016. The study uses data from the latest edition of "Tourism in 2016" published by Central Statistical Office in Poland (2017). Overnight visits include Polish resident travelers and non-resident foreign travelers staying overnight in Polish hotels. The obtained data pertaining to the number of both Polish and foreign tourists were analyzed in an absolute and a relative (percentage) scales. The results shown in a relative scale provide a better picture of the dynamics of changes in the processes as all values are assigned an initial value of 100 percent. They therefore inform us what was the dynamics of growth of the initial 100 tourists who stayed in Polish hotels in the years 2007-2016. Thus, the dynamics of changes in the number of both Polish and foreign tourists who stayed hotels in Poland in that period of time was evaluated. Furthermore, on the basis of the hotel overnight tourists change functions, the velocity rates and the acceleration rates of those changes have been calculated and presented in this study. The overnight tourists change velocity function denotes marginal changes of overnight tourists number during the time. The overnight tourists change acceleration function describes the tourists' pressure on the hotel accommodation market. One of the sources used was literature on the subject of evaluation of the dynamics of economic processes. Initially, an analysis of the dynamics of economic processes was performed on the empirical data. In this study two types of definitions of dynamics were used: an absolute definition of dynamics for continuous series and a relative (the appropriate one) definition of dynamics for these continuous series converted to a percentage scale. Dynamics in both of these cases was treated as a momentary velocities and a momentary accelerations on a strictly defined paths of the processes. The path of a process is the function describing basic continuous elementary events.

INTRODUCTION

Globalization processes in today's world mean that societies are becoming increasingly service oriented. The hospitality and tourism management industry has experienced a rapid growth and development in recent years, providing numerous jobs and contributing significantly to the world economy (Matušíková, Gburová 2014). Tourism and hospitality industry play a significant role in the Polish and regional economy and its expansion has a huge impact on the Polish economy. This important economy sector not only generates economic growth and development, but it also creates various social benefits. It creates new jobs in hospitality, gastronomy and transport businesses. The term "tourism" is used here in a

very broad sense, and also includes all sorts of expenses connected with the departures and arrivals of visitors. Because of the complex nature of tourism, to analyse it one needs various sources of statistical data and the right methodological tools.

This study is based on data from the latest edition of Tourism in 2016 Survey published by Central Statistical Office in Poland (2017). This is the source of data on capacity and occupancy in tourist accommodation establishments, participation of Polish and foreign residents in tourism and on border traffic. Information is obtained through the reports of the capacity and occupancy in tourist accommodation establishments in each year (Central Statistical Office, 2016, 2017).

The reporting units provide the following: precise location, type and category of the establishment, number of rooms, number of beds and catering establishments. Furthermore, they provide information on the establishment occupation in individual months. i.e. on the number of days of the establishment activity, nominal number of bed places or rooms, as well as the number of persons accommodated, and the number of overnights stays and rented rooms (separately for Polish and foreign tourists). Data concerning the number of accommodation beds, rooms and establishments covers all establishments open on 31 July and establishments closed on 31 July, but open on other days of the surveyed month. The maximum number of places has been assumed for them. The number of days of establishment activity does not include breaks between periods, caused by repairs, disinfection, etc. An active establishment is understood as an establishment which was accessible to tourists, at least in part, during the surveyed period. The number of overnight guests is the number of persons (tourists), who began their stay in an hotel in a given month. This means that the persons staying in the hotel at the turn of months will only be included in the survey once, which means that they will only be listed for one month. The number of overnight stays is the number of overnight tourists and the number of days of their stay.

On 31 July 2016, there were 10 125 registered accommodation establishments in Poland. Altogether there were 20 types of lodging facilities, with 3795 being hotel type facilities and the remainder 6330 falling into the rest of the categories. Amongst hotel-type lodging facilities, hotels were the largest group – 2373, while the largest group in the other categories were rooms for guests – 1894. In the all lodging facilities there were 724,0 thousands beds available. Traditionally, the most beds were available in hotels – 244,0 thousands, which made up 33,7% of all beds available as of 31 July 2016 In 2016, as compared to the results of the 2015 Survey, the number of all lodging facilities and the number of beds available have increased respectively by 1,9% and 1,0% (Central Statistical Office, 2016, 2017).

Table 1.1. Hotels by category – number of establishments

Hotels	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Total	1370	1488	1634	1796	1883	2014	2107	2250	2316	2373
*****	24	27	35	43	45	47	47	55	57	61
****	84	114	141	162	180	224	261	303	321	349
***	547	609	676	779	845	910	964	1056	1108	1166
**	450	459	487	510	518	551	565	572	565	552
*	157	170	175	177	174	177	171	167	158	150
During categorization	108	109	120	125	121	105	99	97	107	95

Source: Own work based on data of the Central Statistical Office (2017)

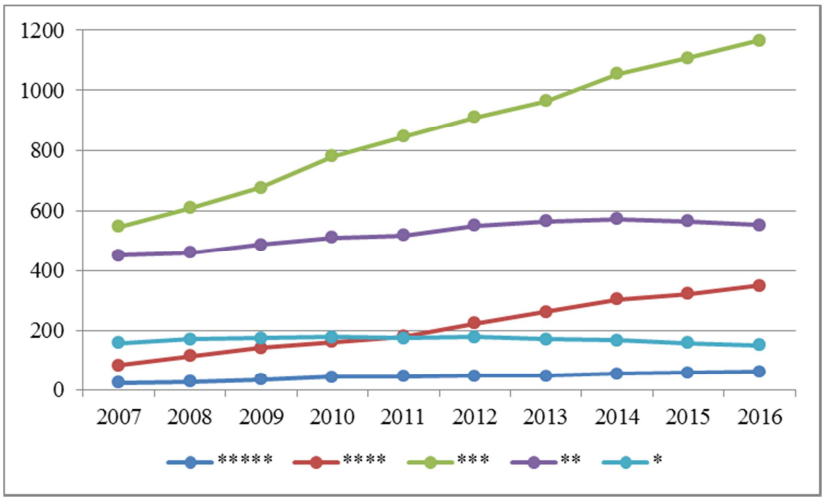

Figure 1.1. Hotels by category – number of establishments
Source: Own work based on data of the Central Statistical Office (2017)

Table 1.2. Hotels by category – number of beds (in thousands)

Hotels	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Total	141,1	155,8	165,6	176,0	187,0	198,1	208,6	227,5	235,6	243,9
*****	7,3	11,8	10,0	10,8	10,8	11,9	11,3	13,0	14,0	14,5
****	18,4	22,7	27,6	33,7	38,6	47,6	53,5	62,0	65,1	69,2
***	60,0	64,3	70,2	73,7	78,0	81,4	85,5	93,2	100,0	104,7
**	36,4	37,3	37,8	38,4	39,1	39,6	41,0	41,2	38,6	38,7
*	11,3	11,9	12,2	11,9	12,0	11,9	11,6	12,1	11,7	11,1
During categorization	7,7	7,8	7,8	7,6	8,6	5,8	5,7	6,1	6,2	5,8

Source: Own work based on data of the Central Statistical Office (2016)

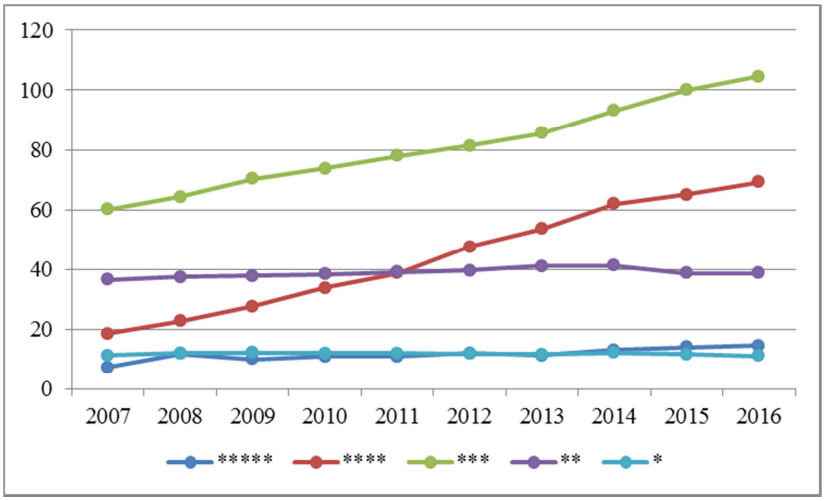

Figure 1.2. Hotels by category – number of beds (in thousands)
Source: Own work based on data of the Central Statistical Office (2017)

Table 1.3. Hotels by category – number of rooms (in thousands)

Hotels	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total	72,5	79,9	84,9	90,6	95,0	100,1	105,8	114,0	117,4	121,4
*****	4,3	6,9	5,8	6,2	6,2	6,6	6,3	7,0	7,4	7,6
****	9,5	11,8	14,4	17,6	19,7	24,0	27,6	31,0	32,3	34,4
***	31,2	33,2	36,0	38,1	39,9	41,4	43,1	46,9	49,9	52,2
**	18,6	18,7	19,2	19,4	19,4	19,7	20,5	20,4	19,3	19,1
*	5,4	5,7	5,8	5,7	5,7	5,6	5,6	5,8	5,6	5,3
During categorization	3,6	3,6	3,8	3,6	4,0	2,7	2,7	2,9	2,9	2,8

Source: Own work based on data of the Central Statistical Office (2016)

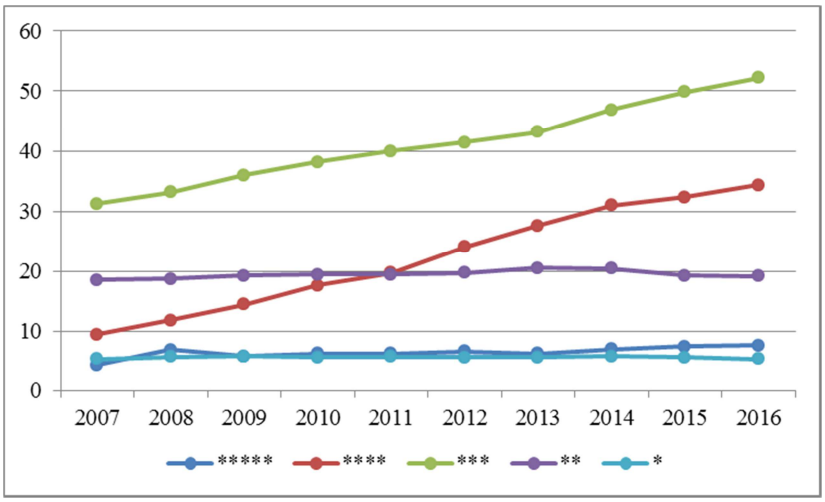

Figure 1.3. Hotels by category – number of rooms (in thousands)
Source: Own work based on data of the Central Statistical Office (2017).

Tables 1.1., 1.2., 1.3. and figures 1.1, 1.2., 1.3. present all hotels by category, including the number of hotel establishments, the number of beds, and the number of rooms available in Poland in the years 2007-2016. A general increase in the number of all hotels was observed in this period of time (for 2016 it was 173,2% of the 2007 value). However, this increase was particularly dynamic starting from 2008. Especially, a considerable rise in the number of 3-star and 4-star hotels contributed to this phenomenon. Moreover, among the total number of hotels, apart from those that were remained in their categories, there was a certain number of hotels which were in the process of categorization. Although this number was gradually decreasing, it rose slightly in the period of 2008-2010 and again in the year 2015. The number of beds in Polish hotels also increased. In 2016, as compared to 2007, the number of hotel establishments, the number of beds, and the number of rooms in those hotels increased respectively by 73,2%, 72,8%, and 67,4%. If we compare 2015 and 2016, these numbers are 2,5% for the number of hotel establishments, 3,5% for the number of beds and 3,4% for the number of rooms available.

METHODS

The aim of this analysis is the evaluation of the dynamics of changes in the number of resident and foreign overnight tourists in Polish hotels in the years 2007-2016. In this study, empirical data published by the Central Statistical Office of Poland (2016, 2017) were used.

Symbols used in this study:
t – time expressed in appropriate units, e.g. years;
J_t – general symbol for a value in time t, expressed in an absolute scale, in time series considered to be discrete time series (for example the general number of overnight tourists in hotels in year t);
J_0 – initial value in time t (value in the year 2007), in an absolute scale, in discrete time series, $t = 0$;
J_k – final value in time t (value in the year 2016), expressed in an absolute scale, in discrete time series;
M_t – general symbol for a value in time t, expressed in an absolute scale, in continuous time series;
M_0 – initial value in time t, (value in the year 2007), in continuous time series, $t = 0$;
M_k – final value in time t, (value in the year 2016), in continuous time series;
P_t – value in time t, expressed in a relative scale, where $P_0 = 100\%$, percentage values are obtained through a linear transformation of the M_t value. P_t informs us about an increase or a decrease in the initial 100 units of the value, it is a normalised scale;
P_0 – initial value in time t, (value in the year 2007), expressed in a relative (percentage) scale, $P_0 = 100\%$;
P_k – final value in time t, (value in the year 2016), expressed in a relative (percentage) scale;
$V(J)$ – overnight tourists change velocity rate;
$A(J)$ – overnight tourists change acceleration rate;
P_K – relative (percentage) change of a final value of a time series as in regard to the initial value (eg. M_k to M_0, where $M_0 = 100\%$).

Table 2.1. presents empirical data on the number of Polish and foreign overnight tourists in Polish hotels in the years 2007-2016. Primary empirical data are marked with J_t, set, where t is the time given in years from 2007 to 2016. They are of a discrete nature.

Table 2.1. The number of resident and non-resident overnight tourists in Polish hotels in the years 2007-2016

Year	All tourists [thousands]	Polish tourists [thousands]	Foreign tourists [thousands]
2007	10323,5	6786,2	3537,3
2008	10739,1	7470,7	3268,4
2009	10641,8	7500,3	3141,5
2010	11739,9	8355,5	3384,4
2011	12721,6	9129,1	3592,5
2012	13461,3	9439,1	4022,2
2013	14568,2	10246,0	4322,3
2014	16138,3	11616,4	4521,9
2015	17487,1	12779,4	4707,7
2016	18818,7	13782,1	5036,6

Source: Own work based on data of the Central Statistical Office (2017)

Data in this form do not allow to evaluate the dynamics of change (Łuka, 2007; Łuka, Kwiatkowska-Sienkiewicz, 2010a, 2010b; Stokłosa, 2004, 2006). Therefore, they were transformed into continuous time series M_t, by adding up consecutive sets according to the formula (2.1.):

$$M_t = \sum_{t=0}^{t} J_t, \text{ and } J_t = M_t - M_{t-1} \quad (2.1.)$$

The M_t values tell us how many foreign and Polish overnight tourists, as well as how many guests in total were in Polish hotels after the passage of a given period of time t. Thus, the M_t sets show us how the number of people who used the hotel services changed on a long-term scale. They allow us to assess the dynamics of change in the examined processes on an absolute scale for consecutive years. In order to assess this dynamics also on a relative scale the sets were subjected to a linear conversion into a relative (percentage) scale P_t according to the following formula (2.2.):

$$P_t = \frac{M_t \cdot 100}{M_0}[\%] \ , \tag{2.2.}$$

where: $P_0 = 100\%$,
$M_0 > 0$,
M_0 – the initial value of the set,
M_t – the value in time t.

On the P_t scale all sets are assigned the initial value $P_0 = 100\%$. Likewise, the discrete J_t sets were converted into a percentage scale P_t [%] according to the formula (2.3.):

$$P_t = \frac{J_t \cdot 100}{J_0}[\%] \ , \tag{2.3.}$$

where: $P_0 = 100\%$,
$J_0 > 0$,
J_0 – the initial value of the set,
J_t – the value in time t.

P_t series allow for the most accurate comparison of the dynamics. They show us with what dynamics the number of the initial 100 tourists grew in Poland in the years 2007-2016. To compare different dynamics it is necessary to start with the same initial value of the compared processes. And it this purpose that the relative percentage scale P_t is so well suited for (Stokłosa, 2004, 2006).

Two definitions of dynamics are used in this study: an absolute one for the M_t sets and a relative (specific) one for the P_t sets. Absolute dynamics is defined as the changes in momentary velocity and momentary acceleration on a precisely defined path of the process. Relative dynamics, on the other hand, is defined by the changes in specific momentary speed and specific momentary acceleration on a precisely defined path of the process. The path of a given process is the mechanism of an elementary event, repeated over and over in time, and in effect a cause-and-effect descriptive function which takes into account the elementary mechanism (Abraham-Frois, 2002; Kondratowicz-Pietruszka, Stokłosa, 1994).

All J_t sets, the obtained M_t sets and the calculated sets of percentages P_t for both discrete and continuous series are presented in table 3.1., which also contains the values of the P_K [%] parameter calculated according to formulas (2.4.), (2.5.) and (2.6.):
for discrete sets J_t:

$$P_K = \frac{J_k \cdot 100}{J_0}[\%] \tag{2.4.}$$

where: $J_0 > 0$,
J_0 – the initial value,
J_k – the final value;

for continuous sets M_t :

$$P_K = \frac{M_k \cdot 100}{M_0}[\%] \quad (2.5.)$$

where: $M_0 > 0$,
M_0 – the initial value,
M_k – the final value;
for discrete and continuous sets P_t :

$$P_K = \frac{P_k \cdot 100}{P_0}[\%] \quad (2.6.)$$

where: $P_0 > 0$,
P_0 – the initial value,
P_k – the final value.
The P_K value tells us what percentage of the initial (100%) value the final value is. The P_K values are not appropriate for assessing the dynamics of processes. However, they provide interesting information on the changes of the value at the end of the process as contrasted with the initial value at the onset of the process (Kondratowicz-Pietruszka, Stokłosa, 1994). The results of the above calculations are presented in tables 3.1. and 3.2.

The values for the overnight tourists change velocity rates *V(J)* were found in accordance with the following formulas (Kondratowicz-Pietruszka 1995, Łuka, Kwiatkowska-Sienkiewicz 2010b):

$$V(J) = -\frac{dJ_t}{dt} \quad (2.7.)$$

The overnight tourists change velocity function is the first order derivative of the J_t values and it denotes marginal change of the overnight tourists number during the processing time.

The values for the overnight tourists change acceleration rate *A(J)* have been calculated using following equations (Kondratowicz-Pietruszka 1995, Łuka, Kwiatkowska-Sienkiewicz 2010b):

$$A(J) = \frac{dV(J)}{dt} = \frac{d^2 J_t}{dt^2} \quad (2.8.)$$

The overnight tourists change acceleration function is the second order derivative of the J_t values and describes the tourists' pressure on the hotel accommodation market.

RESULTS AND DISCUSSION

Table 3.1. contains discrete empirical data pertaining to the total number of overnight tourists in Polish hotels in the years 2007-2016. They have been assigned the symbol J_t. It also presents the values of this process converted linearly into continuous sets – they are marked with the symbol *Mt*. Moreover, it also contains the relative values (percentages) P_t for both discrete J_t and continuous M_t series. Additionally, for every set in an absolute and a relative scale, the table provides the calculated changes of the final values as compared with the initial values (P_K). Using the data from table 3.1., figures 3.1. and 3.2. were created. They show the total number of overnight guests in hotels in Poland in the years 2007-2016 and the dynamics of changes in the total number of overnight visitors in Polish hotels in those years.

The total number of overnight tourists in Polish hotels in the years 2007 to 2016 grew with the passage of time, which means that there was a general increase in the value (P_K = 182,3%). It was a gradual process of a rather slow dynamics. Between the years 2007 and 2009 a velocity rate of the process went down, while in the years 2009-2010, it clearly increased, and then to 2012 it decreased again. From 2012 to 2014 it went up and from 2014

to 2016 decreased again. It is also worth noting that in the years 2012-2014 the increase of the velocity rate was the largest – 1,6 million overnight tourists (table 3.1., figures 3.1. and 3.2.).

Table 3.1. The total number of overnight tourists in Polish hotels in the years 2007-2016

Year	t	J_t [thousands]	P_t [%]	M_t [thousands]	P_t [%]
2007	0	10323,5	100,0	10323,5	100,0
2008	1	10739,1	104,0	21062,6	204,0
2009	2	10641,8	103,1	21380,9	207,1
2010	3	11739,9	113,7	22381,7	216,8
2011	4	12721,6	123,2	24461,6	237,0
2012	5	13461,3	130,4	26182,9	253,6
2013	6	14568,2	141,1	28029,5	271,5
2014	7	16138,3	156,3	30706,5	297,4
2015	8	17487,1	169,4	33625,4	325,7
2016	9	18818,7	182,3	36305,8	351,7
P_K [%]		182,3	182,3	351,7	351,7

Source: Own study based on data of the Central Statistical Office (2017)

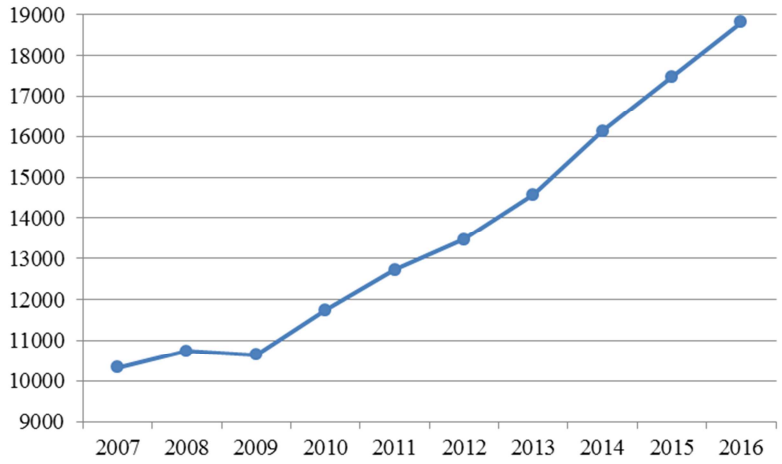

Figure 3.1. The total number of overnight tourists in Polish hotels in the years 2007-2016 – J_t values (in thousands)
Source: Own study based on table 3.1.

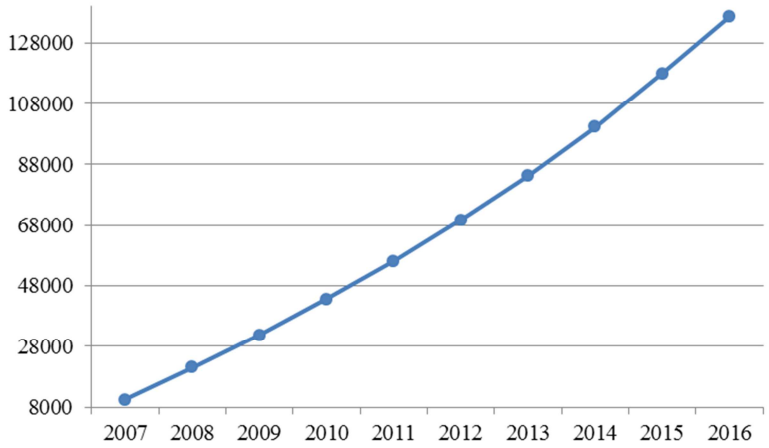

Figure 3.2. The dynamics of change in the number of all overnight tourists in Polish hotels in the years 2007-2016 – M_t values (in thousands)
Source: Own study based on table 3.1.

When comparing the discrete sets J_t with the continuous sets M_t, both of which pertain to the numbers of overnight tourists in Polish hotels, one can clearly notice that the picture of a continuous process is a far better way of presenting a trend over time (figures 3.1. and 3.2).

Table 3.2. The dynamics of change in the number of overnight tourists in Polish hotels in the years 2007-2016

Years	t	Polish tourists				Foreign tourists			
		J_t [thousands]	P_t [%]	M_t [thousands]	P_t [%]	J_t [thousands]	P_t [%]	M_t [thousands]	P_t [%]
2007	0	6786,2	100,0	6786,2	100,0	3537,3	100,0	3537,3	100,0
2008	1	7470,7	110,1	14256,9	210,1	3268,4	92,4	6805,7	192,4
2009	2	7500,3	110,5	21757,3	320,6	3141,5	88,8	9947,1	281,2
2010	3	8355,5	123,1	30112,8	443,7	3384,4	95,7	13331,6	376,9
2011	4	9129,1	134,5	39241,9	578,3	3592,5	101,6	16924,1	478,5
2012	5	9439,1	139,1	48680,9	717,3	4022,2	113,7	20946,3	592,2
2013	6	10246,0	151,0	58926,9	868,3	4322,3	122,2	25268,6	714,4
2014	7	11616,4	171,2	70543,3	1039,5	4521,9	127,8	29790,5	842,2
2015	8	12779,4	188,3	83322,7	1227,8	4707,7	133,1	34498,2	975,3
2016	9	13782,1	203,1	97104,8	1430,9	5036,6	142,4	39534,8	1117,7
P_K [%]		203,1	203,1	1430,9	1430,9	142,4	142,4	1117,7	1117,7

Source: Own study based on data of the Central Statistical Office (20167)

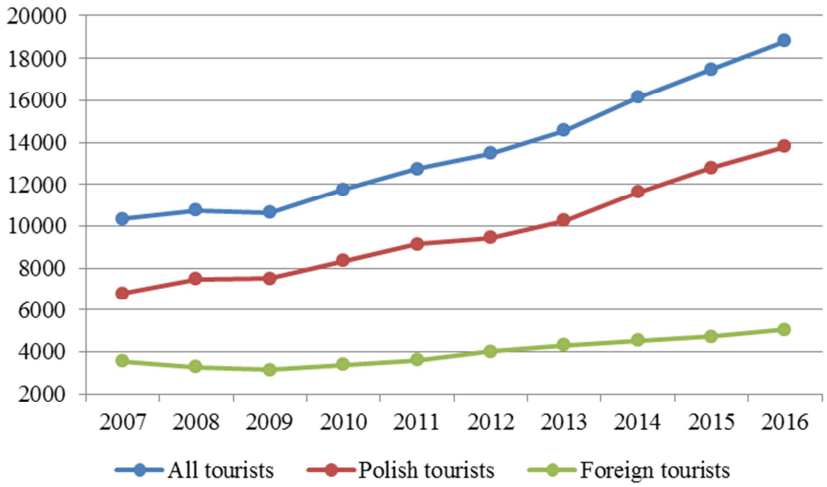

Figure 3.3. The number of overnight tourists in Polish hotels in the years 2007 – 2016 – J_t values (in thousands)
Source: Own study based on table 3.2.

Figure 3.3. presents the number of Polish and foreign overnight tourists in Polish hotels in the years 2007-2016. All values are given in discrete sets (J_t), in an absolute scale. Figure 3.4. presents the dynamics of change in the number of Polish and foreign overnight tourists in the same period of time. These values are also given in an absolute scale, but in M_t sets ,which are considered to be continuous. Figures 3.5. and 3.6. present the same changes in the number of Polish and foreign overnight tourists in Polish hotels in the years 2007-2016 for both discrete and continuous sets in percentages (P_t). Finally, figures 3.6. and 3.7. show respectively the velocity rates and the acceleration rates of the resident and non-resident overnight tourists in Polish hotels in the years 2007-2016.

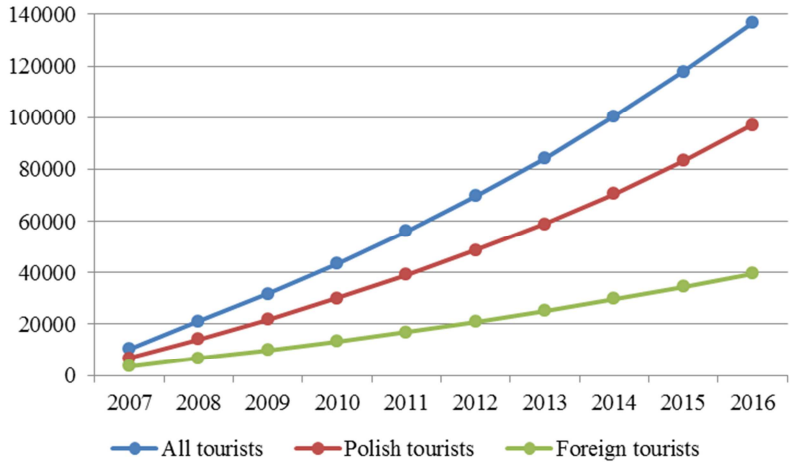

Figure 3.4. A comparison of the dynamics of change in the number overnight tourists in Polish hotels in the years 2007-2016 – M_t values (in thousands)
Source: Own study based on table 3.1.

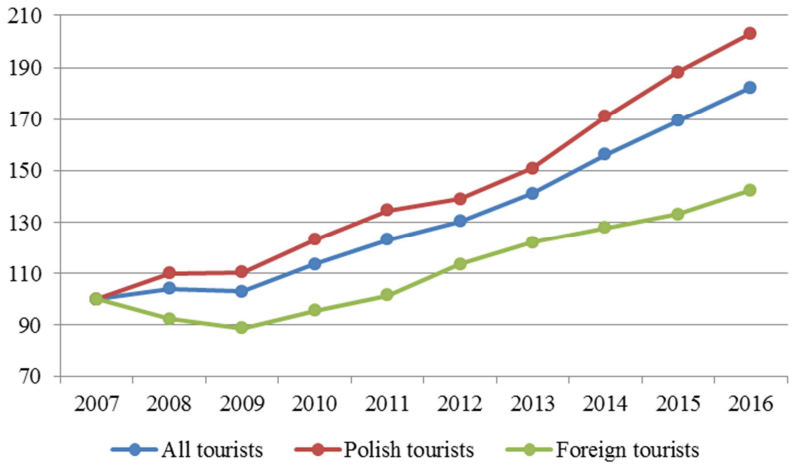

Figure 3.5. The number of Polish and foreign overnight tourists in Polish hotels in the years 2007-2016 for discrete sets (J_t) – values in P_t scale (%)
Source: Own study based on table 3.2.

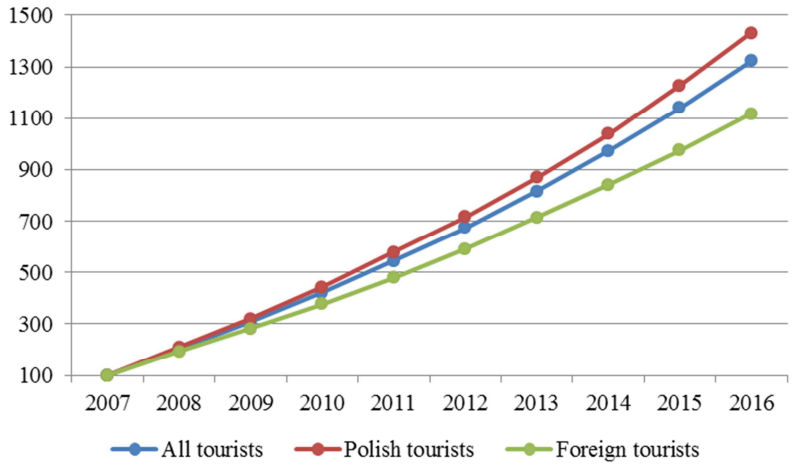

Figure 3.6. A comparison of the dynamics of change in the number of Polish and foreign overnight tourists in Polish hotels in the years 2007-2016 for continuous sets (M_t) – values in P_t scale (%)
Source: Own study based on table 3.2.

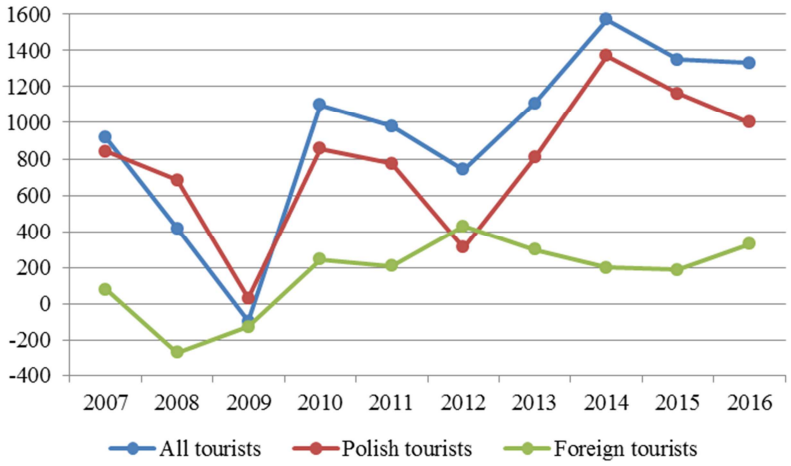

Figure 3.6. Velocity rate of the overnight tourists in Polish hotels in the years 2007-2016
Source: Own study

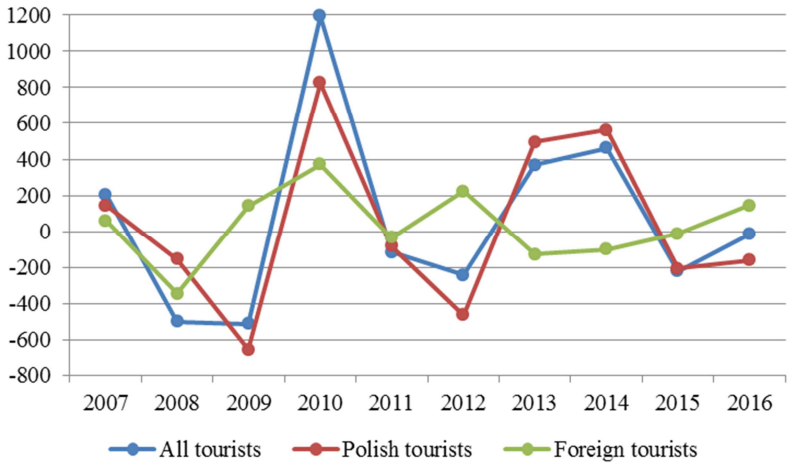

Figure 3.7. Acceleration rate of the overnight tourists in Polish hotels in the years 2007-2016
Source: Own study based on table 3.2.

In the years 2007-2016, the number of Polish and foreign overnight tourists in Polish hotels increased. For both of them, a general increase was observed (P_K > 100%). In the case of Polish tourists, the velocity rate of the whole process increased from 2007 to 2016 (45,1%), but it has reached its highest value in 2014 (63,1%). Finally in the years 2014-2016 a decrease in the velocity rate was noted (26,8%), although the total number of Polish overnight tourists in Polish hotels in those years grew by 18,6% (figure 3.6.). However, in the case of foreign overnight tourists the velocity rate of the process grew gradually from 2007 – 2012, then decreased in the years 2012 – 2015 and finally in 2016 it went up again. In the year 2012 certain hindering factors were noted (figure 3.6.).

By analyzing the velocity rates and acceleration rates for resident and non-resident overnight guests change in Polish hotels in the years 2007-2016 one can see a big difference in the dynamics of growth between the number of foreign and Polish tourists, with the latter of the two groups exhibiting a larger dynamics to the year 2014. Unexpectedly, however, from 2015 to 2016 the dynamics of change in the foreign overnight tourists, expressed especially by acceleration rate, turned out to be greater than that of Polish overnight tourist, although the total number and the velocity rate of foreign overnight tourists in Polish hotels in those years was at a higher level (figures 3.6. and 3.7.).

CONCLUSION

Continuous sets, particularly when expressed in a relative scale (in percentages) allows us to see the dynamics of economic processes in much better way. In the studied case, the discrete sets, converted to continuous sets clearly show the difference in the dynamics of growth between the number of Polish and foreign overnight tourists in Polish hotels in the years 2007-2015.

When comparing the dynamics of the processes for the discrete as well as continuous values, on an absolute and a relative scale, one can notice a general upward trend in both cases, even in spite of the drop from 2012. It can also be noticed that the dynamics of growth in the number of Polish tourists is slightly higher than that in the number of foreign tourists. This reflects the greater participation of Poles in the domestic market.

The velocity rate of non-resident overnight tourists change in Polish hotels grew gradually from 2007 – 2012, then decreased in the years 2012 – 2015. Finally in 2016 it rose again. Some factors have been noted since 2012, which have retained the current upward trend. Observing the velocity rate, 2012 was a peak year for overnight tourists change, probably because in 2012 Poland co-organized the European Football Championship.

By analyzing the velocity rates and acceleration rates for resident and non-resident overnight guests change in Polish hotels in the years 2007-2016 one can see a big difference in the dynamics of growth between the number of foreign and Polish tourists, with the latter of the two groups exhibiting a larger dynamics to the year 2014. Unexpectedly, however,

In recent years between 2015 and 2016 the dynamics of change in the foreign overnight tourists, expressed by acceleration rate, turned out to be greater than that of Polish overnight tourist, although the total number and the velocity rate of foreign overnight tourists in Polish hotels in those years was higher. This trend is likely to continue in the coming years, as Poland becomes an increasingly attractive destination in Central Europe.

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