Dynamics of change in the number of persons who used accommodation services in health establishments in Poland in the years 2008-2015

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Abstract

The aim of the study is to analyze the dynamics of change in the number of people using accommodation services in health establishments in Poland in the years 2008-2015. For the assessment, data from the latest edition of "Tourism in 2015" published by Central Statistical Office in Poland, were used. The obtained data pertaining to the changes in the number of people using the accommodation services, were analyzed both in an absolute and a relative (percentage) scale. The results shown in the relative scale give a better picture of the dynamics of change in the processes, as all values are assigned an initial value of 100 percent. They therefore inform what was the dynamics of growth of the initial 100 people using the accommodation services in health establishments in Poland in the years 2008-2015.

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Introduction

The aim of this study is to assess the dynamics of changes in the number of people using the accommodation services in health spa establishments in Poland in the years 2008-2015. For this evaluation empirical data published by the Central Statistical Office of Poland (2015, 2016) were used. The dynamics of the total number of visitors using accommodation services in health establishments in Poland at that time was evaluated. This number included both domestic and foreign tourists. The study benefited from the studies presented in the literature on the assessment of the dynamics of changes in economic processes (Stokłosa 2004, 2006; Łuka 2007; Łuka, Kwiatkowska-Sienkiewicz 2010a, 2010b).

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.

General characteristics of spa tourism in Poland

Spa tourism, nowadays, is a specialized branch of health tourism. 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 spas, the positive socio-economic trends can be observed. Destroyed ancient stuctures, 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.

The fact is that not in all spa resorts these actions proceed at a steady pace. The main reason is the interaction of supply and demand, which makes that the spa 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 spa 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 spa resorts. Not only because of lower prices, but mainly because of the high standards of treatment and service. 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 beds in those facilities in years 2008-2015. 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 1 and 2).

On 31 July 2015, there were 205 registered health establishments in Poland, where accommodation services for patients were provided. In all accommodation facilities of health spa establishments were prepared 35671 bed places, which was 1797 more than in the previous year. In the year 2015, comparing to the year 2014, the total number of facilities and bed places increased respectively by 4.1% and 5.3%. While compared to 2008, these changes were, respectively 28.9% and 22.5% (Central Statistical Office, 2015, 2016).

For accommodation facilities in the health spa market between the years 2008 and 2015 there was

an overall increase. In the years 2008-2011 there was a slight decrease in the total value of measure (-0.6%), but since 2011 there was a clear increase in the number of accommodation facilities by 29.7% (table 1, figure 1). The number of beds has also increased in those years, but in 2011 this value declined. In 2008-2011, the marginal values of the number of beds have decreased significantly, and in 2011 they have reached negative values (table 1, figure 2). In subsequent years, there was an initial decrease in the marginal values, but in 2015 there was an increase of dynamics. However, the overall trend was maintained as a positive value.

Methods

The aim of this analysis is evaluation of the dynamics of change in the number of tourists who stayed in health establishments in Poland in the years 2008-2015. In this study, empirical data published by the Central Statistical Office of Poland (2015, 2016) were used. They relate to the total number of domestic and foreign tourists using the accommodation services in health establishments in Poland in the years 2008-2015.

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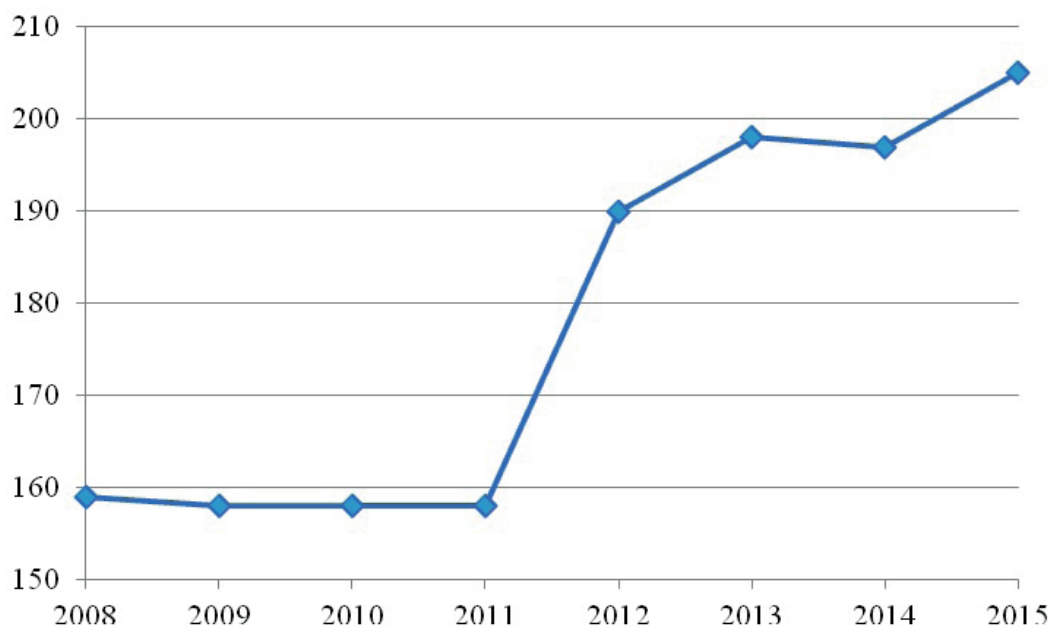
P_k – final value in time t, (value in the year 2015), expressed in a relative (percentage) scale;

Table 1.
Health establishments in Poland in the years 2008-2015
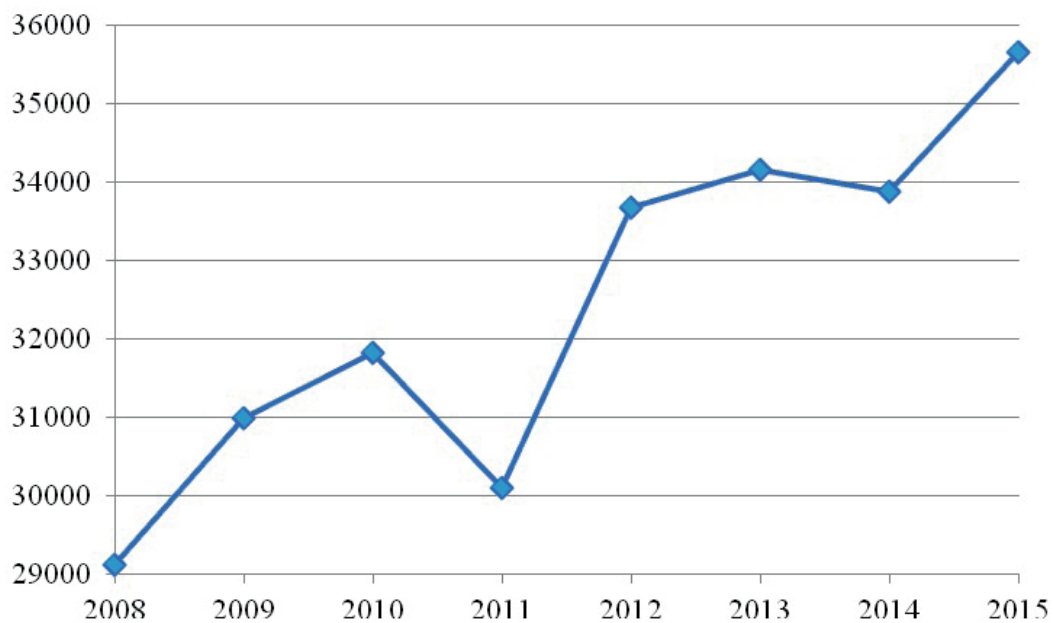Source: Own work based on data of the Central Statistical Office (2016)

Year	Facilities	Bed places
2008	159	29112
2009	158	30987
2010	158	31815
2011	158	30103
2012	190	33681
2013	198	34154
2014	197	33874
2015	205	35671

Fig. 1.
Health establishments in Poland in the years 2008-2015 – facilities
Source: Own work based on data of the Central Statistical Office (2016)

Fig. 2.
Health establishments in Poland in the years 2008-2015 – bed places
Source: Own work based on data of the Central Statistical Office (2016)

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 tourists who used Polish health establishments services in the years 2008-2015 are presented in table 2. 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 2008 to 2015. They are of a discrete nature.

The values 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 (1):

$$M_t = \sum_{t=0}^{t} J_t \text{, oraz } J_t = M_t - M_{t-1} \ (1)$$

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):

$$P_t = \frac{M_t \cdot 100}{M_0} [\%] \ (2)$$

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 formula (3):

$$P_K = \frac{J_k \cdot 100}{J_0} [\%] \ ,(3)$$

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 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 for this purpose, the relative percentage scale P_t is so well suited for (Stokłosa, 2004, 2006).

Table 2.
The number of tourists who stayed in health establishments in Poland in the years 2008-2015 (in thousands)
Source: Own work based on data of the Central Statistical Office (2016)

Year	Tourists
2008	605.8
2009	633.0
2010	612.2
2011	619.7
2012	617.1
2013	634.9
2014	661.3
2015	719.8

Two definitions of dynamics are used in this study: an absolute dynamics for the M_t sets and a relative (specific) 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 (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, which also contains the values of the P_K [%] parameter calculated according to formulas (4), (5) and (6):

for discrete sets J_t:

$$P_K = \frac{J_k \cdot 100}{J_0} [\%] \quad (4)$$

where: $J_0 > 0$,

J_0 – the initial value,

J_0 – the final value;

for continuous sets M_t:

$$P_K = \frac{M_k \cdot 100}{M_0} [\%] \quad (5)$$

where: $M_0 > 0$,

M_0 – the initial value,

M_k – the final value;

for discrete and continuous sets P_t:

$$P_K = \frac{P_k \cdot 100}{P_0} [\%] \quad (6)$$

where: $P_0 > 0$,

P_0 – the initial value,

P_k – the final value.

The P_K values show 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 compared with the initial value at the one set of the

process (Kondratowicz-Pietruszka, Stokłosa, 1994; Łuka, Łuka 2002). The results of the above calculations are presented in table 3.

Results and discussion

In table 3 discrete empirical data referring to the total number of tourists who stayed in health establishments in Poland in the years 2008-2015 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 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, figures 3 and 4 were created. They show the total number of tourists who used health establishments services in Poland in the years 2008-2015 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 tourists who used accommodation services in health establishments in Poland in the years from 2008 to 2015 went up over time, which means that there was a general increase in the value (P_K = 118,8 percent). It was a gradual process of a rather slow dynamics (figure 4). During the period from the year 2008 to 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 the increase of the velocity value was at relatively low level, while in 2015 it was the largest one (table 3, figures 3 and 4).

When comparing the discrete sets J_t with the continuous sets M_t, both of which refer to the numbers of tourists who stayed in Polish health establishments, one can clearly notice that the picture of a continuous process is a far better way of presenting a trend over time (figures 3 and 4).

Table 3.
Dynamics of change in the number of tourists who used accommodation services in
health establishments in Poland in the years 2008-2015 (in thousands)
Source: Own work based on data of the Central Statistical Office (2016).

| Year	t	Jt	Pt [%]	Mt	Pt [%]
2008	0	605.8	100.0	605.8	100.0
2009	1	633.0	104.5	1238.8	204.5
2010	2	612.2	101.1	1851.0	305.5
2011	3	619.7	102.3	2470.7	407.8
2012	4	617.1	101.9	3087.8	509.7
2013	5	634.9	104.8	3722.7	614.5
2014	6	661.3	109.2	4384.0	723.7
2015	7	719.8	118.8	5103.8	842.5
PK [%]		118.8	118.8	842.5	842.5
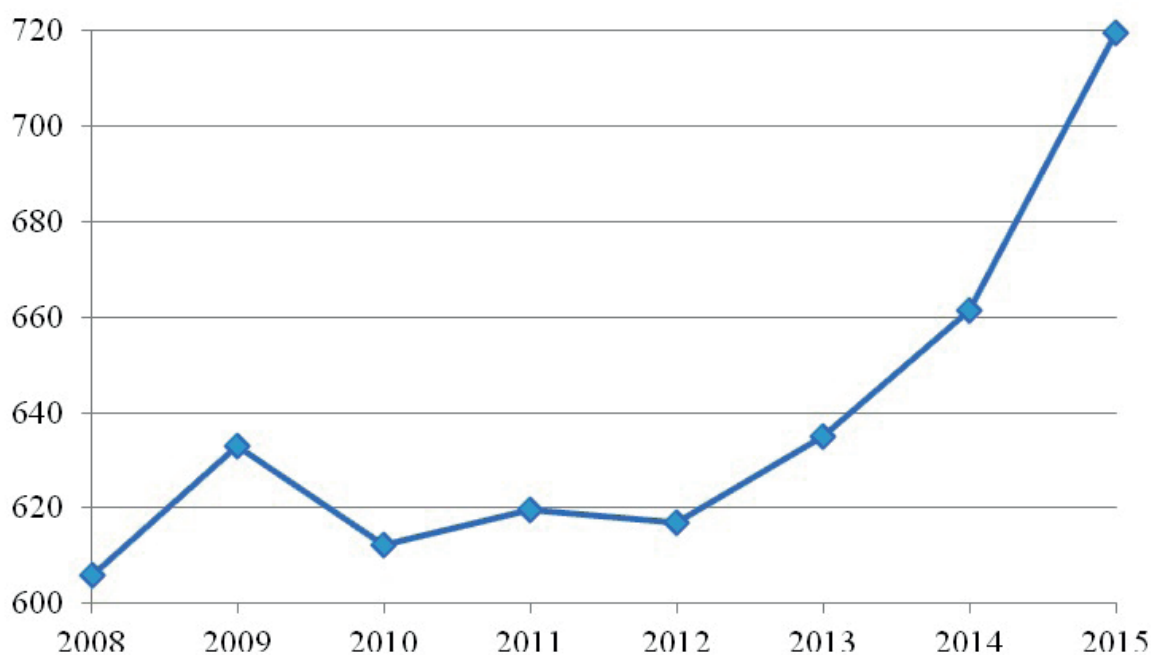
Fig. 3.
The number of tourists who stayed in health establishments in Poland
in the years 2008-2015 – Jt values ((in thousands)
Source: Own work based on data of the Central Statistical Office (2016)

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 2008-2012 and 2012-2015. The increasing trend of 2012-2015 probably will continue in the coming years due to the fact that Polish economic growth is higher than the EU average. Thus, the growth rate of 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 of greater demand from EU countries.
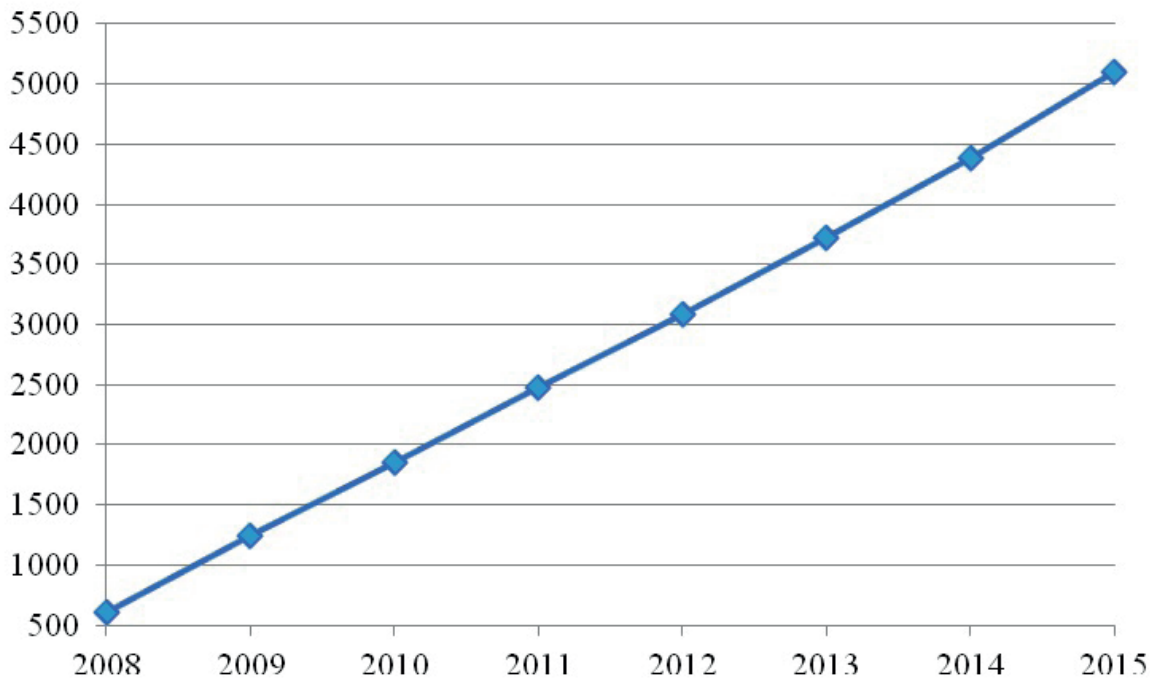
Fig. 4.
The dynamics of change in the number of tourists who stayed in health establishments in Poland in the years 2008-2015 – Mt values (in thousands)
Source: Own work based on data of the Central Statistical Office (2016)

Conclusion

Continuous sets, particularly when expressed in a relative scale P_t (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 in the number of overnight visitors who stayed in Polish health establishments between 2008 and 2015.

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 every 100 patients using the services of accommodation establishments in health spas in Poland in the years 2008-2015. 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 2012. In addition, by comparing the change in both the number of visitors and the number of facilities and beds, one can see the immediate response of supply to changes in demand in this market. Observing the entities a market economy, one can not miss the market mechanism. This mechanism, however, is a human driven mechanism. It is always understood as economic interaction. This is, because all tastes, preferences, trends, and opportunities always come from human needs, wants and desires and people always make decisions in both demand and supply side.

References

1. Abraham-Frois G, Dynamique Economique, Précis-Dalloz, 9 édition, Paris 2002.

2. Central Statistical Office, Tourism in 2014, Statistical Information and Elaboration, Social Surveys and Living Conditions Department, Warszawa 2015.

3. Central Statistical Office, Tourism in 2015, Statistical Information and Elaboration, Social Surveys and Living Conditions Department, Warszawa 2016.

4. Kondratowicz-Pietruszka E, Stokłosa K. Wybrane zagadnienia kinetyki procesów ekonomicznych, Wydawnictwo AE w Krakowie, Kraków 1994.

5. Łuka P. Dynamika wzrostu liczby osób korzystających z krajowych połączeń lotniczych w Polsce w latach 2002-2005, Ekonomia i Nauki Humanistyczne z. 16, Zeszyty Naukowe Politechniki Rzeszowskiej Nr 235, Rzeszów 2007.

6. Łuka P, Kwiatkowska-Sienkiewicz K. Kinetic analysis of quality, utility and price changes of the second-hand cars in Poland, Annals of the Ovidius University, Economic Science Series 2010a, Volume XV.

7. Łuka P, Kwiatkowska-Sienkiewicz K. Quality and utility estimation of the second-hand cars, Current trends in commodity science. Selected quality problems, Zeszyty Naukowe UE w Poznaniu nr 160, Poznań 2010b.

8. Łuka P, Łuka M. Analiza działalności hotelarskiej w Polsce w latach 1994-1999, Ekonomia i Nauki Humanistyczne, z. 11, Zeszyty Naukowe Politechniki Rzeszowskiej Nr 201, Rzeszów 2002.

9. Stokłosa K. Krytyka współczesnych metod oceny i porównań dynamiki procesów ekonomicznych, Materiały Konferencji Naukowej Politechniki Radomskiej, Radom 2004.

10. Stokłosa K. Krytyka współczesnych metod oceny dynamiki procesów w ekonomii i w zarządzaniu, praca zbiorowa pod redakcją naukową M. Trockiego i S. Gregorczyka, SGH w Warszawie, Warszawa 2006.