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The results of the Russian mechanical engineering movement on the path of new industrialization

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***Abstract*— The article presents the results of the movement of Russian engineering on the path of new industrialization. The main trends of industrial production in the group of developed countries, BRIC countries, MIST are highlighted. The authors compare the structure of industrial exports in the USA, China and Russia. The factors preventing the Russian industry from reaching the starting point of new industrialization are highlighted.. Analyzed indicators, processes, trends in the development of the engineering industry in Russia. The main causes of the current state of engineering in Russia are identified. The article proposes the basic conditions for the development of machine-building industry in Russia on the way of new industrialization.**

Keywords—economy; industrial production index; engineering; world development indicators; structure of export

I. INTRODUCTION

With regard to the new industrialization in Russia, we can talk about two ways of development: reactionary and progressive. The progressive way is impossible without the development of knowledge of whom, high-tech production. New industrialization can be defined as the creation of a highly intellectual, knowledge of the coy model of industrial production, and these components are the driving force of its development. Without these components, the transition of Russian industry to the trajectory of advanced development is impossible.

Unfortunately, the situation in Russian industry is far from a new industrial revolution. Industrial enterprises curtail promising programs, do not introduce new developments, not only do not produce expensive robots, but also have the opportunity to purchase them.

The annual turnover in the world market of high technologies and high technology products is several times higher than the turnover of the market for raw materials, including oil, oil products, gas and wood. A lot of expert opinions are expressed regarding the place of Russia in the world market.

Today, with respect to the development of Russian industry and its place in the world economy, two opposing points of view have emerged. Some experts say that the current model of the national economy of Russia has many negative consequences for the development of our country, including those that are delayed in time. This model (export-raw material) hinders the formation of an innovative economy, generates macroeconomic instability, a low level of demand for innovative type products.

There are those who believe that the place of Russia in the export of high technology begins to change for the better. The wanderers of this position cite Russia's position on the world market in atomic and space technologies, technologies, metallurgy, and the chemical industry. In order to form innovatively active industrial production and its development directions, it is necessary to clearly understand the real situation in the Russian industry and its place in the world market.

The relevance of the study is a significant role played by mechanical engineering in the overall structure of industry and the economic development of any country. A considerable amount of scientific research has been devoted to this problem study, which allows us to follow the development trends of mechanical engineering as separate countries, so as to carry out comparative efficiency [1,2,3,4,5,6].

II. RELEVANCE OF A RESEARCH

In one of the most authoritative rankings of global competitiveness 2016–2017 (The Global Competitiveness Index 2016–2017) [7], which is regularly provided by the analytical group of the World Economic Forum (WEF),

Russia's position has improved somewhat. Russia climbed 45th to 43rd place in 2016 and 38th in 2017. But it continues to yield significantly to world market leaders. As a comparison, let us cite the positions of the United States and China, occupying the 3rd and 28th places in 2016 respectively and changing their positions by the previous period by one point (2nd and 27th places).

The report of the World Economic Forum (The Global Competitiveness Report 2016-2017) [7] still highlights the key problems hindering the development of the Russian economy: the corruption component, the low efficiency of the government apparatus, and high tax rates. These factors for a long time hinder economic growth. The factors of negative impact also include weak innovation potential, insufficient development of the financial market and distrust of the financial system. It could not but affect the development of the Russian economy, the pressure of economic sanctions and, as a result, the growing uncertainty in the Russian markets.

III. Results of a research

Currently, the share of engineering in the United States accounts for 40% of industrial products. Suffice it to recall such world leaders as Ford Motors and General Motors to assess the US position in the automotive industry. The United States occupies a leading position in the group of agricultural machinery, shipbuilding, aerospace and electrical engineering. Chinese companies are rapidly improving their positions in mechanical engineering, conquering new markets and, in a number of positions, including heavy engineering, are becoming world leaders.

In the USA, after the rise of industrial production development in 2014 in the further period of 2015-2016. there was a slight decline in development rates. In 2017, industrial production increased slightly and the industrial production index was 110.2. However, this growth should not be regarded as a qualitative leap in development. Note that the growth rate of industrial production in the United States is much lower than the growth rate of the group of countries of the European Union. In this aspect, it should be noted separately Germany, for which in the export of cars of the group of industrialized countries is 60%. The index of industrial production in Germany in 2017 amounted to 115.5. And growth cannot exceed the level of 2014. Thus, the total industrial production in the United States stalled within four years after it grew out of the crisis trough within five years from 2010 to 2014.

Speaking about the development of industrial production in the group of developed countries, two defining tendencies can be distinguished:

- gradual, albeit insignificant, increase in industrial production;
- a number of countries still could not reach the industrial production volumes of the pre-crisis period of 2008 (USA, Japan), which indicates the continuing stagnation of the industrial sector;
- continuous growth of industrial production in Germany since 2014.

In the group of BRICS countries, mixed tendencies in the development of industry are also more likely to be observed. China occupies a separate position in the group, the growth rate of industry in which production significantly exceeds the performance of other countries.

In the group of MIST countries, which occupy an insignificant share in the export of machinery and equipment in the world market, they show rather growing indicators. The undisputed leader of the group is Turkey, the industrial production index of which shows a positive trend since 2009 (Table 1) [8].

TABLE I. Trends in global industrial production Worldwide industrial production from 2008 to 2017

Countries	***Industrial Production Index (indices are calculated to the level of 2010)***	
	2008 year	***2017 year***
United States	*107,1*	*110,2*
Germany	*108,1*	*115,5*
European Union countries (28 countries)	*108,6*	*109,2*
Japan	*110,1*	*101,2*
China	*77,8*	*179,9*
India	*90,9*	*124,0*
Brazil	*97,7*	*85,4*
Russian Federation	*104,7*	*114,7*
Turkey	*98,1*	*162,3*
Indonesia	*93,4*	*139,0*
Mexico	*101,8*	*109,1*
Korea, Rep.	*86,1*	*112,6*

Russia, the volume of production of industrial goods has not reached the pre-reform level. In the group of BRICS countries, in terms of industrial production development rates, Russia is inferior not only to China, but also to India. The period of 2014-2015. can be described as a period of stagnation of the Russian industry, only since 2016 there has been a slight increase (Table 2).

TABLE II. Russian Industrial Production Index

Index	***Year***			
	2014	***2015***	***2016***	***2017***
Industrial production	*102,5*	*99,2*	*102,2*	*102,1*
Manufacture of computers, electronic and optical products	*108,9*	*106,1*	*108,5*	*98,3*
Manufacture of electrical equipment	*97,9*	*90,5*	*108,1*	*104,7*
Manufacture of machinery and equipment not included into other groups	*92,1*	*95,3*	*101,5*	*106,8*
Manufacture of motor vehicles, trailers and semi-trailers	*88,7*	*76,9*	*105,8*	*114,5*
Manufacture of other transport equipment	*116,2*	*105,4*	*108,1*	*106,3*

Unfortunately, the growth rates of industrial production in Russia in 2018, as before, demonstrate stagnating trends.

The share of exports in the volume of Russian machine-building products will continue the downward trend under pressure from sanctions. The development of engineering industries for the development of the country's economy is a priority industry. But, unfortunately, over the past two decades, in spite of the proclaimed priorities in industrial policy and the implemented state program "Development of industry and increasing its competitiveness" of April 15, 2014 (as of 30.03. 2018), there are negative trends. On the site of the once city-forming factories, it is not uncommon to see ruins alone. On the site of the once city-forming factories, it is not uncommon to see ruins alone. A striking example is what remained at the place of one of the largest agricultural machinery factories in the Altai Territory - the Altai Tractor Plant (Rubtsovsk). At the beginning of 2018, Altai Tractor Plant is a small company with a registered capital of 20,000 rubles and zero financial statements for 2015 and 2016. And there are dozens of such examples when it was not possible to preserve the production capacities of the former giants.

The structure of Russia's GDP does not allow it to be classified as a group of industrialized countries. GDP in principle is not intended to change the quality of the economy. But it clearly shows that high rates of economic development are inherent in countries with a high share of production in the structure of GDP (Table 3) [9].

TABLE III. WORLD DEVELOPMENT INDICATORS: STRUCTURE OF OUTPUTA

Country	*Agriculture (% of GDP)*		*Industry (% of GDP)*		*Manufacturing (% of GDP)*		*Services, value added (% of GDP)*	
	2010	*2017*	*2010*	*2017*	*2010*	*2017*	*2010*	*2017*
United States	*1*	*1*	*20*	*19*	*12*	*12*	*76.0*	*77.0*
Germany	*1*	*1*	*27*	*28*	*20*	*21*	*62.2*	*61.9*
Japan	*1*	*1*	*28*	*29*	*21*	*21*	*70.2*	*68.8*
China	*10*	*8*	*46*	*40*	*32*	*29*	*44.1*	*51.6*
India	*18*	*15*	*30*	*26*	*16*	*15*	*45.2*	*48.9*
Brazil	*4*	*5*	*23*	*18*	*13*	*10*	*57.6*	*63.1*
Russian Federation	*3*	*4*	*30*	*30*	*13*	*12*	*53.1*	*56.2*
Turkey	*9*	*6*	*25*	*29*	*15*	*18*	*54.3*	*53.3*
Indonesia	*14*	*13*	*43*	*39*	*22*	*20*	*40.7*	*43.6*
Mexico	*3*	*3*	*32*	*30*	*16*	*17*	*60.4*	*60.9*
Korea, Rep.	*2*	*2*	*35*	*36*	*28*	*28*	*53.6*	*52.8*

The analysis of indicators, processes, trends in which the branch of the Russian machine-building industry is moving speaks about the impossibility of its sustainable existence. As you might guess, a significant share of our exports is raw materials. For example, supplies of fuel and energy products (oil, gas, coal) to non-CIS countries accounted for 62% of total exports. Another 10% accounted for metals and products from them (Fig.1) [10].

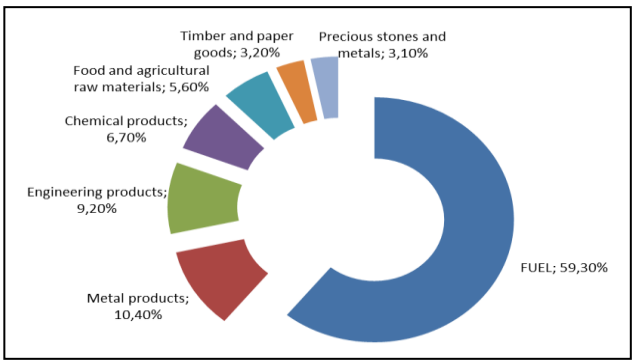

Fig. 1. Structure of export of Russia in 2017

The commodity structure of Russian exports just as clearly demonstrates the negative trends in the development of domestic engineering and the economy as a whole. The basis of Russia's exports remains fuel, its share in Russian exports amounted to 59.3%.

Moreover, the share of fuel in exports in the first half of 2018 amounted to 64% (30.5% the share of processed fuel), and the share of engineering products amounted to 6.3%, which is less by 0.3% from the same period in 2017.

The USA and China export a lot of various high-tech goods and services. The main commodity group of US exports is traditionally products of general and special engineering. The share of cars and equipment, including computers, is quite large and continues to grow in the structure of China's exports (Fig. 2).

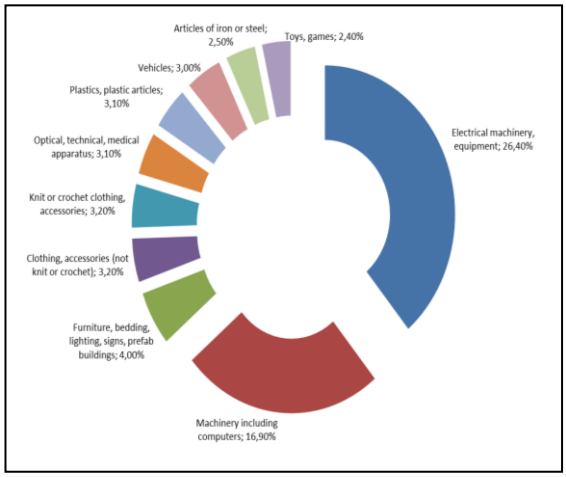

Fig. 2. Structure of export of China in 2017.

The main commodity group of US exports is traditionally products of general and special engineering. The fastest growing share in the structure of US exports has been the extraction of minerals, including oil, which testifies in favor of

a more qualitative development of the Chinese economy (Fig. 3) [11].

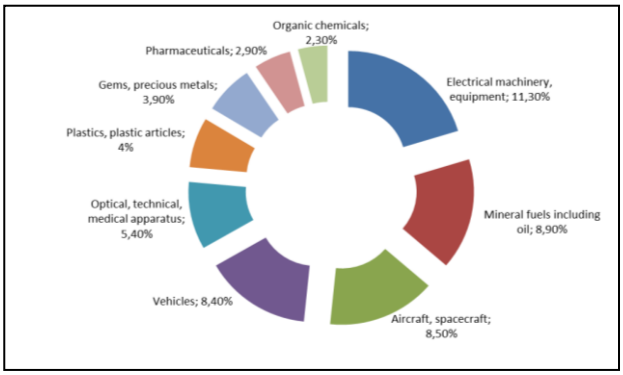

Fig. 3. Structure of export of USA in 2017.

The structure of Russian exports is more vividly than GDP indicates a qualitative development of the domestic economy. Raw materials and extremely low-tech products account for 94% of Russian exports.

What are the reasons for such a state of the engineering industries in Russia in the presence of such competitive advantages as the presence of large stocks of raw materials and energy resources; cheap labor and the availability of a sufficient number of highly qualified personnel; availability of government programs to support the development of engineering.

In most developed countries, there are programs of state support for the development of their own mechanical engineering leading to positive developments. In Russia, the positive effect of the implementation of most state support programs is leveled by the reasons highlighted in the Global Economic Report 2016-2017 report: corruption and inefficiency of the state apparatus.

In China, along with high-tech kupu machine-building enterprises, most of which are created mainly with the participation of foreign capital, a lot of small factories. The competitiveness of China's engineering products is primarily determined by its cost leadership strategy. Note that in China, private enterprises produce more than two thirds of the country's GDP. The private sector accounts for more than 90% of Chinese exports. And that is not all. According to the National Bureau of Statistics of China, the private sector is the largest source of employment in the country (36%), which brings more than 80% of the profits to the economy.

An important factor in the development of the economy is the "optimism-pessimism" factor. The majority of Chinese consumers today are characterized by a factor of optimism, which can not, but affect the pace of development of the Chinese economy.

IV. Conclusions

In Russia, the institutionalization of the relationship between the state and business can only be talked with a certain degree of conditionality, since it was not possible to avoid a "merging" of the state and business. This is one of the key problems of the Russian economy.

A way out of the crisis of the Russian industry can come only with a combination of certain factors. First of all, in order to overcome the crisis in the Russian economy, it is necessary not only to improve, but to change the system of government, which is currently extremely inefficient.

The second factor is massive investment attraction. Russia should open country, expand ties with other states, which will attract foreign investors. Today, in the conditions of a sufficiently rigid position of a number of countries with regard to Russia, it is not necessary to count on the implementation of this factor.

The third factor is the formation of an export-oriented model of industrial development, which will make it possible to increase the production intensity by means of foreign exchange earnings.

Thus, the likelihood of achieving a positive scenario for the engineering industry, taking into account existing trends, is small. The implementation of the scenario of the innovation development of the Russian industry, about which there is so much talk today, has not yet found its practical realization. At the same time, the machine-building complex of Russia has quite a good potential that must be realized.

If Russia is heading for a new industrialization, then the priority should belong a priori to industrial capital, not raw materials. Only this will ensure a radical systemic shift in the development of machine-building industries and the economy as a whole.

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