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PREREQUISITES FOR THE INDUSTRIAL POLICY FORMATION OF THE COUNTRY IN CONDITIONS OF TRANSITION TO THE SIXTH TECHNOLOGY REVOLUTION

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In the conditions of transition to the sixth technology revolution, it is important to determine the vector of the formation of industrial policy and the points of growth of the country, considering the specifics of its development and potential resources. For Ukraine, the choice of a niche, industry, directions that would become the mainstream of sustainable development of the country continues to be relevant. Main purpose of the article is to justify the hypothesis of the need to form a niche orientation of the industrial policy of the country in the conditions of transition to the sixth technology revolution. A classic model of industrial policy is characteristic for Ukraine. In conditions of decentralization and the need for uniform development of regions for the country, it is optimal to use a system model that initiates the diversification of production of goods and services and cost optimization. An important element in the cluster model is the definition of the main niche that unites innovative clusters of territories. In Ukraine, there is some positive dynamics of growth in value added created in the country, up to 2010. At the same time, the absolute values of the gross

value-added index created in Ukraine in general are several times smaller (or even 10 times) than the created gross value added in manufacturing industry of leading countries. The country enters a new technological cycle without having a strong industrial base. This defines its low launch opportunities for introducing design innovations and further sustainable development. It is proposed to form industrial robotics as a leading niche in the country's industry, which would become a point of growth for the export of products with high added value. This choice is due to the socio-economic progress of mankind in the 21st century and the indices of the development of industrial robotics in recent years.

Keywords*: industrial policy, technological structure, niche, robotics, industrial multiplier, Kondratieff waves, manufacturing industry, gross value added, model, Ukraine.*

Introduction. Vectors of the economic systems development are determined by socially and economically acceptable practices in society, both in terms of saving, consumption, and in the capacities of society to produce educational, technological, and cultural innovations. In addition, the growing dematerialization of production of economic entities is caused by the formation and further spread of business processes in the Internet environment. Industry creates the basis for an intensive model of the country's development. In turn, the development of the industrial complex is ensured by the industrial policy of the country.

Analysis of recent researches and publications. The work of Rifkin J. [7] is devoted to the questions of the formation of industrial policy in the countries. The influence of long waves on the processes of industrial development is considered in the work of Grinin L.E. [3] et al.

Kindzersky Yu.V. substantiates the possible specialization of Ukraine in the world division of labor [4]. Khaustova V.E. considers the specifics of the implementation of industrial policy in the developed and developing countries of the world in 2014 [5]. The non-industrial transformation of the industrial potential of Ukraine is considered in the collective monograph of the researchers of the Institute of Economics and Forecasting of the National Academy of Sciences of Ukraine [2].

The UNIDO report "Industrial Development Report 2018. Demand for Manufacturing Products: A Factor of Comprehensive and Sustainable Industrial Development" analyzes trends in the development of the world's industry [6]. World Investment Report 2017 UNCTAD identifies the links between the level of development of countries, investments and the digitization of the economy [10].

Previously unsettled problem constituent. In the conditions of transition to the sixth technology revolution, it is important to determine the vector of the formation of industrial policy and the points of growth of the country, considering the specifics of its development and potential resources. For Ukraine, the choice of a niche, industry, directions that would become the mainstream of sustainable development of the country continues to be relevant.

Main purpose of the article is to justify the hypothesis of the need to form a niche orientation of the industrial policy of the country in the conditions of transition

to the sixth technology revolution.

Results and discussions

At present, the world is in a phase of decline of the fifth long wave, the upper turning point of which is defined as the financial crisis of 2008 [3, p. 106]. In connection with the strengthening of the state role in the economy, some cyclic-forming tendencies of world economic development were seriously violated [3, p. 112], and in fact, since 1994, there has been no significant transformation of technical and economic paradigm: the industry semiconductor manufacturing remained the main industry based on which the industry developed, both in the fourth long wave and in the phase of the fifth long wave.

In fact, the development of the Internet, the development of mobile communications and the full penetration of digital technologies into all spheres of society were the basic innovations of the fifth long wave. Cloud data centers, graphics processors, search engines, voice assistants, drones lead to a radical change in both production and consumption, increasing the worker productivity.

Large-scale application of ICT in the XXI century contributed not only to increasing employment in new industries, but also to reducing it through the modernization of manufacturing industries that have entered the maturity phase of their life cycle.

An increase in the unemployment rate in developed countries, as well as a decrease in the degree of population participation in the labor force at the beginning of the 21st century were the signs of modification of the long wave (a large cycle). The involvement of the huge resources of cheap labor into the world economy from China and India was another reason for this type of modification.

In the current technological trends, the technological, rather than the design branch of scientific and technological revolution predominates. Computing technologies, communication media (first, the Internet and mobile applications) are developed at a very high speed, determining the changes in economic reality. But they do not belong to the design branch of scientific and technological revolution.

Design innovations define the beginning of the ascending wave of the long cycle, the transition to a new technological order, within which the formation of the country's industrial policy in the areas of innovation takes place [6].

Today, three basic models of industrial policy have emerged:

1) classical, or vertical model (it was used in Japan in 1950-1960 of the XX century);

2) neoclassical or horizontal model – soft forms of state intervention – creating framework conditions for efficient allocation of resources;

3) a system model (Scandinavian policy based on a cluster approach), based on the interaction of the institutional and evolutionary theory with the implementation of the neo-Schumpeter approach to the process of creating innovations [8].

The use of a horizontal model of industrial policy is argued by the need to prevent system failures in the economy through the methods of soft horizontal intervention in the economy, covering all sectors. The purpose of such interventions is to improve the environment of partnership interactions between economic agents and the formation of triple spirals.

Classical industrial policy appeals to the creation of a critical set of industries, and neoclassical policy refers to the introduction of a critical mass of effective market institutions. In turn, the system model appeals to the formation of a critical mass of innovative clusters. The development of cluster organization of the economy (network structure) provides for activation of registration and diversification of industries (the opening of new sectors) and the formation of a new cost structure.

In his work Behrens argues that clusters can change significantly in a relatively short time (just over 10 years). On the one hand, such a rapid change can be associated with the processes of development and changes in the industrial environment, on the other hand they are associated with the effects of production concentration in one place [1].

A classic model of industrial policy is characteristic for Ukraine. In conditions of decentralization and the need for uniform development of regions for the country, it is optimal to use a system model that initiates the diversification of production of goods and services and cost optimization. An important element in the cluster model is the definition of the main niche that unites innovative clusters of territories.

The report of the MAPI Foundation presented an assessment of the contribution of industry to the US economy in 2016. The traditional statistical assessment does not include complex integrated value chain generated by production activity: the cost of initial resources, raw materials, materials and services that are needed in production activities (raw materials extraction, production and delivery of components, consumables and services, R&D, investment activity, design centers, transport, energy, engineering and service companies, etc.); as well as the cost of services for the delivery, distribution and sale of the final products (warehousing and transport logistics, wholesalers, service providers, distributors and retailers, advertising and marketing).

MAPI Foundation calculated the industrial multiplier in the economy, which was 3.6 in 2016. This means that every $1 of added value in the industrial sector generates $3.6 of added value in the economy along the entire value chain. Estimates generally showed that the entire value chain in industry accounts for more than one-third of US GDP [13].

The MAPI Foundation estimates of the multiplier effect of domestic industrial production in 2016 are more than twice as high as earlier estimates. So, in 2014, the MAPI Foundation gave the multiplier for the industry “only” in 1.33 [14].

An important indicator of developed industry of the country is the volume of

gross value added of the manufacturing industry (that is, the volume of the value that was created inside the country). Let's compare the gross value added created by the manufacturing industry of the leading countries of the world (Table 1). For Ukraine, the data on the created added value in the country are available (Table 2).

Table 1. **Gross value added created by manufacturing industry of leading countries of the world in 2000-2015, billions of dollars (calculated from OECD data)** [11]

Country	2000	2005	2010	2015	Rate of increase 2015/2000, %
China	252	509	1400	2973	1079,8
USA	1015	1163	1208	2170	113,8
India	47	90	178	311	561,7
Japan	770	712	842	810	5,2
Germany	308	461	556	690	124,0

The data of Table 1 indicate the highest growth rate of gross value added in China in 2015 compared to 2000 (at 1079.8%). High rates of growth were in India (561.7%) and Germany (124.0%). But the absolute value of gross value added in India, Japan, Germany is several times less than the values of China and the United States.

Table 2. **Gross value added, created in Ukraine in 2000-2015, billion dollars (calculated according to ukrstat, data of the NBU at the rate of hryvnia for 2000-2015)**

Country	2000	2005	2010	2015	Rate of increase 2015/2000, %
Ukraine	28	79	119	77	175,0

In Ukraine, there is some positive dynamics of growth in value added created in the country, up to 2010. At the same time, the absolute values of the gross value-added index created in Ukraine in general are several times smaller (or even 10 times) than the created gross value added in manufacturing industry of leading countries.

Table 3 shows the dynamics of indices of industrial production in Ukraine from 2010 to 2018.

Table 3. **Dynamics of indices of industrial production in Ukraine, 2010-2018, % [15]**

Year	2010	2011	2012	2013	2014	2015	2016	2017
Index	112,2	103,4	94,4	99,0	82,8	98,4	103,1	97,1

The data of Table 3 show a decline in industrial production in Ukraine during 2010-2018. In other words, the country enters a new technological cycle without having a strong industrial base. This defines its low launch opportunities for introducing design innovations and further sustainable development.

In our opinion, Ukraine needs to define a niche in the industrial sector that would become a point of growth for the export of products with high added value. This niche can become industrial robotics.

According to the survey of the world market of robotics, the growth rate of the industrial robotics market outruns the growth rates of world GDP: the average annual growth in sales of industrial robots was 12% between 2011 and 2016. In 2016, 294,000 industrial robots were sold, and the total market volume reached $13.1 billion (considering software and integration services, the market exceeds $40 billion).

The main characteristics of the service robotics market:

– the sales volume in 2015 was 48 thousand of professional service robots, in 2016 – 59 thousand, the growth rate was 23%;

– the market volume of professional service robots composed $ 4.7 billion;

– according to IFR estimates, the average annual growth rate of the world's industrial fleet will be 14% in the industrial years 2018-2020;

– 91% of all industrial robots was established in the manufacturing sector in 2016.

In 2011-2016 the average annual growth rate of sales in all branches of manufacturing was 13%; 12% in automotive industry and 19% in electronic industry. The average annual growth rate of sales in all branches of manufacturing in 2011-2016 was 13%; in automotive industry – 12%, and in electronic industry – 19%;

– 74% of world sales of industrial robots are accounted for five countries: China (30%), the Republic of Korea (14%), Japan (13%), the United States (11%) and Germany (7%);

– the main manufacturers of industrial robots are Japanese enterprises: FANUC, Yaskawa, Kawasaki, Nachi, Denso, Mitsubishi, Epson и Omron and enterprises from the EU zone: ABB, Stäubli, Kuka, Comau, Universal Robots. The United States leads (49%) in the service robotics industry;

– in absolute terms the most robots are sold to logistics (~ 25 thousand units), military use (~ 11,000), to commercial spaces (~ 7,000), field works and exoskeletons

(~ 6,000). 69% of robots purchased for home use in 2016 were mostly vacuum cleaners or machines for household tasks, 31% belonged to toys.

The directions, which will form the basis of the service robotics market by 2020, are:

– logistic systems (include logistics inside the premises, unmanned and air delivery vehicles outside the premises);

– robots for customer service;

– industrial exoskeletons;

– robots for household tasks (personal assistants) [9].

Conclusions and further researches directions

Thus, there is an industrial multiplier in the economy of each country, which means that each unit of added value in the industrial sector generates a certain added value in the economy along the entire value chain.

Ukraine enters the new sixth technology revolution without having a powerful industrial base. Industrial Production Indices of the country tend to decrease. This determines its low launch opportunities for introducing design innovations and further sustainable development.

It is proposed to form industrial robotics as a leading niche in the country's industry, which would become a point of growth for the export of products with high added value. This choice is due to the socio-economic progress of mankind in the 21st century and the indices of the development of industrial robotics in recent years.

References

1. Behrens K. (2016). Agglomeration and clusters: Tools and insights from coagglomeration patterns. Canadian Journal of Economics/Revue canadienne d'économique. 2016. T. 49. №. 4.

2. Deineko L.V. et al. (2016). Neoindustrial transformation of industrial potential of Ukraine. K.: 2016. 278 p.

3. Grinin L.E. et al. (2017). Kondratiev N.D.: crises and forecasts in the light of the theory of long waves. A glance from the present. Moscow: 2017. 384 p.

4. Kindzersky Yu.V.(2016). Anti-crisis industrial policy: variant of the domestic concept. Bulletin of the National Academy of Sciences of Ukraine. 2016. No. 10.

5. Haustova V.E. (2015). Industrial policy in Ukraine in terms of integration and globalization of the economy. K .: 2015. 505 p.

6. Industrial Development Report 2018. Demand for Manufacturing Products: A Factor of Comprehensive and Sustainable Industrial Development. UNIDO. Vienna, 2017.

7. Rifkin J. (2014).Third Industrial Revolution. As horizontal interactions change the energy, the economy and the world as a whole. Moscow: 2014. 410 p.

8. Smorodinskaya N.V. (2015). The globalized economy: from hierarchies to the network way of life. M.: 2015. 344 c.

9. Sberbank presented an overview of the world market of robotics. Retrieved from http://www.nanonewsnet.ru/news/2018/sberbank-predstavil-obzor-mirovogo-rynka-robototekhniki

10. World Investment Report (2017). Investment and the Digital Economy. UNCTAD, 2017.

11. Retrieved from https://data.oecd.org/natincome/value-added-by-activity.htm

12. Retrieved from http://www.ukrstat.gov.ua
13. Retrieved from https://mapifoundation.org/manufacturing-facts/2016/9/13/how-important-is-us-manufacturing-today
14. Retrieved from http://www.themanufacturinginstitute.org/Research/Facts-About-Manufacturing/Economy-and-Jobs/Multiplier/Multiplier.aspx
15. Retrieved from https://index.minfin.com.ua/economy/index/industrial/