COMPARABLE ANALYSIS IMPLEMENTATION INDUSTRY-4.0 VS SMART STRATEGIES OF POLAND AND UKRAINE

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What is role of smart strategies for realize Industry — 4.0 in country economy? And how more efficiency to implement architectural framework Industry-4.0 to economic processes? Is it simple or hard way of development? Does it need to transform all technological bases of country economy or can be realize due gradually? All that questions is important for forming industry policy of state.

Industry — 4.0 envisages the automation of large-scale manufacturing processes, reduced costs of manufacturing personalized products, increased productivity, and the potential economic growth of regional economies. Industry-4.0 technological changes are aimed at creating more complex digital industries by overcoming the barriers between information and physical elements. First of all Industry-4.0 deals with automatization, increasing labor productivity; strategic goals are innovation and movement to new business models, in which base is information, services.

That is, smart factories, smart power supply networks, smart buildings of Industry 4.0 will consist of cyber-physical systems that control physical processes, create a virtual copy of the physical world and make decentralized decisions.

Industry 4.0 implementation technologies are:

- horizontal integration in value chains;
- vertical integration and network (connected production systems);
- technologies for cyber-physical production systems;
- consistency of engineering throughout the value chain;
- new social infrastructure of labor.

The architectural framework Industry -4 .0 is the RAMI 4.0 model, which includes 3 dimensions. The first hierarchical dimension consists of 7 levels of aggregation (connecting the world, enterprises, work centers, stations, control devices, field devices, products). The second dimension is related to the description of objects and products based on the IEC 62890 standard and value flow. The third dimension covers 6 architectural layers: an enterprise and its business processes, asset functions, required data, communications, integration (transition from the real to the digital world), assets (physical things in the real world).

The transformation of the economic system of countries within the framework of Industry-4.0 is realized with the help of smart-strategies, which are formed taking into account the competitive advantages and resources of the country and its regions.

Poland and Ukraine are similar countries. It characterized by big territory in European region, slight difference in population and labor resources, the same climate. But if we compare indicators of economy development of both countries, then it received such results (fig.1, fig. 2) [3, 5]:

- GDP of Poland (2018) — 585, 664 billion US$, GDP of Ukraine (2018) — 130,832 billion US$;
- industry (including construction), value added, 2018: Poland — 167.589 billion US$, Ukraine — 30.477 billion US$;
- tendencies of development industry of Poland and Ukraine during 1995-2018 years are different. In 1995 industry value added Poland's is more then twice bigger then Ukraine's. From 1996 to 2003 growth rates of industry value added Poland and Ukraine approximately the same. But from 2003 to 2007, 2016-2018 years Ukraine has more growth rates of industry value added. Then periods 2008-2010, 2013-2015 Poland's growth rates of industry value added is bigger than Ukraine.

In results growth rates of industry value added of Poland during 1996-2018 years are stable opposite jumps ups and downs of Ukraine growth rates of industry value added.

Discuss about what determine development of industry in both countries and what role of Industry 4.0 in forming industry economic processes. Poland presented "Strategy for Sustainable Economic Development» (so-called Morawiecki's plan). It goal is to strengthen Polish capital and increase the innovation of Polish firms so that it can be competitive in foreign markets. Part of general idea of "Morawiecki's plan» is creating platform of implementation Industry-4.0 — "The Future Industry Platform». Poland's smart specialization strategies include three-tier hierarchical system of priorities (from general areas to detailing activities). The Plan focused

on particular sectors in which Poland could gain competitive advantage as for example “Zwirko and Wigura” drone production programme or “Luxtorpeda 2.0” which focuses on the production of fast trains.

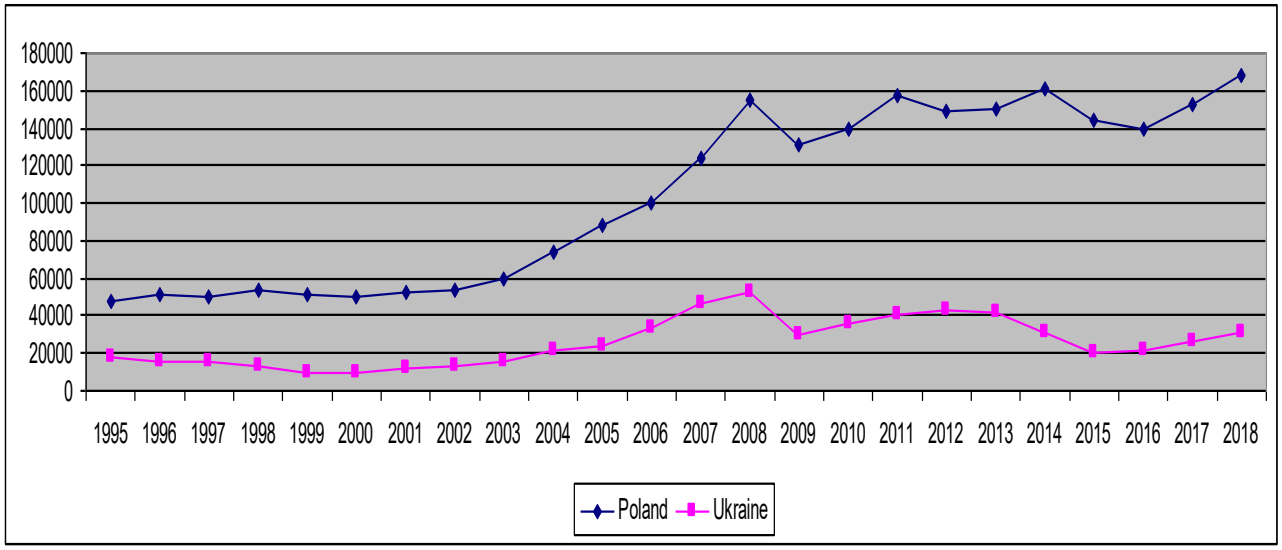

Figure 1. Industry (including construction), value added (billion US$) — Ukraine, Poland, 1995-2018 (basis on data of World Bank) [5]

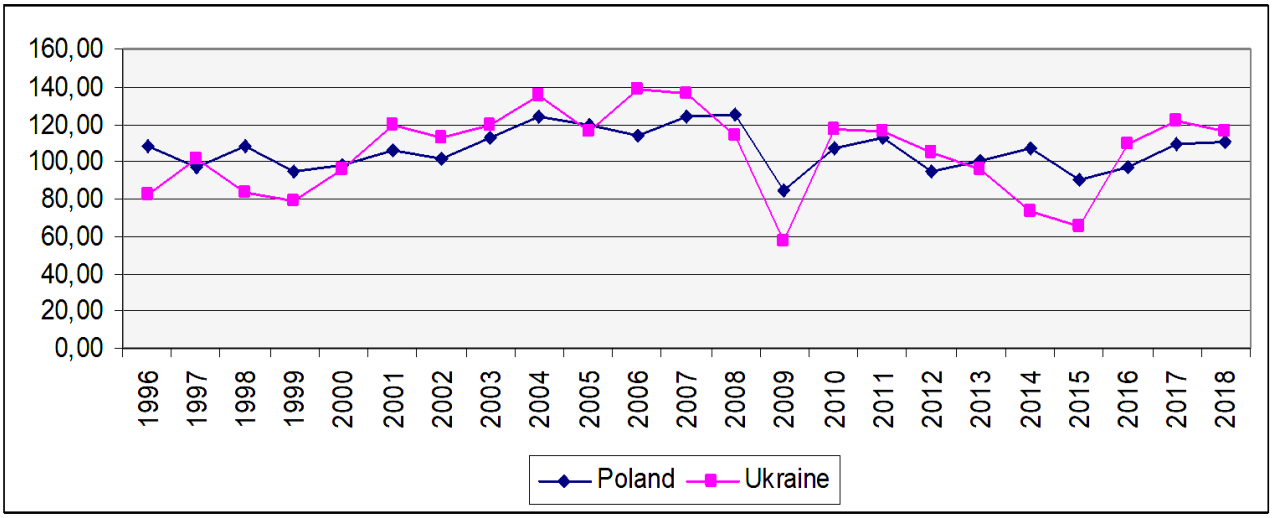

Figure 2. Growth rates of Industry value added — Ukraine, Poland, 1996-2018, % (basis on data of World Bank)

Ukraine has no plan of implementation Industry-4.0. In the same time Ukraine has Concept Development of the Digital Economy and Society of Ukraine 2018-2020, which identifies key components of the implementation Industry 4.0 — creation of infrastructure Industry 4.0 (industrial parks and industry centers of technology); providing access to capital to create new innovative industries. Some aspects of industrial measures are part of regional strategies. Introduction of the smart specialization approach is foreseen to achieve goals of Strategy development industrial complex of Ukraine until 2025 year.

There are results of comparable analysis some bases of implementation Industry-4.0 in Poland and Ukraine in tab. 1.

Number of enterprises in Poland is more 6 times than Ukraine. Part of industry enterprises, that have innovation activity in Poland — 18.5 %, in Ukraine — 16.2 %; share of total industrial enterprises that produce new or improved products less in Ukraine in comparing with Poland in 57.7 %; share of total industrial enterprises that forming new or improved business processes less in Ukraine in comparing with Poland in 57.8 %. As conclusion bases of implementation Industry-4.0 in Poland much higher than in Ukraine, especially in indicator — number of enterprises.

Conclusion. Poland's industrial development indicators are higher than Ukraine ones. Poland has developed general legislative framework for the implementation of smart specialization strategies and implementation of Industry 4.0 policy. Ukraine is still developing strategic documents of implementation smart specialization strategies and Industry 4.0 policy. The strategy of smart specialization in Poland is multilevel, detailing activities and funding programs and projects, unlike in Ukraine. However, advancement of realization of the strategy in Poland also depends on the programmers. It is advisable for both countries to cooperate in the following areas and forms: technology transfer Ukraine-Poland, Poland-Ukraine; creation of joint innovation research centers; transfer of strategic planning institutes from Poland to Ukraine; focus in collaboration programs on companies with high technological level of production, etc.

Table1

Results of comparable analysis bases of implementation Industry-4.0 in Poland and Ukraine

Criteria	Poland	Ukraine
Plan of implementation Industry-4.0	«The Future Industry Platform».	Part of Concept Development of the Digital Economy and Society of Ukraine 2018-2020
Government finance support	General direction outlined in "Strategy for Sustainable Economic Development» (so-called Morawiecki's plan)	Budgets of regional strategies
Level of competition among enterprises of Industry-4.0	Low	Low
Number of enterprises, 2017 [2, 6] big average small	2080000 3600 15000 2 million (micro) and 57 000 (small)	338300 400 15000 322900
Part of industry enterprises, that have innovation activity, 2017, % [1, 4]	18.5	16.2
Innovative enterprises as the share of total industrial enterprises — new or improved products, 2017, % [1, 4]	12.0	7.6
Innovative enterprises as the share of total industrial enterprises — new or improved business processes, 2017, % [1, 4]	15.3	9.7

Perspectives of next researches deal with estimation of influence system of factors to processes of implementation Industry-4.0 policy.

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