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DYNAMICS OF CHANGES IN THE LEVEL OF COMPETITIVENESS OF MANUFACTURING IN POLAND

DYNAMIKA ZMIAN POZIOMU KONKURENCYJNOŚCI PRODUKCJI W POLSCE

ABSTRACT: The development of modern economies is inseparably connected with the phenomenon of competition and competitiveness of business entities. Issues in the field of competitiveness of economies, sectors and enterprises have become the subject of intensive analyses worldwide. In Poland, there is also an urgent need to conduct research on various aspects of competitiveness, which should thoroughly diagnose the situation in this respect and indicate the development of adequate instruments of economic policy that are capable of stimulating the growth of competitiveness. This article is a response to this need. The main aim of the study is to assess and compare selected aspects of competitiveness of enterprises from manufacturing divisions. Therefore, the analysis covered manufacturing enterprises (Section C) at the two-digit level of aggregation, i.e. at the level of divisions in this Section. To assess competitiveness in the years 2010-2016, the following measures were used: export/import ratio, intra-industrial trade index (IIT), sold production, labour productivity, and total factor productivity (TFP). The research proceedings were based on data published by the Central Statistical Office (Statistics Poland).

KEY WORDS: manufacturing divisions, measures of competitiveness, measures of efficiency and effectiveness of enterprises, number of manufacturing entities in urban municipalities.

ABSTRAKT: Rozwój współczesnych gospodarek nierozerwalnie związany jest ze zjawiskiem konkurencji i konkurencyjności rywalizujących podmiotów. Zagadnienia z zakresu konkurencyjności gospodarek, ich sektorów oraz przedsiębiorstw stały się przedmiotem intensywnych analiz na całym świecie. W Polsce również istnieje pilna potrzeba prowadzenia badań nad różnymi aspektami konkurencyjności, które powinny rzetelnie diagnozować sytuację w tym względzie i wskazywać rozwój adekwatnych instrumentów polityki gospodarczej, stymulujących wzrost konkurencyjności. Niniejszy artykuł wpisuje się w to zapotrzebowanie. Głównym celem badania jest ocena i porównanie wybranych aspektów konkurencyjności przedsiębiorstw z działów przetwórstwa przemysłowego. Analizą objęto więc przedsiębiorstwa przetwórstwa przemysłowego (sekcja C) na dwucyfrowym poziomie agregacji, czyli na poziomie działów tej sekcji. Do oceny konkurencyjności w latach 2010–2016 wykorzystano: stopę eksportu, wskaźnik *Intra-Industry Trade* (IIT), dynamikę

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produkcji sprzedanej, dynamikę wydajności pracy oraz łączną produktywność czynników produkcji (TFP). Postępowanie badawcze oparto na danych publikowanych przez Główny Urząd Statystyczny.

SŁOWA KLUCZOWE: działy przetwórstwa przemysłowego, mierniki konkurencyjności, wskaźniki efektywności, liczba podmiotów gospodarczych przetwórstwa przemysłowego w gminach miejskich.

Introduction

European integration and progressing globalisation increase the possibility of the Polish economy functioning in the international space. This is a positive phenomenon, but it should be remembered that alongside development-conducive opportunities, there are also a number of real threats. The competitiveness of the Polish economy determines whether Poland will actually benefit from internationalisation.

Accepting M. Porter's view (1990, 1994) that there is no competitive economy without competitive industrial enterprises, an attempt was made to assess the competitiveness of manufacturing enterprises. In this study, due to the lack of individual data, the Polish Classification of Activity (PKD) 2007 was taken into account. The analysis covered manufacturing enterprises (Section C) at the two-digit level of aggregation, i.e. at the level of divisions in this Section. This level of information aggregation was considered sufficiently detailed and appropriate to assess the competitiveness of manufacturing enterprises. Thus, the objects (units) of the study are 24 manufacturing divisions (Section C). The Central Statistical Office (CSO) grouped enterprises using PKD 2007, which is in line with the Statistical Classification of Economic Activities in the European Union (NACE Rev2). According to PKD 2007, 24 divisions are distinguished under Manufacturing (Section C). A detailed list is included in Appendix 1 – Table 1. It is worth noting that *de facto* the subjects of the analysis are manufacturing enterprises, i.e. entities conducting business activity in the above-mentioned manufacturing divisions. From the point of view of practice, it is important to recognise and understand what determinants and factors affect the competitiveness of enterprises, taking into account various aspects and specificities of individual manufacturing divisions.

The main aim of the study is to assess selected aspects of competitiveness of manufacturing divisions in the years 2010-2016 and to develop rankings of divisions according to the values of certain competitiveness indicators. The first three measures of competitiveness relate to the international market (export rate, export/import ratio, intra-industrial trade (IIT) index), while the other measures characterise the efficiency and effectiveness of the enterprise (sold production, labour productivity and total factor productivity). The research procedure was based on data published by the Central Statistical Office. *Statistical Yearbooks of Industry*, covering the period of analysis, i.e. the years 2010-2016, were particularly useful. They provided information on exports, imports, gross wages, sold production, employment volume, and gross value of fixed assets.

Competitiveness as an economic phenomenon

By joining the European Union, Poland agreed to the free movement of goods, services and labour between the Member States. The elimination, as a result of European integration and progressing globalisation, of institutional barriers forced economic entities to compete not only in the domestic market, but also in the Single European Market and the international market. The task of the State is to create the most favourable conditions for conducting broadly understood economic activity so that domestic enterprises could increase their competitiveness, which translates into an increase in the well-being of society. Due to its importance, the subject of competitiveness and factors determining competitiveness is often taken up in economic and social research (Kamerschen, McKenzie, Nardinelli 1991; Hund, Morgan 1995; Hallin, Marnburg 2008; *Polska. Raport o konkurecyjności…* 2018). The issue of competitiveness of national economies, sectors, divisions, and entities operating in them has been an important element of economic policy in recent years.

The literature lacks a uniform definition of competitiveness of the economy, which may be due to the high complexity of this issue and a large number of criteria necessary to describe it. The achievements of M.E. Porter are highly appreciated in the literature. He proposed his own concept of international competitiveness, which is the result of many years of research (Porter 2001). According to M.E. Porter, the country's competitiveness depends on the efficiency and effectiveness of the use of resources such as labour and capital. Porter believes that companies compete with one another, and whether an enterprise achieves high efficiency or not depends on the environment and conditions in the economy. He also believes that sources of competitiveness change with the development of the economy, and maintenance of a steady economic growth is determined by increasing the competitive advantage of existing sectors, basing it on increasingly advanced factors of competitiveness, as well as by creating competitive advantages in new sectors of the economy. He also draws attention to trade as an important element in the economies of highly developed countries that export goods produced by more developed sectors of the economy, and import those that require less advanced factors of production (Borowski 2015).

A different approach to competitiveness was proposed by: J.D. Sachs and G.L. Stone (2000), World Bank experts (Radło 2008; Krugman 1994). The achievements of Polish researchers are also worth noting. The results of their research on competitiveness can be found in the following works: (Gorynia 1998), (Misala, Młynarzewska, Misztal, Siek. 2007), (Misala 2011), (Borowski 2015), (Wesołowska 2015), (Wosiek 2016). The following largest international institutions dealing with cyclical research on competitiveness of national economies also propose their own approach to competitiveness: The Organisation for Economic Cooperation and Development (OECD) (*The World Competitiveness Report* 1994), The World Economic Forum (WEF), The International Institute for Management Development (IMD), and The Irish National Competitiveness Council.

Competitiveness is a relative phenomenon, not an absolute one, hence we indicate its significance by referring to other related objects. Therefore, one cannot speak of competitiveness at all levels of economic systems. Competitiveness can be discussed in the case of micro-micro, micro, meso and macro levels, because the competitiveness of entities from individual levels can be compared to other objects at the same level or to some standard of comparison (Gorynia 1998).

Manufacturing in Poland

Due to continuous investments, some of the manufacturing sectors in Poland are currently achieving results similar to, or even better than, those located in Western Europe. In addition, the role of Polish companies in foreign markets is constantly growing. The direct effect of this process is a relatively high – compared to Europe – share of industry in the creation of Polish GDP.

Manufacturing is a sector of the economy characterised by relatively high labour productivity. According to the data presented by the Central Statistical Office, its contribution to the economy is higher than to employment (*Rocznik Statystyczny Przemysłu* 2018). It also results from strong competition and environmental requirements that force investments in modern, efficient technologies. Since 2011, capital expenditure has been characterised by an upward trend. Investment outlays in industry increased by 30.1% between 2009 and 2017.
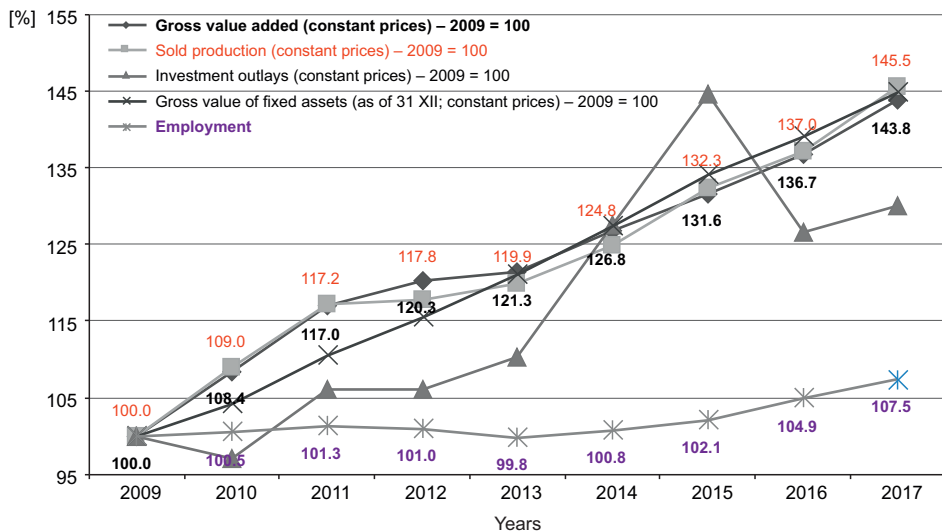

Fig. 1. Dynamics of the share of the manufacturing sector in the national economy in terms of gross value added, sold production, investment outlays and employment

Source: own elaboration based on statistical tables, GUS 2018, *Rocznik Statystyczny Przemysłu*, Warszawa and Local Data Bank, www.stat.gov.pl.

High labour productivity is also reflected in labour costs. In 2017, average earnings in manufacturing in Poland were higher by approx. 2.2 percent than the average monthly gross wages in the national economy. This confirms that manufacturing industries require highly qualified staff – engineers and specialists with technical education.

Over the years, the number of manufacturing enterprises in Poland has been growing – it has risen on average by 6% compared to 2010. There were more than 21,500 manufacturing business entities in Poland in 2017 than in 2010. In the analysed period, the number of manufacturing enterprises increased the most in Podkarpackie Voivodship (13.1%), Małopolskie Voivodship (10.1%) and Pomorskie Voivodship (9.8%). Apart from Podkarpackie Voivodship, where in 2017 the share of manufacturing entities in the total number of enterprises was at the level of 4.3%, Małopolskie and Pomorskie Voivodships had – and still have – relatively large clusters of manufacturing entities. The observed upward trend in Pomorskie Voivodeship, in comparison with the downward trend in Łódź Voivodeship, meant that in 2017, in terms of the number of entities operating in manufacturing, Pomorskie Voivodeship overtook Łódź Voivodeship in the ranking. Over the years, invariably, the dominant share of manufacturing entities in the total number of enterprises is recorded in Mazowieckie (15.9%), Śląskie (11.8%) and Wielkopolskie (10.5%) Voivodships.

The summary of the data in Table 1 confirms the propensity to locate manufacturing entities in urban areas, which have more relevant facilities at their disposal. The share of manufacturing entities in the total number of enterprises is the largest in voivodships characterised by developed infrastructure, a comprehensive offer of academic centres, and the presence of large urban centres. Table 2 presents more detailed data on the share of manufacturing entities in towns with county (*poviat*) rights and in urban municipalities. In the era of post-industrialisation, retaining industry in cities plays an important social role. It favours reconciliation of work and private life, facilitates creation of bonds between the employer and employees, and has a positive effect on the relationship between public administration and residents. Locating industry not in the periphery, but in the city centre, also plays an educational role, as it makes residents aware of the importance of human work, the strength of technology's impact on the environment, and the need for appropriate waste management.

Table 2 presents more detailed data on the share of manufacturing entities in towns with county rights and in urban municipalities. Urban centres attract manufacturing enterprises. In Poland, an average of 52.4% of all the manufacturing entities are located in urban municipalities or in towns with county (*poviat*) status. The factors affecting dispersion of manufacturing enterprises in individual voivodships include: (1) a lack of a strong/main urban centre acting as an incubator for industrial activities (e.g. Opolskie Voivodship), or (2) the presence of several important urban centres within one voivodship (e.g. Wielkopolskie Voivodship). From the point of view of the share of manufacturing entities located in urban municipalities and towns with county rights in the total number of enterprises, voivodships in Poland can be divided into four groups. (1) Voivodships with a very strong concentration of/with a very strong

Table 1

Manufacturing enterprises in Poland – comparison between 2010 and 2017

Voivodship	2010	2017	Share in 2010 [%]	Share in 2017 [%]	Difference $D_{2017/2010}$	$i_{2017/2010}$ [%]
Dolnośląskie	25 571	27 353	7.1	7.2	1 782	107.0
Kujawsko-pomorskie	17 027	17 746	4.7	4.6	719	104.2
Lubelskie	13 166	14 028	3.7	3.7	862	106.5
Lubuskie	8 323	8 744	2.3	2.3	421	105.1
Łódzkie	29 014	28 390	8.1	7.4	−624	97.8
Małopolskie	33 180	36 536	9.2	9.6	3 356	110.1
Mazowieckie	57 421	60 365	15.9	15.8	2 944	105.1
Opolskie	8 599	9 079	2.4	2.4	480	105.6
Podkarpackie	14 674	16 589	4.1	4.3	1 915	113.1
Podlaskie	7 802	8 204	2.2	2.1	402	105.2
Pomorskie	28 084	30 823	7.8	8.1	2 739	109.8
Śląskie	42 425	44 779	11.8	11.7	2 354	105.5
Świętokrzyskie	9 865	10 527	2.7	2.8	662	106.7
Warmińsko-mazurskie	9 759	10 290	2.7	2.7	531	105.4
Wielkopolskie	37 772	40 036	10.5	10.5	2 264	106.0
Zachodniopomorskie	17 408	18 172	4.8	4.8	764	104.4
Poland	362 100	383 678	X	X	21 578	106.0

Source: own elaboration based on statistical tables, GUS 2018, *Rocznik Statystyczny Przemysłu*, Warszawa and Local Data Bank, www.stat.gov.pl.

propensity to locate industry in their urban centres, where the share of entities located in urban municipalities or in towns with the *poviat* status is not lower than 60%. Here, examples include Śląskie, Mazowieckie, Pomorskie and Łódzkie Voivodships. Then there is a group of voivodships with a strong concentration of industry in urban centres, where the share of entities located in urban municipalities or in towns with county rights is below 60%, but at the same time exceeds 50%. These are Dolnośląskie, Podlaskie, Zachodniopomorskie and Kujawsko-Pomorskie Voivodships. Voivodships with a moderate concentration of manufacturing entities in urban municipalities include: Lubelskie, Warmińsko-Mazurskie and Lubuskie Voivodships. In their case, the share of entities operating in urban municipalities or in towns with the *poviat* status remains within the range between 40% and 50%. The last group characterised by a low concentration/propensity appears to be the most diverse, and the share of entities conducting activity in urban municipalities is below 40%. The following voivodships belong to this group: Małopolskie, Wielkopolskie, Podkarpackie, Świętokrzyskie and Opolskie Voivodships.

Table 2

Manufacturing enterprises in individual voivodships in Poland

Voivodship	Total number of enterprises	Number of manufacturing entities in urban municipalities and towns with the *poviat* status	Number of manufacturing entities in towns with the *poviat* status	Share of manufacturing entities in urban municipalities and towns with the *poviat* status [%]	Share of manufacturing entities in towns with the *poviat* status [%]
Dolnośląskie	27 353	15 462	9 638	56.5	35.2
Kujawsko-pomorskie	17 746	8 915	7 121	50.2	40.1
Lubelskie	14 028	6 965	4 312	49.7	30.7
Lubuskie	8 744	3 909	2 722	44.7	31.1
Łódzkie	28 390	17 046	10 956	60.0	38.6
Małopolskie	36 536	13 491	11 148	36.9	30.5
Mazowieckie	60 365	38 642	29 911	64.0	49.6
Opolskie	9 079	2 460	1 510	27.1	16.6
Podkarpackie	16 589	6 091	2 904	36.7	17.5
Podlaskie	8 204	4 583	3 284	55.9	40.0
Pomorskie	30 823	19 238	12 985	62.4	42.1
Śląskie	44 779	30 059	15 109	67.1	33.7
Świętokrzyskie	10 527	3 840	2 090	36.5	19.9
Warmińsko-mazurskie	10 290	4 819	2 471	46.8	24.0
Wielkopolskie	40 036	14 735	10 045	36.8	25.1
Zachodniopomorskie	18 172	9 706	7 444	53.4	41.0
Poland	381 661	199 961	133 650	52.4	35.0

Source: own elaboration based on statistical tables, GUS 2018, *Rocznik Statystyczny Przemysłu*, Warszawa and Local Data Bank, www.stat.gov.pl.

Research methods and tools

Conducting an assessment of competitiveness of manufacturing divisions requires using certain measures. There are many suggestions in the literature in this respect. They were presented in a synthetic way by W. Jakóbik (2000), who – in the set of mesoeconomic measures of competitiveness – distinguishes several indicators:

— domestic production import penetration rate,
— cost index of domestic factors of production,
— revealed comparative advantage index,
— intra-industry trade index (*IIT*).

Another set of competitiveness indicators used in mesoeconomic level analyses was prepared by A. Zielińska-Głębocka (*Konkurencyjność przemysłowa…* 2000):

− export competitiveness index,
− technological and innovative competitiveness index,
− regional competitiveness index.

The further part of the article will present only those measures that will be used in the empirical assessment of competitiveness of manufacturing divisions. The assessment of competitiveness was based on six measures. The first three measures relate to foreign trade.

The first indicator is the export rate. This indicator determines the attractiveness of the examined division and it is the relation of the export of the i-th division to the production volume in the i-th division (*Konkurencyjność przemysłowa…* 2000):

$$W_i = \frac{X_{it}}{P_{it}},$$

where:
P_i – sold production in the i-th division,
X_i – export in the i-th division,
 t – time period of analysis.

Another indicator that will be used to assess the competitiveness of the division is the export/import ratio (*Konkurencyjność przemysłowa…* 2000):

$$R_i = \frac{X_{it}}{M_{it}},$$

where:
X_i – export in the i-th division,
M_i – import in the i-th division,
 t – time period of analysis.

The competitiveness of a given division cannot be evidenced solely by a positive trade balance in relation to certain goods. It is necessary to determine the intensity of simultaneous export and import in a given industry. If the volumes of exports and imports are similar, then one can speak of the so-called "partner competitiveness" (*Wpływ bezpośrednich inwestycji…* 2009). Thus understood competitiveness is measured by another index. It is an index of specialisation, otherwise known as the intra-industry trade index (IIT) of the i-th division, which is simultaneously an index of export and import of products of the i-th division. This index is also called the Grubel-Lloyd index and it is determined according to the following formula (Jankowska 2005):

$$IIT_{it} = 1 - \frac{|X_{it} - M_{it}|}{X_{it} + M_{it}},$$

where:
X_i – export in the i-th division,
M_i – import in the i-th division,
 t – time period of analysis.

The competitiveness indicators presented so far relate to the international market. Thus, it can be said that they can be used to assess the international competitiveness of manufacturing divisions. However, in a study of the competitiveness of a given division, one cannot stop at examining foreign trade relations. An important role in assessing competitiveness is also played by measures characterising efficiency and effectiveness of operations. According to M. Porter, divisions of a given economic sector develop thanks to the introduction of innovations in enterprises, which allows companies to gain competitive advantages over domestic and foreign rivals. Therefore, improvement of a company's competitiveness is reflected in a short-term increase in sold production, and in the long-term – in an increase in the total factor productivity. Popular measures used for this type of competitiveness assessment are (*Konkurencyjność przemysłowa...* 2000):
- employment growth rate,
- sold production and/or its growth rate,
- labour productivity and/or its growth rate,
- efficiency/productivity of resources used to manufacture sold production,
- total factor productivity index (*TFP).*

The index measuring the efficiency (productivity) of resources used to manufacture sold production can be written as follows (Jankowska 2005):

$$W_i = \frac{P_{it}}{Z_{it}},$$

where:

P_i – sold production in the i-th division,
Z_i – resources used to manufacture production in the i-th division,
t – time period of analysis.

In order to examine total labour productivity and productivity of the resources used for manufacturing, total factor productivity (TFP) can be used. It is determined with the use of the following formula (Englander, Gurney 1994):

$$TFP_{it} = \frac{P_{it}}{P_{it-1}} - \left[\left(\frac{LP_{it}}{LP_{it-1}} \cdot 1 - \alpha \right) + \left(\frac{CP_{it}}{CP_{it-1}} \cdot \alpha \right) \right],$$

where:

$$\alpha_{it} = \frac{W_{it} + N_{it}}{W_{it} + N_{it} + C_{it}},$$

$$LP_{it} = \frac{P_{it}}{L_{it}},$$

$$CP_{it} = \frac{P_{it}}{C_{it}}.$$

P_i – sold production of the i-th division,

LP_{it} – labour productivity of the i-th division,

CP_{it} – productivity of fixed assets of the i-th division,

W_i – wages in the i-th division,

N_i – salary overheads in the i-th division,

C_i – fixed assets of the i-th division,

L_i – employment in the i-th division,

$1 - \alpha$ – coefficient informing about the share of labour in the income from factors of production,

t – time period of analysis.

The measures presented above can be considered synthetic measures, used to assess the competitiveness of divisions of a given section. They are based on aggregated data on exports, imports and production volumes of the analysed manufacturing divisions. In the procedure of assessing the competitiveness of divisions, one can still use the so-called partial measures, which are estimated based on data from individual enterprises operating in the said divisions (Jankowska 2005).

Competitiveness of manufacturing divisions – research results

The competitiveness of 24 manufacturing divisions in Poland in the years 2010-2016 was assessed based on the values of six measures. First, focus was on assessing the competitiveness of selected aspects of foreign trade. Three measures were used for this purpose: the export rate, the export/import ratio and the IIT index. Then the competitiveness related to the efficiency of the production process in enterprises was assessed. Changes in sold production, labour productivity and total factor productivity were analysed.

As part of the assessment of competitiveness of production relating to the international market, export rates W_i, export/import ratios R_i and intra-industry trade indices IIT_i were calculated. Due to the significant differences in the values, obtained in the conducted analyses, it was decided to average the values of these measures. Table 3 summarises the average annual values of these three competitiveness indices calculated for the years 2010-2016 and individual manufacturing divisions.

The value of the average annual export rate calculated for the years 2010-2016 ranged from 0.081 (*Manufacture of beverages*) to 0.925 (*Manufacture of electrical equipment*). It can be observed that the share of exports in sold production in the *Manufacture of beverages* division in the analysed years was small, which proves the domestic market orientation of this division. A relatively large share of exports in sold production occurred in the *Manufacture of electrical equipment* division, which means that products of this division are attractive in terms of price and quality to foreign customers. The conducted analyses and the results presented in Table 3 entitle us to state that half of the manufacturing divisions achieved a result of 0.407, which means that in these divisions export accounts for at least 41% of sold production.

Table 3

Average annual export rate, export/import ratio and IIT index in manufacturing divisions
in the years 2010-2016

Division	Export rate	Export/ import ratio	IIT index	Division	Export rate	Export/ import ratio	IIT index
Div. 10	0.226	1.468	0.81	Div. 22	0.435	1.309	0.866
Div. 11	0.081	0.604	0.753	Div. 23	0.236	1.511	0.796
Div. 12	0.316	0.727	0.841	Div. 24	0.407	1.828	0.707
Div. 13	0.520	1.318	0.863	Div. 25	0.359	1.687	0.743
Div. 14	0.387	1.953	0.677	Div. 26	0.597	0.684	0.812
Div. 15	0.474	1.626	0.761	Div. 27	0.925	2.145	0.601
Div. 16	0.307	2.649	0.548	Div. 28	0.446	1.895	0.691
Div. 17	0.372	1.334	0.857	Div. 29	0.801	1.597	0.770
Div. 18	NDA	1.425	0.757	Div. 30	0.881	1.437	0.819
Div. 19	0.206	0.299	0.459	Div. 31	0.588	4.191	0.385
Div. 20	0.392	1.397	0.834	Div. 32	0.491	1.657	0.752
Div. 21	0.416	0.741	0.849	Div. 33	0.347	0.969	0.957

Source: own calculations based on GUS, *Rocznik Statystyczny Przemysłu*, Warszawa, 2010-2017 respectively,
www.stat.gov.pl.

A high share of exports is achieved not only by *Manufacture of electrical equipment* (92%), but also by *Manufacture of other transport equipment* (88%) *and Manufacture of motor vehicles, trailers and semi-trailers, excluding motorcycles* (80%). The divisions occupying the first three places in the ranking clearly dominate in terms of export rate over other divisions. The following divisions were characterised by an average share of exports: *Manufacture of furniture* (58%) and *Manufacture of textiles* (52%) as well as *Manufacture of leather and related products* (47.4%). A relatively high value of the export rate for the *Manufacture of furniture* division is the result of a significant improvement in the competitiveness of enterprises in this division. In 2016, Poland was ranked as the sixth largest producer and exporter of furniture in the world, with a 6.3% share of global furniture exports. Polish furniture enjoys a strong reputation and recognition around the world. In the divisions characterised by a large share of exports in sold production, a significant increase in the export growth rate has been recorded in recent years.

Export, taking into account the unused production potential of manufacturing enterprises and the base of raw materials, is an important factor determining the development of the Polish economy. The importance of export in the development of the entire manufacturing is evidenced by its growing share in the value of total sold production.

Another indicator used to assess the competitiveness of manufacturing divisions in Poland in the context of the international market is the export/import ratio. The aver-

age annual value of this indicator in the years 2010–2016 for individual manufacturing divisions (see Table 3) is characterised by high volatility, as its value ranged from 0.299 (*Manufacture and processing of coke and refined petroleum products*) to 4.919 (*Manufacture of furniture*). In the next ranking, *Manufacture of furniture* achieves significant values. In recent years, the Polish furniture industry has been conquering not only European, but also global markets. Polish furniture is very popular with and valued by foreign customers. The international competitiveness of this division is determined by a high quality of the furniture and its relatively low price. On the other hand, the division of *Manufacture and processing of coke and refined petroleum products* had a low share of exports in imports – this is caused by a high level of import of this type of raw materials, among others, due to the determinants of natural resources in Poland.

In 18 manufacturing divisions, the value of the export/import ratio was greater than one, which means that exports exceeded imports. In Division 16 (*Manufacture of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials*) and 25 (*Manufacture of electrical equipment*), exports were more than twice as large as imports. In the *Manufacture of furniture* Division (4.191), i.e. in the division which ranked first, exports exceeded imports more than four times. If we compare the conducted competitiveness assessment with the previous one, which was based on the export rate, it can be observed that *Manufacture of beverages* (11) and *Manufacture and processing of coke and refined petroleum products* (19) were characterised by the lowest level of competitiveness, while *Manufacture of electrical equipment* (27) and *Manufacture of furniture* (31) were characterised by the highest level. *Manufacture of electrical equipment*, which according to the export rate was the most competitive, currently ranks third. In addition, it can be seen that according to the export rate, in the first ranking, *Manufacture of beverages* took the last position, while according to the export/import ratio – its competitive position improved by one position.

When conducting comparative analyses of this type, it should be emphasised – as discussed earlier – that competitiveness is an extremely complex and multidimensional phenomenon and one cannot draw too far-reaching conclusions based on individual measures.

The intra-industry trade index (the Grubel Lloyd index) is the third measure used to assess the competitiveness of manufacturing divisions in Poland in the framework of the international market. Table 3 presents manufacturing divisions according to the value of the IIT index. One can notice that *Repair, maintenance and installation of machinery and equipment* (33) is the most competitive, as it reaches the highest IIT value of 0.957. *Manufacture of furniture* (31) holds the last position in this ranking, with an index value of 0.385. A spectacular decrease in the competitive position of this division can be observed in comparison to previous analyses – this situation indicates large disproportions of exports to imports in this division. The lowest values of the IIT index were recorded for: *Manufacture and processing of coke and refined petroleum products* (19), as well as *Manufacture of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials* (16) – 0.459 and 0.548, respectively. On the

other hand, the divisions occupying top positions in the ranking, for which the IIT index is relatively high, are characterised by high intensity of both exports and imports. In the division of *Repair, maintenance and installation of machinery and equipment* (33), the IIT index is very high and exceeds 0.9. The value of the IIT index exceeding 0.8 is accompanied by the occurrence of partner competitiveness (Jankowska 2005), which means that the scale of both exports and imports is similar and indicates developed intra-industry trade.

The analysis of competitiveness of manufacturing divisions requires consideration of other – apart from international trade relations – aspects of competitiveness. The competitiveness of divisions is primarily the result of the competitiveness of enterprises operating in a given industry. Competition between manufacturing companies in the domestic and foreign market forces them to improve efficiency, which can be achieved through product, process, organisational, and marketing innovations. Innovative activity of enterprises may be manifested by an increase in sold production, labour productivity and total factor productivity, and thus an increase in the competitiveness of enterprises. For a more complete illustration of competitiveness of manufacturing divisions, average annual rates of change in sold production and labour productivity calculated on the basis of data from the years 2010-2016 are presented in Table 4.

Table 4

Annual average rates of change in sold production and labour productivity in the years 2010–2016

Division	Sold production	Labour productivity	Total factor productivity	Division	Sold production	Labour productivity	Total factor productivity
Div. 10	5.664	5.902	4.815	Div. 22	7.984	4.403	6.878
Div. 11	0.829	3.540	0.904	Div. 23	3.800	3.688	3.463
Div. 12	7.396	8.026	6.013	Div. 24	3.740	2.068	4.738
Div. 13	9.627	8.388	2.779	Div. 25	8.038	4.697	7.256
Div. 14	4.214	8.954	−1.707	Div. 26	−0.664	0.956	1.123
Div. 15	8.569	9.342	3.504	Div. 27	5.789	3.928	5.748
Div. 16	5.965	6.029	4.078	Div. 28	3.660	4.787	1.477
Div. 17	7.961	6.259	6.109	Div. 29	7.197	3.047	7.167
Div. 18	6.482	3.141	2.337	Div. 30	9.780	8.960	4.692
Div. 19	−1.521	0.634	4.794	Div. 31	8.760	6.571	6.407
Div. 20	4.965	3.870	4.788	Div. 32	7.776	5.599	6.904
Div. 21	3.343	3.491	2.113	Div. 33	7.002	4.499	4.807

Source: own calculations based on GUS, *Rocznik Statystyczny Przemysłu*, Warszawa, 2010-2017 respectively, www.stat.gov.pl.

The analysis of the dynamics of sold production proves that only in two manufacturing divisions, i.e. *Manufacture and processing of coke and refined petroleum products*

(19) and *Manufacture of computer, electronic and optical products* (26), these values deteriorated. The average annual growth rate of sold production in other manufacturing divisions varied and ranged from 0.83% in *Manufacture of beverages* to 9.78% in *Manufacture of other transport equipment* (see Table 4). *Manufacture of other transport equipment* proved to be the most competitive in this ranking with a value of 9.78%. *Manufacture of textiles* ranked second in terms of the growth rate of sold production – 9.63%. *Manufacture and processing of coke and refined petroleum products* (19) ranked last. It achieved a negative value of –1.52%, which indicates a decrease in sold production in this division. A significant increase in sold production is also noticeable in *Manufacture of furniture*, *Manufacture of leather and leather products* and *Manufacture of fabricated metal products, except machinery and equipment,* as it was respectively: 8.76%, 8.57% and 8.04%.

When assessing the competitiveness of divisions by means of changes in the level of sold production, it is worth noting a very positive phenomenon. In all manufacturing divisions, an increase in sold production was accompanied by an increase in labour productivity, which indicates technical progress and an increasingly better use of factors of production in the examined areas of economic activity. An average annual decrease in labour productivity, measured by production sold per 1 employee, was not recorded in any division. In the years 2010 to 2016, in all manufacturing divisions, labour productivity increased on average from year to year, from 0.63 (*Manufacture and processing of coke and refined petroleum products*) to 9.34 (*Manufacture of leather and related goods*).

The assessment of competitiveness of manufacturing divisions carried out by analysing total factor productivity (TFP) indicates to what extent the increase in sold production results from changes in productivity of factors of production. Table 4 illustrates the situation of individual manufacturing divisions in terms of the average TFP value in the years 2010-2016. Only in one division – *Manufacture of wearing apparel* (14) – the average TFP value was negative. Analysing the situation in the enterprises of this division, it can be concluded that an increase in sold production was accompanied only by an increase in labour productivity, while the productivity of fixed assets did not increase. Low values of total factor productivity were obtained for the following divisions: *Manufacture of beverages* (11), *Manufacture of computer, electronic and optical products* (26), *Manufacture of machinery and equipment not elsewhere classified* (28). The fastest average annual TFP growth rate was recorded in the following divisions: *Manufacture of fabricated metal products, except machinery and equipment* (25) and *Manufacture of motor vehicles, trailers and semi-trailers excluding motorcycles* (29) – these divisions achieved a value of more than 7. The TFP growth rate throughout the entire period considered is the higher, the higher the level of technological advancement of Section C is. Quite high TFP values were also obtained by: *Other manufacturing* (32), *Manufacture of rubber and plastic products* (22) and *Manufacture of furniture* (31) – their values exceeding 6. Productivity changes played a significant role in the growth of sold production in manufacturing. In most

divisions, TFP was an important source of growth in sold production. The improvement in productivity was a consequence of the investment revival in manufacturing in the period of integration with the European Union, which was associated with the need to adapt plants to EU standards. Current investment activity results from the necessity of continuous modernisation of production potential in order to improve the competitiveness of enterprises as well as from the need to build solid foundations for increasing production.

Table 5

Summary of competitiveness rankings

Division	Sold production	Labour productivity	Total factor productivity	Export rate	Export/ import ratio	IIT	Range
Div. 10	15	9	9	21	12	10	12
Div. 11	22	18	23	23	23	15	8
Div. 12	9	5	7	18	21	6	16
Div. 13	2	4	18	6	17	3	16
Div. 14	17	3	24	14	4	20	21
Div. 15	4	1	16	8	9	13	15
Div. 16	13	8	15	19	2	22	20
Div. 17	7	7	6	15	16	4	12
Div. 18	12	20	19	24	14	14	12
Div. 19	24	24	11	22	24	23	13
Div. 20	16	16	12	13	15	7	9
Div. 21	21	19	20	11	20	5	16
Div. 22	6	14	4	10	18	2	16
Div. 23	18	17	17	20	11	11	9
Div. 24	19	22	13	12	6	18	16
Div. 25	5	12	1	16	7	17	16
Div. 26	23	23	22	4	22	9	19
Div. 27	14	15	8	1	3	21	20
Div. 28	20	11	21	9	5	19	16
Div. 29	10	21	2	3	10	12	19
Div. 30	1	2	14	2	13	8	13
Div. 31	3	6	5	5	1	24	23
Div. 32	8	10	3	7	8	16	13
Div. 33	11	13	10	17	19	1	18

Source: own calculations based on GUS, *Rocznik Statystyczny Przemysłu*, Warszawa, 2010-2017 respectively, www.stat.gov.pl.

Conclusions

The considerations carried out in the article confirm that competitiveness is a complex and difficult to measure phenomenon. Differences in the formulation of the definition of the term result from a different understanding of competitiveness. Competitiveness can be considered from the macroeconomic (i.e. of the entire economy), mesoeconomic (of a region, industry, or industry sector) and microeconomic (of an enterprise) perspective. In the article, the authors focused on the statistical assessment concerning the diversity in the level of competitiveness of manufacturing divisions. Based on the extensive literature, it can be assumed that competitiveness of economies is primarily their ability to maintain a sustainable economic growth, improve the standard of living of society and strengthen the country's position in foreign markets. The intensity of research conducted on competitiveness results in the dynamic development of theories and analytical methods related to this economic issue. New aspects of research on competitiveness include not only striving to improve the competitiveness of economies understood from the perspective of productivity growth, but also to achieve the so-called sustainable competitiveness, covering a number of areas that go beyond the economic results obtained.

Based on the empirical research carried out in this article which aims to assess the competitiveness of manufacturing enterprises, it can be concluded that the competitiveness of these enterprises is on average growing. This is evidenced by the increase in production, exports, labour productivity, and total factor productivity (TFP). The constructed rankings allow us to state that particularly positive trends in terms of production growth rate were recorded in enterprises manufacturing beverages. The best results in foreign trade were recorded in the following divisions: *Manufacture of electrical equipment* (27), *Manufacture of other transport equipment* (30) and *Manufacture of motor vehicles, trailers and semi-trailers excluding motorcycles* (29). In the years 2010–2016, total factor productivity was negative in only one division – *Manufacture of wearing apparel* (14).

There are divisions that are thriving and have been constantly prospering in the market for many years. One can also observe manufacturing enterprises that are experiencing their revival and a huge improvement in competitiveness in a given market. These include the *Manufacture of furniture* (31) division, which has gained popularity in Europe and worldwide in recent years. Polish furniture is appreciated internationally due to its good quality and affordable price. Unfortunately, one can also see divisions whose competitiveness is very low, which can be caused by various factors, among others: too expensive production, a lack of innovation in production methods, shortage of specialised workforce, and many others. A high level of competitiveness is influenced by many interrelated factors that form a whole and translate into the performance of a given company. The empirical research carried out has confirmed that the competitiveness of manufacturing enterprises in Poland varies. The largest diversification of manufacturing enterprises is recorded in the sphere of sold production. The assessment

of competitiveness presented in this article does not exhaust the complexity of the issue but is just one way of measuring and assessing it.

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APPENDIX 1

Table 6

Manufacturing divisions according to the Polish Classification Activity (PKD) 2007

Polish Classification Activity (PKD) 2007	Section C – Manufacture
	Division
10	Manufacture of food products
11	Manufacture of beverages
12	Manufacture of tobacco products
13	Manufacture of textiles
14	Manufacture of wearing apparel
15	Manufacture of leather and related products
16	Manufacture of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
17	Manufacture of paper and paper products
18	Printing and reproduction of recorded media
19	Manufacture and processing of coke and refined petroleum products
20	Manufacture of chemicals and chemical products
21	Manufacture of basic pharmaceutical substances and medicines and other pharmaceutical products
22	Manufacture of rubber and plastic products
23	Manufacture of other non-metallic mineral products
24	Manufacture of metals
25	Manufacture of fabricated metal products, except machinery and equipment
26	Manufacture of computer, electronic and optical products
27	Manufacture of electrical equipment
28	Manufacture of machinery and equipment not elsewhere classified
29	Manufacture of motor vehicles, trailers and semi-trailers excluding motorcycles
30	Manufacture of other transport equipment

Table 6 contd.

Polish Classification Activity (PKD) 2007	Section C – Manufacture
	Division
31	Manufacture of furniture
32	Other manufacturing
33	Repair, maintenance and installation of machinery and equipment

* Pursuant to the Act developed as part of "Operation 2007," the Polish Classification of Activity (PKD 2007) was introduced by the Regulation of the Council of Ministers of 24 December 2007 regarding the Polish Classification of Activity (PKD) (Journal of Laws 251, item 1885). PKD 2007 was developed on the basis of the Statistical Classification of Economic Activities NACE Rev2, introduced by Regulation (EC) No 1893/2006 of the European Parliament and of the Council of 20 December 2006 on the Statistical Classification of Economic Activities NACE Rev2, amending Council Regulation (EEC) No. 3037/90 and certain EC Regulations on specific statistical domains (EU Official Journal L 393/1 of 30.12.2006). Therefore, it maintains full methodological, conceptual, scope and code comparability with the NACE Rev2 classification. This classification is a conventionally accepted, hierarchically structured division of the set of types of socio-economic activities that entities pursue.

Source: own elaboration based on: *Działalność innowacyjna przedsiębiorstw przemysłowych w latach 2013–2015*, GUS i US w Szczecinie, Warszawa 2016, p. 20; *Nauka i technika w 2015 r.*, GUS i US w Szczecinie, Warszawa 2016, p. 195.