

STRUCTURAL ASSESSMENT OF THE INDUSTRY OF UKRAINE AND POLAND

Lyubomyr Sozanskyy¹

ABSTRACT

In the article research the structural estimation and exposure of comparative advantages of Ukrainian and Polish industry. The methodical basis of research the structural indexes of producing, gross value added and export of gross value added served as. It is educed at results undertaken a study, similar and excellent structural and quality lines of Polish and Ukrainian industry. The results of the study made it possible to state that Ukraine has comparative advantages in the raw materials sectors of industry, while Poland is in the processing industry, which focuses on the largest industrial innovation, investment resources and human capital. Significant comparative advantages of the Polish processing industry are due to the fact that processing industries with a low share of gross value added in production (food production, wood production, paper, printing and duplicating and metallurgical production) predominate in Ukraine's processing industry. Instead, the Polish processing industry holds a significant share in the processing industry with a higher share of gross value added (production of basic pharmaceutical products and pharmaceuticals, production of rubber and plastic products, production of other non-metallic mineral products, production of finished metal products, except machinery and equipment, production of motor vehicles, trailers and semitrailers). Therefore, the further development of the Ukrainian processing industry and industry in general requires sectoral and innovative development (construction of organizational and economic mechanisms for the comprehensive modernization of certain industrial enterprises). The revealed differences between the Ukrainian and Polish industries are the basis for building mutually beneficial Ukrainian-Polish economic relations in international trade, investment and innovation activities.

Key words: industry of Ukraine, industry of Poland, types of industrial activity, gross value added, producing, the export of gross value added, processing industry.

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¹ SI Institute of Regional Research n.a. M. I. Dolishniy of the NAS of Ukraine, Lviv, Ukraine.
E-mail: ls.ird2@ukr.net.

1. Introduction

One of the strategic goals of Ukraine is economic growth, a significant role in which the industry belongs. The promising direction of Ukraine's economic development is to increase the volume of industrial production with high added value and to withdraw from raw material-oriented investment-innovative model of economy. The definition of priority industrial activities requires a structural assessment of industry, which is carried out by comparing the industrial and industrial sectors of Ukraine and Poland as countries with close economic relations and structural similarities in the industrial sector of the economy. Thus, the share of industry in gross domestic product (GDP) of Ukraine in 2015 amounted to 20.9% SSSU (2017), and Poland – 23.5% GUSP (2017), and the dominant link in the industry of both countries is the processing industry. At the same time, in absolute terms, the Polish industry in 2015 significantly exceeded the Ukrainian one. In particular: – by 4.8 times (73.060.8 billion \$ vs. 357.187.1) for industrial output; – by 6.2 in times (\$ 17,997,1 billion versus \$ 111,309.0 billion) in gross value added of industry; – by 4.4 times (\$ 29.164.2 billion vs. \$ 129.179.0 billion) for the export of goods and services industry. Before the crisis in 2013, the predominance of the Polish industry was smaller and still significant: 2.7 times the output of industrial products, 3.2 times the gross value added of industry and 2.4 times the export of goods and services industry. At the same time, in 2013, the number of people employed in industry in Ukraine was 1.1 times higher than in Poland (3170 thousand people vs. 2843), and in 2015 it decreased by 0.88 times (2573.9 thousand people vs. 2926.6 thousand people). The problematic issues in the development of Ukrainian industry are the following scholars: V., Geyets and T., Ostashko (2016), Ishchuk S. O. (2015), Amosha O. I., Vishnevsky V. (2014), Salikhova O. B. (2012).

2. Methodological aspects of the assessment of the structure of industry

The purpose of the article is to present the results of the structural assessment of the industry of Ukraine and Poland and the possible forms of cooperation between the industrialists of countries. The methodical basis for the structural assessment of the industry of Ukraine and Poland was chosen as a methodological approach developed by Salihova O. B. (2012). On the basis of this approach, the indicators characterizing the industrialization of the economy, the specialization, the socio-economic result and the efficiency of the country's industry and its competitiveness on foreign markets are calculated. The industrialization of the country illustrates the share of industry in the release of all types of economic activity, and the specialization of industry by type of industrial activity – the share

of industrial activities in the production industry. The higher the values of these indicators, the higher level of industrialization/specialization of the country's industry (Table 1).

Table 1. Structural indicators of industrial output of Ukraine and Poland in 2013–2015, %

| Indicator | 2013 | | 2014 | | 2015 | |
|---|---------|--------|---------|--------|---------|--------|
| | Ukraine | Poland | Ukraine | Poland | Ukraine | Poland |
| The share of industry in the country's production | 38.3 | 38.3 | 38.9 | 37.7 | 38.1 | 37.8 |
| The share of extractive industry and the development of quarries in the production industry | 13.0 | 4.0 | 12.0 | 4.0 | 12.0 | 4.0 |
| The share of the manufacturing industry in the production industry | 73.9 | 83.6 | 74.8 | 84.7 | 75.6 | 84.5 |
| Share of electricity, gas, steam and air conditioning in industrial production | | | | | | |
| Share of electricity, gas, steam and air conditioning in industrial production | 11.0 | 9.0 | 11.0 | 8.0 | 11.0 | 9.0 |
| Share of water supply; sewage, waste management in industry | | | | | | |
| Share of water supply; sewage, waste management in industry | 1.8 | 2.8 | 1.8 | 2.9 | 1.7 | 3.0 |

Source: State Statistics Service of Ukraine (2017), Central Statistical Office of Poland (2017).

The socio-economic result of the industry's activity is characterized by the amount of gross value added (GVA) created. The higher the value of this indicator, the higher the socio-economic result of the type of economic activity. The importance of industry in the results of all types of economic activity is determined by the indicator of the share of industry in the GFS of all types of economic activity, and the types of industrial activity as a result of industry – the indices of the industrial activities in the GVA industry. To characterize the efficiency of industry and types of industrial activities, from the socio-economic point of view, indicators of the share of gross value added in the issue are calculated. The higher the value of these indicators, the higher the efficiency of industry. This is due to the higher proportion of gross value added in the production of industry or industrial activities, the higher the degree of processing of raw materials and the application of technology and human capital. The competitiveness of industry in foreign markets and the importance of this sector in the competitiveness of the country's economy are determined by the indicator

of the share of industry in the export of airborne vehicles of all types of economic activity, which calculates the ratio of exports of gross value added of industry to the export of gross value added of all types of economic activity in the country. Export of gross value added of industry is defined as the product of commodity export of industry and the share of gross value added in industry output. Indicators of the share of industrial activities in exports of gross value added of industry are calculated by analogy with the previous indicator, except for the denominator, which exports the Aviation industry. For a comprehensive assessment of the comparative advantages of Ukraine and Poland by the named structural indicators of output, gross value added and exports of gross value added, generalized indicators of comparative advantages of industry and industrial activities are calculated by (1):

$$SEVA_{ij} = E_{ij} \frac{VA_{ij}}{OP_{ij}} : \sum_j E_{ij} \frac{\sum_j VA_{ij}}{\sum_j OP_{ij}} \quad (1)$$

where $SEVA_{ij}$ – generalized indicator of the comparative advantages of the industry or the type of industrial activity of the country;

E_{ij} – commodity export of industry or – the type of industrial activity of the country;

VA_{ij} – gross value added of the industry or the type of industrial activity of the country;

OP_{ij} – the volume of industrial output or the type of industrial activity of the country;

$\sum_j E_{ij}$ – commodity exports of all types of economic activity or industry;

$\sum_j VA_{ij}$ – added value of all types of economic activity or industry;

$\sum_j OP_{ij}$ – the volume of production of all types of economic activity or industry.

3. Estimation of the structure of industry in Ukraine and Poland

The indicators calculated on this method gave the opportunity to formulate such analytical conclusions. The values of industrialization of Ukraine and Poland in 2013 were the same, and in 2014–2015 there was an insignificant comparative advantage of the Ukrainian economy.

However, the level of industry specialization by type of industrial activity in these countries is somewhat different. The share of extractive industry in the production showed a comparative advantage of Ukraine (12% vs. 4%), while the

share of processing industry in the output was Poland (84.5% versus 75.6% in 2015). In the supply of electricity, gas, steam and conditioned, Ukraine's predominance (11% vs. 9%) and water supply were observed; sewage, waste management – Poland (3% vs. 1.7%). Thus, the Ukrainian industry has comparative advantages in the specialization of extractive industrial activities, and Polish - production. Despite some prevalence of the Ukrainian industry by the level of industrialization in 2014–2015, the Polish industry for the analyzed period from the socio-economic position was more productive, as evidenced by the higher share of industry in the gross value added of all types of economic activity (26.3% against 23.3% in 2015) (Table 2).

Table 2. Structural indices of gross value added of industry of Ukraine and Poland in 2013–2015, %

| Indicator | 2013 | | 2014 | | 2015 | |
|---|---------|--------|---------|--------|---------|--------|
| | Ukraine | Poland | Ukraine | Poland | Ukraine | Poland |
| The share of industry in the gross value added of all types of economic activity | 22.3 | 25.8 | 23.5 | 25.4 | 23.3 | 26.3 |
| The share of extractive industries and the development of quarries in the gross added value of industry | 27.3 | 8.4 | 24.3 | 7.2 | 24.2 | 6.7 |
| The share of the processing industry in gross value added of industry | 55.5 | 72.9 | 59.6 | 74.6 | 60.2 | 74.9 |
| Share of electricity, gas, steam and air conditioning in gross value added of industry | 14.9 | 13.9 | 13.8 | 13.2 | 13.6 | 13.4 |
| Share of water supply; sewage, waste management in gross added value of industry | 2.3 | 4.8 | 2.2 | 5.0 | 2.2 | 5.0 |

Source: State Statistics Service of Ukraine (2017), Central Statistical Office of Poland (2017).

Meanwhile, in the mining industry, a significant preponderance of Ukraine (24.7% vs. 6.7% in 2015) was observed in the mining industry's share in the gross value added of the industry, which is due to the significantly higher magnitude of the specialization of Ukrainian industry in this type of industrial activity. The results of the manufacturing industry, which accumulates the largest number of jobs in the industry, needs the most innovations and has the potential to bring the highest incomes, which are of great importance both for industry and for the

economic and social sectors of the country as a whole. The share of the processing industry in the gross value added of the industry during the analyzed period saw a significant (almost 15 pp.) predominance of Poland (74.9% vs. 60.2% in 2015).

According to the indicator of the share of electricity, gas, steam and air conditioning in the gross value added of the industry, a comparative advantage of Ukraine, which is a sign of structural similarity, gross value added, of this type of industrial activity of the two countries, was observed to be insignificant (up to 1 percentage point). According to the share of water supply; wastewater treatment in the gross value added of industry, as well as in terms of output, during the analyzed period, the comparative advantage of Poland was observed, which in 2015 amounted to 2.8 pp. (5.0% vs. 2.2%). The qualitative characteristic of the industry's activity is its efficiency, which is characterized by the indicators of the share of airborne vehicles in the output (Table 3) and which showed a relatively higher level of Polish industry. In particular, the comparative advantages in terms of performance in 2015 were: for the industry as a whole – 6.6 pp. (31.2% to 24.6%); extractive industry and the development of quarries m-4 cent. (55.7% to 51.7%); processing industry – by 8 percentage points (27.6% to 19.6%); Electricity, gas, steam and air conditioning supply – 17.2 pct (47.4% to 30.2%); water supply; sewage, waste management – 23.4 pct (52.8% to 29.4).

Table 3. Indicators of the share of gross value added in the output of Ukrainian and Polish industries in 2013 – 2015, %

| Indicator | 2013 | | 2014 | | 2015 | |
|---|---------|--------|---------|--------|---------|--------|
| | Ukraine | Poland | Ukraine | Poland | Ukraine | Poland |
| The share of gross value added in industry output | 24.8 | 29.7 | 24.9 | 29.9 | 24.6 | 31.2 |
| The share of gross added value of the extractive industry and the development of quarries in the industry | 52.8 | 57.8 | 50.7 | 53.8 | 51.7 | 55.7 |
| The share of gross value added of the manufacturing industry in the production industry | 18.8 | 25.9 | 19.9 | 26.3 | 19.6 | 27.6 |
| Share of gross value added of electricity, gas, steam and air conditioned in the industry | 31.5 | 44.9 | 30.2 | 46.8 | 30.2 | 47.4 |
| Share of gross added value of water supply; sewage, waste management in industry | 31.0 | 50.1 | 30.8 | 51.9 | 29.4 | 52.8 |

Source: State Statistics Service of Ukraine (2017), Central Statistical Office of Poland (2017)

Higher efficiency of industrial activity in Poland is a sign of a relatively higher degree of processing of raw materials, innovation, more rational cost management and the availability of effective economic and organizational mechanisms of sectoral functioning.

Competitiveness of the industry of Ukraine and Poland in foreign markets in the analyzed period was characterized by dynamism. Thus, according to the share of industry in exports of gross value added of all types of economic activity in 2013-2014, the comparative advantage of Ukraine was observed at 2.85 and 5.91 pp. respectively, and in 2015 – Poland – by 2.73 pp. (Table 4).

Table 4. Structural indices of gross value added of industry of Poland and Ukraine, %

| Indicator | 2013 | | 2014 | | 2015 | |
|--|---------|--------|---------|--------|---------|--------|
| | Ukraine | Poland | Ukraine | Poland | Ukraine | Poland |
| The share of industry in exports of gross value added of all types of economic activity | 39.51 | 36.66 | 40.54 | 34.63 | 37.21 | 39.94 |
| The share of extractive industries and the development of quarries in exports of gross value added of industry | 22.4 | 8.33 | 22.46 | 7.10 | 19.91 | 5.99 |
| The share of the processing industry in the export of gross value added of industry | 66.68 | 82.88 | 69.71 | 91.44 | 70.92 | 92.98 |
| The share of electricity, gas, steam and air conditioned in the export of gross value added of industry | 1.71 | 0.27 | 1.61 | 0.45 | 1.49 | 0.17 |
| Share of water supply; sewage, waste management in exports of gross value added of industry | 0.23 | 0.85 | 0.20 | 1.01 | 0.21 | 0.86 |

Source: State Statistics Service of Ukraine (2017), Central Statistical Office of Poland (2017)

This dynamics of the comparative advantages of the Ukrainian industry may be attributable to the processes of reorientation of commodity exports that took place in the analyzed period and the relatively positive trend of the growth of the Polish economy as a whole in 2015. Among the types of industrial activity by the

share of industrial activities in the export of gross value added of industry, Ukraine had significant comparative advantages in the extractive industry and the supply of electricity, gas, steam and coal localized air, and Poland – in the processing industry and water supply; sewage, waste management. In particular, the comparative advantage of Ukraine in the extractive industry in 2015 was 13.92 pp. (19.91% vs. 5.99%), while Poland in the processing industry – 22.06 pct (92.98% versus 70.92%). This is an indication that Ukraine has the highest export-oriented output in the mining industry, while Poland is in the processing industry. Summarizing the results of the structural assessment of the industry of Ukraine and Poland, we will mention the following analytical conclusions.

According to the general indicators of comparative advantages (Table 5), Ukraine had comparative advantages for industry in general in 2014, and Poland in 2013 and 2015. Among the types of industrial activity during the analyzed period, Ukraine had significant comparative advantages in the extractive industry and the development of quarries and water supply; sewage, waste management, as well as electricity, gas, steam and air conditioning, and Poland – in the processing industry.

Table 5. General indicators of comparative advantages of industry and industrial activities of Ukraine and Poland

| Indicator | 2013 | | 2014 | | 2015 | |
|--|---------|--------|---------|--------|---------|--------|
| | Ukraine | Poland | Ukraine | Poland | Ukraine | Poland |
| A generalized indicator of the comparative advantages of industry | 0.227 | 0.249 | 0.250 | 0.230 | 0.225 | 0.240 |
| A generalized indicator of comparative advantages of extractive industry and the development of quarries | 0.460 | 0.167 | 0.449 | 0.124 | 0.398 | 0.105 |
| A generalized indicator of comparative advantages of the processing industry a generalized indicator of comparative advantages of the processing industry | 0.496 | 0.724 | 0.559 | 0.810 | 0.563 | 0.825 |
| A generalized indicator of comparative supply of electricity, gas, steam and air-conditioned air | 0.023 | 0.004 | 0.021 | 0.007 | 0.019 | 0.002 |
| A generalized indicator of comparative water supply; sewage, waste management | 0.003 | 0.015 | 0.002 | 0.017 | 0.003 | 0.014 |

Source: State Statistics Service of Ukraine (2017), Central Statistical Office of Poland (2017)

Thus, having industrial potential and at the same time significant natural resources and human resources, Ukraine occupied only 19-th place among the EU member states in terms of volume of industrial output (13-th in 2013) and in the 20-th place the volume of the latter's aircraft, giving way to the leader – Germany – in more than 30 and almost 44 in times respectively. The specialization of Ukrainian industry is typical for countries with a raw material type of economy. Thus, in particular, the share of extractive industry and the development of quarries in the structure of the GTS of the industrial sector of the national economy is over 24% (the highest among the EU member states is 13.35% in the Netherlands), while the share of the processing industry is only 60.21% (the lowest value in the EU-28 – 64.46% in Cyprus). The Ukrainian mining industry is fully export oriented – its share in the export of agricultural products to the industrial sector of the national economy is approaching 20% (the highest figure among the EU member states is 8.15% in Croatia), but in terms of exports of airborne vehicles to this type of industrial activity, and, in terms of production – 3-rd. Ukraine's competitors in this segment of commodity exports are Poland, Great Britain, Denmark and Germany. The key problem for Ukrainian industry is its low efficiency – the 28-th place among the EU member states in terms of the share of airborne emissions in the release.

The least efficient are refineries, in which the share of airborne vehicles in the output is only 19.63%. The above shows the domination in the structure of the cost of industrial production of material and energy components and, thus, confirms the raw material orientation of domestic industry, in particular, processing industry. The price of raw materials directly depends on the state of the world markets for energy and material resources. Since the main export commodities in Ukraine are food products and metallurgy products, lower prices for agricultural products and metals have led to a reduction in revenues from currency earnings and, consequently, a decline in the national currency. As a result, volumes of production, airborne vehicles, the exports of domestic industry in terms of value significantly decreased. The latter, in turn, led to the loss of Ukraine's positions in relevant ratings among the EU member states.

4. Conclusions

The results of the study made it possible to state that Ukraine has comparative advantages in the raw materials sectors of industry, while Poland is in the processing industry, which focuses on the largest industrial innovation, investment resources and human capital. Significant comparative advantages of the Polish processing industry are due to the fact that processing industries with a low share of gross value added in production (food production, wood production, paper, printing and duplicating and metallurgical production) predominate

in Ukraine's processing industry. Instead, the Polish processing industry holds a significant share in the processing industry with a higher share of gross value added (production of basic pharmaceutical products and pharmaceuticals, production of rubber and plastic products, production of other non-metallic mineral products, production of finished metal products, except machinery and equipment, production of motor vehicles, trailers and semitrailers). Therefore, the further development of the Ukrainian processing industry and industry in general requires sectoral and innovative development (construction of organizational and economic mechanisms for the comprehensive modernization of certain industrial enterprises). The revealed differences between the Ukrainian and Polish industries are the basis for building mutually beneficial Ukrainian-Polish economic relations in international trade, investment and innovation activities. Such relationships can develop in such forms.

1. Joint industrial enterprises, which will carry out full cycle production, using Ukrainian raw materials and materials, human capital and Polish technologies. Such unions can accelerate the competitiveness of industrial production in the foreign and domestic markets of both countries.
2. International educational-research-industrial centers of branch and regional direction (IERIC). The purpose of the functioning of such centers is to increase the level of skills of employees and the innovative component of technological development of the industries and economies of the participating countries in accordance with the needs of the market. IERIC can operate on the material and technical bases of industrial enterprises and educational establishments provided that they are modernized and meet the needs of modern production. Training should be carried out according to the programs developed as a result of cooperation between scientists and practitioners and consistent with the strategies of interstate industry development. The interest in the functioning of the IERIC may arise from the following parties: international manufacturing enterprises – for the improvement of the skills of employees for the purpose of mastering technological innovations and the introduction of innovations (new types and models of products or services), modernization of production processes, increase of labor productivity; educational institutions – to strengthen the practical component of the educational process (quality of production practices); scientific institutions – to strengthen the information and logistical support of scientific developments, inventions and innovations and their testing and implementation; regional state administrations – to ensure the socio-economic development of the regions.

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