Implementation of a Model Descriptive Tool for Competitiveness in Energy Companies

Submitted 24/10/19, 1st revision 19/11/19, 2nd revision 14/12/19, accepted 17/01/20

Stanisław Sirko[1], Marzena Piotrowska-Trybull[2], Henryk Wojtaszek[3]

Abstract:

Purpose: *The aim of the research was to identify the factors and barriers which, in the opinion of the representatives of the surveyed entities, affect the competitiveness of companies from the energy sector in the Silesian Province. The Silesian Voivodeship still remains the most important Polish region in terms of energy development. Both production and demand for energy in Silesia are the largest in the whole country. However, a decrease in demand for energy generated in a conventional way should be expected in the coming years. As a result of empirical research, it was indicated that in the opinion of the vast majority of respondents, the competitiveness of their own company was perceived rather well.*

Approach/Methodology/Design: *Scientific and industry literature and secondary results from energy companies and other reports were analysed. The article contains the results of own analyses, which were carried out on the basis of data obtained in the course of research carried out in energy companies.*

Findings: *It was found that the surveyed companies, which have been operating on the market for a shorter period of time have evaluated their competitiveness well or very well. Interesting solutions have been created on a global scale based on the proposed modelling.*

Practical Implications: *The applied research allowed to create a model for practical implications that could help not only in Poland but worldwide.*

Originality/Value: *The research provides theoretical assumptions and practical answers to encourage further research and summary research on a global scale.*

Keywords: *Analysis, energy companies, practical applications, competition.*

JEL classification: *O19, O33, P10,K32.*
Paper Type: *Research article.*

[1]War Studies University, Management Institute, Management and Command Department, ORCID ID: 0000-0002-5154-8522, e-mail: s.sirko@akademia.mil.pl
*[2]Corresponding author, War Studies University, Management Institute, Management and Command Department, ORCID ID: 0000-0003-3174-0725
e-mail:* m.trybull@akademia.mil.pl
[3]War Studies University, Management Institute, Management and Command Department, ORCID ID: 0000-0002-9201-3057, e-mail: h.wojtaszek@akademia.mil.pl

1. Introduction

The beginning of the energy market in Poland is considered to be the entry into force of the Act of 10 April 1997 Energy Law, which contains the rules for shaping energy policy in Poland, the principles of energy supply and use, and the conditions for the operation of energy companies (Energy Law, www.ure.gov.pl). The regulatory functions resulting from the Act are performed by the Energy Regulatory Office (ERO)[i]. Its main tasks include energy price control, which is carried out through the approval of energy suppliers' tariffs, granting licenses to carry out certain types of activities, controlling operators and market participants, controlling energy supply parameters and preventing monopolistic practices on the energy market (Act of 10 April 1997 - Energy Law).

In Poland, there is a decentralised market model, where the competitive issue takes place between market entities and between market segments. Such a model results in constant changes in the market position of the participating entities, which in turn increases competition. As a result, the way the energy demand is met is optimised. The Energy Regulatory Office indicates four energy markets, such as: electricity market, gas market, heat market and liquid fuels market (Ibidem).

The region of particular importance in the field of hard coal mining in Poland is the Silesian Voivodeship. The Upper Silesian Coal Basin is located in Silesia, which is one of the three regions richest in hard coal in Poland. It is in this area that most mines extract the raw material used to produce energy. In the third quarter of 2019, gas consumption in the EU was 7% higher than in the same period (13%) last year. Electricity generation from gas was much higher in the EU (by 20%), which reduced the role of coal in power generation in several EU countries. Total gas consumption in the EU in the third quarter of 2019 was slightly higher than in the last five years. Third quarter consumption in 2019 amounted to 84 billion m^3, compared to 79 billion m^3 a year earlier. In the first three quarters of 2019, EU gas consumption was 343 billion m^3(3%) higher than in the same period of 2018, when it was only 333billion m^3.

The market position of each of the producers is strong and stable, due to the high demand for electricity, but their activities depend on energy resources, which are extracted by other companies. Although the existing regulations are aimed at increasing competition on the energy market, entry barriers are high – the vast majority of the market has been seized by three capital groups. The biggest competition for entities using conventional energy sources are companies related to Renewable Energy Sources (RES). The need to diversify the energy market resulting from the development of the economy and the European Union (EU) guidelines set out in the Europe 2020 package may significantly weaken the position of these generators (ec.europa.eu).

Silesia is the region of operation for both large distribution companies and small enterprises that have obtained concessions. The diversity on the market is large - among DNOs there are mines, power plants and steelworks.

Many European generators produce energy at a more favourable price than the Polish power plants, which places them in a worse market position. The problem of competitiveness of electricity production in Poland in relation to other EU countries is very important. Poland's place in relation to other EU countries, as well as the progressing liberalisation of the energy market forces the Polish economy to build organisational structures similar to those of Western companies operating in this sector. For over two years, vertical links have been consistently established between mining, energy production, distribution and trading companies (elektroenergetyka.pl). It is not rational to maintain such a "fragmented" market in Poland, where everyone competes with everyone, which leads to a devastating price war, and as a consequence, there are no funds for development and the price offer for the end user does not improve.

Since 2008, the Polish energy sector has faced difficult challenges: consolidation, privatisation, modernisation and major investments. Noticeably, energy in Poland is much cheaper than in other countries, such as Germany. The state of competition on the electricity market can be determined on the basis of indicators measuring the degree of concentration. In the absence of sufficiently well-developed cross-border competition, competition on national markets depends on the structure of the electricity sector of individual Member States. The liberalisation of electricity markets aims at breaking down monopolistic and oligopolistic market structures in both the wholesale and retail markets. A good measure of this strategy is the number of generators (for the wholesale market) and suppliers (for the retail market) with a market share of at least 5% in electricity. A relatively simple and convenient indicator is the HHI index, which is calculated as the sum of squares of percentage market shares of all market participants (Zawada *et. al.,* 2013, p. 290).

Analysing the scientific and industry literature, as well as publicly available statistical data, the article has been formulated that competitiveness is an important element in improving the level of innovation in energy companies. A research tool in the form of a descriptive model concerning the competitiveness of energy industry enterprises was implemented.

2. State of Competition on the Electricity Market in the European Union

Mechanisms of competition can function in the supply of energy to the network (covering not only generation but also its import), provided that a proper competitive structure and mechanisms are in place. The state can act in both areas through rules, e.g. prohibiting the acquisition of excessive market power and shaping specific competitive market mechanisms. The introduction of competition

on the electricity market is primarily hampered by the high level of consolidation of the electricity industry and its high level of concentration.

The level of concentration is most often measured by the Herfindahl-Hirschman Index (HHI) mentioned above[ii]. The higher the level of this index, the lower the branch's ability to compete. In order to determine the degree of concentration of production (*generation*) in the electricity sector due to its specificity, the level of HHI has been increased. The HHI[iii] provides a relatively easy assessment of the degree of competition on the market, as only sales volumes or production capacities are required to calculate it. However, it does not take into account demand-side behaviour, market strategies and, frequently, the congestion. It assumes that all competitors behave in a similar, i.e. oligopolistic way. However, this assumption may lead to the wrong conclusion if there are also many small suppliers with significant combined capacity. In nine cases, the ratio on the producers' market is above 5,000 (*very high degree of competition*). In eight countries, this ratio is between 1,800 and 5,000, which means a high level of market concentration and thus a low degree of competition. The most competitive EU markets (*average level of market concentration*), according to the HHI, are the UK and Italy. The European Union Member States also have different levels of competition on retail markets. In this case, the markets in Austria, Romania, Slovakia, Slovenia, Hungary and the UK and Italy can be considered the most competitive.

It is worth pointing out in this study that the problems of professional (*conventional*) power plants are not an effect of market over-regulation or renewable energy subsidies, as it is customary in Poland, but rather the opposite is true – it is the case of market liberalisation. Unfortunately, the imbalanced one. The level of concentration of electricity generation in Poland has been decreasing for many years. The share in production of the three largest energy groups dropped to 57% in 2018, and the HHI index to 1,760 points, which means that we have an average level of market concentration, although in 2008 it was still -high (*the HHI index exceeded 2,200 points*) - for comparison, the level of very high concentration starts at 5,000 points). Within the capital groups themselves, individual power plants are still competing with each other.

It is also important that 47% of the energy produced in Poland was sold on the exchange, and another 5% on the so-called balancing market, which has features similar to those of the exchange. Both shares have unfortunately significantly decreased since 2017 (*back then it was 54% and 6% respectively*), but still it is the exchange and the balancing market that have the greatest influence on setting the market price and are the reference for many bilateral contracts. Trading on the Warsaw Power Exchange TGE is also relatively liquid. The total trading volume with physical delivery in 2017 amounted to almost 118% of domestic consumption. Competition between power plants is strengthened by another factor – permanent oversupply of production capacity, which has been maintained for nearly 30 years. For the first time demand exceeded supply in August 2017. Usually, the available

capacity significantly exceeds demand, because, unlike most goods, energy storage capacity in Poland is small. Whereas, an increase in demand beyond the capacity to satisfy it would have to lead to administrative restrictions in energy consumption for entire groups of consumers. In Poland, it is not yet possible to selectively reduce consumption, e.g. only among this group of customers who pay a lower fee (*ec.europa.eu*). Figure 1 below shows the number of electricity generators and sellers for final consumers.

Figure 1. *Number of electricity generators and sellers for final customers*
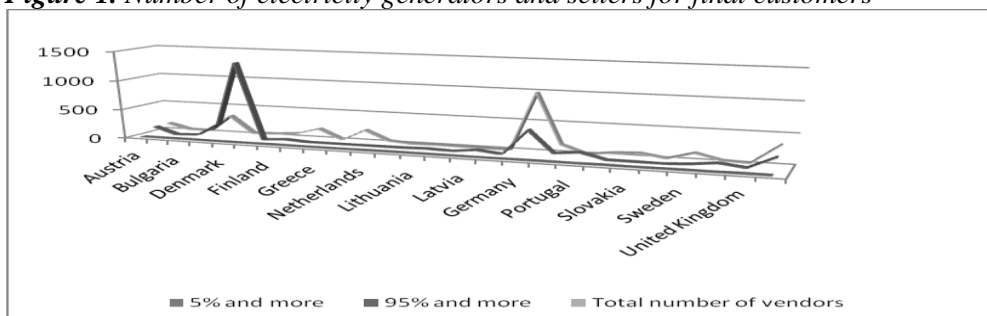
Source: Study based on CSO data.

The level of concentration of wholesale electricity markets of EU countries is characterised by data concerning the share of domestic electricity generators in them, which allows for its more precise determination within the ranges determined by HHI values (Figure 2). They indicate that in 2018 the most competitive market among the EU countries was the UK market, as it had the largest number of electricity generators (9), whose market share exceeded 5 per cent.

Figure 2. *HHI index for the generators' market*

Source: Own study based on CSO data.

The number of generators with a domestic market share of at least 5 per cent in Romania (6) and Ireland (6) was relatively high. Competition on domestic retail markets is fostered by a large number of suppliers, none of which has a dominant position. The data summarised in Figure 2 shows that in the year under review most

of them were in Germany (over 1000), three of which exceeded the 5% market share threshold. A relatively large number of suppliers operated in the Czech Republic, Spain and Italy. The 5% retail market share threshold was exceeded by the largest number of suppliers in Romania, Slovenia and Poland. Currently, only 11 Member States (Austria, Belgium, the Czech Republic, Finland, Germany, Italy, Luxembourg, the Netherlands, Slovenia, Sweden and the United Kingdom) have no regulated retail energy prices. This way of pricing gives consumers a false sense of being protected, so that they have no incentive to look for better opportunities, including energy efficiency services. Moreover, regulated end-user prices stand in the way of investments, discouraging market entry and investment in new generation infrastructure.

3. Practical Research - Assumptions and Results

The article contains the results of own analyses, which were carried out on the basis of data obtained during the research carried out in the energy industry companies. The aim of the research was to identify the factors and barriers that affect the competitiveness of companies from the energy industry in the Silesian Voivodeship, in the opinion of the representatives of the studied entities. During the research process, answers to the following research problems were sought:

1. What factors and barriers affect the competitiveness of enterprises?
2. What actions ensure competitiveness of the company?
3. How does the company shape relations with suppliers?
4. How does the company shape relations with consumers?

In order to obtain answers to the questions formulated in this way, the research used both theoretical (analysis, synthesis, inference) and empirical methods, including the survey technique, in particular telephone and postal survey. For the purposes of the research, a questionnaire was prepared, which consisted of 19 questions. The specification data part included two questions, concerning the number of employees in the company and the year of its establishment.

The analyses of the collected data were performed using Statistica v.13.1. and Excel 2013 computer programs. The results presented in the article were influenced by multiple-choice questionnaires and measurement scales used in the questionnaire. Analysing the data obtained by means of multiple-choice questions, the basic measures (percentage) were calculated in relation to the number of respondents in a given group. The χ^2 test was used to verify statistical hypotheses. The results presented in the study were statistically significant at 0.05. Figures 4, 5, 6 show the effects of the correspondence analysis. The results presented in them are interpreted on the basis of points reflecting specific variables. The points that are far from the centre of projection make the greatest contribution to rejecting the hypothesis of variable independence. The close distribution of points belonging to different

variables indicates the existence of links between them. The close location of two points belonging to the same variable indicates a great similarity of their profiles[iv].

4. Competitiveness of Enterprises

The word competition comes from Latin *concurrentia,* meaning competition. In the source literature it is emphasised that it is a competition for obtaining benefits. Entities taking part in it strive to achieve better results than their competitors. Better results concern not only an increase in the share of sales value, but also an increase in profitability and value" (Bossak, 2000).

Lubiński, Michalski and Misala (1995) emphasise that the notion of competitiveness is evaluative in nature and defines a certain state desired by a company, region, country. Competitiveness means, on the one hand, the ability to participate in rivalry at present and in the future, and on the other hand, the result of that rivalry. Competitiveness is based on a set of features, resources and relations favourable from the point of view of undertakings implemented by an enterprise, which in consequence determine its economic efficiency. The formation of a specific set of characteristics, resources and relations in a particular company enables it to compete effectively on the market and is defined as gaining an advantage over other entities.

Companies taking part in market rivalry strive to gain a higher position than their rivals (new sales markets, increased customer satisfaction, the possibility of taking advantage of a location-based benefits – access to a qualified workforce, improved relations with customers and suppliers). Moreover, their competitiveness affects the ability of the regional and/or national economy to participate in international economic rivalry (Bossak, 2000). Thus, the competitiveness of enterprises is based, inter alia, on the ability to develop their own potential (including resources), build relationships with stakeholders (e.g. suppliers, consumers, customers, local authorities), take advantage of opportunities and adapt to changes in the environment and create changes in the surrounding.

In economic literature there is a distinction between competitive ability and competitive position (Klamut and Passella, 1999). Competitive ability (potential competitiveness) means that the entity has the potential to join the market competition. Competitive ability is defined as factor competitiveness, as it consists in a dynamic process of adapting to changing economic, social, institutional and technical conditions. Through innovative and adaptive measures, companies can increase their ability to compete. In turn, competitive position is defined as the result of the company's competitive strategy and that of its rivals. Enterprises build a competitive advantage based on their potential and/or strategy to gain a specific competitive position on the market. For this purpose, they use the instruments of competition, namely the quality of products and their differentiation in terms of features and prices, adjustment of the offer to the requirements and expectations of customers, convenient and timely access to products, reliable information about the

product, advertising, promotion, product brand, company image, CSR activities, after-sales service defined by its scope, price and quality, terms and methods of payment, and others (Gorynia and Łaźniewska, 2009).

Porter (1998), when analysing the factors shaping the competitive advantages of enterprises, considered the key factor of geographical concentration and quality of the local environment. He pointed out that classical production factors as a result of globalisation processes are becoming more and more accessible and therefore the emergence of advantages, especially in advanced industries, is more strongly determined by differences in the level of knowledge and innovation. According to Porter, the process of creating "capacity" to compete has local roots and thus influences the innovativeness of particular areas. He indicated the following factors as the sources of competitive advantages in space (Porter, 2001, p. 260-265):

a) factor conditions determined by the level of equipment in production factors (natural, human, capital and infrastructure resources), their quality, cost and specialisation;
b) demand conditions determined by demanding local customers whose needs precede those arising elsewhere, as well as by the demand of specialized sectors that can be served globally;
c) existing related and supporting industries with a high level of efficiency;
d) the strategies of companies and the nature of competition between them (based on innovation and high levels of investment).

5. Characteristics of Enterprises

The research was conducted in 247 companies having their registered offices in Silesian Voivodeship. More than half of them (55.5%) are micro enterprises employing up to 9 people. A large group (39.7%) were small enterprises, in which 10 to 49 employees found employment. In the remaining ones (4.8%), hereinafter referred to as medium-sized enterprises, between 50 and 249 employees worked. Among the enterprises there were those, more than one third (35.2%), which have operated for less than 10 years, others have been present on the market for 10 to 20 years (30.4%), and almost every fourth of them (24.3%) for 20 to 30 years. Others (10.1%) have existed for thirty years and more (Figure 3). In the surveyed group of enterprises, as the time of their functioning increased, the share of enterprises changed due to their size (statistically significant dependence).

The enterprises which participated in the survey manufactured products for which there was a constant (37.6%), variable (35.2%) or seasonal (27.2%) demand. In order for these products to be created, enterprises cooperated with a different number of suppliers. There were: less than 10 (for 31.6% of respondents), 10-50 (53.8%), 51-100 (11.7%), more than 100 (2.9%). The company's products were delivered to consumers, which were: less than 10 (10.5%), 10-50 (37.7%), 51-100 (26.7%), more than 100 (25.1%).

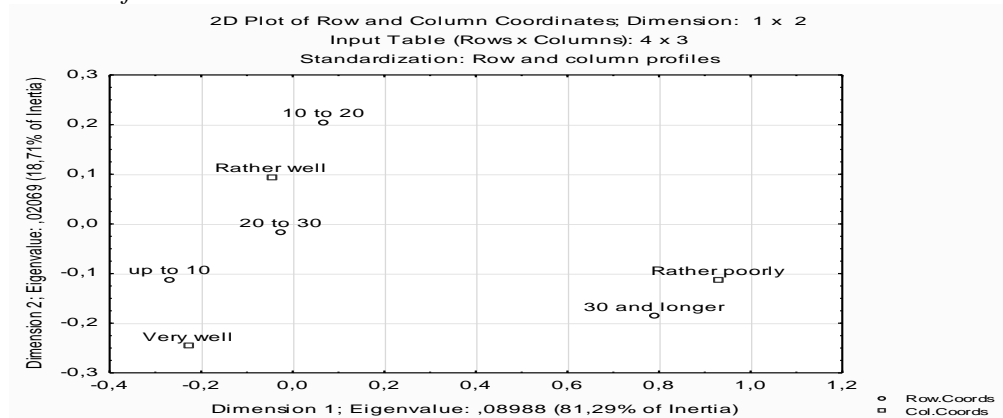**Figure 3**. *Duration and size of enterprises*
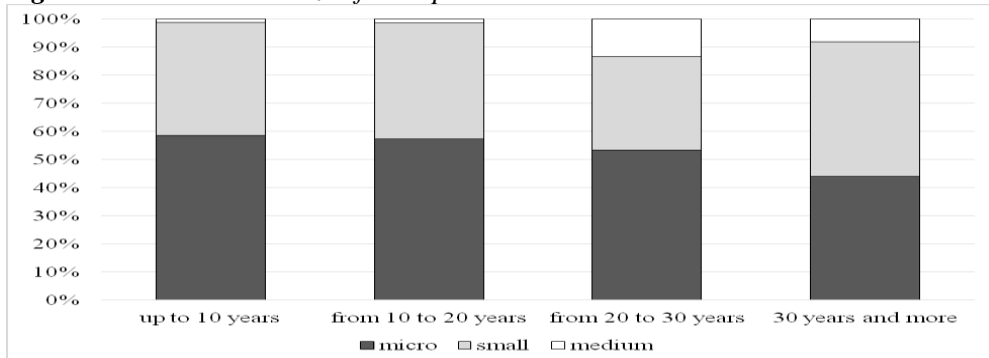
6. Results of Analyses

In the opinion of the vast majority of respondents (68.8%), the competitiveness of their own enterprise was perceived rather well. According to (22.3%) of the respondents – very well, while in the case of the others (8.9%) it was seen as poor. It was found that the respondents from those companies, which have been operating on the market for a shorter period of time, more often than the respondents from the other ones, evaluated their competitiveness well or very well (statistically significant dependence), (Figure 4). Analysing the responses of the enterprises in relation to the life cycle of the organisation, it can be assumed that for the entities that have been operating on the market for a shorter period of time, which are at the stage of establishment and growth, the characteristic features favourable to staying on the market include entrepreneurial behaviours aimed at searching for and offering novelties, openness and creative thinking, flexibility of action, building commitment, checking various patterns in cooperation with stakeholders and developing them, as well as taking care of the product offered on the market. Therefore, among this group of respondents, higher competitiveness ratings were more frequent, indicating optimism in perceiving the situation of their own company.
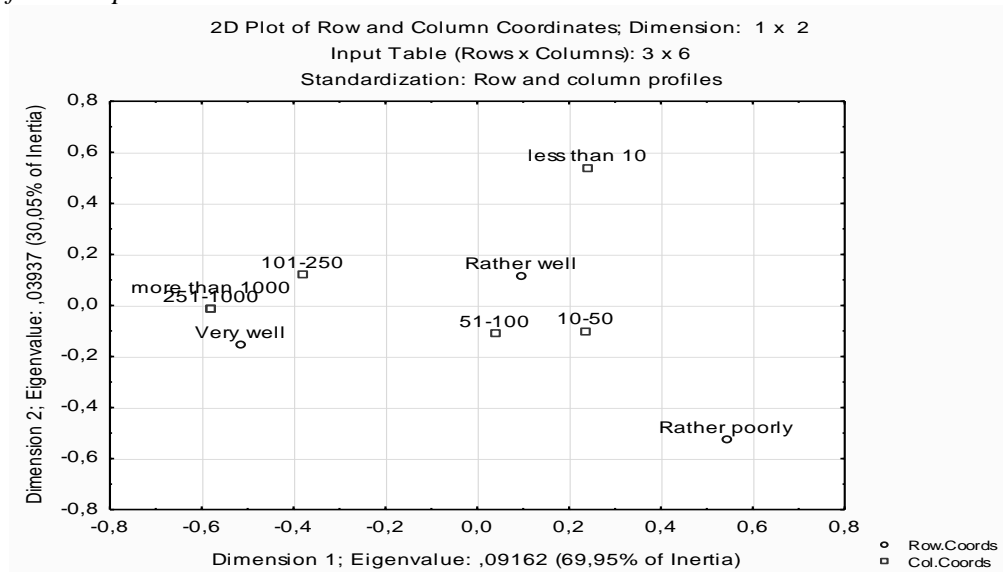
It was found that those respondents who assessed the competitiveness of their enterprise better indicated a greater number of entities that received their products (statistically significant dependence), (Figure 5). A larger number of consumers of the company's products is conducive to its survival on the market and sales growth. Relations with customers based on the quality of the product, adequate price, timeliness of deliveries, as well as the requirements of after-sales service in the long term determine the existence of a competitive advantage. The growing number of customers is an expression of trust and appreciation for the company's products and can be considered in terms of its future development. In such a case, companies want to invest in product development because they want to keep their customers and gain new ones thanks to their good reputation and image.

Figure 4. *Competitiveness assessment of companies participating in the survey and the time of their existence*

2D Plot of Row and Column Coordinates; Dimension: 1 x 2
Input Table (Rows x Columns): 4 x 3
Standardization: Row and column profiles

Source: Own study.

Figure 5. *Assessment of companies' competitiveness and the number of customers for their products*


2D Plot of Row and Column Coordinates; Dimension: 1 x 2
Input Table (Rows x Columns): 3 x 6
Standardization: Row and column profiles

Source: Own study.

Companies tried to achieve a high level of competitiveness through specific actions. According to the respondents, this could be achieved by implementing one or several undertakings (the respondents could indicate from one to ten such measures). People employed in the level of customer service (59.3%), good quality of offered products (59.3%), qualified personnel (54.7%) and a wide range of products (37.2%) above all allowed their company to achieve a high level of competitiveness. In these companies, which have existed on the market for 10 to 20 years, four factors were most often indicated. Among them were: good quality of products (68.0% of

indications), good relations with customers (64.0%), high level of their service (61.3%) and staff with high qualifications (42.7%). In companies present on the market for 20-30 years, three measures were most often mentioned. These included: good relations with customers (66.1%), good quality of products (64.4%), high level of customer service (59.3%). Respondents from the last group of companies (operating for at least thirty years) also most often pointed out: good relations with customers (68.0%), good quality of products (64.0%) and high level of customer service (64.0%) (Figure 6).

Figure 6. *Distribution of respondents' indications from companies with different time of existence in terms of activities leading to high competitiveness and the company*
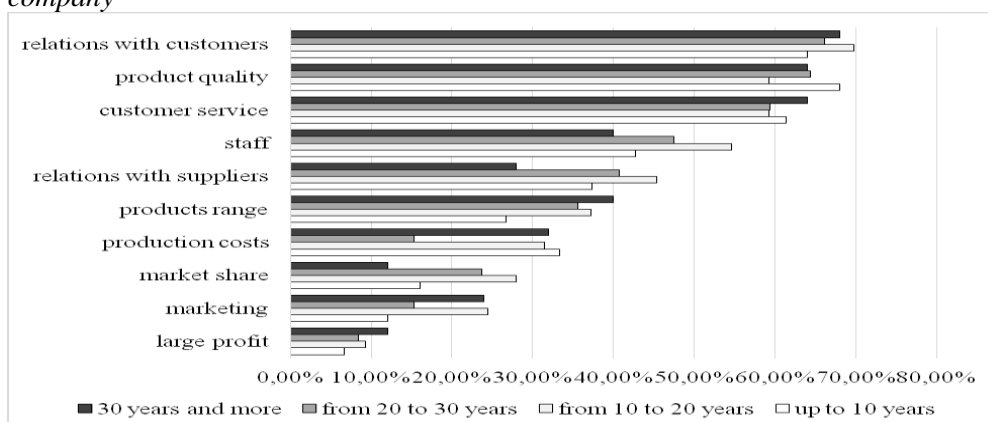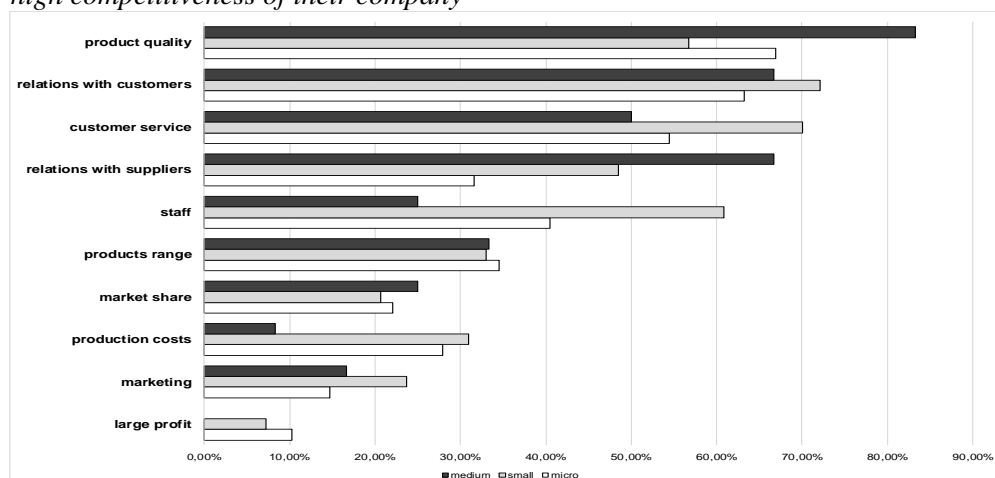

Source: Own study.

Further analyses of the respondents' answers, which concerned activities leading to a high level of competitiveness, made it possible to state that the respondents from micro enterprises most often indicated three activities, paying the greatest attention to product quality (66.9%), customer relations (63.2%) and customer service (54.4%). Whereas the respondents from small enterprises most often mentioned four activities, including good customer relations (72.2%), their good service (70.1%), high qualifications of the personnel (60.8%) and good product quality (56.7%). For the respondents from medium-sized enterprises, the quality of the product was important (83.3%), good relations with suppliers and customers (66.7% each) and a high level of customer service (50.0%) were equally significant (Figure 7).

People who assessed the competitiveness of their enterprise very well most often indicated high quality of the product (69.1%), good relations with customers (67.3%) and good quality of their service (63.6%). In turn, people who assessed their company's position on the market as weak, most often chose a good level of customer service (81.8%), good relations with customers (68.2%) and qualified personnel (63.6%).

In most cases, regardless of the period of operation of enterprises on the market and the size of employment, among the factors important from the point of view of building competitiveness, special attention was paid to customer relations, actions for the quality of products and ensuring an appropriate standard of customer service. The efficiency of the above mentioned activities is conditioned by the competence of the personnel, which was also stressed by the respondents. In the context of building the competitiveness of enterprises, the respondents pointed first of all to the importance of equipping with production factors, including the quality and specialisation of human resources, as well as, although to a slightly lesser extent, relations with suppliers. The latter corresponds to the existence of related industries and high levels of efficiency as a factor influencing competitiveness, as mentioned by M.E. Porter.

Figure 7. *Respondents from companies of different sizes, with activities leading to high competitiveness of their company*
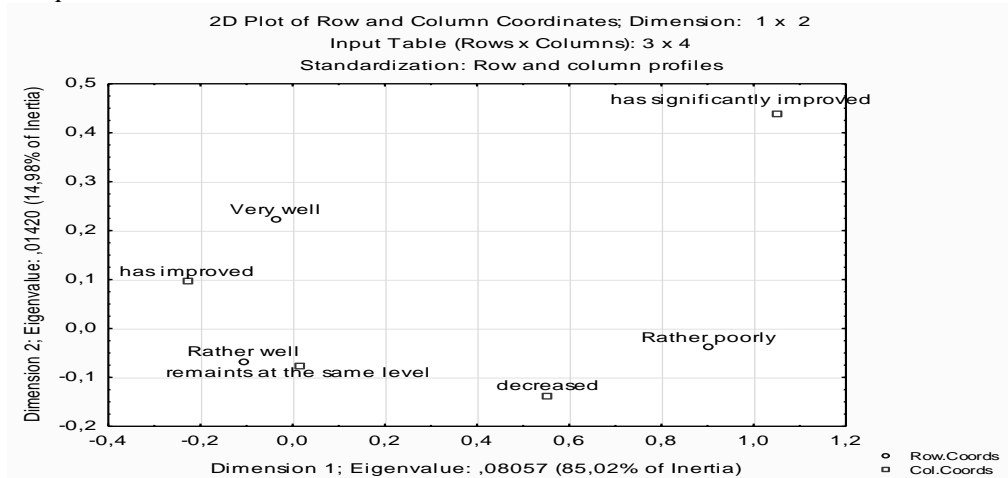

Source: Own study.

The respondents attributed lesser importance in influencing competitiveness to generating high profits, low production costs and intensive marketing activities. This may have resulted from the fact that in activities aimed at building a competitive advantage, generating high profits and low production costs do not guarantee its achievement. Building a long-term competitive advantage based on knowledge and innovation requires investment in these elements, which to some extent makes it impossible to achieve high profits and reduce production costs at the same time. In the context of the competitive instruments mentioned in the source literature, it is puzzling to attribute little importance to marketing activities aimed at providing information about the product and maintaining interest in the product.

Among the presented factors, which should lead the company to achieve a high level of competitiveness, as assessed by the respondents, good relations with customers played an important role. There was a statistically significant correlation between

the respondents' opinions on the competitiveness of their company and their assessment of cooperation with customers, which took place in the last five years. It was indicated as being at the same level by 54.5% of those who assessed the competitiveness poorly, 52.9% of those who assessed the competitiveness of their enterprise well and 43.6% of those who assessed it very well (Figure 8).

**Figure 8.** *Evaluation of cooperation with customers and evaluation of enterprise competitiveness*

Source: Own study.

In the light of the respondents' answers, enterprises, regardless of how long they have been operating on the market, tried to build closer relations with customers mainly through effective communication and data exchange (70.1% of enterprises existing for up to 9 years, 67.6% of enterprises operating on the market for 10 to 20 years, 69.5% of enterprises existing for 20 to 30 years and 75.0% of enterprises operating for 30 years and more). For enterprises, joint planning and effective use of electronic communication systems was also important. The distribution of the respondents' indications was similar in terms of the presented issue, taking into account the size of the company, as shown in Figure 9. Whereas, activities aimed at joint forecasting, stock replenishment and standardisation, as well as risk-benefit sharing were indicated less frequently (with representatives of medium-sized companies not emphasising this possibility at all).

In the course of the implementation of their tasks, enterprises encountered various types of obstacles. The respondents most often mentioned high operating costs, problems with maintaining financial liquidity, untimely execution of orders by suppliers and problems with the high level of stocks of raw materials and finished products. Referring to the barriers in building good relations with the consumers of their products, the respondents pointed out mainly to the general lack of trust (30.8% micro, 31.5% small, 18.2% medium enterprises), lack of reliable information (25.0%

micro, 21.4% small, 18.2% medium enterprises) and lack of potential benefits from building closer relations (21.7% micro, 23.6% small, 36.4% medium enterprises).

Figure 9. *Activities leading to building closer relations with customers, in the opinion of representatives of enterprises of different sizes*
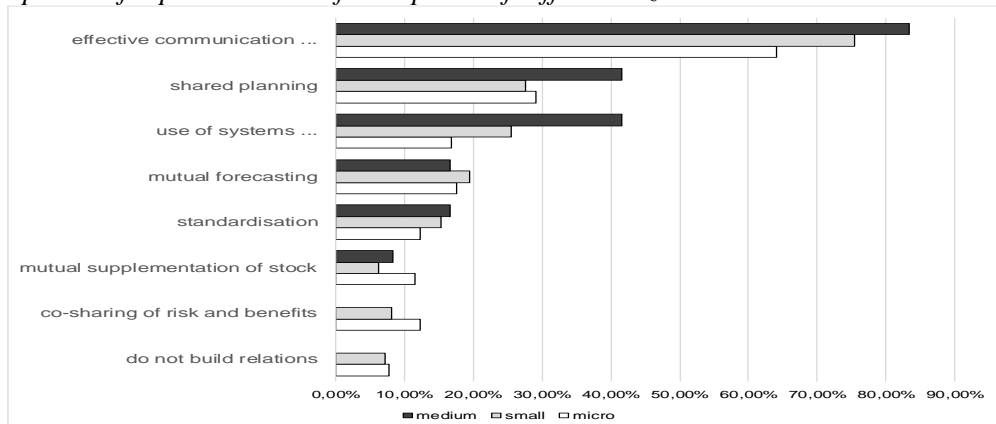
Source: *Own study.*

While it is possible to notice some differences in the perception of particular factors by representatives of enterprises, it is characteristic, in the light of previously presented issues, that these differences are not large. It can also be observed by analysing the respondents' answers taking into account the time of enterprise existence (Figure 10).

Figure 10. *Barriers in building close relations with customers, in the opinion of respondents from enterprises with different time of existence*
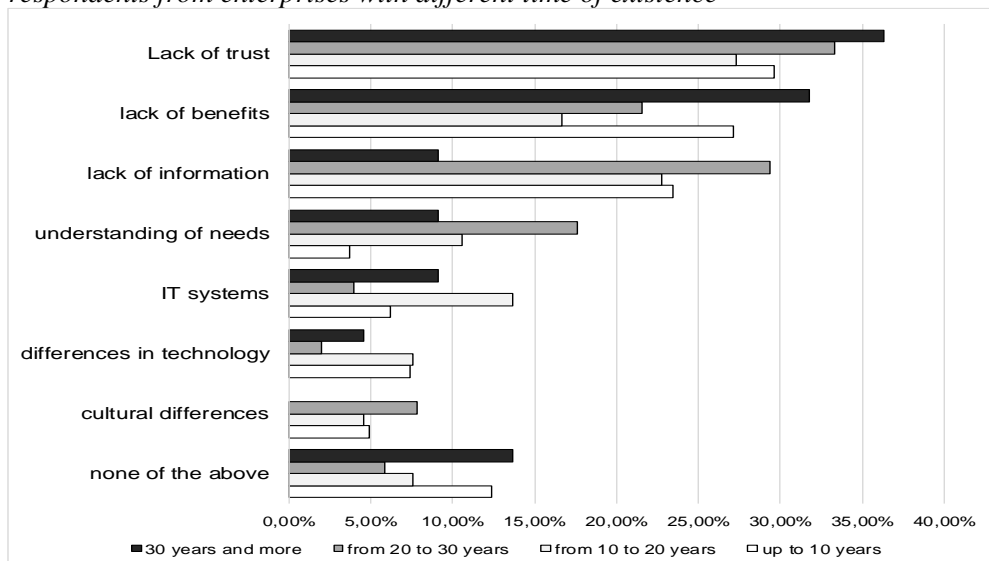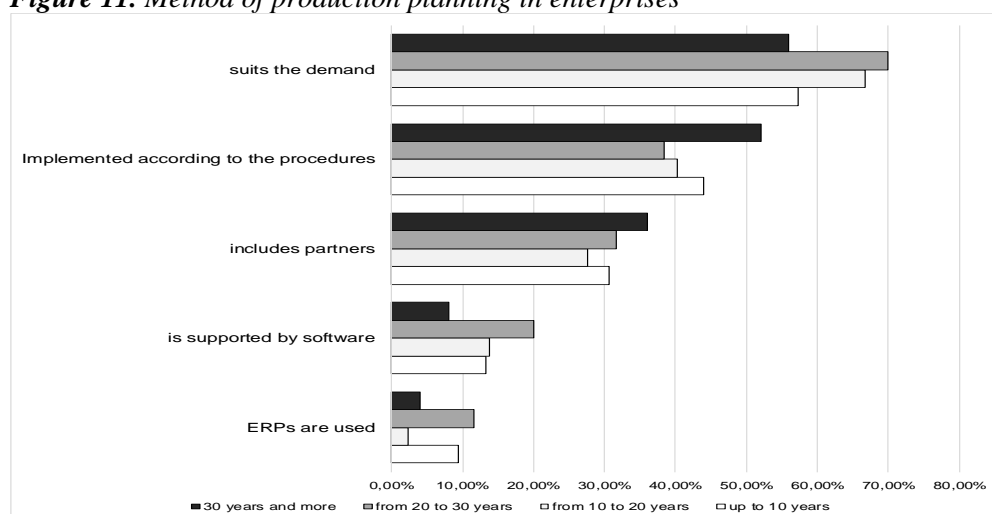

Source: *Own study.*

The companies participating in the survey also cooperated with suppliers. In the opinion of the majority of the respondents (58.7%), in the last five years, cooperation with them has been stable. When pointing out the barriers which hindered building close relations with suppliers, similarly as in the situation of consumers, the most often indicated ones were the lack of trust and fear of sharing information. These factors dominated when both the age of the company and its size were taken into account. The respondents also paid attention to the late completion of orders (noticed by 19.1% of the respondents from enterprises existing up to 9 years, 20.3% from those that have operated in the market from 10 to 20 years, 23.6% from those existing from 20 to 30 years and 23.3% operating for 30 years and more).

In the respondents' answers particular attention was paid to the lack of trust in business partners, the failure to see the potential benefits of building closer relations and the lack of reliable information, which also potentially limits the level of trust between entities. It can be assumed that the effect of these barriers is a relatively low competitive potential resulting from the cooperation of enterprises located in a given territory. Intensification of cooperation between enterprises, based on cooperation, could result in raising the level of competitiveness of the region and increase economic efficiency of enterprises.

As assessed by the respondents in their enterprises, when planning production, regardless of its size and duration, first of all, the demand for products was taken into account (micro enterprise 65.0%, small 60.2%, medium 75.0%). Plans were developed according to established procedures (micro enterprise 39.0%, small enterprise 44.9%, medium enterprise 58.3%). The distribution of the respondents' answers, taking into account the time of enterprise's existence, is presented in Figure 11.

Figure 11. *Method of production planning in enterprises*

Source: Own study.

When assessing the impact of changes in the size of orders on the functioning of an enterprise, regardless of its size and period of operation, the respondents indicated to a comparable extent that this led to an increase in costs and stocks, contributed to the creation and execution of orders or did not have a greater impact on the functioning of their enterprise.

7. Conclusions

The Silesian Voivodeship still remains the most important Polish region in terms of energy development. Both production and demand for energy in Silesia are the largest in the whole country. However, a decrease in demand for energy generated in a conventional way should be expected in the coming years. This is particularly unfavourable for coal companies, which have been recording increasing losses since 2011.

As a result of empirical research, it was indicated that in the opinion of the vast majority of respondents, the competitiveness of their own company was perceived rather well. It was found that the surveyed from those companies, which have been operating on the market for a shorter period of time, more often than the respondents from others, evaluated their competitiveness well or very well.

In turn, when analysing the responses of the enterprises in relation to the life cycle of the organisation, it can be assumed that for the entities that have been operating on the market for a shorter period of time, which are at the stage of establishment and growth, the characteristic features favourable to staying on the market include entrepreneurial behaviours aimed at searching for and offering novelties, openness and creative thinking, flexibility of action, building commitment, checking various patterns in cooperation with stakeholders and developing them, as well as taking care of the product offered on the market. Therefore, among this group of respondents, higher competitiveness ratings were more frequent, indicating optimism in perceiving the situation of their own company.

It was found that those respondents who assessed the competitiveness of their company better indicated a greater number of entities that received their products. A larger number of consumers of the company's products is conducive to its survival on the market and sales growth. Relations with customers based on the quality of the product, adequate price, timeliness of deliveries, as well as the requirements of after-sales service in the long term determine the existence of a competitive advantage. The growing number of customers is an expression of trust and appreciation for the company's products and can be considered in terms of its future development. In such a case, companies want to invest in product development because they want to keep their customers and gain new ones thanks to their good reputation and image. In order to obtain information on the factors and barriers affecting the competitiveness of power supply companies, a competitiveness model has been

implemented. Information was also obtained on the relations formed with customers and suppliers, as shown in Figure 12.

Figure 12. *Research tool - competitiveness model for industrial enterprises*
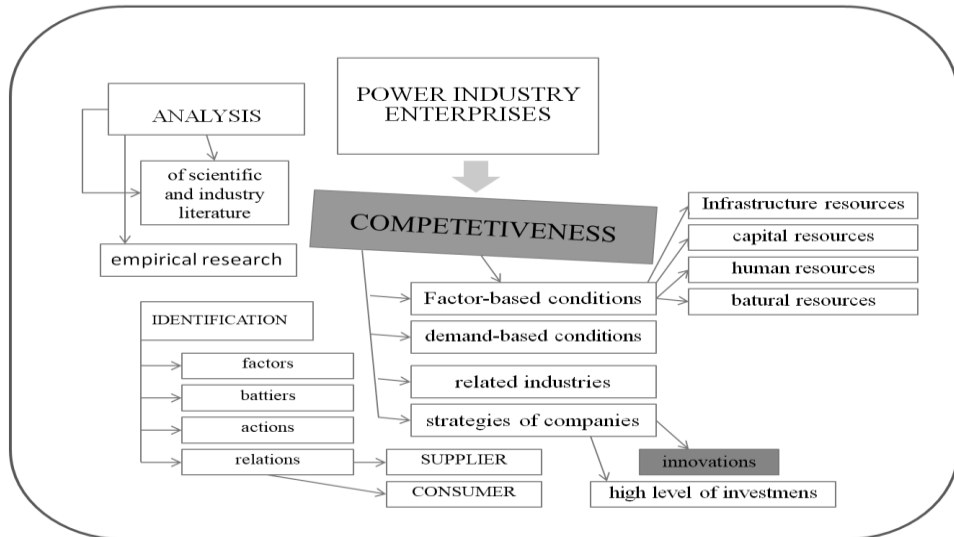
Source: *Own study based on the research carried out.*

The presented model is a universal proposal of a research tool aimed at identifying factors and barriers of actions shaping competitiveness, including relations with suppliers and customers in energy industry enterprises. The model approach allows for the application of a descriptive procedure of desired actions in terms of obtaining "opportunity" in the aspect of desired competitiveness.

In accordance with this approach, it is worth noting the need to analyse scientific and industry literature and conduct empirical research. While conducting the analysis we move from micro to macro factors (on a global scale). Factors, barriers and supplier-consumer relations are inseparable elements of identification. Competitiveness is determined by factor conditions such as: infrastructure resources, capital resources, human resources and natural resources and demand conditions, related industries and company strategies created by innovation and high level of investment.

References:

Aksoy, H., Cengiz, E. 2016. Innovative marketing in SMEs and large scale enterprises: gaziantep sample. Economic and Social Development: Book of Proceedings,Varazdin. https://search.proq uest.com/docview/ 1793195821? accountid=17116.

Anna S.C., Fang, W. 2016. Utilizing customer knowledge in innovation: antecedents and impact of customer involvement on new product performance. Journal of the

Academy of Marketing Science, 44(4), 516-538. http://dx.doi.org/10.1007/s11747-015-0433-x.

Bossak, J. 2000. International competitiveness of the country's economy and enterprise. Zagadnienia teoretyczne i metodologiczne, [in:] Konkurencyjność gospodarki Polski w dobie integracji z Unii Europejskiej i globalizacji, Instytut Gospodarki Światowej, Warszawa, p. 46.

Cagno, E, Trianni, A. 2013. Exploring drivers for energy efficiency within small-and medium-sized enterprises: first evidences from Italian manufacturing enterprises. Applied Energy, 104, 276-285.

Cummins, D., Gilmore, A., O'Donnell, A., Carson, D. 2000. Innovation marketing in SMEs a conceptual and descriptive framework. New Product Development and Innovation Management, 21(2), 227-244.

Gorynia, M., Łaźniewska, E. (ed.), 2009. Compendium of knowledge on competitiveness. PWN Scientific Publishing House, Warsaw, 53-58.

Gunasekaran, A., Bharatendra, K., Rai, G.M. 2011. Resilience and competitiveness of small and medium size enterprises: an empirical research. International journal of production research, 49(18), 5489-5509.

Klamut, M., Passella, E. 1999. Improving the competitiveness of regions, [in:] Competitiveness of regions, ed., Klamut, A.E. Wroclaw, p. 57.

Lubiński, M., Michalski, T., Misala, J. 1995. International competitiveness of the economy. The concept and method of measurement, IRiSS, Warsaw, 10-11.

Pearce, R.D., Decentralised, R. 1999. Strategic competitiveness: globalised approaches to generation and use of technology in multinational enterprises (MNEs). Research Policy, 28(2-3), 157-178.

Porter, M.E. 1998. The competitive advantage of nations. New York.

Porter, M.E, 2001. Porter about competition. PWE, Warsaw, 260-265.

Stanimir, A. 2005. Analysis of correspondence as a tool to study economic phenomena. A.E., Wrocław.

Stanisz, A. 2007. Accessible course of statistics v.3 Multidimensional analyses. StatSoft, Cracow.

Streimikiene, D., Valentinas, K., Bubeliene, J. 2007. Use of EU structural funds for sustainable energy development in new EU member states. Renewable and Sustainable Energy Reviews, 11(6), 1167-1187.

Thomas, M.W.Y., Lau, T., Chan, F.K. 2002. The competitiveness of small and medium enterprises: A conceptualization with focus on entrepreneurial competencies. Journal of business venturing, 17(2), 123-142.

Ungerman, O., Dedkova, J., Gurinova, K. 2018. The impact of marketing innovation on the competitiveness of enterprises in the context of industry 4.0. Journal of Competitiveness, 10(2), 132-140.

Zawada, M., Pabian, A., Bylok, F., Kucęba, R. 2013. Competition in the electricity market. Scientific Journals of the Humanitas University, Management, (2), 289-298.

Internet sources:

http://elektroenergetyka.pl/upload/file/2004/11/elektroenergetyka_nr_04_11_1.pdf
http://pnt.euro-centrum.com.pl/files/post/830/Rynek-energii-w-wojewodztwie-slaskim.pdf
http://inwestor.msp.gov.pl/si/polska-gospodarka/wiadomosci-gospodarcze/26271,Wydobycie-wegla-w-Polsce-kluczowy-dla-gospodarki-przemysl-w-

kryzysie.html
https://ec.europa.eu/energy/sites/ener/files/quarterly_report_on_european_gas_markets_q3_2019.pdf
https://www.ure.gov.pl
https://ec.europa.eu/clima/policies/strategies/2020_pl
https://wysokienapiecie.pl/1599-rynek-mocy-polska/

Notes:

[i] Central body of state (government) administration, regulating the Polish energy market (including electricity and gas). It controls the obligation to purchase energy generated in renewable sources and the share of market participants in the costs of obtaining it (through the obligation to present certificates of origin for redemption); it also cooperates in the construction and promotion of the market for electricity from co-generation (the so-called red certificates), deals with the restructuring and retrofitting of energy enterprises (including the period of adjustment to European regulations) and implements measures contributing to the reduction of energy losses, especially heat energy.

[ii] Herfindahl-Hirschman Index (HHI).-It takes values from a range $(1/n; 1)$, with the higher its value, the stronger the concentration. According to the recommendations of FERC (Federal Energy Regulatory Commission), in the USA the value of the index below 0.10 indicates no concentration, from 0.10 to 0.18 for a moderately high concentration, above 0.18 for a very high concentration.

[iii] The following limit values have been adopted for it: HHI below 750 points – non-concentrated market; HHI between 750 and 1,800 points – moderately concentrated market; HHI between 1,800 and 5,000 points – highly concentrated market; HHI above 5,000 points – very highly concentrated market.

[iv] More in the works of A. Stanimir, Analysis of correspondence as a tool to study economic phenomena, AE, Wrocław 2005, A. Stanisz, Accessible course of statistics vol.3. Multidimensional analyses, StatSoft, Cracow 2007.