FEATURES OF THE DEVELOPMENT OF THE MACHINE-BUILDING COMPLEX OF UKRAINE

**Abstract.**
In the presented article, the problems of the development of the machine-building complex of Ukraine are studied, as well as the prospects for the development of the machine-building complex in a market economy. The positive and negative aspects of the development of mechanical engineering are revealed. It has been substantiated that an important condition for the development of mechanical engineering is the expansion of the export potential, which, in turn, is associated with foreign exchange earnings necessary for the structural restructuring of the economy, modernization of production, and the purchase of fuel and raw materials.

**Keywords:** mechanical engineering, market economy, mechanical engineering problems, mechanical engineering development prospects, economic crisis, market environment, economic development

Mechanical engineering is one of the central sectors of the economy of any state. The level of GDP, its material consumption and energy intensity depend on the level of development of mechanical engineering. In addition, the development of mechanical engineering affects the increase in labor productivity and the efficiency of almost the entire economy. Therefore, it is quite clear that the state of the machine-building complex should be a constant subject of consideration by the country's leadership. The prospects for the country's economic and social development impose new requirements on the level of mechanical engineering, its scientific, technical and production base. This article is devoted to the study of the features, problems and opportunities for the development of the machine-building complex of Ukraine.

Mechanical engineering is recognized all over the world as the leading industry. The level of development of the machine-building complex determines the state of the production potential of the state, ensures the stable functioning of the leading sectors of the economy (fuel and energy complex, transport and telecommunications, agro-industrial complex, defense industries, construction), as well as filling the consumer market. The most important specific indicators of the country's gross domestic product (material consumption, energy intensity, etc.), labor productivity in the sectors of the national economy, the level of environmental safety of industrial production and, of course, the state's defense capability depend on the development indicators of mechanical engineering. The machine-building complex ensures scientific and technological progress and the restructuring of the economy of the entire country, therefore, its industries in modern conditions are developing at an accelerated pace, and their number is constantly growing.

However, when analyzing economic activity in the country, there is a need to create conditions for combining the factors of the scientific and technical program, resource potential and staffing, which requires mobilization of efforts from all subjects of the economic system. In turn, these fundamental mechanisms are implemented within the framework of the Ukrainian machine-building complex, which suffered more than other economic sectors during the last economic crisis. Currently, the economic situation in the machine-building complex is rather difficult.

The research results show that by 2012 the profitability of machine-building enterprises tended to grow. But with the beginning of the political crisis in the country in 2012, since 2013 the profitability of machine-building enterprises tended to decrease and positive values, which indicates the presence of losses in the activities of enterprises. First of all, it is connected with the loss of sales markets in the countries of the Commonwealth of Independent States, the share of which reached 80% of all machine-building production.
The export of engineering products from Ukraine in 2018 increased by 9% from 5,05 to 5,51 billion dollars. With the exception of the countries of the Eurasian Economic Union (EAEC) (Russia, Belarus and Kazakhstan), the growth is higher – 14.8%. But such growth is not sufficient to achieve the pre-crisis level.

In 2012, machine building exports amounted to $13.3 billion. In 2012, the machine-building export amounted to $13.3 billion, and outside the EAEC countries it is also more - $4.7 billion. The growth is due to the electrical products of international campaigns located on the western border of the country. All other industries, old enterprises in general, reduce exports. Table 4 shows the export volumes of the main groups of engineering products - equipment and machinery, railway transport and electrotechnical industries. Railway transport is mainly wagons. In 2012 they accounted for 20% of all engineering export from Ukraine. In 2015 the export of wagons, as well as of other railway transport, fell to the minimum values. Exports of equipment and machinery decreased during the crisis in 2015 and almost did not recover. At the same time, exports of electrical products are catching up with pre-crisis indicators.

![Figure 1 - Profitability of production facilities for large, medium, small and micro enterprises [1]](image1)

![Figure 2 - Exports of major groups of engineering goods, million dollars [1]](image2)
Figure 3 shows the dynamics of exports by main machine building commodity groups. If in 2012 the main commodity group were railway wagons, in 2018 their contribution is not visible. Wagons were exported to Russia and other post-Soviet countries. The crisis of 2014-2015 reduced the opportunities for fuel and raw materials countries to buy railcars, besides, they built their factories in Russia. The demand for railcars in the post-Soviet countries fell naturally, no other people appeared.

The second place was occupied by engines, mainly turbojet engines. They were sold mainly in Russia and countries bought Russian vehicles. Political reasons led to a sharp decrease in supplies to the Russian Federation, to other countries - old contracts were fulfilled, there were fewer and fewer new ones, because the engines came with Russian supplies. Therefore, the sales of engines did not drop to 0 at once, but is significantly reduced every year.

The main problems of Ukrainian mechanical engineering can be described as follows:

1. Domestic mechanical engineering lags far behind many developed and some developing countries.
2. Severe depreciation of fixed assets. The need for the development of domestic mechanical engineering is especially emphasized by the situation in the structure of fixed assets: the coefficient of renewal of fixed assets is quite low, and the rate of renewal of mechanical engineering is 2 times lower than in the industry as a whole.
3. Duration (often uncertainty) of the payback period of investment resources. Since the production assets of machine-building enterprises require significant renovation, an important indicator is the volume of investments in the machine-building sector. The growth rate of investment in mechanical engineering lags behind the growth rate in the economy as a whole. Taking into account the fact that the industry was chronically underfunded during the crisis years, such dynamics does not contribute to the qualitative growth of both machine building and the entire Ukrainian economy. The plans for modernization and the transition to an innovative path of development cannot be implemented at such rates and volumes of financing for the machine-building industry.
4. Deepest specialization of production. Each machine-building enterprise still has its own fairly strictly defined range of products. In market conditions, too deep specialization is a serious obstacle to development.
5. Steadily aging and deterioration of the qualitative composition of engineering and production personnel, their insufficient qualifications.

Depending on the nature of the difficulties that hinder the development of the machine-building complex of Ukraine, the following groups of problems can be distinguished:

- investment (critical moral and physical deterioration of equipment and technologies; obsolete infrastructure of production facilities; low investment attractiveness of mechanical engineering);
A characteristic feature of the current stage of human development is the search for alternative energy sources and the development of bioenergy production. The article considers topical issues of biofuels production from organic waste produced by agricultural enterprises. The life cycle of agricultural biomass (waste) generation, its processing into biofuels and use for energy purposes is analyzed. An algorithm for calculating the cost of biofuels from agricultural production waste is presented. It is substantiated that the main research methods used in studying the raw material potential of waste are desk research and the method of business contacts. It is proved that raw materials make up a significant part of the cost of biofuels from agricultural waste, and since the cost of waste is a fairly conventional value, further research is needed in the formation of methods for their evaluation. A method for calculating the share of traditional fuels, which can be replaced by biofuels from crop waste, is proposed. The peculiarity of the proposed method is the calculation of the share of waste (by-products), which should be used for the production of solid biofuels, as part of the waste must remain in the fields to preserve soil fertility. A method for calculating the share of natural gas, heat and electricity, which can be replaced by similar products obtained from livestock waste by bioconversion. The peculiarity of the proposed method is that it takes into account that biogas is inferior to natural gas in terms of energy output and there is a need to enrich it to the level of biomethane, if a direct target replacement is envisaged. A method of calculating the economic benefit from the replacement of traditional fuels with biofuels from the company's own waste is proposed, which provides for the comparison of the cost of biofuels with the price of traditional energy sources.

Key words: biofuels, waste, organic waste, cost, methodology.

Introduction. The governments of many countries are taking radical measures to conserve traditional forms of energy and develop bioenergy production. So-called “green quota” has been introduced in European countries, which provides the mandatory use of energy produced by alternative methods: 20% of the total energy consumed must be provided by renewable energy sources and in the amount of 10% – for biofuels. There