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**THE PROBLEM OF FINANCING REPLACEMENT OF FIXED
ASSETS MANUFACTURING INDUSTRIES**

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Abstract

The article presents analytical material that gives an idea of the state and development of the most important manufacturing industry in mechanical engineering. The main economic indicators depend on the level of development of machine building: material consumption, energy intensity of gross domestic product, labor productivity, industrial safety, etc. At present, Russian machine building enterprises are able to produce modern competitive products only in limited volumes for some market segments. The share of Russia in the world export of machinery, equipment and vehicles is very insignificant. The main problems of the state and use of fixed assets of machine-building enterprises are high physical and moral depreciation of equipment, low rates of reproduction of production capacities, as well as a low level of utilization of production capacities. The reason for the unsatisfactory state of production potential is the lack of investment resources to renew fixed assets. Analysis of the factors limiting investment activity showed that the main one is the lack of own investment resources to renew fixed assets.

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1. Introduction

The manufacturing industry is the leading sector of the global industry, the state of which determines the economic development of the country. The structure of the manufacturing industry includes the production of machinery and equipment, which accounts for 22% of the total output of the manufacturing industry, oil refining, which occupies 21%, as well as metallurgy - 16%, the food industry - 16%, the chemical industry – 10 %, building materials - 5%, pulp and paper - 3%, etc. (Bazhanov, 2013).

The production of machinery and equipment is designed to provide production equipment for key sectors of the economy, primarily manufacturing industries, and thereby determines the state of the production potential of the Russian Federation. The level of development of the production of machinery and equipment depends on the consumption of materials, the energy intensity of the gross domestic product, labor productivity, industrial safety and the defense capability of the state.

2. Problem Statement

The main problems of enterprises in the machine-building industry are a decrease in the share of machine-building products in the total volume of production, a decrease in profitability, which leads to a deterioration in the financial situation (Boyko et al., 2019a, 2019b).

3. Research Questions

In its current state, Russian engineering enterprises can manufacture high-tech competitive products only for relatively narrow market segments (Blachev & Gusev, 1999). At present, in the overwhelming majority of positions, the share of Russia in the world export of machinery, equipment and vehicles is tenths and hundredths of a percent.

4. Purpose of the Study

Mechanical engineering provides the key production sectors of the economy and, first of all, the manufacturing sectors of the industry and thus determines the production sector of the Russian Federation. The level of development of the production of machinery and equipment depends on the consumption of materials, the energy intensity of the gross domestic product, labor productivity, industrial safety and the defense capability of the state. In their current state, Russian engineering enterprises ensure the production of high-tech competitive products only for relatively narrow market segments. Today, according to the overwhelming majority of Russia's positions in the world export of machinery, equipment and vehicles, it is even hundredths of a percent (Abramov, 2014).

5. Research Methods

The share of machinery and equipment production in the total volume of industrial production is about 20%. In developed countries, this share ranges from 35 to 50%, which allows updating technological

equipment in most industries every 7–10 years, providing these countries with another leap in technological development (Bazhanov, 2013).

The volume of output of machine-building enterprises in 2014 amounted to more than 5.74 trillion rubles, which is 5.2% less than in 2013. The profitability of this industry is 8.8%, in 2013 this figure was 9.1% (Blachev & Gusev, 1999).

One of the reasons for the above problems of machine-building enterprises is the technical condition of fixed assets. Table 1 shows the degree of physical wear and tear of fixed assets.

The table shows that the degree of physical wear and tear of fixed assets is growing every year and is more than 40%. In addition to the physical deterioration of fixed assets, enterprises engaged in the production of machinery and equipment have a high obsolescence, which is 60%. It is the production of machinery and equipment that is one of the leaders in terms of the percentage of depreciation of fixed assets. In the Table. 2 shows the characteristics of the reproduction of fixed assets (Boyko et al., 2019a).

In general, in the manufacturing industry, the retirement rate is less than the renewal rate. Nevertheless, the share of fully worn-out equipment is 13.3%. The reproduction rate of fixed assets is less than 1% per year, while to maintain them in working order, the reproduction rate must be 10–12% per year.

The technical condition of fixed assets determines the level of efficiency in the use of production resources, production volume, quality and level of competitiveness of products (Chaldaeva, 2014).

The final results of the enterprise's activity, as well as its financial condition, depend on the technical condition of fixed assets.

The age structure of fixed assets is also developing negatively. The average age of the machinery and equipment park is 13 years (Table 3). In developed countries, this indicator does not exceed 6–7 years (Gavrilov, 2013).

From the data Table. 3 shows that only 39% of machines and equipment are under 10 years old. The average age of machinery and equipment is 13 years, while the standard service life adopted in many developed countries of the world is 7 years (Kuvalin, 2012). With an increase in the service life of the equipment, its physical wear and tear increases, which leads to an increase in repair costs, an increase in operating costs, and a decrease in product quality.

High physical wear and tear of fixed assets is the main reason for the low degree of equipment utilization, which is 59% (Lakhmetkina, 2013).

Table 1. Degree of physical wear and tear of fixed assets in organizations by type of economic activity

	2005	2011	2012	2013	2014
Manufacturing industries of them:	44.1	42.5	43.4	43.5	43.8
manufacture of machinery and equipment	46.9	44.0	44.6	44.9	45.2
manufacture of vehicles and equipment	51.9	49.3	48.2	47.4	47.9

Table 2. Characteristics of the reproduction of fixed assets of the manufacturing industry, %

	2005	2011	2012	2013	2014
Update rate	5.4	6.4	6.5	6.6	6.9
Retirement rate	1.8	1.0	0.8	0.8	0.8

Table 3. Age structure of fixed assets of the manufacturing industry, %

Cars and equipment:	2011	2012	2013	2014
up to 5	14	15	15	15
over 5 - up to 10	24	25	24	25
over 10 - up to 15	26	22	24	26
over 15 - up to 20	13	14	16	15
over 20 - up to 30	15	16	13	14
over 30	4	4	4	4
Average age of machinery and equipment, years	13	13	13	13

Thus, the main problems of using the basic production assets of machine-building enterprises are high physical and obsolescence of equipment, low rates of reproduction of production facilities, as well as low level of capacity utilization.

One of the main reasons for the above problems is the lack of investment resources for the renewal of fixed assets. To date, the replacement of physically obsolete production facilities requires \$ 350 million, and if the renovation is carried out with a focus on obsolescence factors, then another \$ 185 million is needed. 64 million dollars, which amounted to only 54.55% of the required investment (Tarquin & Blank, 2013).

The increase in the volume of investment resources is influenced by the factors limiting investment activity, which are presented in Table. 4.

The main reasons for the lack of investment resources are as follows: lack of own financial resources - this is the opinion of 60% of organizations, high investment risks - 30%, a high percentage of commercial loans - 29%, as well as the uncertainty of the economic situation in the country - 34%.

A low share of own funds in this industry is observed due to a decrease in depreciation deductions - in 2010 the share of depreciation deductions for the investment of fixed assets was 20.4%, while in 2014 it was 17.6%, as well as low profitability (Sergeev, 2014). Table 5 shows the profitability of the production of machinery and equipment.

From Table 5 shows that the profitability of the production of machinery and equipment is decreasing and in 2014 it was only 3.3% (Kukartsev et al., 2019).

Based on the above, we can conclude that at present enterprises engaged in the production of machinery and equipment are experiencing problems with the formation of investment resources. The distribution of organizations by assessing the objectives of investment in fixed assets can be seen in Table 6 (Salnikov et al., 2017).

The main purpose of investing in fixed assets is to replace worn out machinery and equipment - 69%, while only 38% of funds are spent on the introduction of new technologies (Fedorova et al., 2017). There are not enough financial resources to acquire new technologies. The only thing that machine-building enterprises can afford is the replacement of worn-out equipment with a new one with similar characteristics (Vasilyev et al., 2018).

Currently, there are various sources of funding for the renewal of fixed assets - own, such as profit, depreciation, depreciation of intangible assets, issue of shares, and borrowed - commercial credit, leasing, budget funds. The structure of investments in fixed assets by sources of financing is presented in Table 7.

Table 4. Distribution of organizations according to the assessment of factors limiting investment activity, %

Factors limiting investment activity	2010	2011	2012	2013	2014
Insufficient demand for products	19	19	19	21	23
Lack of own investment resources	67	60	64	59	60
High percentage of commercial loans	31	25	25	27	29
Complex mechanism for obtaining loans	15	15	13	14	16
Investment risks	23	27	27	27	30
Unsatisfactory condition of the technical base	5	6	7	8	7
Low profitability of investments in fixed assets	11	11	10	13	13
Uncertainty of the economic situation in the country	32	31	26	26	34
Imperfect legal and regulatory framework governing investment processes	10	10	11	9	11

Table 5. Return on assets of the manufacturing industry, %

	2005	2011	2012	2013	2014
Manufacturing industries	11.9	8.4	8.1	4.5	4.3
of them:					
manufacture of machinery and equipment	6.1	2.8	4.1	3.3	3.3

Table 6. Distribution of organizations by assessing the goals of investment in fixed assets, %

	2013	2014
Replacement of worn out machinery and equipment	69	69
Automation or mechanization of an existing production process	48	50
Energy saving	42	41
Introduction of new production technologies	39	38
Reducing production costs	41	37
Increase in production capacity with an expansion of the product range	34	33
Creation of new jobs	22	23

Table 7. Structure of investments in fixed assets by sources of financing

	2010	2011	2012	2013	2014
Fixed capital investments - total	100	100	100	100	100
Including:					
Own funds	41	41.9	44.5	45.2	45.8
Involved funds	59	58.1	55.5	54.8	54.2
Of which bank loans	9	8.6	8.4	10	10.6
Including loans					
Foreign banks	2.3	1.8	1.2	1.1	2.6
Borrowed funds from other organizations	6.1	5.8	6.1	6.2	6.4
Investments from abroad	...	...	...	0.8	0.8
Budget resources	19.5	19.2	17.9	19	17
Including from:					
Federal budget	10	10.1	9.7	10	9.1
Budgets of RF constituent entities	8.2	7.9	7.1	7.5	6.4
Local budget funds	...	...	1.1	1.5	1.5
Extra budgetary funds	0.3	0.2	0.4	0.3	0.2
Funds of organizations and the population, attracted					
For shared construction	2.2	2.0	2.7	2.9	3.5

6. Findings

In 2014, the share of own sources is 45.8%, and the share of borrowed funds is 54.2%. In the volume of borrowed funds, the largest share is taken by budget funds 17% in 2014, however, the amount of budget funds decreased in comparison with the previous year. Budget funds are mainly provided to enterprises that are of great importance for improving the country's defense capability. The share of bank loans increased in 2014 compared to 2013 and amounted to 10.6%. However, there are problems in attracting them due to the high cost of these sources. The smallest share is taken by funds from the issue of bonds and the issue of shares, their share is less than 1% (Boyko et al., 2019b).

7. Conclusion

Thus, investment processes in the manufacturing industry are financed mainly from borrowed sources, a large share of which is taken by budget funds. But these funds are not enough to purchase new technologies. Funding sources need to be developed. Solving the problem of a lack of investment resources for reproduction of MPA will allow machine-building enterprises to increase the efficiency of MPA reproduction (Abramov, 2014).

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References

- Abramov, S. I. (2014). *Investing*. Center for Economics and Marketing.
- Bazhanov, V. A. (2013). Manufacturing industries in Russia in the first decade of the XXI century. *Vestnik NSU: Socio-economic sciences*, 4, 37-51.
- Blachev, R., & Gusev, V. (1999). Optimization of the financing scheme for investment projects. *Investments in Russia*, 12, 34-38.
- Boyko, A. A., Kukartsev, V. V., Ereemeev, D. V., Tynchenko, V. S., Bukhtoyarov, V. V., & Stupina, A. A. (2019a). Imitation-dynamic model for calculating the efficiency of the financial leverage. In *Journal of Physics: Conference Series* (Vol. 1353, No. 1, p. 012123). IOP Publishing.
- Boyko, A. A., Kukartsev, V. V., Tynchenko, V. S., Kukartsev, V. A., Chzhan, E. A., & Mikhalev, A. S. (2019b). Dynamic simulation of calculating the purchase of equipment on credit. In *Journal of Physics: Conference Series* (Vol. 1333, No. 3, p. 032009). IOP Publishing.
- Chaldaeva, L. A. (2014). Innovative development of the Russian economy: incentives and growth factors. *Finance and credit*, 45, 2-5.
- Fedorova, S. N., Razzhivin, O. A., & Maymina, E. M. (2017). Characteristic of economic indicators of reproduction of fixed capital. *International Journal of Applied Business and Economic Research*, 15(12), 73-82.
- Gavrilov, V. V. (2013). Economic analysis of the risks of Russian firms in the real sector of the economy. *Modern economics: problems and solutions*, 2, 8-21.
- Kukartsev, A. V., Boyko, A. A., Kukartsev, V. V., Tynchenko, V. S., Bukhtoyarov, V. V., & Tynchenko, S. V. (2019, May). Methods of business processes competitiveness increasing of the rocket and

space industry enterprise. In *IOP Conference Series: Materials Science and Engineering* (Vol. 537, No. 4, p. 042009). IOP Publishing.

Kuvalin, D. B. (2012). *Russian enterprises: current problems and investment situation*. Nauka.

Lakhmetkina, N. I. (2013). *Investment strategy of the enterprise*. KnoRus.

Salnikov, V., Galimov, D., Mikheeva, O., Gnidchenko, A., & Rybalka, A. (2017). Russian manufacturing production capacity: Primary trends and structural characteristics. *Russian Journal of Economics*, 3(3), 240-262.

Sergeev, I. V. (2014). *Economy of the enterprise*. Finance and statistics.

Tarquin, A. J., & Blank, L. T. (2013). Engineering Economy. *IEEE Trans*, 3, 145.

Vasilyev, S., Stankevich, I., & Ujegov, A. (2018). A Model of the Real Sector of Russian Economy with Several Goods and Agents-Traders. *HSE Economic Journal*, 22(3), 362-386.