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## DEVELOPMENT OF INDUSTRIAL ENTERPRISES IN POLAND: FINANCIAL PROBLEMS AND PROSPECTS

**Abstract:** The paper proved that the industrial enterprises constitute the foundation of the national economy in Poland. It was found that the level and prospects of development of industrial enterprises determine the economic stability in the country and the level of social security of the population. The main financial indicators of the industrial enterprises in Poland were analyzed and the environment of their operation was studied. The findings of the research identified the most promising countries for the economic partnership with Poland. In order to assess the effectiveness of development directions of economic partnership of Poland on the international arena it has been proposed to apply the methodical approach, the use of which will reveal the raising and lowering phases of the economy of potential partner countries with the exact dating of the turning points of the economic cycle and, based on the building of leading indicators system to develop appropriate development management model of industrial companies in Poland.

### ROZWÓJ PRZEDSIĘBIORSTW PRZEMYSŁOWYCH W POLSCE: PROBLEMY FINANSOWE I PERSPEKTYWY

**Streszczenie:** W artykule uzasadniono, że fundamentem rozwoju gospodarki polskiej są przedsiębiorstwa przemysłowe. Stwierdzono, że poziom rozwoju przedsiębiorstw przemysłowych wyznacza poziom stabilności gospodarczej w kraju oraz poziom zabezpieczenia społecznego. Przeprowadzono analizę głównych wskaźników finansowych polskich przedsiębiorstw przemysłowych oraz badanie ich otoczenia. Zgodnie z wynikami analizy zidentyfikowano kraje najbardziej obiecujące dla współpracy gospodarczej z Polską. W celu oceny skuteczności kierunków rozwoju współpracy gospodarczej Polski na arenie międzynarodowej, opracowano podejście metodyczne, które ujawnia fazy wzrostu i załamania gospodarczego w krajach potencjalnych partnerach z precyzyjnym datowaniem punktów zwrotnych cyklu koniunkturalnego. Przedstawione podejście metodyczne pozwala na podstawie kształtowania systemu wskaźników wyprzedzających zbudować odpowiedni modeli zarządzania rozwojem przedsiębiorstw przemysłowych Polski.

**Keywords:** enterprises, development, methodical approach, indicators, model.

**Słowa kluczowe:** przedsiębiorstwa, rozwój, podejście metodyczne, wskaźniki, model.



## 1. INTRODUCTION

The current stage of development of global economic processes is characterized by a permanently existing instability of the financial and commodity markets, whereas national economies are closely included in the system of international financial-industrial relations. Meanwhile, a peculiar form of protection of national economies against the global instability is the formation of regional international unities, which, when functioning effectively, can play a leading role in the global political and economic arenas. However, the importance of individual countries both in regional integrative unions and in the global economic and political processes depends on the development level and the stability margin of their national socio-economic systems.

It goes without saying that enterprises form the basis, the fundamental principle of any national economy. Enterprises operate in the field of commodity-money relations; they reflect the price progression of the created product at all stages of the reproduced process. It is also known that the revenue is generated and the initial distribution of the newly created price takes place exactly at the enterprise level. At this point, the expanded production process is carried out and the material basis of the entire system of the country's national economy is formed. The degree of development of enterprises is dependent upon economic stability in the country, the state of its social sphere and, ultimately, the political significance of the country on the world stage. Thus, it is relevant to conduct research of the current state of the manufacturing enterprises in Poland and determine the prospects of their development under the influence of the contemporary geopolitical transformations.

## 2. THE FINANCIAL ANALYSIS OF THE MANUFACTURING ENTERPRISES IN POLAND AND THEIR EXTERNAL ENVIRONMENT OF OPERATION

The basis for the foundation of paths for further transformation of any object of research is the identification of indicators of its development. The main developmental quotients of enterprises are their revenues and expenses, as well as the financial performance in the main, financial and other types of activity. The analysis of the given figures allows to reveal the most important interconnections in the factor system of the economic development of enterprises. Therefore, the listed indicators can be defined as the main indicators of the enterprise performance effectiveness (see Table 1).

The conducted research shows a steady increase in revenues from total activity of the Polish industrial enterprises during the study period. The revenues from total activity increased by 50.371 mln zł in 2014 compared with the previous 2013, by 413.234 mln zł compared to 2010, and by 86%, in 2005 which amounted to 1.128.334 mln zł. The costs of obtaining revenues from total activity increased during the analyzed period by 1.87 times, which was 2,217,359 mln zł (from 1.250.067 mln zł in 2005 to 2.337.426

mln zł in 2014). Net financial result of Polish enterprises in 2014 compared to 2005 increased by 75%, which amounted to 38.749 mln zł. Thus, over the past 10 years at the Polish industrial enterprises it is possible to see the steady growth of investments, income and financial results from operations and financial performance (Table. 1, Fig. 1).

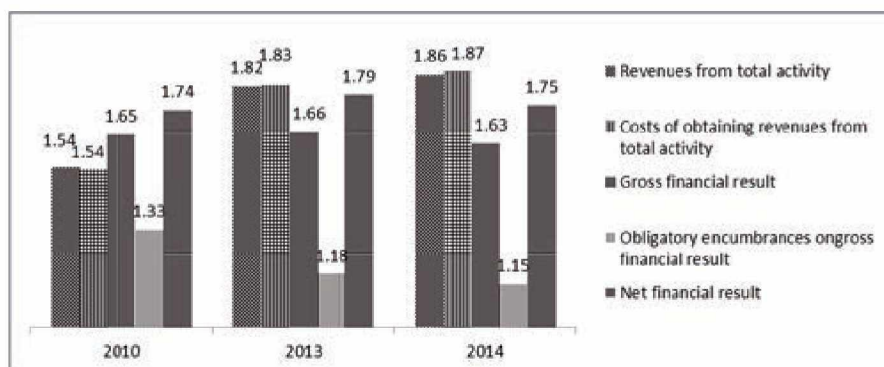
Table 1. Financial result of Polish enterprises

Specification	2005	2010	2013	2014
Revenues from total activity, mln zł	1314631	2029731	2392594	2442965
Costs of obtaining revenues from total activity, mln zł	1250067	1922052	2284485	2337426
Gross financial result, mln zł	64964	107489	108113	105686
Obligatory encumbrances on gross financial result, mln zł	13554	18043	16006	15527
Net financial result, mln zł	51410	89446	92107	90159

Source: Concise Statistical Yearbook Of Poland (2015)

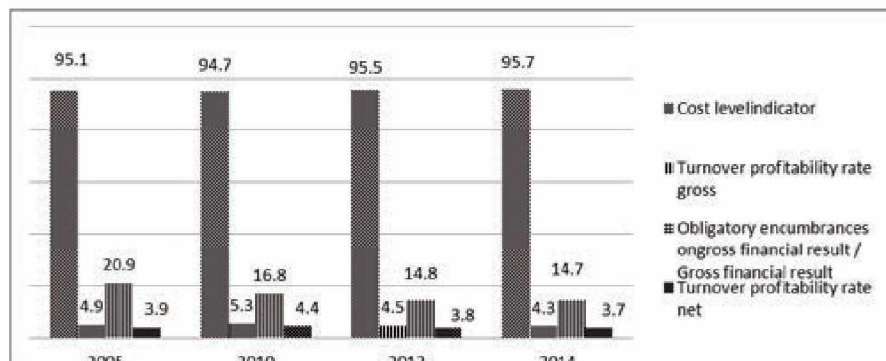
In the next stage of the analysis it is necessary to determine the effectiveness of the functioning of finance at Polish enterprises. The conducted research leads to the conclusion that the enterprises are characterized by low return on invested capital. The figure of cost level indicator shows that each invested zloty brings about 5 groszy income. Profitability Gross turnover is also on the level of 4-5%, as turnover profitability rate gross was 4.3%, in 2014 and its maximum value for this period was 5.3% in 2010. Accordingly, the turnover profitability rate net has even lower values. In 2014 it was 3.7%, which means that the net financial result of invested 100 zloty is only 3 zloty 70 groszy income. It should be noted that this low profitability of Polish enterprises takes place against the reduction of tax pressure on businesses. Thus obligatory encumbrances on gross financial result declined in 2014 compared with the previous 2013 year by 479 mln zloty, in comparison to 2010 by 2,516 mln zloty. In 2005 the value of this indicator amounted to almost 21% of the gross financial result, and in 2014 less than 15% (Table. 1, Fig. 2).

Figure 1. Growth rates, revenues, costs and financial result of enterprises by 2005 (%)



Source: Concise Statistical Yearbook Of Poland (2015)

Figure 2. Economic relations in enterprises (%)



Source: Concise Statistical Yearbook Of Poland (2015)

Having analyzed the financial solvency of the Polish enterprises, it can be concluded that it is currently at sufficient level as the total solvency ratio is about 1.5 for the entire period under study (Table 2).

Table 2. Corporate financial solvency analysis

Specification	2005	2010	2013	2014
Current assets of enterprises, mln zł	394340	663259	737915	768734
Short-term liabilities of enterprise, mln zł	288595	451150	523092	519204
Solvency ratio of corporates	1.37	1.47	1.41	1.48

Source: Concise Statistical Yearbook Of Poland (2015)

Thus, the conducted studies make it possible to jump to the conclusion that Polish manufacturing enterprises are characterized by financially stable condition, though their profitability level is low.

Certain economic relations and interconnections, which emerge during the functioning of enterprises, express the essence of the financial-economic activity of enterprises, maintaining the price progression of gross domestic product. Given the fact that enterprises do not make a closed system, it is necessary to analyze the external environment in which they operate. It is possible to divide the external environment into two domains: macroeconomic domain and global domain. Each of these domains forms both positive and negative factors of enterprise development.

Within the analyzed period, the Polish economy is characterized by stable development, yet not very high growth rates. Therefore, the chain growth rate of GDP (Gross domestic product) amounted to 1.7% in 2013, and to 3.4% in 2014, however, during the entire analyzed period from 2005 to 2014, the GDP growth in Poland amounted to 41%. In addition, during the entire analyzed period it is possible to observe

the constant increase in sold production of industry (9% in 2010, 1.8 in 2013, 3.1 in 2014). The growth processes in the Polish economy take place against the background of the growth of currency in circulation (monetization ratio in 2005 was 43%, and in 2014 it already amounted to 62%), which is accompanied by the growth of deposits of enterprises (by 126% or 126.13 millions of zlotys in 2014 as compared to 2005) and by a low inflation rate (1.7% – 2010, 1.2% – in 2013, 0.6% – 2014).

During the analyzed period, the volumes of sold production of industry are 70% on average of the country's GDP. These are positive trends that show not only the stable development but also a significant potential of the Polish economy in general and enterprises in particular (Table 3).

Table 3. Main macroeconomic developmental quotients of the Polish national economy

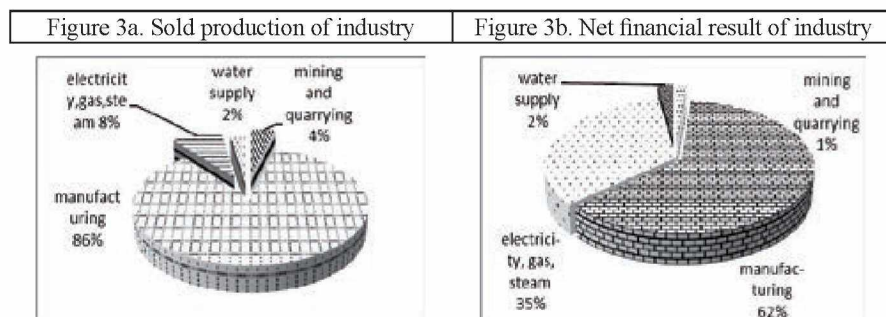
Specification	2005	2010	2013	2014
Gross domestic product (current prices), mln zł	984919	1437357	1662678	1728677
Previous year=100%	-	103.7	101.7	103.4
2005=100%	-	-	-	141,1
Sold production of industry, mln zł	687810	985716	1182964	1230333
Previous year=100%	-	109.0	101.8	103.1
M3 money supply total, mln zł	427125	783649	978908	1059186
Non-financial corporations: Deposits and other liabilities, mln zł	99749	181260	206526	225879
Price in dices gross domestic product	-	101.7	101.2	100.6
Monetisation factor	0.43	0.55	0.59	0.62

Source: Concise Statistical Yearbook Of Poland (2015)

The statistical data for 2014 show that 85% of the sold industrial output is accounted for the processing industry (manufacturing), 8.1 – for the energy industry (electricity, gas, steam and air conditioning supply), 4 – for the mining industry (mining and quarrying) and 2.4 – for the water supply and wastewater (water supply; sewerage, waste management and remediation activities) (Figure 3). At the same time, 62% of the financial results of industrial production is made by the processing industry (manufacturing), 35 – by the energy industry (electricity, gas, steam and air conditioning supply), only 1% – is made by the mining industry (mining and quarrying) and 2 – by water supply and wastewater (water supply; sewerage, waste management and remediation activities) (Figure 3b).

Thus, the processing industry (manufacturing) and the energy industry (electricity, gas, steam and air conditioning supply) are some sort of a locomotive for Poland's economic growth both in terms of industrial production and financial efficiency. The further stimulation of the development of these branches will allow including a multiplier of economic growth not only in "locomotive-branches" themselves but also in all the other domains of the national economy.

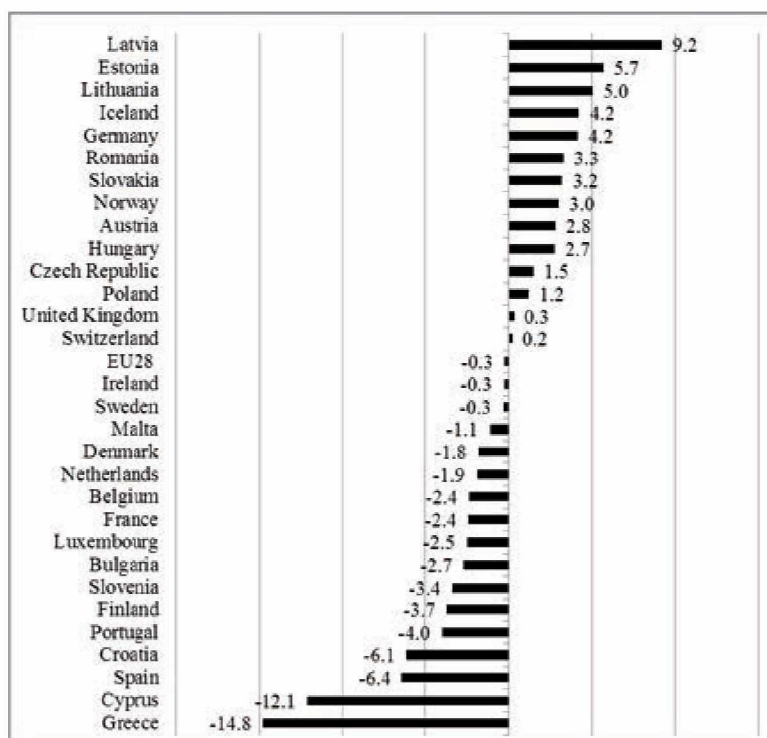
Figure 3. The structure of industrial production in Poland by sections and divisions in 2014



Source: Concise Statistical Yearbook Of Poland (2015)

The analysis of the international operation environment of the Polish enterprises indicates the following situation. In general, there is a decline in the industrial production across the European Union by 0.3% on average in the last 5 years (Fig.4).

Figure 4. Indices of industrial production in selected countries (average for 2010-2014)



Source: Eurostat (2015)

At the same time, there is a significant decline in such developed countries of Western Europe as Spain – 6.4%, Portugal – 4.0, Finland – 3.7%, France, and Belgium – 2.4%, Netherlands 1.9%, Denmark – 1.8, Sweden and Ireland – 0.3%. “The leader” of the industrial decline over the past 5 years is Greece – 14.8%. Against the backdrop of the fall of industrial production in the countries of Western Europe, we can see a transfer of production capacities to the countries of Eastern Europe, which, in turn, causes the industrial growth in these countries. The greatest rates of growth in industrial production are observed in Latvia – 9.2%, Estonia – 5.7%, Lithuania – 5.0%, and the average increase in industrial production in Poland during 2010-2014 amounted only to 1.2%.

In this connection, there is a question about the prospects of further development of Polish enterprises. On the one hand, Poland has a stable growth rate of industrial production and a sufficient level of financial solvency of Polish enterprises. On the other hand, however, the rate of industrial growth is small – it is only 1.2% (average values for 2010-2014), and the profitability of less than 4%. And all this is against the fall of industrial production and crisis across the EU in general, which in turn could lead to a narrowing of industrial output in Poland.

Based on the conducted research logically arises the problem of finding ways of the further development of Polish enterprises, increase in their profitability and industrial output. As it is known, this can be achieved through expanding of the sales market of manufactured goods, through the inclusion of the so-called “scale” effect (the increase in business profitability and the increase of its capitalization by reducing expenses on the basis of increased production level).

Where should Polish manufacturers move, how to expand the existing markets and where to look for the new ones? Is the further increase in the production distribution in the countries of European Union possible, and if not, where to look for new markets? The answer to these questions can be found by using the methods of mathematical modeling.

### 3. THE SEARCH FOR POSSIBLE DIRECTIONS OF ENTERPRISES DEVELOPMENT IN POLAND

Modern economic and political conditions on the international market (particularly the military conflicts in Ukraine and Syria, economic sanctions against Russia) necessitate a quick search for additional markets for products of Polish industry. First and foremost, search for the countries where it is possible to promote the products of Polish enterprises is considered the priority.

In order to identify the opportunities of increasing the sales volumes of Polish products on the foreign markets, it is necessary to fulfill three main conditions.



*The first condition* is the presence of a certain degree of economic freedom and the independence of Polish enterprises from those of EU member countries. The presence of such economic freedom will increase the range of market activity of Polish manufacturers, its maneuverability and efficiency in occupying market niches that are potentially available for the products of Polish enterprises. Mathematically, to fulfill this condition, the absence of close correlative dependence between the pace of development of Polish industry and the pace of industrial development of the EU member countries is required.

*The second condition* is the presence of the country-potential partner of a solvent demand for the products of Polish enterprises in a country – potential partner. In turn, the presence of a solvent demand is only possible in stably developing economies, and the basis of a traditional economy development is, as it is known, an industrial production. Thus, when inspecting the feasibility of the second condition, it is necessary to conduct an analysis of the dynamics and growth rates of industrial development in the countries-potential partners.

*The third condition* consists in the fact that at the time of the creation of a new market there should not be any economic activity between the country-potential importer and the country-potential-exporter, since the absence of such activity stipulates the existence of a market niche for the products of Polish enterprises. To identify such countries, one should use the statistics data of the volumes of exports and imports of goods and services.

*To test the feasibility of the first condition*, the quarterly data from Eurostat on the rate of industrial development of EU Member States for the 2000-2014 and for the 2<sup>nd</sup> quarter of 2015 were used. In the course of the calculations it was revealed that only 16 out of 28 EU member countries have close correlative dependence in the industrial development (the correlation coefficient ranges from 0.90 to 1.00, the average absolute percentage error of up to 20%, all the other necessary criteria for the adequacy of econometric models correspond to their optimum values, i.e. the calculations are characterized by high reliability). Poland is not included on this list, as the closeness level of correlative connections of Polish industrial development with the EU countries is only 0.41 (Table 4).

Based on the findings, one can conclude about the feasibility of the first condition – the development pace of the Polish industry is currently poorly correlated with the development pace of the industry in the European Union member countries. Thus, Poland has a quite wide search range of potential partners-consumers of products from its manufacturing enterprises. At the same time, the findings do not exclude the possibility of seeking for new trading partners of Poland within the territory of the

EU. Therefore, the examination of the second condition is performed primarily for the member countries of the European Union.

Table 4. Correlative-regressive analysis of industrial development in the EU member countries

Nr	Country	Correlation coefficient	The absolute average percentage error
1	Sweden	0.99	0.05
2	Slovenia	0.99	0.04
3	France	0.98	0.17
4	Finland	0.98	0.02
5	Romania	0.98	0.03
6	Ireland	0.96	0.02
7	Portugal	0.96	0.10
8	Hungary	0.95	0.04
9	Netherlands	0.95	0.08
10	Czech Republic	0.95	0.05
11	Luxembourg	0.94	0.08
12	Malta	0.93	0.01
13	Belgium	0.91	0.05
14	United Kingdom	0.91	0.03
15	Spain	0.90	0.02
16	Latvia	0.90	0.03
...			
26	Poland	0.41	0,03
...			

Source: author's own development

*Feasibility test of the second condition.* In order to perform calculations on the feasibility verification of the second condition, quarterly data of the industrial development rates of the European Union member countries beginning from 2000 were used. The analyzed time interval was divided into six periods. Each period consists of three years or 12 quarters. The last sixth period due to the lack of statistical data comprises only two quarters of 2015. For each period, an average quarterly value of the industrial development rate of the corresponding country was found. Provided that the values above 101% in the respective box is put to "1", otherwise to "0".

Depending on the obtained findings, all the European Union countries were divided into two categories, namely, the countries that do not have the potential to find new market outlets for Polish industry products and the countries that have such a potential (Table 5 and 6, respectively).



Table 5. Countries with no potential to find new market outlets

GEO/TIME	Period 1 (2000-2002)	Period 2 (2003-2005)	Period 3 (2006-2008)	Period 4 (2009-2011)	Period 5 (2012-2014)	Period 6 (1, 2 2015)	The proportion of time growth rates*
Belgium	1	1	1	0	0	0	60
Bulgaria	1	1	1	1	0	0	80
Ireland	1	1	1	0	0	1	60
Greece	1	1	1	0	0	0	60
Spain	1	1	1	1	0	0	80
France	1	1	1	0	0	0	60
Croatia	1	1	1	0	0	0	60
Cyprus	0	0	1	0	0	0	20
Luxembourg	1	1	1	0	0	0	60
Malta	1	1	1	1	0	0	80
Netherlands	1	1	1	0	0	0	60
Portugal	1	1	1	0	0	0	60
Slovenia	1	1	1	1	0	0	80
Finland	1	1	1	1	0	0	80
Sweden	1	1	1	1	0	0	80
United Kingdom	1	1	1	0	0	1	60
Switzerland	0	0	1	0	0	0	20

\*The proportion of time with positive growth rates of industrial production in the analyzed countries for 1 – 5 periods is shown in percentage form.

Source: author's own development

Table 6. Countries with the potential to find new markets

GEO/TIME	Period 1 (2000-2002)	Period 2 (2003-2005)	Period 3 (2006-2008)	Period 4 (2009-2011)	Period 5 (2012-2014)	Period 6 (1, 2 2015)	The proportion of time growth rates**
Czech Republic	1	1	1	1	1	1	100
Germany	1	1	1	1	1	1	100
Estonia	1	1	1	1	1	1	100
Latvia	1	1	1	1	1	1	100
Lithuania	1	1	1	1	1	1	100
Hungary	1	1	1	1	1	1	100
Austria	1	1	1	1	1	1	100
Poland	1	0	1	0	1	1	60
Romania	1	1	1	1	1	1	100
Slovakia	1	1	1	1	1	1	100
*Norway	0	0	1	1	1	1	60

\* Not included in the European Union, but due to active foreign economic relations was included in the list of the analyzed countries to identify potential markets.

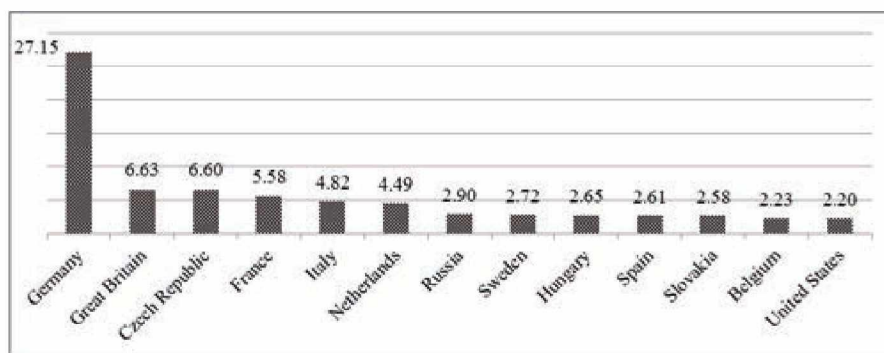
\*\* The proportion of time with positive growth rates of industrial production in the analyzed countries for 1 – 5 periods is shown in percentage form.

Source: author's own development

According to the calculations, a group of EU member countries that do not have the potential to find new markets for the products of Polish industry comprises 17 countries (it should be noted that the financial condition of the analyzed countries' market, as well as the gross domestic product, were not taken into account). Among these countries are Cyprus and Switzerland – countries in which the industrial production does not occupy leading positions in the economy. In the 11 EU member countries, the crisis has been observed since 2009. Given the fact that most of the crisis phenomena take place for more than 2 periods, highlighted in the analysis, it is possible to predict the increase of problems in the real economy sector before the end of 2017 in countries such as Bulgaria, Spain, Malta, Slovenia, Finland, and Sweden. 9 of the European Union member countries and Norway were included in the list of the countries with a potential to find new markets. Since 2000, there has been a stable development of the industrial sector of the national economy in these countries. Thus, the countries with a potential to develop new market outlets for products of Polish corporates are as follows: The Czech Republic, Germany, Estonia, Latvia, Lithuania, Hungary, Austria, Romania, Slovakia, and Norway.

*Feasibility test of the third condition.* According to the statistical data, Poland is currently trading in goods and services with 253 external contractors. And only 13 countries of which in the export structure (Fig. 5), and 11 countries in the import structure (Figure 6) exceed 2%. The share of the export-import transactions with these countries accounts for 73.16 and 68.06%, respectively.

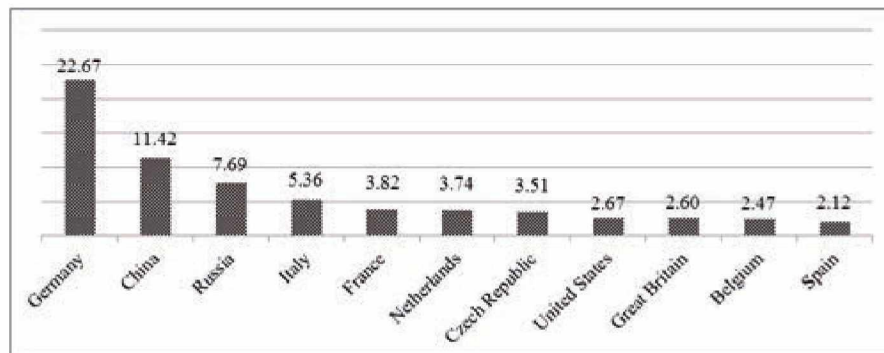
Figure 5. Countries, which share in the structure of export for Poland is more than 2%



Source: Concise Statistical Yearbook Of Poland (2015)

Based on these data, the most active trade partner of Poland is Germany, the trade share of which constitutes 27.15% in the export structure and 22.67% in the import structure. Also, in the structure of the Polish import, there is a large proportion belonging to Chinese (11.42%) and Russian (7.69%) products.

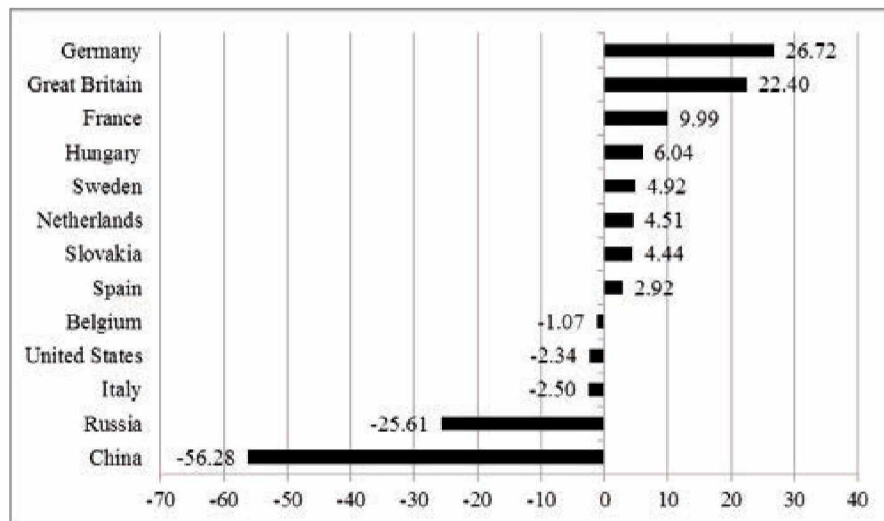
Figure 6. Countries, which share in the structure of import for Poland is more than 2%



Source: Concise Statistical Yearbook Of Poland (2015)

The balance analyses of the foreign trade turnover of products and services with the countries with which either import or export is more than 2% of the total volume of import and export, respectively (Fig. 7) allows to conclude that with such countries as Germany, the UK, France, Hungary, Sweden, the Netherlands, Slovakia and Spain there is a positive balance on export-import operations, active foreign trade operations are carried out.

Figure 7. The balance on foreign trade operations in Poland in relation to external contractors import or export with which is more than 2% in the general structure



Source: Concise Statistical Yearbook Of Poland (2015)

Combining the results of all three condition tests of expanding Polish manufacturing enterprises into a new market, we can conclude that today Poland's most promising partners are: The Czech Republic, Estonia, Latvia, Lithuania, Romania, and Norway.

#### 4. THE EVALUATION SYSTEM OF DEVELOPMENT PROSPECTS FOR AN INTERNATIONAL ECONOMIC PARTNERSHIP OF MANUFACTURING CORPORATES OF POLAND

A further development of an economic partnership of Poland on the international arena requires the formation of a clear assessment system of such prospects.

The conducted research of existing methodological approaches to forecasting the development of the national economy leads to the conclusion that one of the most common methods of predicting the future economic dynamics is the system of leading indicators. The leading indicator – is an indicator that allows to assess the likely development pathway of the economy and predict a possible change in the business activity ahead of the economy for several months. The decline of the leading indicator level can be an early signal of a slowdown in economic growth.

1. A composite leading indicator is formed of several indicators that create leading signals in the group [Anas, Ferrara 2004: 193–225; Cooley, Hansen 1995: 175–216]. According to this method, for further study and analysis of the development prospects of the international economic partnership of the manufacturing enterprises in Poland, it is necessary to solve two interrelated problems:

- 1) An identification of raising and lowering phases in the economy of countries-potential partners and an accurate dating of the turning points in the economic cycle;
- 2) A construction of the system of leading indicators and, as a result, a calculation of composite leading index (weighted average, based on the original series).

At the same time, the components of the leading indicators system should have the following characteristics:

- 1) They should display the changes in the overall economic dynamics in the countries-potential partners as a consequence of changes in supply and demand;
- 2) They should display the expectations of economic agents;
- 3) They should, before the economy as a whole, respond to the changes in economic activity;
- 4) The formed dynamic series should be sufficiently reliable and comparable throughout the analyzed period, and their fluctuations should be cyclical in nature (i.e., the periods of growth should alternate with the periods of recession);
- 5) The information should be updated promptly (monthly), and with the minimum number of delays;
- 6) It is necessary to keep track of the turning points and compare them with the turning points of the global economic cycle for each of the countries-partners.

At the same time, to characterize the prospects of supply and demand ratio it is possible to use not only direct but also in direct estimates. Thus, the direct supply and demand ratio is reflected in survey data on the level of demand, on order portfolio status and on the level of stocks of end products at a particular corporate, and the indirect ones are reflected in the world's oil prices, in the real exchange rate of the international means of payment (dollar, euro), in the current status indicators of the balance of payments of the countries-partners. That is, the direct expectation estimates include various kinds of survey data and indirect ones include share index, interest rates, exchange rates, the level of innovative activity, and the growth rates of the real economy sector [OECD. Cyclical Indicators and Business Tendency surveys, OECD, OECD/GD (97) 58].

The conducted studies led to the conclusion that the assessment system which consists of a number of leading indicators usually leads to ambiguous conclusions about the future prospects of development. For this reason, it is expedient to construct a generalizing indicator of composite leading index (ESR) [Berge, Jordà 2011: 246–277; Chauvet, Hamilton 2005: 27–35].

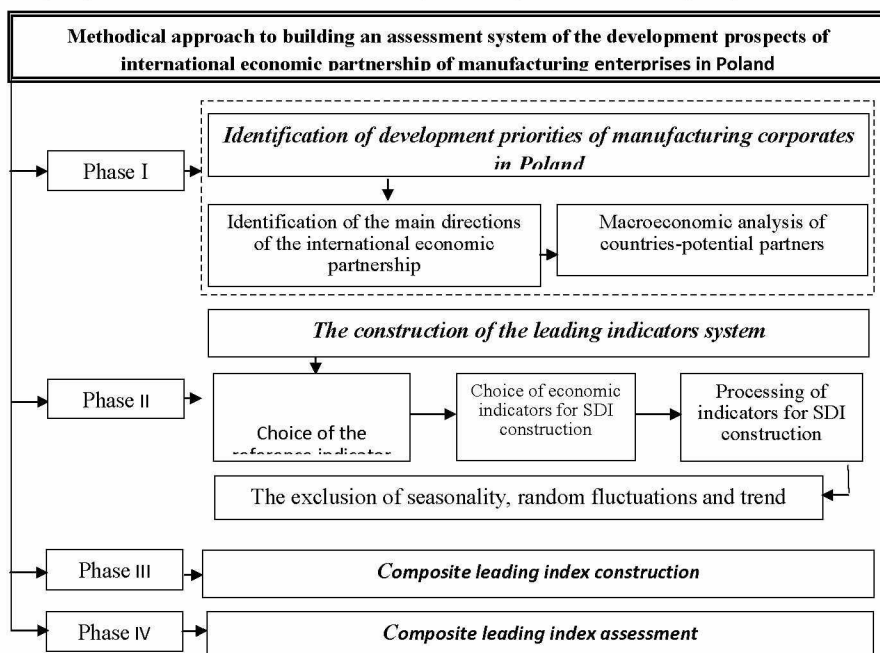
To combine the initial leading indicators into one index, it is necessary for series expressed in different units (kind, monetary value, percentage, etc.), to be brought to a common scale. To do this, one should eliminate the difference in scale and variability of baseline indicators and the variability of composite leading index and the variability of the industrial production index.

In practice, when constructing a system of leading indicators, two different concepts are used: the concept of business cycle and the concept of reference indicator. With the concept of the business cycle, the focus is on the direction of the economy up and down (increase-decrease), which corresponds to a classical concept of the business activity cycle, as well as on the speed change in the economic development (acceleration-deceleration) and the concept of growth of cycles is used. A recession is defined as a period of decline in production, income, employment and trade, and is characterized by the spread of the recession in a number of sectors of the economy.

In the concept of reference indicator, the ideal reference indicator is the monthly GDP (it is believed that the economic cycle is adequately reflected in the dynamics of this indicator and any additional information to determine the turning points and phases of the cycle is not required). However, since the monthly GDP estimates do not exist, it is necessary to choose another indicator, the dynamics of which is close to the dynamics of GDP. In this regard, in practice in some countries index of industrial production is used as a reference indicator. It is for this indicator peaks and pits are determined, it is in the relation to this indicator the entire system of leading indicators is constructed. The used in such a manner procedure of dating of the turning points is quite formal. It is based on the comparison of the actual values of the industrial production index with trend values [Fukac, Pagan 2009: 15–30; Stock, Watson 2010: 16–19].

The methodical approach to building an assessment system of the development prospects of the international economic partnership of Polish manufacturing corporates should be formed on the combination of the concept of the business cycle and on the concept of the reference indicator (Figure 8).

Figure 8. The methodical approach to building an assessment system of the development prospects of the international economic partnership of manufacturing corporates



Source: author's own development

The procedure of calculating the composite leading index is as follows.

1. It is necessary to make a choice of the reference indicator. The reference indicator reflects the fluctuations in economic activity and its value is a benchmark for the use of leading indicators for purposes of prediction. As the reference indicator, it is necessary to use a seasonally adjusted index of industrial production in Poland and in the partner countries.

Local (compared to six months adjacent to either side) maxima of the series can be considered peaks, local minima – pits. Peaks and pits should alternate, and the gap between them should be more than six months.

2. It is necessary to make a choice of indicators (exponents) that are similar in certain qualitative and statistical characteristics relative to the reference indicator. It is important to use the following criteria when selecting economic indicators:

a) economic characteristics: The indicators shall have an economic explanation for why they outstrip, coincide or fall behind the reference indicator, they shall reflect a wide range of economic activities and should be formed out of balanced results of the conjuncture surveys, financial and economic indicators. For instance: the indicator of stocks of finished products outstrips the change in the index of physical volume of the industry – if the stocks are available in greater quantity, then there will be a decline in the production in the future;

b) time response characteristic: when selecting economic indicators, one should opt for monthly data, which should be accessible and have long historical series;

c) statistical data: it is necessary to take into account the size and the sequence of advancing of the indicator's turning points with respect to the reference series. The cyclicity correlation of the reference series with the indicator cyclicity can serve as the sequence of advancing indicator. The sequence of advancing is understood as the fact that the indicator should not have extra or missing cycles in relation to the reference series.

3. For all the selected indicators  $X_t^i$  ( $i$  – line number,  $t$  – current time) symmetrical monthly increments are calculated [Adericho 2013: pp. 286-300]:

$$x_t^i = \frac{200 * (X_t^i - X_{t-1}^i)}{(X_t^i + X_{t-1}^i)}.$$

Then one estimates the average value of  $x_{cp}^i$  and the standard deviation of  $s^i$  of the acquired growth series ( $n$  – the number of months in the reference period):

$$x_{cp}^i = \sum x_t^i / n;$$

$$s^i = \sqrt{\sum (x_t^i - x_{cp}^i)^2 / (n-1)}.$$

For each  $t$  time period an average  $g^i$  gain is calculated, as well as the average deviation of the  $g_{cp}$  series ( $m$  – number of derived indicators):

$$g_i = \sum \left( \frac{x_t^i}{s^i} \right) / m;$$

$$g_{cp} = \frac{\sum g_t}{n};$$

The result is the standard  $S^i$  deviation of the acquired series of rates of growth / index decline.

$$s^i = \sqrt{\frac{\sum (g_t - g_{cp})^2}{(n-1)}}.$$

The  $g$  index is adjusted in compliance with its volatility similar to the dynamics of the rate of growth (decline) of the reference indicator:

$$G_t = g_t * \left( \frac{s^i}{s_g} \right).$$

Via the recursive formula, the value of the composite leading index  $Z_t$  is calculated (by the return from growth to the unit):

$$Z_t = \frac{(200 + G_t)}{(200 - G_t)},$$

4. Having identified the dynamics of the composite leading index, it is possible to estimate the future direction of the index alteration in the physical volume of the industry.

The use of the proposed assessment system allows to determine the development prospects of the Polish economy and the economy of the potential countries-partners, and to develop, and on this basis, appropriate management development models of manufacturing enterprises in Poland.

## 5. CONCLUSION

Based on the conducted studies it is possible to make the following conclusions.

1. The development foundation of the national Polish economy is manufacturing enterprises. Thus, in the last ten years, the volume of sold industrial production has been about 70% on average of country's GDP. Therefore, the level and the development prospects of manufacturing enterprises determine the current and future economic stability in the country and, as a consequence, the level of social and public security.

2. The analysis of the key financial indicators of the manufacturing corporates activity in Poland shows a steady increase in revenues from total activity of enterprises over the last ten years and a sufficient level of their solvency. At that, the conducted research allows to conclude about the low efficiency of the Polish manufacturing corporates functioning. Thus, the return on invested capital in Polish enterprises is about 4% only.

3. In the course of the conducted analysis of the external environment functioning of manufacturing enterprises in Poland, two domains were studied: the macroeconomic domain and the global domain. Each of these domains creates positive and negative factors of business development.

4. Within the analyzed period, the Polish macroeconomic condition is characterized by stable development, but it is marked with not very high growth rates. Thus, the chain growth rate of Gross domestic product of the country has been in the range of 2-4% over the last ten years on average. In addition, during the entire analyzed period, there is a constant increase in sold production of industry by 1.2% damage on average. The development processes of the Polish economy are accompanied by a constant growth of money supply in circulation on the background of a slight inflation, which is a positive trend.

The analysis of the industrial production structure in Poland indicates that 85% of the sold industrial products accounts for the processing industry (manufacturing), it brings 62% of the financial results of industrial production, and energy industry takes the second place (electricity, gas, steam and air conditioning supply) with 35% of the total financial result of the manufacturing corporates in Poland. Thus, the processing industry (manu-



facturing) and the energy industry (electricity, gas, steam and air conditioning supply) are some sort of a locomotive for Poland's economic growth both in terms of industrial production and financial performance. The further stimulation of the development of these branches will allow including a multiplier of economic growth not only in "locomotive-branches" themselves but also in all the other spheres of the national economy.

5. The analysis of the international functioning environment of manufacturing enterprises in Poland shows a decline in industrial production in the Western Europe countries and the transferring of their production capacities to the countries of Eastern Europe. Such a situation causes an economic growth in the countries, which are industrial recipients. In this connection, there is a question about finding the prospects of the further development of Polish enterprises.

6. The search for the directions of Polish enterprises development requires first and foremost an answer to the question as in what countries it is possible to promote their products. In order to identify the opportunities of increasing the sales volume of Polish enterprises' products on foreign markets, the feasibility of the three main conditions was analyzed: the presence of a certain degree of economic freedom and the independence of the Polish corporates from those of the countries-potential partners; the presence in the country-potential partner a solvent demand for the products of Polish enterprises; the absence of a strong economic activity between the country-potential importer and the country-potential exporter of industrial products. According to the inspection results of the feasibility of these three conditions, we concluded that today Poland's most promising partners are: The Czech Republic, Estonia, Latvia, Lithuania, Romania, and Norway.

7. In order to assess the effectiveness of the development directions of the Polish economic partnership in the international arena, a methodical approach is offered for building an assessment system of the development prospects of the international economic partnership of Polish manufacturing enterprises, which is formed by the combination of the concept of the business cycle and the concept of the reference indicator. The use of the proposed methodological approach will allow revealing the raising and the lowering phases in the economy of the countries-potential partners with a precise dating of the turning points in the economic cycle and, will allow, on the basis of constructing a system of leading indicators, to devise appropriate management development models of manufacturing enterprises in Poland.

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