The dynamics of growth in the number of overnight guests in health resorts in Poland in the years 2007-2016

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Abstract

The article aims to examine the dynamics of changes in the number of overnight guests in health resorts in Poland in the years 2007-2016. The study uses data from the latest edition of "Tourism in 2016" published by Central Statistical Office in Poland [1]. Total overnight visits include both resident and non-resident guests staying overnight in Polish health resorts. The obtained data pertaining to the changes in the number of all visitors 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 health establishments in the years 2007-2016. Dynamics in this study was treated as a momentary velocities and a momentary accelerations on a strictly defined paths of the processes.

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Introduction

The aim of this study is to evaluate the dynamics of changes in the number of overnight visitors in health resort establishments in Poland in the years 2007-2016. For this evaluation empirical data published by the Central Statistical Office in Poland [1] were used. The total guests number included both domestic and foreign tourists. The study benefited from the studies presented in the literature on the assessment of the dynamics of the economic processes changes [2-6].

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 momentary velocities and momentary accelerations on a strictly defined path of the process. The path of a process is the function describing basic continuous elementary events .

The capacity of health resort accommodation in Poland

Health resorts, nowadays, play a significant role in the Polish and regional economy. They are treated as specialized branch of health tourism. In recent years, in the world, and also in Poland, the significant growth and the rapid rate of its development is observed. In addition to many economic advantages, this sector also brings many social benefits. With the changes of the modern lifestyle and the growing demand for a health-oriented services, in the most of Polish health resort destinations, the positive socio-economic trends can be observed. Destroyed aged structures, spa parks and associated architecture are revitalized. Also, new structures are built on the basis of the original, historical assumptions. Treatment rooms in sanatoriums, hospitals, clinics and health spas are enriched with modern facilities. Also, accommodation quality in health establishments do not differ from standardized hotels. According to the Central Statistical Office [7], in 2016 on average, the

health establishments occupancy rate of bed places was at the highest level among all tourist accommodation establishments in Poland (77,8%). For comparison, the occupancy rate of hotels in Poland was on average only 41,1% (figure 1).

The main problem on this market is that not in all health resorts positive actions proceed at a steady pace. The reason is the interaction of supply and demand, which makes the health resort companies, operating in different market structures, both in the public and private sectors, have completely different economic opportunities. But the market for health tourism, like any other market is surrounded by many different environmental forces and will be filled with more efficiently operating mechanisms working for health. Financial support, as well as relevant regulations of local and central authorities are also very important. Increasingly numerous and fully professional facilities for short-term stays of leisure, recreation, climatic or sightseeing are the evidence that the spas definitely change their character. In health resorts, services are effectively combined with other forms of stays. This is one of the most significant competitive advantages in the tourism market. Non-resident tourists willingly visit Polish health resorts, not only because of lower prices, but mainly because of the high standards of treatment and service. Unfortunately, the total number of foreign guests, comparing to the Polish guests is still at a very low level, on average 6,3% in 2016 [1]. All of these valuable resources should be fully utilized, and the benefits maximized.

Table 1 presents the data on health establishments, in particular the number of accommodation facilities and the number of bed places in those facilities in the years 2007-2016. During this period, a general increase of all facilities and bed places was observed in Poland, but this growth was the most dynamic since 2011 (see figures 2 and 3).

On 31 July 2016, there were 215 registered health establishments in Poland, where accommodation services for patients were provided. In all accommodation facilities of health establishments 36921 bed places were prepared, which was 1250 more than in the previous year. In the year 2016, comparing to the year 2015, the total number of facilities and

bed places increased respectively by 4.9% and 3,5%. While compared to 2007, those changes were, respectively 37,8% and 32.5% [1].

For accommodation facilities in the health resort market there was an overall increase between the years 2007 and 2016. In the years 2007-2011 there was a slight increase in the total value (1,3%), but since 2011 there was a clear increase in the number of accommodation facilities by 36,1% (table 1, figure 2). The number of bed places has also increased in the years 2007-2016 (32,5%), but in 2011 this value declined by 5,4%, comparing to the previous year. In the years 2007-2011, the marginal values of the number of bed places have decreased significantly, and in 2011 it has reached a negative value (table 1, figure 3). In subsequent years, there was an initial decrease in the marginal values in 2014, but in 2015 there was an increase of dynamics. However, the overall trend was maintained as a positive value. Furthermore, on the figure 4, the development of the total number of health establishments and the total number of bed places in Poland in the years 2007-2016 were provided. The initial value for the year 2007 is 100 percent. There was a general increase in those values, but from
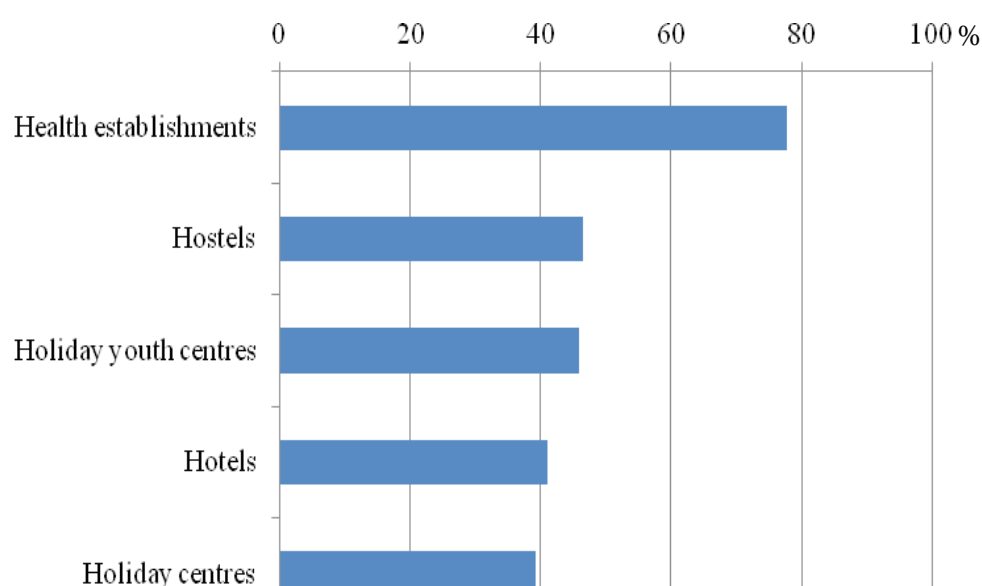

Fig. 1.
The top five occupancy rate of bed places in the tourist accommodation establishments in Poland in 2016
Source: Own work based on data of the Central Statistical Office (2017b)

Table 1.
The number of facilities and bed places in health establishments in Poland in the years 2007-2016
Source: Own work based on data of the Central Statistical Office (2017a)

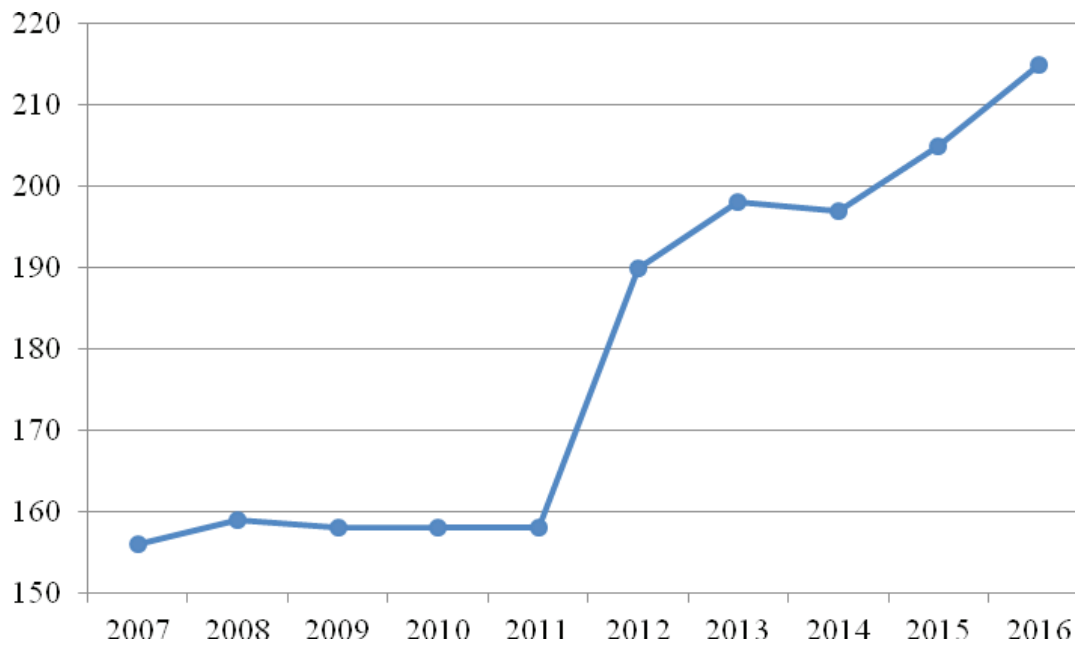| Years	Facilities	Bed places
2007	156	27871
2008	159	29112
2009	158	30987
2010	158	31815
2011	158	30103
2012	190	33681
2013	198	34154
2014	197	33874
2015	205	35671
2016	215	36921

Fig. 2.
The number of health establishments in Poland in the years 2007-2016
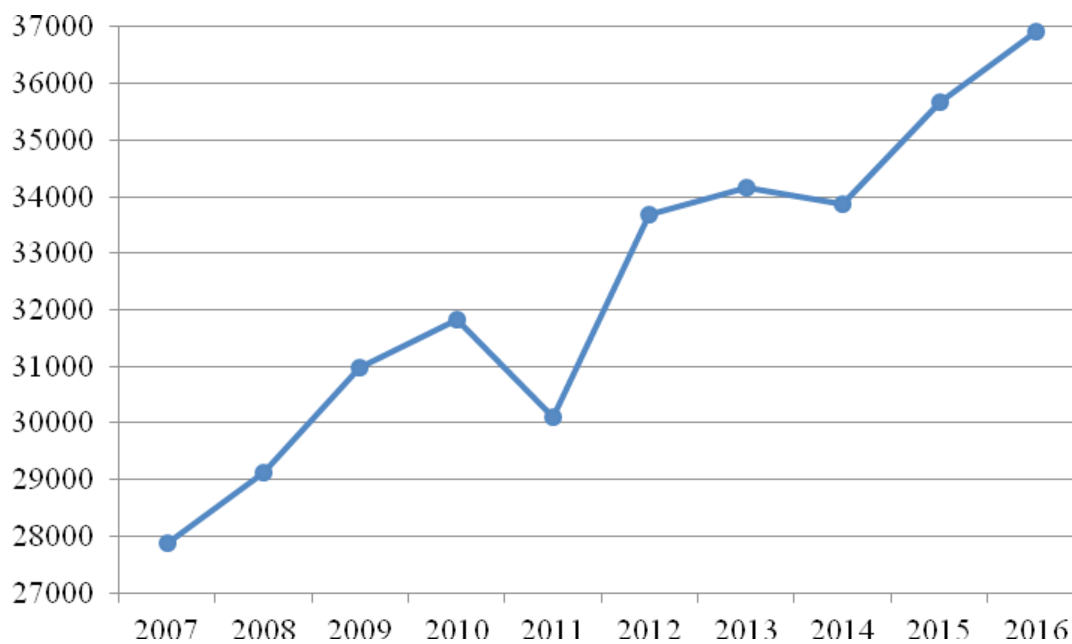Source: Own work based on data of the Central Statistical Office (2017a)

Fig. 3.
The number of beds in health establishments in Poland in the years 2007-2016
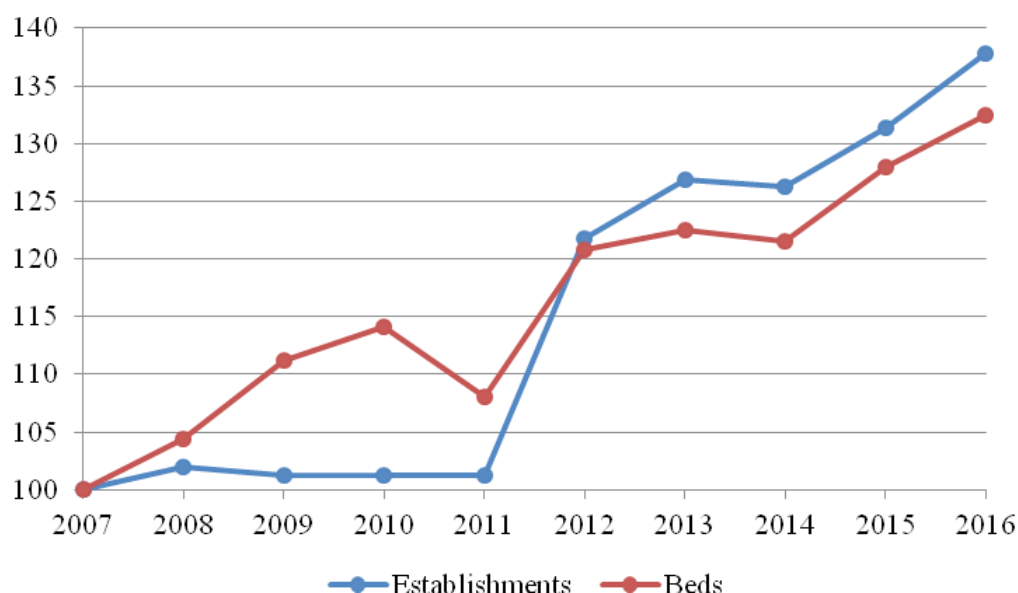Source: Own work based on data of the Central Statistical Office (2017a)

Fig. 4.
The development of the number of facilities and bed places in health establishments in Poland in the years 2007-2016 (2007 = 100%).
Source: Own work based on data of the Central Statistical Office (2017a)

2012, the development of the number of health establishment was more dynamic than the development of the number of bed places.

Methods

The aim of this analysis is evaluation of the dynamics of change in the number of overnight guests who stayed in health establishments in Poland in the years 2007-2016. In this study, empirical data published by the Central Statistical Office of Poland [1] were used. The values relate to the total number of domestic and foreign overnight visitors in health establishments in Poland in the years 2007-2016.

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 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;

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%).

The empirical data on the total number of overnight visitors in Polish health establishments in the years 2007-2016 are presented in table 2. The table also shows the number of nights spent in those establishments in the same years. Comparing the number of overnight guests and the number of overnight stays will estimate the average stay of all guests in health resorts in Poland. The total number of tourists relates to both, Polish residents and non-residents. Obtained original data are marked with set J_t, where t is the time given in years from 2007 to 2016. They are of a discrete nature.

Table 2.
The number of overnight tourists and the number of nights spent in health establishments in Poland in the years 2007-2016 (in thousands)
Source: Own work based on data of the Central Statistical Office (2017a)

Year	Tourists	Nights spent
2007	551,5	7 142,2
2008	605,8	7 739,2
2009	633,0	8 335,2
2010	612,2	7 641,4
2011	619,7	7 792,9
2012	617,1	8 607,6
2013	634,9	8 841,5
2014	661,3	9 226,4
2015	719,8	9 735,9
2016	763,6	10 150,2

The values in this form do not allow to evaluate the dynamics of change [2-6]. Therefore, they were transformed into continuous time series M_t, by adding up consecutive sets according to the formula (2.1.):

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

The M_t values inform how many resident and non-resident overnight visitors stayed in Polish health establishments during a given period of time t. Thus, the M_t sets show how the number of people who used the accommodation services changed on a long-term scale. They allow to estimate the dynamics of change in the examined processes in an absolute scale for consecutive years. In order to estimate 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.):

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

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.):

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

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 at what dynamics level, the number of the initial 100 overnight tourist number increased 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 for this purpose, the relative percentage scale P_t is so well suited for [2,3].

Two definitions of dynamics are used in this study: an absolute dynamics for the J_t and M_t sets and a relative one for the P_t sets. The 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 velocity 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 [8,9].

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, 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:

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

where: $J_0 > 0$,

$\quad$ J_0 – the initial value,

$\quad$ J_0 – the final value;

for continuous sets M_t:

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

where: $M_0 > 0$,

$\quad$ M_0 – the initial value,

$\quad$ M_k – the final value;

for discrete and continuous sets P_t:

$$P_K = \frac{P_k \cdot 100}{P_0} [\%] \qquad (2.6.)$$
where: $P_0 > 0$,

$\quad$ P_0 – the initial value,

$\quad$ P_k – the final value.

The P_K values show what is the percentage change of the final (2016) values comparing with the initial (2007) values. 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 compared with the initial value at the one set of the process [9,10]. The results of the above calculations are presented in table 3.

Furthermore, the average length of stay of overnight visitors in health resorts in Poland in the years 2007-2016 were estimated. The average length of stay of overnight visitors in the reference period was obtained by dividing the total number of overnight stays by the total number of overnight visitors during the reference period, according to formula 2.7. [11]:

$$AS = \frac{OS}{OG} \qquad (2.7.)$$

where: AS – the average length of stay,

$\quad$ OS – the number of overnight stays,

$\quad$ OG – the number of overnight guests.

Results and discussion

In table 3 discrete empirical data referring to the total number of overnight tourists who stayed in health establishments in Poland in the years 2007-2016 were provided. 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, table 3 also contains the relative (percentage) values 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

Table 3.
The dynamics of changes in the number of overnight tourists in health establishments in Poland in the years 2007-2016 (in thousands)
Source: Own work based on data of the Central Statistical Office (2017a).

Year	t	J_t	P_t [%]	M_t	P_t [%]
2007	0	551,5	100,0	551,5	100,0
2008	1	605,8	109,8	1157,3	209,8
2009	2	633,0	114,8	1790,3	324,6
2010	3	612,2	111,0	2402,5	435,6
2011	4	619,7	112,4	3022,2	548,0
2012	5	617,1	111,9	3639,3	659,9
2013	6	634,9	115,1	4274,2	775,0
2014	7	661,3	119,9	4935,5	894,9
2015	8	719,8	130,5	5655,3	1025,4
2016	9	763,6	138,5	6418,9	1163,9
P_K [%]		138,5	138,5	1163,9	1163,9

changes of the final values as compared with the initial values (P_K). Using the data from table 3, figures 5 and 6 were created. They show the total number of overnight guests in health establishments in Poland in the years 2007-2016 and the dynamics of change in the total number of visitors who stayed in health establishments in Poland in those years. The dynamics was presented with M_t values.

The total number of overnight tourists in all health establishments in Poland in the years 2007-2016 went up over time, which means that there was a general increase in the value (P_K = 138,5 percent). It was a gradual process of a rather slow dynamics (figures 5 and 6). During the period from the year 2007 to 2010 and again in 2012, the velocity of the process went down, while in the years 2012-2015, it clearly increased. It is also worth noting that in the year 2010
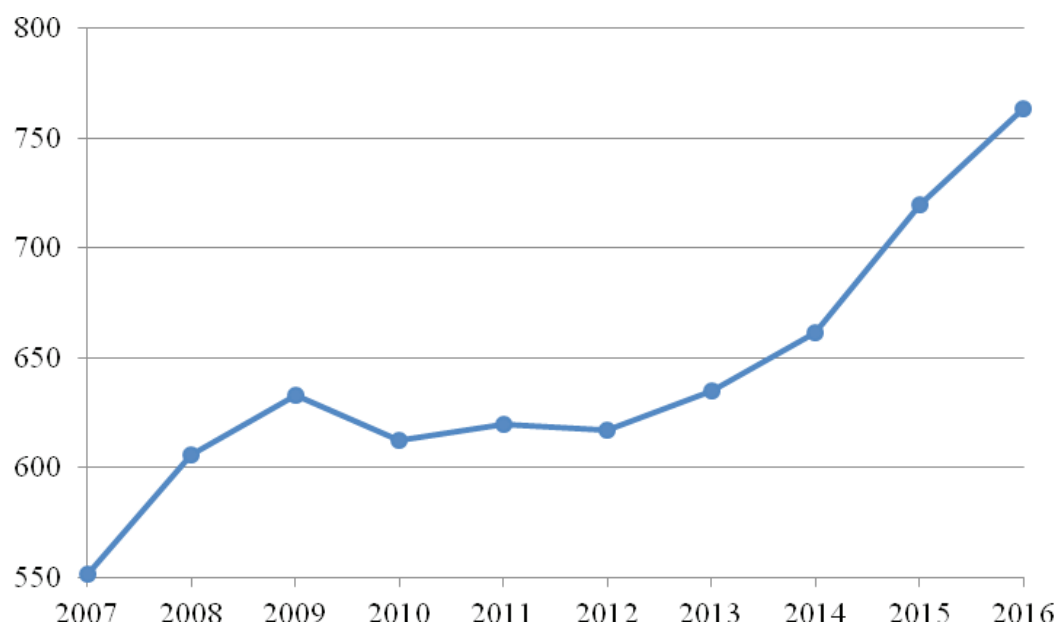

Fig. 5.
The number of overnight tourists in health establishments in Poland in the years 2007-2016 – Jt values ((in thousands)
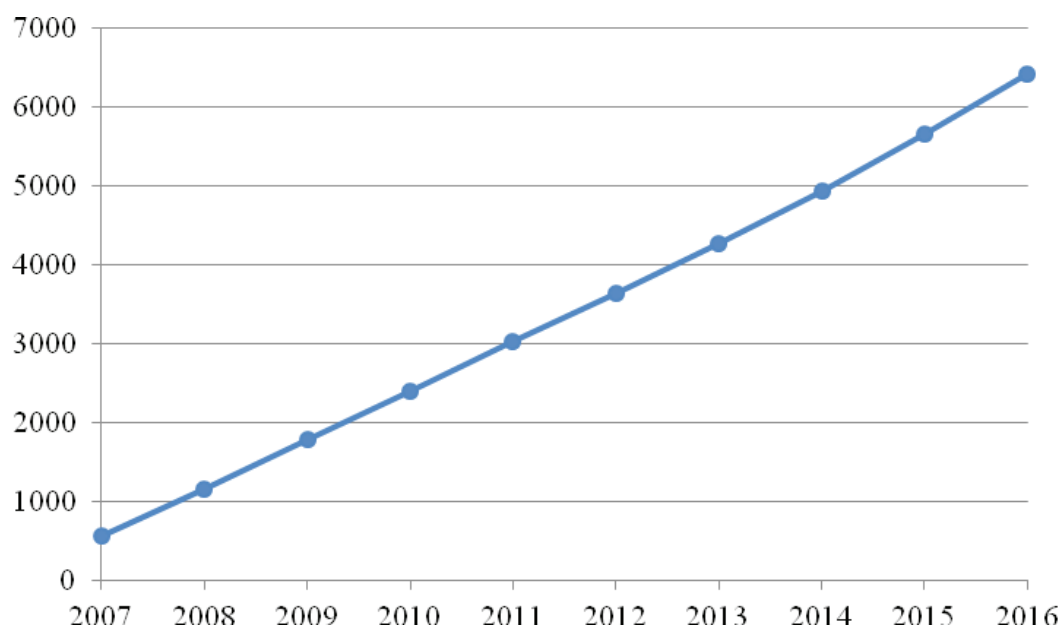Source: Own work based on data of the Central Statistical Office (2017)

Fig. 6.
The average stays of visitors in health resorts in Poland in the years 2007-2016
Source: Own work based on data of the Central Statistical Office (2017a)

the value of the velocity rate was at relatively low level, while in 2015 it was the largest one. In 2016 the velocity rate fell again (table 3, figures: 5 and 6).

When comparing the discrete sets J_t with the continuous sets M_t, both of which refer to the numbers of overnight tourists who stayed in Polish health resorts, one can clearly notice that the picture of a continuous process is a far better way of presenting a trend over time (figures: 5 and 6).

Analyzing the continuous processes, both in an absolute scale – M_t and the relative (percentage) scale – P_t, one can see a big difference in the dynamics of change in the number of tourists between the years 2007-2010 and 2010-2016. The increasing trend of 2010-2016 probably will continue in the coming years due to the relatively high economic growth in Poland, which is greater than the EU average. Thus, the growth rate of income and wealth in Poland is also higher than the EU average. This gives the opportunity of attracting not only a growing number of visitors from the domestic market, but also there is a real chance to increase demand from EU countries.

Figure 7 presents the average length of stay of overnight visitors in health resorts in Poland in the years 2007-2016. The average length of stay of overnight guests in health resorts in Poland in the researched period was 13,26 days. On average, overnight visitors stayed more days in health resorts in Poland since 2007. Their stays were the longest in 2014 (13,95 days) and the shortest in 2010 (12,48 days). This is mainly due to the length of rehabilitation and treatment stays, which last usually 21 or 28 days.

Conclusion

Continuous sets, particularly when expressed in a relative (percentage) scale P_t allows us to see the dynamics of economic processes in much better way. In the researched case, the discrete sets, converted to continuous sets clearly show the difference in the dynamics of growth in the number of overnight visitors in Polish health resorts in the years 2007-2016.

The values in the relative (percentage) scale allow accurate comparison of the dynamics of economic processes. They inform, in the case under examination, at which the dynamics of increasing the number of initial 100 overnight guests in health resorts in
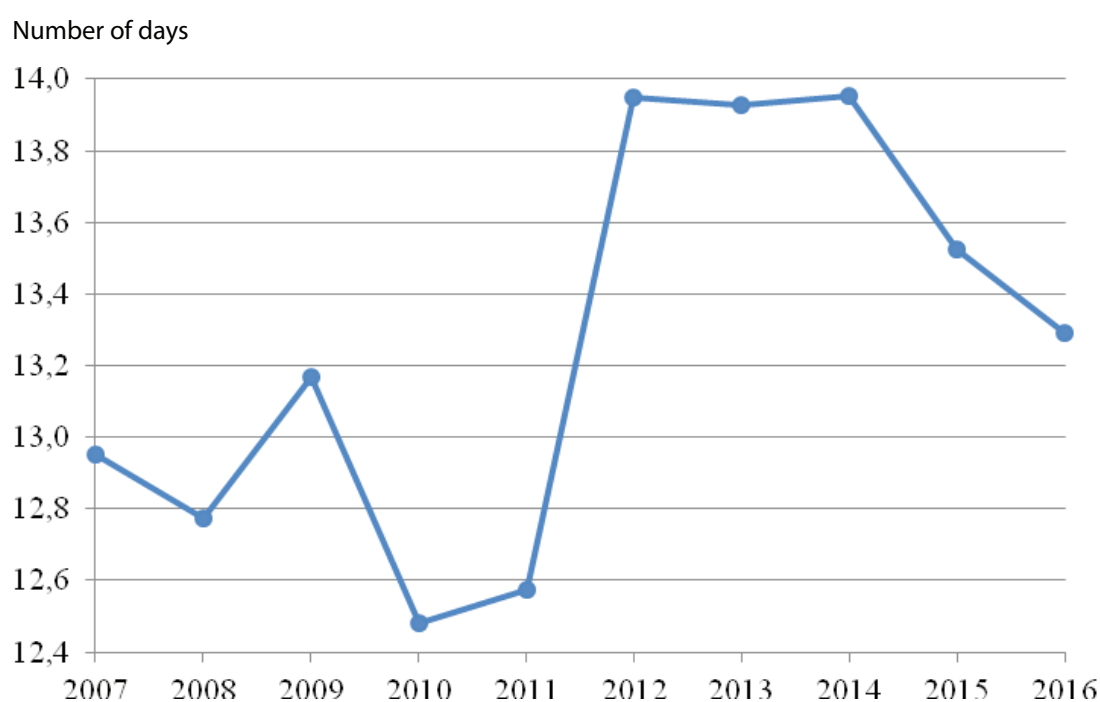
Number of days

Fig. 7.
The average stays of visitors in health resorts in Poland in the years 2007-2016
Source: Own work based on data of the Central Statistical Office (2017a)

Poland in the years 2007-2016. To compare dynamics it is necessary to consider the same initial values of compared processes, and that is what provides the relative (percentage) scale, because all the values on a relative scale acquire a common initial value.

When comparing the dynamics of the processes for the discrete as well as continuous values, in an absolute and a relative scale, one can notice a general upward trend in both cases, even in spite of the drop in 2010 and 2012. The velocity rate of overnight guests in Polish health resorts fell gradually from 2007–2010, then it was an increase in 2011 and again in 2012 it went down. In the years 2012-2015, it clearly increased. It is also worth noting that in the year 2010 the value of the velocity rate was at relatively low level, while in 2015 it was the largest one. In 2016 the velocity rate fell again.

The average length of stay of overnight guests in health resorts in Poland in the researched period was 13,26 days and it increased gradually since 2007. Their stays, on average, were the longest in 2014 (13,95 days) and the shortest in 2010 (12,48 days). This is mainly due to the length of rehabilitation and treatment stays, which last usually 21 or 28 days.

In addition, by comparing the change in the number of overnight guests, the number of facilities and the number of bed places, one can see the immediate response of supply to changes in demand in this market. Observing the health establishments, which operate in a market economy, supply and demand forces are very visible. This market mechanism, however, is a human driven one. It is always understood as economic interaction. This is, because all tastes, preferences, trends, opportunities, and other values always come from human needs, wants and desires. According to human needs, supply and demand are created. and people always try to make good economic decisions.

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