High-tech manufacturing as a determinant of the economic development

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Abstract

The aim of the article is to study high-tech production as determinants of the country's economy. The article proves that one of the important factors in the development of the Ukrainian economy is highlighting the development of high-tech production as a priority of the state policy, which will provide opportunities for entering new markets with highly competitive products. A historical analysis of economic phenomena in the global aspect, the possibility of applying experience in the economy of Ukraine. For Ukraine, the experience of the economic miracle of South Korea, which also survived the experience of war, may be interesting. Now the country is among the 12 strongest countries in terms of GDP in the world, at 5th place in the world in the export of high-tech products. The country was called an example of successful government intervention in the economy. The experience of the economic miracle of Singapore is also considered. For 50 years, Singapore has turned from a poor country into a world leader in high-tech industries, such as electronics and pharmaceuticals, and has become the largest financial and oil refining center. Singapore's modernization was ensured by efforts in four key areas: economic reforms, which determined the vector of investment and innovation development, social modernization, an effective fight against corruption and political stability. The government has relied on attracting foreign investors, developing the financial market and high-tech industries. Simple and transparent business registration and regulation procedures have been adopted in Singapore. It is believed that Singapore owes its success to competent public policy. The article considers the possibilities for the transition of the Ukrainian economy to a new level of development. One of the important competitive advantages for Ukraine is a strong and internationally recognized IT industry, human capital. According to statistics, the main industries that fill the country's budget are metallurgy, the agricultural sector, food and IT. You can also add woodworking and chemical industries, whose share in the state budget is also large. In recent years, these industries have begun to use high technology more and more because of the need to compete in the global market with more developed companies. At the same time, there are no programs at the state level for the introduction of high technologies in the real sector of the economy. Now enterprises independently invest in their innovations. It is possible to launch a revolution in industrial production only by introducing advanced production technologies, which are called "breakthrough", emphasizing their revolutionary influence on the structure of production. Today in Ukraine there is a fragmented approach to innovative development. Therefore, the task for the public administration system should be the allocation of priority areas for industrial development, the development of effective mechanisms for the development of production of high value-added products. High-tech production deserves special attention.

Keywords: commodity market supply chain, resource flows, supply chain management.

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Introduction

The fourth industrial revolution (it is also known as Industry 4.0) for many countries of the world is already reality. According to the international consulting company McKinsey, more than 40% of the world companies passed to Industry 4.0. It means that in production are already used cyber-physical system, the industrial Internet of things (IIoT), 3D – the printed, augmented reality, and artificial intelligence makes a part of decisions in real time. *Till 2025, according to forecasts of McKinsey, the annual contribution of the Internet of things to world economy will make $4-11 trillion, and the size of the market of industrial automation, according to the research company Allied Market Research, – $368.37 billion.*

Growth of a role of a human factor, intellectual work is thanks to what forms and methods of management of production are improved. Ukraine is in process of transition to the fourth industrial revolution at an initial stage so far. Real cases are capable to show some companies. At the state level in the direction of Industry 4.0 in general nothing occurs. Introductions of digitalization are strengthened by the importance of production, technological and institutional innovations, and robotization already needs in legal and institutional regulation. At the same time technological ways are transformed, there are high-quality changes in corporate structures, the nature of relationship becomes complicated.

Analysis of the last researches and publications. For the last decades the importance of process parameters in understanding of an essence, behavior and features of a combination of resources for development household. The position of Marxists in a question of dependence of structure of the enterprise on the technological device, acquires special relevance in the context of problems of reindustrialization of society, transition of industrial production to technologies of higher level which are capable to provide high-quality changes, that is development of production of complex products with high added value that in Ukraine has to become strategically favorable business for domestic businessmen. It is, first of all, about corresponding technological base, set of technologies, their effective use in one complex within one fund. Since the second half of the 20th century emerge the theory of "post-industrial society" is [1]. J.K. Galbraith connects transformation of economy with growth of large corporations as carriers of scientific progress which combination, according to him, is the basic platform of the industrial planning system [2]. In postindustrial (D. Bell, Mr. Castells, A. Touraine) the main focus is placed on identification of impact of technical and scientific progress on social development [3, 4, 5]. The concept of "post-industrial society" claims that gradual transformation of economic activity happens, depending on the level of development of the equipment and technologies, at the same time the leading role belongs science and education. The special part is assigned to high technology production for development of national economy during the solution of problems of the third and fourth industrial revolutions.

Results and discussion

The purpose of article is the research of hi-tech production as determinants of development of national economy.

Only entry into the new markets with hi-tech competitive products can provide opportunities for economic development of Ukraine. It is the most difficult task as the economy of the state tests hard times. It is difficult to speak about innovative climate of the country which is the sixth year at war. Investments into economy of such unstable country are high risks. However, history knows economic phenomena. For example, South Korea is an economic miracle which occurred for one generation. In 1953 here war was only ended. Now the country – among 12 largest GDP of the countries of the world, on the 5th place in the world on export of hi-tech products. South Korea has practically no natural

minerals, in particular, of gas and oil, and 70% of products import from other corners of the world. Experts allocate such main components of an economic miracle of this country:

the government relied on the only resource – people;

Koreans very hardworking and basic, work for 10 hours a day, have one day off a week;

Koreans do not buy the Japanese goods because Japan – the former invader;

the country leaders forced rich Koreans to invest in the industry;

the power supported business by soft loans and the state orders;

as a result, the country was called an example of successful intervention of the government of the state in economy.

One more example of an economic miracle is the Republic of Singapore – the city-state located on the island of the same name and several tens more smaller islands. A phenomenon of Singapore the most perhaps, the known economic miracle of Asia. In 50 years, this country turned into one of the richest in the world. Singapore – one of the smallest states in the world where there are no obvious economic advantages and considerable stocks of natural resources. The country had to import fresh water from Malaysia. The most part of the population lived in slums and was illiterate. In the country was corruption, drugs traffic and sea piracy prospered. Modernization of the state began with coming to power in 1959 of the founders of Social Democratic Party of national action 36-year-old Lee Kuan Yew – in the past of the lawyer who received London education. Himself and the team he called “bourgeois leaders from English education”. Lee Kuan Yew's reforms allowed the country to make economic breakthrough. Today Singapore – one of world leaders in high-tech industries, such as electronics and pharmaceutics, the largest financial and oil processing center. Nominal GDP per capita at par of purchasing power of the country in 2017 reached 93 thousand dollars – the third place in the world after Qatar and Luxembourg. Since 2016 the indicator grew by 4.8 thousand or for 5.38%. Nearly 3% of the population of the country – dollar millionaires. How it was succeeded to achieve these results in short terms – during government of one person, all for couple of decades?

Modernization of Singapore was provided by efforts in four key directions, such as: Economic reforms that set a vector of investment innovative development, social modernization, effective fight against corruption and political stability. The government relied on involvement of foreign investors, development of the financial market and high-tech industries of the industry. In Singapore simple and transparent registration procedures and regulations of business were adopted. The city-state became the first country in Asia which could establish very favorable conditions for foreign corporations, and they began to open the subsidiaries. The simple and transparent system of taxation with low tax rates was created. For avoidance of double taxation Singapore immediately signed about 70 agreements with the foreign states. Along with simplification of conditions of business the government of the state realized consistent industrial policy in which instruments of public administration have a significant role. The power allocated the priority industries, invested in them and developed, and then these segments, having reached a certain level of development as locomotives, pulled all economy forward. In the 1960th years it was relied on oil refining (raw materials were delivered from Indonesia) and creation of modern seaport. These two directions allowed to turn the country into the big center of world trade and to provide the population with work. Singapore remains the world's third center of oil processing (after Houston and Rotterdam). In the 1970th years appeared new the priority direction – electronic industry in which small Singapore managed to take the place of one of world leaders. Development of the industry allowed not only to create highly paid jobs, but also to equip the Singapore enterprises state-of-the-art. In the 1980th years IT the plan within which there passed the total computerization of public institutions that gave an impetus to development of the computer industry at the expense of the state order was accepted. It

induced the private companies to accelerate also the computerization, having given to the computer industry an additional impulse. Today Singapore – one of the most computerized countries. At the end of the 20th century the government found a new priority – development of pharmaceutics and biotechnologies. Now preferential programs for business continue to work in the country. So, tens of programs of preferential crediting are developed for small and medium-sized enterprises, the state assists them in staff recruitment, compensates up to 90% of expenses on its training and retraining. The foreign hi-tech companies investing in scientific developments receive tax exemption for ten years. In modernization of the country reform of an education system which took place in 1960 1970 and years had the major role. The obligatory minimum educational standards for all schools were created. In addition, studying of English and teaching on it a number of objects became obligatory. The government payed of the Singapore students at the best universities of the world, in parallel creating the leading scientific education centers at home. Now in Singapore four universities, five technical colleges, a number of private institutes and office of many foreign universities work.

Success of the Asian state is interesting first of all that it took place in the conditions of total absence of clear advantages and was provided with exclusively competent state policy. A basis of success became: support of the priority industries, simplification of procedures and improvements of conditions for business, fight against corruption. A lot of things from this were reused in the most different parts of the world. It is obvious that success is provided actions, and their reasonable application by highly motivated professionals are not unique.

Basis for transition of national economy to new level is industrial production of products with high added value and entry into the new markets. Therefore, it is possible to claim that creation favorable innovative and investment climate is extremely important task for development of the country.

The World Intellectual Property Organization (WIPO) published the annual report of Global Innovation Index 2019 in which innovative activity of 129 countries and economies of the world is compared. For assessment used 80 parameters, including the review of a political situation, a condition of education, the level of development of infrastructure and business. Ukraine in the global innovative index of 2019 takes the 47th place, having lost four positions, in comparison with 2018, having entered in the countries TOP-3 of the economic Lower middle-income group. By results of the world which is recently defined the rating of innovative economies, according to Bloomberg, Ukraine in 2019 lost 7 positions and took the 53rd place from 60. Analyzing economy of 60 countries of the world, Bloomberg will annually publish rating on the eve of the World Economic Forum in Davos. Key indicators which consider when forming this rating: Expenses on development; Production capacities; Concentration of the hi-tech companies; quality of education. Top-5 the most innovative economies in 2019 are: South Korea; Germany; Finland; Switzerland; Israel. Poland have position 22, Russia – 27, Romania – 29, Slovakia – 31, Hungary – 32.

At the same time in Ukraine about 185 thousand experts in the field of IT work and this indicator will increase to 220 thousand in 2020. Ukraine is included into the list of the leading countries of the world on quality of IT developments. In the last two years the number of technical specialists in 50 largest IT companies of the country grew more than by a third: From 43 thousand up to 58 thousand. In Ukraine more than 4 thousand technological companies, from them 1.6 thousand – on development of the software work. 100 companies from the list of Fortune 500 are clients of the Ukrainian IT industry. Growth of the Ukrainian industry by 20% annually is a bright demonstration of unceasing demand of foreign customers, the companies and R&D-centers on the Ukrainian talents. The EU and the USA are the largest importers of the Ukrainian talents who develop for them innovative solutions. So, according to the rating of DOU.ua, the five of the largest Ukrainian IT companies – Ciklum, LuxSoft, GlobalLogic, a softserve and EPAM – works for

an outsource. New offices were opened worldwide by 13 Ukrainian companies from the list. It is about generally service companies which provide services in development of the software to foreign customers.

In the last five-seven years there was a boom of technological startups against the background of rapid development of the service it-industry. Only for 2018 a startup the industry attracted about 350 million dollars of investments. Among the most known – GitLab, Grammarly, Petcube, Genesis, bpm online, Jooble, Readdle, poptop, mikheliks, a technovator, Luciding, SolarGaps, Cardiomo, klikkl, Preply, kvambio and TripMyDream. Technological startups with a view to high technologies become property of corporations. Google bought the Ukrainian company to a Viewidle that was engaged in technologies of face recognition. Snapchat bought Looksery – the modifier of persons on a photo in smartphones in real time. AI Factory acquired the company developing functions addition of a photo in video. Oracle was bought by Maxymiser – the "cloudy" decision on testing and optimization of work for brands. Recently cofounders of TemplateMonster – the leader in creation of templates - sold the company for 100 million dollars.

According to Gosstat, primary branches which "feed" Ukraine now is the metallurgy, the agro-industrial sector, food and IT. It is possible to add still the woodworking and chemical industries which share in the state treasury is big too. In recent years these industries began to use more and more high technologies because of need to compete in the world market with more developed companies. Unfortunately, at the level of the state there are no programs for implementation of high technologies in the real sector of economy. The new created ministry of digital transformation gives a certain hope, but to speak about results still early. Now the enterprises independently invest in development of internal innovations.

Examples of the Ukrainian companies can inspire. "Progrestekh Ukraina", working in the aviation industry (design), invests in support of engineering specialties in higher education institutions and an industrial incubator of Sikorsky Challenge. The Nikolaev company MDEM (Marine Design Energy Mykolaiv) to a project sea vessel for the Dutch DAMEN, improved production to conform to the international standards. It helps to create products of the superior quality in the shortest possible time, to work with the checked design and to have high price even at resale of vessels. The company has high rates through flexible approach to work, at observance of high standardization makes products by the individual order of clients.

That is, high technologies need to be introduced to the real sector of economy. But rapid growth and positive dynamics of the service it-industry does not mean that Ukraine achieved essential results in development of technologies. The human capital in spite of the fact that this indicator decreased (the 22nd position in 2016, 24 position – 2017) remains a basis of innovative competitiveness of Ukraine. Ukraine in a year fell in the rating of the UN by the index of human development by 29 positions. According to forecasts of authoritative world institutions (OECD, the World Bank) and the international industrial associations, till 2030 it is possible to start revolution in industrial production only through implementation of the advanced production technologies which call "breakthrough", emphasizing their revolutionizing influence on structure of production. The generalized understanding of breakthrough technologies covers: (1) technological replacement that conducts to high-quality improvement existing or creations of essentially new products; (2) production automation that makes new demands to qualification of experts; (3) production customization as flexible adaptation with needs of the customer; (4) localization – decrease in expenses due to economy on logistics and geographical proximity to the consumer (customer); (5) cost efficiency, connector with reduction of prime cost in comparison with mass production, or with economy of resources, increase in labor productivity, investment attractiveness and competitiveness [6-9]. According to the forecast

of the McKinsey company, aggregate economic effect of implementation of the latest technologies will be 14 33 trillion dollars till 2025.

The modern science allocates three the main a class of productions of processing industry – hi-tech, middle tenological and low tenological. High-technological effectiveness, or technology intensity – the indicator is widespread in the countries of OECD, and is a symbol of the "advanced" economies "[10] that is, hi-tech productions are considered as engines of innovative growth of economy.

The hi-tech industrial enterprise it is business entity which because of use of the advanced industrial technologies and skills of workers the technology oriented professions makes hi-tech goods and also, systematically using scientific and technical knowledge, carries out development, development and a conclusion to the market of new goods, receiving the high added value which share in proceeds from sales of products makes not less than 25%. The advanced industrial technologies are the way of realization of functions based on the last scientific and technical developments on: 1) design, virtual production; 2) processing, production and drawing up; 3) inspection and testing; 4) communications; 5) the automated processing of freights.

The hi-tech industrial output is products that is the embodiment of the last scientific and technical (engineering) developments (essentially new which have no analogs or new in the key technological directions) which release provides exclusive provisions or strengthens competitive positions in the international market.

According to classification of the Organization for Economic Cooperation and Development (OECD), now in high-tech industries the aerospace industry, the pharmaceutical industry, production of computers and office equipment, the information and communication industry and instrument making belong [11].

To key the technological directions determined by the modern innovative strategy of the leading countries belong: Aerospace technologies; technologies for safety (arms); nuclear technologies; Optical technologies; information and communication technologies; Electronic technologies; technologies of process of production; Transport technologies; New materials and materials with the improved properties; biotechnologies; Technologies in the field of science about life (biochemistry, immunology, genetics, physiology, ecology); nanotechnologies.

The fourth industrial revolution promptly changes priorities. So, according to the World Economic Forum, till 2022 there will be 133 million new professions whereas 75 million old are gradually replaced with artificial intelligence and works. That is perhaps three options of succession of events: New work for those who develop necessary skills, low-wage job already now for those who do not want to study and change qualification, and unemployment. Besides, a number of the American scientists, including read out from the Massachusetts Institute of Technology that the next industrial revolution will be connect with convergence of sciences about life, physical sciences and engineering. Today practically all developed states of the world (the USA, the European Union countries, Japan, South Korea, China, India and Russia) see in convergent technologies (nano – (N), bio – (B), info – (I) and cognitive (C) technologies or NBIK technologies) one of the main tools by means of which it will be possible to solve the main global problems of mankind in the near future, namely: Depopulation and aging of the population; Shortage of food; environmental problems and environment protection; exhaustion of natural resources and new power; Transition to new technological way. NBIC convergence – technologies are a basis of creation of global "breakthrough" innovative technologies of the 21st century and give the chance to considerably accelerate development of the social sphere and to lift it to qualitatively new level [12].

The World Bank annually creates the rating of the countries on two indicators: 1) on costs of research and development to GDP; 2) on the volume of hi-tech export in structure of industrial export of the country [13, 14]. These

indicators show how many the countries earn from the innovative products and what return investments into scientific research and innovative developments have. According to the rating of the World Bank, most of all Sweden spends for science and scientific developments among EU countries (on average 3.4% of GDP), further there are Finland, Austria, Denmark and Germany with an indicator of nearly 3%. The lowest indicator of financing such countries as Latvia, Romania, Cyprus (about 0.5% of GDP) owe. The average indicator for all European Union is about 2% of GDP.

The highest rates of hi-tech export from all industrial export of the analyzed countries have the Republic of Malta (~ 30%), Ireland (~ 27%), France (~ 27%), Great Britain (~ 21%), Germany (~ 17%). The average indicator on EU countries is about 17%. At the same time Ukraine spends for science on average 0.7% of GDP (that much less, than in the developed countries), and export of hi-tech products makes ~ 6-7% of industrial export. On figure 1 it is shown to the loudspeaker of cost of hi-tech export of the certain countries of the world and groups (China, Germany, Japan, the USA, the countries of the eurozone and the EU-28) for 2000-2016.

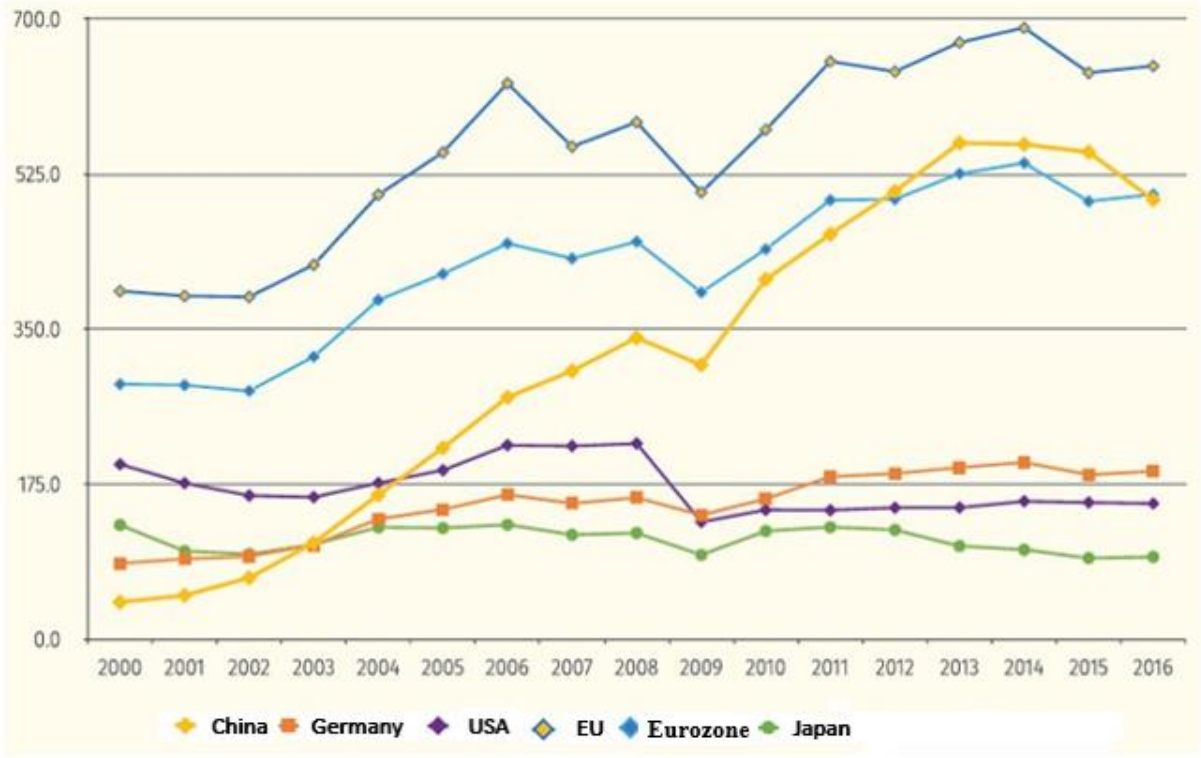

Fig 1. Cost of hi-tech export of China, Germany, Japan, USA, countries of the Eurozone, EU-28, 2000-2016, bln. dollars of the USA

Source: it is constructed by data [15].

So, in 2000 China had the lowest value of cost of hi-tech export, but, since 2004, outstripped Japan and Germany, in 2005, besides these countries, behind left the USA, and in 2012 – cumulative value of the countries of the eurozone. Among hi-tech goods the largest specific weight in export of the People's Republic of China goods of group to “the elektro of the equipment” (26.4% of the cost of export of finished goods) have, separate types of goods of group “coppers of cars; nuclear reactors, etc.” (16.4%)," optical, photo and medical devices" (3.2%). The share of other types of hi-tech products does not exceed one percent in the total cost of export of finished goods (tab. 1).

The share of the Ukrainian economy in world, following the results of 2018 made 0.29% (GDP on PPS, according to the World Bank).

Table 1 – Export of the People's Republic of China on separate hi-tech goods, 2016

Branches of economy	the cost of export, one billion dollars of the USA	a share from total exports of finished goods, %	the number of reporting partners	mirror assessment of number of partners, units
30. Pharmaceutical products	7,01	0,33	125	128
37. Photo / cinema goods	1,07	0,05	115	120
84. Coppers of machines, nuclear reactors and so forth	343,77	16,39	129	129
85. Electric electronic equipment	553,17	26,37	129	129
88. Lethal devices and their parts	3,36	0,16	96	104
90. Optical, photo and medical devices	67,49	3,22	129	129
93. Weapon, ammunition, their parts and accessories to them	0,14	0,01	73	86
All industries	**2097,64**	**100**	**129**	**129**

Source: it is constructed by data [16]

Information of rather hi-tech groups of goods in structure of foreign trade of Ukraine in 2018 is provided in table 2.

Table 2 – Export and import of Ukraine on separate hi-tech goods, 2018

Commodity groups	Export			Import		
	mlln. dollars of the USA	in % to 2017	in % to all volume	mlln. dollars of the USA	in % to 2017	in % to all volume
In total	**47339,9**	**109,4**	**100,0**	**57141,0**	**115,2**	**100,0**
30 pharmaceutical products	216,2	112,5	0,5	1947,0	110,2	3,4
84 reactors	1726,1	99,9	3,6	6476,3	112,1	11,3
nuclear, cars	2930,6	115,0	6,2	5475,1	132,7	9,6

Source: it is constructed by data [17]

The structure of export from Ukraine has low-quality character. The basis of commodity structure of the Ukrainian export in 2018 was made by non-noble metals and products of them, products of plant origin, mechanical and electrical machines, fats and oils of animal or plant origin, mineral products, ready foodstuff, products chemical, wood and products of wood. Export of raw materials and semi-finished products made 18.7 billion dollars in the first half of the year 2019 that makes more than three quarters of the Ukrainian export – 76.4%. The largest volumes of export to EU countries the products of agro-industrial complex and the food industry – 30.4% of the total amount of export made, non-noble metals and products of them – 22.0%, mechanical and electrical machines – 14.2%, mineral products – 13.4%. The highest rate of export is 6.2% of the total amount electrical machines in 2018. However already in the first half of the year 2019 decline by 8.8% of export in such group of technological products as “machines and the electrotechnical equipment”, including export of coppers and nuclear reactors decreased by 10.1%, for 8.1% – electrical machines draws attention.

We have decrease in export of products of ferrous metallurgy by 11.1%. Obviously, is the reason deterioration in a price environment of the world markets of steel and iron ore raw materials, being a negative factor for the domestic metallurgical enterprises. So, Ukraine

moves from the status of the exporter of metallurgical and chemical products to the status of the exporter agrarian mineral raw materials (export of ready-made products of food grew by 10.2%, but its share in the general structure of export made 6.6%) and metallurgical semi-finished products. Both statuses certify change of specialization and demonstrate fixing in the lowest league of world exporters. The share of the commercialized innovations in Ukraine makes 1.4% in industrial output, and hi-tech export – 7.3%. For example, in South Korea hi-tech export makes 26.8%. However, there are also positive trends. So, export of means of land transport, aircraft and floating means in 2019 increased by 40.8% though, their share in the total amount of export made only 1.7%. Export of optical devices and cameras grew by 20.3%, but their share of export is 0.3%. The volume of export of pharmaceutical products which part belongs to goods with high added value increased by 19.4%.

The industry 4.0 only began to gain steam and therefore fully it is still impossible to predict its influence on the future of mankind. According to representatives of the World Economic Forum, now to successful entry into a new era 25 states are ready - it is those countries to which share 75% of added value of global industrial production already fall. Most of them are the states of the EU and also the country of East Asia and North America.

Ukraine in this report is included into category “Eurasia” and near Argentina and Indonesia is in the list of the “unripe” countries. In it a certain danger is, technological progress moves very in high gear and if not to take the necessary speed at the initial stages, it will be much more difficult to catch up with it.

According to specialists of Microsoft, till 2020 40% of operational processes at the enterprises will be adjusted without participation of the person. At the Ukrainian enterprises innovative solutions take root too, though very slow rates. In particular, technologies of the Internet of things already use 2% of the Ukrainian enterprises, and 47% of respondents did not provide introduction in work of the company, and another 51% of producers do not know about advantages of introduction of IoT in general.

The key idea of the industry 4.0 provides that production capacities of the enterprises will interact with the made goods and on the course of production to adapt under new inquiries of consumers. “The industries 4.0” were designated by key trends of the concept works and automation, additive technologies and digital technologies – the Internet of things (IoT) and artificial intelligence.

Yes, history of industrial robotics began in the 40th years of the last century in the USA, with the advent of the first automatic machines for coloring. In the 1950th there were first patents for industrial manipulators, and already in the early sixties the AMF companies (American Machine and Foundry) and Unimation were put by the first of them on the market. In 1968 also the Japanese Kawasaki Heavy Industries began to make industrial robots. In 2015 in the world 254 thousand industrial robots were sold and the market continues to grow. Experts [18] offer such structure of modern technologies which already mother considerable influence on development of humanity: (1) new materials, (2) new power sources, (3) interaction of groups of robots and people, (4) alternative ways of navigation for extreme conditions, (5) machine learning and technologies of artificial intelligence for robots, (6) man-machine interaction, (7) handling robotics, (8) sensory and bodies of perception of surrounding reality, (9) robot simulator with use of ML/RL, (10) technologies the new principles of driving mechanisms, (11) ways of production of robots and technologies of through design of robotic systems.

The technological vector of post-industrial society decides by transition to completely automated digital production on application of cybernetics systems, capable to self-organization. An important part of such systems are autonomous industrial works. Industry robotization, according to McKinsey Global Institute (MGI), promotes economy of operating expenses from 15% to 90%, depending on the industry. In most the industries of economically

developed countries of work already proved the efficiency that led to increase in global demand for them. By estimates of IFR [19], in 2017. Sales volumes of industrial robots increased by 31%, in comparison with 2016. In total 381 335 robots (picture 2) were sold.

The total amount of the market of industrial robots in 2017 was $16.7 billion without the cost of the software. Taking into account the software, assessment of the market makes more than $48 billion [20].

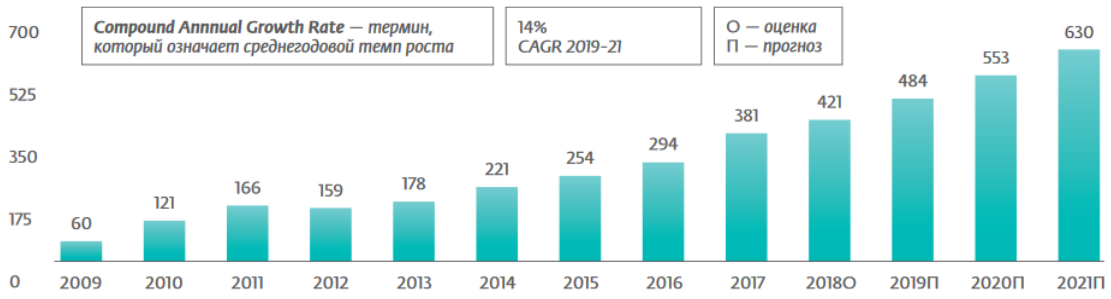

Fig 2. Dynamics of sales of industrial robots in the world in 2009-2017. And the forecast for 2018-2021, one thousand units the Source: [19]

Growth of sales of robots in 2018 was made by about 10%, in comparison with 2017. So, with a trend of modern development of society it is already allocated active process of robotization all spheres of life, especially service. The World Economic Forum (WEF) estimates a share of world production which already robotic somewhat at 29%. Distribution of robots will continue further, is predicted that in 2021 the total number of the installed industrial robots will double, in comparison with the present. Increase in demand for robots is followed by depreciation on them: The average price for one industrial work fell from $45 500 in 2016 to less than $44 000 in 2017. At the same time a share of “inexpensive” robots in the total amount of installations in 2017 increased, in comparison with previous years. For today industrial works in terms of money are the market approximately in 11 billion dollars, these are 10% of the all market of automation, and it is expected that by 2025 the segment of robotics will reach 24 billion dollars.

So rapid development of the market of industrial robotics is caused by a number of factors. The main of them is considered the continuing large-scale modernization of the Chinese industry: About a third of all world sales of industrial robots is the share of "under heaven". That promotes robotization, is one more factor application 3D – the seals composite materials and other new technologies for production of robots who do them by cheaper, more well and with higher quality. Development of robotization significant growth in investments into this industry promotes. According to The Robot Report (TRR), investments into robotics continue to grow in high gear. Total amount of financing on ten the largest operations in 2018 exceeded $11.5 billion. For comparison, ten largest transactions of 2017 in the sum made $700.6 million (growth more than by 16 times). Besides, the number of patents for robotic developments increases. According to the IFI Claims company, engaged in monitoring and researches in the field of patenting, for the last decade the number of the applications connected with works trebled. China is the leader here – 35% of the submitted applications are the share of it that is twice more from Japan which takes the second place [20]. Considering the provided data, it is possible to claim that for Ukraine in which there was a situation innovative crisis that is followed by considerable loss of intellectual potential of the country it is necessary to react to public technological calls very quickly. The domestic science for years of independence lost functions to a influence on social and economic development of the state, the indicator of domestic scientific and technical potential decreased to critical level that became threat of national security of Ukraine.

Conclusions

Thus, the Ukrainian economy is in conditions long transformations now that, certainly, carries out influence and explains need of further transformation of institutes and relevant government institutions.

The government of Ukraine is declared the development of digital economy. However, in conditions lack of farm a full-fledged innovative system, with the corresponding infrastructure, this task is extremely difficult.

Structural degradation of economy of Ukraine continues. In Ukraine for years of market transformations the volume of the knowledge-intensive production was considerably reduced (for example, mechanical engineering – by 2.5 times). Especially menacing there is a trend concerning a raw distortion of economy of the state. Aging of fixed assets of the enterprises entered catastrophic volumes (70-95%). The labor productivity indicator at par of purchasing power (12-16% of labor productivity in the USA, 30-33% – the Czech Republic, Hungary) decreases [21]. Reduction of number of the organizations which perform scientific and scientific and technical works already became regularity in Ukraine. Besides considerable reduction of number of the experts involved in performance of scientific and scientific and technical works is observed.

Now Ukraine is in difficult conditions because of what economic development happens too low rates. On separate indicators innovative Ukraine considerably concedes cooperation in a business sector to the countries European of the union. Special scale such gap gets for small enterprises. Discrepancy of the innovative environment to the international standards and adverse innovative climate promotes to kill a weak competitive position of Ukraine in the conditions of global innovative space. Today in Ukraine we have fragmentary approach to innovative development. Therefore, allocation of the priority directions of development of the industry, development of effective mechanisms of development of production with high added value has to become a task for the system of public administration. The special attention is deserved by hi-tech production.

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