

## **THE DYNAMICS OF CHANGE IN THE NUMBER OF OVERNIGHT TRAVELERS IN POLAND IN THE YEARS 2008-2015**

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### **Keywords:**

- dynamics,
- hospitality,
- accommodation.

### **Abstract:**

This article examines the dynamics of change in the number of tourists who used hotel services in Poland between the years 2008 and 2015. The study uses data from the latest edition of “Tourism in 2015” published by Central Statistical Office in Poland. Overnight visits included Polish resident travelers staying overnight in Polish hotels and non-resident foreign travelers who stayed in Polish locations overnight. The obtained data pertaining to the number of both Polish and foreign tourists were analysed in an absolute and a relative (percentage) scales. The results shown in a relative scale provide a better picture of the dynamics of change in the processes as all values are assigned an initial value of 100%. They therefore inform us what was the dynamics of growth in the initial 100 tourists who used Polish hotel services in the years 2008 – 2015. Thus, the change of the dynamics in the number of both Polish and foreign tourists who used hotels in Poland in that period of time was evaluated. 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 path of the process. The path of a process is the function describing basic continuous elementary events.

## **1. INTRODUCTION**

Tourism has in recent years come to play a more and more important role in the Polish economy. This important economy sector not only generates economic growth and development, but it also produces 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 2015 Survey published by Central Statistical Office in Poland (2016). 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, 2015, 2016).

The reporting units provide the following: precise location, type and category of the establishment, number of rooms, 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).

On 31 July 2015, there were 10 024 registered collective accommodation establishments in Poland, out of which 6845 operated all year round. Altogether there were 20 types of lodging facilities, with 3723 being hotel type facilities and the remainder 6301 falling into the rest of the categories. Amongst hotel-type lodging facilities, hotels were the largest group – 2316, while the largest group in the other categories were rooms for guests – 1876. In the all lodging facilities there were 710,3 thousands bed places available. Traditionally, the most bed places were available in hotels – 235,6 thousands, which made up 33,2% of all bed places available as of 31 July 2015. In 2015, as compared to the results of the 2014 Survey, the number of all lodging facilities and available bed places have increased respectively by 1,4% and 0,02% (Central Statistical Office, 2015, 2016).

**Table 1.1.** Hotels by category – facilities

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

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

**Table 1.2.** Hotels by category – bed places (in thousands)

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

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

Tables 1.1. and 1.2. present Polish hotels by category, including the number of facilities and the number of bed places in the years 2008-2015. A general increase in the number of hotels was observed in this period of time. 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 2014-2015. The number of bed places in Polish hotels also increased. In 2015, as compared to 2008, the number of hotel facilities and the number of bed places in

those hotels increased respectively by 55,6% and 51,2%. If we compare 2014 and 2015, these numbers are 2,9% for the number of hotel facilities and 3,6% for the number of bed places.

## 2. METHODS

The aim of this analysis is the graphic evaluation of the dynamics of the change in the number of Polish and foreign tourists who used Polish hotel services in the years 2008-2015. In this study, empirical data published by the Central Statistical Office of Poland (2015, 2016) 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 tourists who used hotel services in year  $t$ );

$J_0$  – initial value in time  $t$  (value in the year 2008), in an absolute scale, in discrete time series,  $t = 0$ ;

$J_k$  – final value in time  $t$  (value in the year 2015), 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 2008), in continuous time series,  $t = 0$ ;

$M_k$  – final value in time  $t$ , (value in the year 2015), 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 2008), expressed in a relative (percentage) scale,  $P_0 = 100\%$ ;

$P_k$  – final value in time  $t$ , (value in the year 2015), expressed in a relative (percentage) scale;

$P_K$  – 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 tourists who used Polish hotel services in the years 2008-2015. Primary empirical data are marked with set  $J_t$ , where  $t$  is the time given in years from 2008 to 2015. They are of a discrete nature.

**Table 2.1.** The number of Polish and foreign tourists who used Polish hotel services in the years 2008-2015 (in thousands)

Year	Tourists in total	Polish tourists	Foreign tourists
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

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

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.):

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

The  $M_t$  values tell us how many foreign and Polish tourists, as well as how many visitors in total had used 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.):

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

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.):

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

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 2008-2015. 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  $J_t$ :

$$P_k = \frac{J_k \cdot 100}{J_0} [\%] \quad (2.4.)$$

where:  $J_0 > 0$ ,

$J_0$  – the initial value,  
 $J_0$  – 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.

### 3. RESULTS AND DISCUSSION

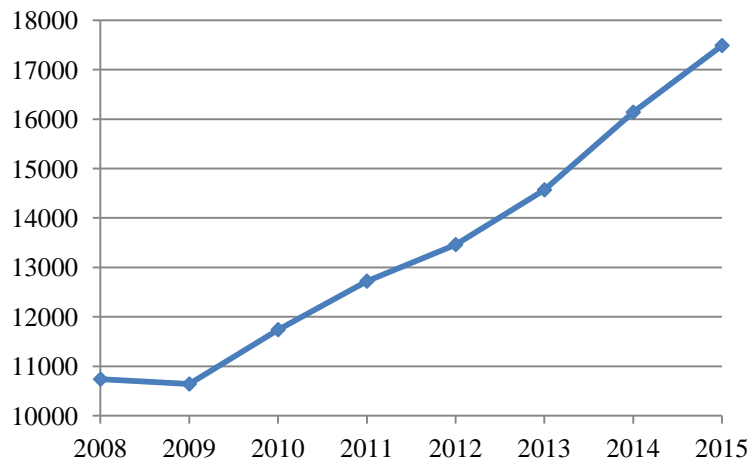
Table 3.1. contains discrete empirical data pertaining to the total number of tourists who used Polish hotel services in the years 2008-2015. They have been assigned the symbol  $J_t$ . It also presents the values of this process converted linearly into continuous sets – they are marked with the symbol  $M_t$ . 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., charts 3.1. and 3.2. were created. They show the total number of tourists who used hotel services in Poland in the years 2008-2015 and the dynamics of changes in the total number of visitors who used hotel services in Poland in those years.

The total number of tourists who used Polish hotel services in the years from 2008 to 2015 grew with the passage of time, which means that there was a general increase in the value. It was a gradual process of a rather slow dynamics. Between the years 2008 and 2009 a velocity 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 decreased again. It is also worth noting that in the years 2012-2014 the increase of the velocity value was relatively large, while in the years 2014-2015 it dropped and in 2014 it was the largest – 14,6% (table 3.1., charts: 3.1. and 3.2.).

**Table 3.1.** The total number of tourists who used Polish hotel services in the years 2008-2015

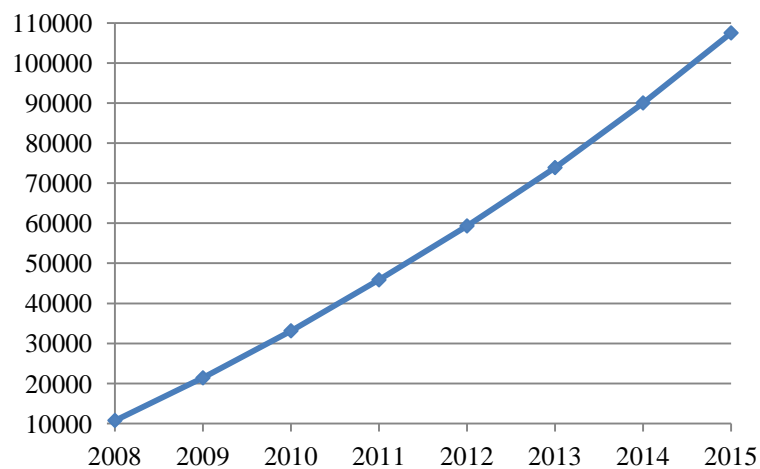
Year	$t$	$J_t$ [thousands]	$P_t$ [%]	$M_t$ [thousands]	$P_t$ [%]
2008	0	10739,1	100,0	10739,1	100,0
2009	1	10641,8	99,1	21380,9	199,1
2010	2	11739,9	109,3	33120,8	308,4
2011	3	12721,6	118,5	45842,5	426,9
2012	4	13461,3	125,3	59303,7	552,2
2013	5	14568,2	135,7	73872,0	687,9
2014	6	16138,3	150,3	90010,3	838,2
2015	7	17487,1	162,8	107497,4	1001,0
$P_K$ [%]		162,8	162,8	1001,0	1001,0

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



**Chart 3.1.** The number of tourists who used Polish hotel services in the years 2008-2015 –  $J_t$  values (in thousands)

Source: Own study based on table 3.1.



**Chart 3.2.** The dynamics of change in the number of tourists who used Polish hotel services in the years 2008-2015 –  $M_t$  values (in thousands)

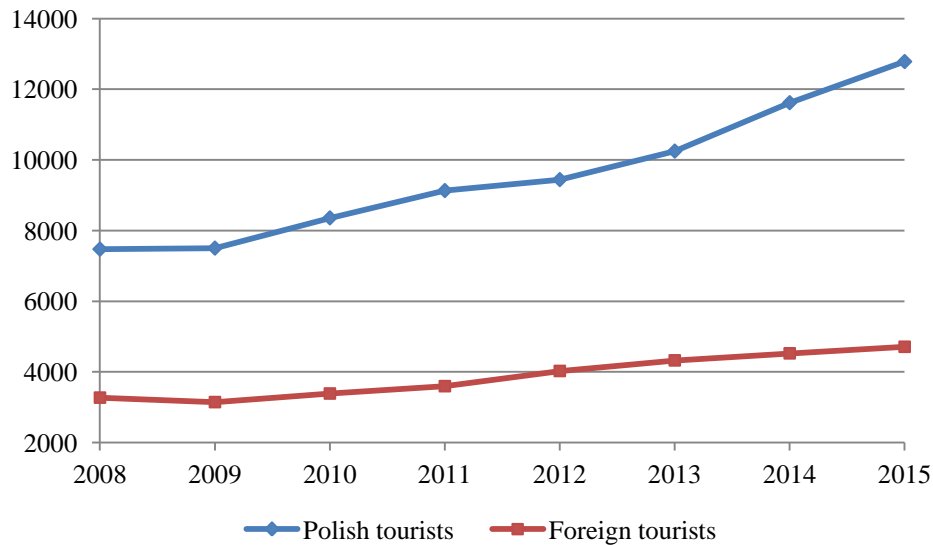
Source: Own study based on table 3.1.

When comparing the discrete sets  $J_t$  with the continuous sets  $M_t$ , both of which pertain to the numbers of tourists who used Polish hotel services, one can clearly notice that the picture of a continuous process is a far better way of presenting a trend over time (charts: 3.1. and 3.2).

**Table 3.2.** The dynamics of change in the number of tourists who used Polish hotel services in the years 2008-2015

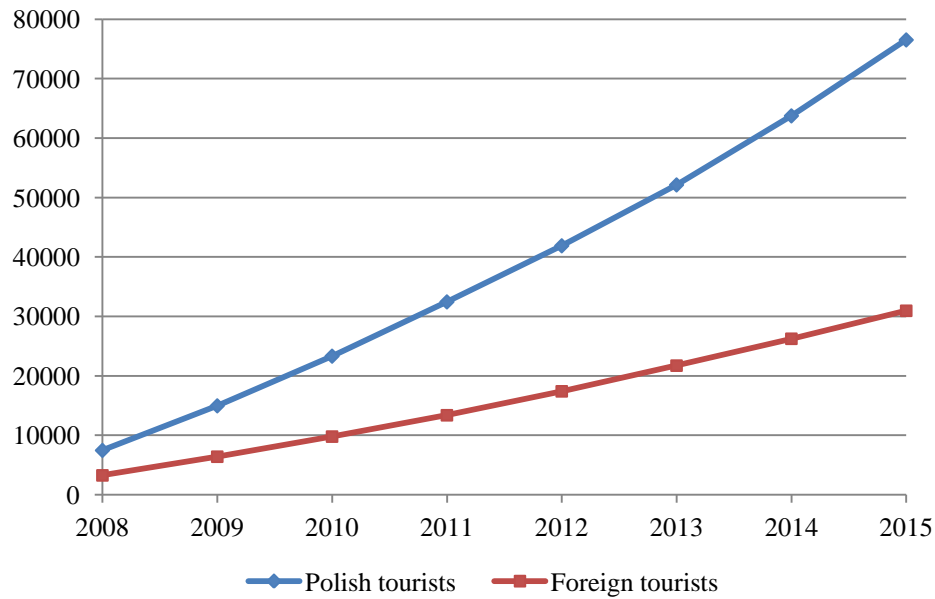
Year	$t$	Tourists who used Polish hotel services							
		Polish tourists				Foreign tourists			
		$J_t$ [thousands]	$P_t$ [%]	$M_t$ [thousands]	$P_t$ [%]	$J_t$ [thousands]	$P_t$ [%]	$M_t$ [thousands]	$P_t$ [%]
2008	0	7470,7	100,0	7470,7	100,0	3268,4	100,0	3268,4	100,0
2009	1	7500,3	100,4	14971,0	200,4	3141,5	96,1	6409,9	196,1
2010	2	8355,5	111,8	23326,5	312,2	3384,4	103,6	9794,3	299,7
2011	3	9129,1	122,2	32455,6	434,4	3592,5	109,9	13386,9	409,6
2012	4	9439,1	126,3	41894,6	560,8	4022,2	123,1	17409,1	532,6
2013	5	10246,0	137,1	52140,6	697,9	4322,3	132,2	21731,4	664,9
2014	6	11616,4	155,5	63757,0	853,4	4521,9	138,4	26253,3	803,2
2015	7	12779,4	171,1	76536,4	1024,5	4707,7	144,0	30961,0	947,3
$P_K$ [%]		171,1	171,1	1024,5	1024,5	144,0	144,0	947,3	947,3

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

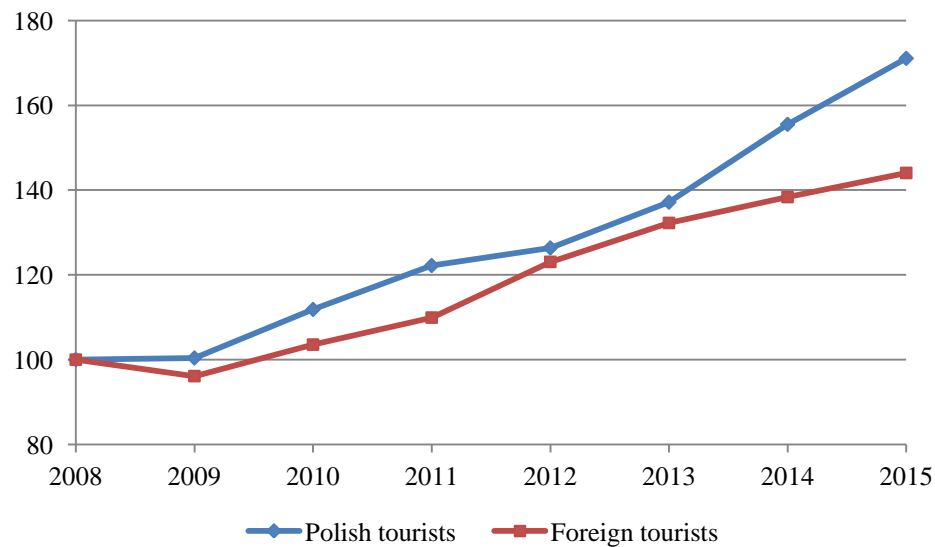


**Chart 3.3.** The number of Polish and foreign tourists who used Polish hotel services in the years 2008 – 2015 –  $J_t$  values (in thousands)

Source: Own study based on table 3.2.

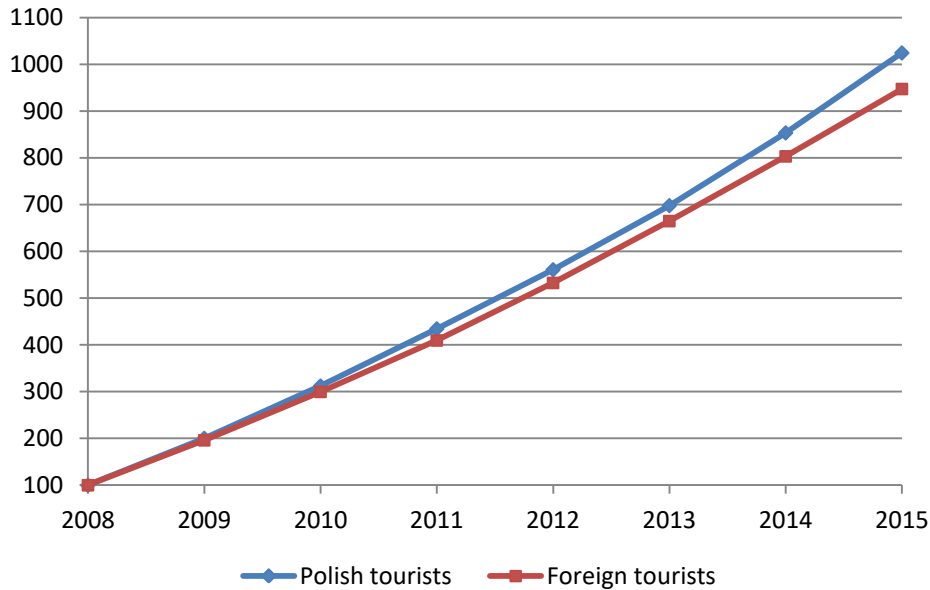


**Chart 3.4.** A comparison of the dynamics of change in the number of Polish and foreign tourists who used Polish hotel services in the years 2008-2015 –  $M_t$  values (in thousands)  
Source: Own study based on table 3.1.



**Chart 3.5.** The number of Polish and foreign tourists who used Polish hotel services in the years 2008-2015 for discrete sets ( $J_t$ ) – values in  $P_t$  scale (%)  
Source: Own study based on table 3.2.





**Chart 3.6.** A comparison of the dynamics of change in the number of Polish and foreign tourists who used Polish hotel services in the years 2008-2015 for continuous sets ( $M_t$ ) – values in  $P_t$  scale (%)  
Source: Own study based on table 3.2.

Chart 3.3. presents the number of Polish and foreign tourists who used Polish hotel services in the years 2008-2015. All values are given in discrete sets ( $J_t$ ), in an absolute scale. Chart 3.4. presents the dynamics of change in the number of Polish and foreign tourists in the same period of time. These values are also given in an absolute scale, in  $M_t$  sets, which are considered to be continuous. Charts 3.5. and 3.6. present the same changes in the number of Polish and foreign tourists who used Polish hotel services in the years 2008-2015 for both discrete and continuous sets in percentages ( $P_t$ ).

In the years 2008-2015, the number of Polish and foreign tourists who used Polish hotel services increased. For both of them, a general increase was observed ( $P_K > 100\%$ ). In the case of Polish tourists, the velocity of the process increased from 2008 to 2015, but a little more slowly from the year 2010 to 2012. However, in the case of foreign tourists the velocity of the process grew gradually from 2008 – 2012, and then decreased in the years 2012 – 2015. In the year 2012 certain hindering factors were observed. By analysing the continuous processes, both on an absolute ( $M_t$ ) and on a relative percentage scale ( $P_t$ ) 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. This trend will probably keep up in the years to come due to the fact that the dynamics of Poland's economic growth is much higher than in the other EU countries.

#### 4. 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 tourists who used Polish hotels between 2008 and 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 in 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 increasing participation of Poles in the domestic market.

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