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Import Substitution in High-Tech Industries under External Sanctions

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ABSTRACT

In the context of restrictions on the import of technologies and equipment to the Russian Federation caused by external sanctions and the withdrawal of Western European, American and Japanese companies from our country, initially, high-tech branches of domestic industry found themselves in a difficult situation. There were problems related to the substitution of products that fell under the ban on import, and the development of localization of the main production segments. The **purpose** of the study is to review import substitution plans in the machine tool, aviation, electronic and machine-building industries in order to assess the effectiveness of their implementation; to identify the causes and factors of inhibition of the import substitution policy, as well as ways to improve its effectiveness. The author offers directions of improvement of the State support of high-tech branches of manufacturing industry to solve the problems facing it.

Keywords: import substitution; industry; high-tech industries; external sanctions; localization of production; machine tool; aviation, electronic industry; mechanical engineering

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INTRODUCTION

In connection with the imposition of sanctions unfriendly to Russia, restricting the import of technology and equipment into our country, the issue of substitution of products that have been banned from importation sharply there was a question. The need for an independent industrial and technological policy based on an import substitution strategy with a focus on the domestic producers and the search for their own modern solutions in various fields of science and technology came to the fore, maintain a high level of technological safety and to survive global crises with the lowest losses in the future.

A large number of publications are devoted to import substitution problems in the Russian industry [1–12]. Import substitution in high-tech industries is addressed by studies presented in [13–20].

According to experts, high-tech industries are lagging behind on import substitution[1] — the head of the Ministry of Industry and Trade of the Russian Federation D.V. Manturov named aviation, radio electronics, rehabilitation industry, pharmaceuticals and power engineering among the most important of them [21].

Consider the status and processes of import substitution in such high–tech sectors of the domestic industry as machine tool, aviation, electronic and mechanical engineering.

AVIATION INDUSTRY

Aviation industry is one of the economic drivers. Being high–tech, it creates a great synergy effect. The competence of the aviation industry can be used in many other sectors of the economy to create on their basis competitive products compared with foreign analogues.

Russia with a share of 1% of world exports of civilian aircraft and helicopters is poorly represented in this segment of the global market — Currently, the aviation industry supplies abroad 0.4% of engines, 1.5% of aggregates, 2.6% of devices, as well as 2.3% of aircraft (mainly military). As a result of implementation the federal targeted programme " Development of the aviation industry on 2013–2025 years ",[2] task of forming a stable position of the civil sector and positioning the Russian Federation, as a world center of aviation industry, it is should be solved, that capable of implementing by 2025 at least 5% of the world's aviation equipment, including: in the field of aircraft engineering — 4–5%; helicopter industry — 19,4%; engine building — at least 1% for civilian aircraft and 7% — for helicopters; in the field of aviation and instrument engineering — at least 2.9% of the world market of aggregates and systems and 11.2% of on-board aviation complex [22].

The main problems of the aviation industry at present are:

- moral depreciation of the equipment's;
- low level of managerial qualification and lack of experience in in preparation for series production;
- underdevelopment of cooperative interaction and inability to work with partners;
- high age of leading specialists;
- low level of manufacturing automation.

Based on the analysis of regulations and strategic documents, can be concluded, that development of the domestic aircraft industry in the period from 2011 to 2021 was carried out on the basis of the model of partial import substitution and the choice of the

[1] Company secret (online resource). URL: https://secretmag.ru/news/rossiyanam-nazvali-samye-otstayushie-po-importozamesheniyu-otrasli-19–05–2022.htm

[2] Resolution of the Government of the Russian Federation No. 303 from 15.04.2014 "On approval of the State programme of the Russian Federation "Development of the aviation industry on 2013–2025 years". URL: https://base.garant.ru/70644068/?ysclid=l60uxrb8ds585710311

Table

Key indicators of the implementation of the state program "Development of the aviation industry"

Name of indicator	Unit of measurement	2011	2015 plan/actual	2018 plan/actual	2019	2020
Quantities of newly established small aircraft (airplanes)	Units	–	–/9	6/10	7	7
Share of Russian civil aviation aircraft deliveries in the international civil aircraft markets	%	0.6	2/1	1/1	1	1
Share of Russian aircraft in the fleet of the largest Russian air carriers	%	–	–/–	14/9	10	11
Number of delivered the aircraft engines	Units	690	1835/1263	937/846	835	911
Share of Russian aircraft engines for civilian aircraft in the international market of aircraft engines for civilian aircraft	%	0	–/0	0/0	0	0
Share of Russian aircraft engines for helicopters in the international market of aircraft engines for helicopters	%	7	8/8	8/8	8	8
Share of Russian on-board aviation complexes for aircraft in the international market of on-board aviation complexes for aircraft	%	3	8/8	8/8	8	9

Source: compiled by the author based on the State Program of the Russian Federation "Development of the aviation industry for 2013–2025". URL: https://ach.gov.ru/upload/iblock/086/08613e7c838609058a081ea2663f3c11.pdf?ysclid=l60vjscvf2920750409

optimal cost of the product, i.e. responsible for the implementation of the state program of the Ministry of Industry and Trade of the Russian Federation and executives — leading corporations. Leading corporations were chosen as final product nodes imported components due to the price positioning of the product in international markets. Some aircraft were purchased from foreign suppliers (*Table. 1*).

In addition, as a result of this policy, the share of Russian–made aircraft in the fleet of the largest Russian air carriers (from 15 to 10%) and the number of aircraft engines supplied (from 1 263 to 850 un.) has decreased year on year. Despite the tense situation in the world and Russian economy, the focus was not on complete import substitution, but on partial.

When referring to current document — the order of the Ministry of Industry and Trade of Russia No. 2914 from 02.08.2021 "On approval of the Plan of measures for import substitution in the civil aviation industry of the Russian Federation for the period up to 2024",[3] which regulates the import substitution policy in the industry, then questions arise about the difficult value of its indicators: increase the share of domestic products from 0% in 2020 to 100% in 2024 for the next high–tech products and components:

1. Aircraft engine PD-14.

2. Aircraft "Sukhoi Superjet 100" and its components:

- Auxiliary power unit.
- On-board radio electronic equipment.
- Integrated aircraft management system.
- Integrated air conditioning system.
- Panels of cabin crew.
- Engine vibration control system.
- Hydrosystem computer.
- Fuel management and measurement system.
- Hydraulic system elements and components.
- Water supply and waste disposal system.
- Emergency flight information system.

Taking into account the R&D situation, the real time for the implementation of projects in the aviation industry for the creation of final products with a complete set of systems based on the share of import–substituted components and aggregates above 80%, taking into account foreign experience and complex characteristics of high–tech industries,— it is 2028–2030 years.

Proposals on improvement of the mechanism of implementation of tools of modernization of the production base for creation of competitive production in the aviation industry are the following:

1. From 2022 to 2025, it is necessary to systematize production and technical activities. For this you should:

- identify the main priorities of the Russian economy in civil aviation products;
- quantify the need and allocate work dynamics by years;
- form technological chains of production for each product;
- perform engineering the entire process chain;
- identify weaknesses in supply chain production and technology; develop programmes to accelerate the modernization of the relevant industries;
- develop a service plan for each type of aircraft.

2. Implement a new type of management of the production and technological chain based on cooperation of its members and form a management body of representatives of

[3] Order of the Ministry of Industry and Trade of Russia No. 2914 from 02.08.2021 "On approval of the Plan of measures for import substitution in the civil aviation industry of the Russian Federation for the period up to 2024". URL: http://www.consultant.ru/document/cons_doc_LAW_392319/?ysclid=l60vxd9gh7389524397

manufacturers of components and assemblers of the final product (aircraft, helicopter, engine and aggregate).

3. Identify the needs of technology chains for highly professional staff.

4. Develop a technical and economic substantiation for the development of the aviation industry and a project financing system.

In order to achieve the above objectives is required:

In the field of development:

• to ensure a high technical level of domestic aviation equipment, including aircraft construction, helicopter construction, aviation engine building and production of aviation aggregates, devices;

• to create and implement in the practice of aviation industry advanced achievements of science and technology and breakthrough technologies.

In the civil aviation industry:

• to promote differentiated approach of final integrators and manufacturers of aviation components;

• to organize serial production of helicopters and engines with optimal model range (including new generation engines);

• to promote the development of small and medium–sized business in the industry;

• to form and develop innovative territorial clusters;

• to organize development, production, after–sales service, logistics and marketing management throughout the product life cycle;

• to provide operational aircraft service.

There is also a need to support the civil aviation industry in its:

• modernization of aviation transport infrastructure and improvement of aviation safety of domestic aviation models;

• providing advanced development of scientific and technical basis for creation of fundamentally new models of aviation technology.

In order to achieve the above objectives, the management of priority projects should be improved, monitoring not only development and certification, but also the organization of serial production, promotion of products on the market, its after– sales service, modernization and recycling. It is important to develop aviation technology with the possibility of its maximum unification, both within each "family" and between them, which will increase the development productivity.

5. Implement network production structures, conducting complexes of measures, such as:

• to create systems for standardization of production quality, taking into account world experience;

• to form institutes of attestation of competence of enterprises of manufacturing industry with the purpose of selection of promising for creation of effective production chains;

• to determine the results of certification of competence of the production company and on their basis to form cluster structures for the development of modules of complex products (for example, in the aviation industry it is the fuselage, wing, engines, navigation and control equipment, engineering and ergonomic saturation of aircraft).

6. Create a system for transforming scientific knowledge into breakthrough technologies: it should consist of separate sections for the development of aircraft (aircraft and helicopters) as well as modules, nodes and components for them, which are under the competence, accordingly, aircraft integrator and first–level supplier according to their functional purpose [23].

7. Create sustainable demand for high-technology products in the domestic market

by developing an integrated development programme that includes:

• increase the share of domestic aircraft in the fleet of Russian air carriers;

• development of aviation transport infrastructure and aviation industry for 20–25 years;

• organization of a modern after–sales service system.

This will allow planning for increase in the scope of activities, which will contribute to increasing productivity and reducing risks of production development.

The proposed set of measures for the modernization of the production base of the aviation industry can be used for the solution of the corresponding task for high-tech manufacturing industries, within which complex equipment is produced, consisting of a set of modules, nodes, aggregates [23].

ELECTRONICS INDUSTRY

The program of import substitution in the electronics industry, effective since 2015[4,5] is aimed at the creation and development of domestic enterprises involved in the chain of creation of complex products of the industry. The programme's implementation plan includes the following results in reducing the proportion of imports:

• Semiconductor microwave electronics — from 70 to 10%.

• Telecommunications equipment — from 90 to 50%.

• Microprocessors — to 25% in public sector and to 90% in mass market.

• Automated control systems — from 90 to 45%.

• LED technology — from 90 to 50%.

• Medical equipment — from 90 to 30%.

• Semiconductor manufacturing equipment — from 90 to 30%.

• Computer engineering — to 25% in public sector and to 90% in mass market.

• Individual elements of computer technology — from 90 to 50%.

• Electronic measuring tools — from 90 to 30–50% (with different technologies).

The problems of import substitution in the electronics industry, computer and information technology industry are addressed by studies presented in the works [24–26].

One of the most complex and ambitious projects in electronics is the plan to replace software in the public sector, which in 2016 provided for restrictions on the purchase of imported software for government agencies and organizations of Russia.

In practice, this program is more aimed at the formation of import substitution of the part of the industry that relates to the defense and industrial complex. In the civilian sector, technologies and components are mostly copied from foreign. Also common insignificant (and more formal) development of foreign components at domestic enterprises in order to achieve the required level of localization. Not all these circumstances contribute to the goals of real import substitution in the Russian electronics industry.

The main support measures for organizations that participate in import substitution projects in this area of the economy are:

• granting of preferences for income tax and insurance premiums.

• expanding the list of electronic industries, which have tax exemptions (the project

[4] Order of the Ministry of Industry and Trade of Russia No. 662 from 31.03.2015 (amend. on 31.05.2018) "On approval of the sectoral plan of measures for import substitution in the radio–electronic industry of the Russian Federation". URL: https://minpromtorg.gov.ru/common/upload/files/docs/662.PDF

[5] Plan of measures for import substitution in the radio-electronics industry of the Russian Federation. URL: https://frprf.ru/download/plan-po-importozameshcheniyu-v-radioelektronnoy-promyshlennosti.pdf

provides the reduction of income tax to 3% and insurance premiums to 7.6%).

• obligation of purchase by the public sector of domestic electronics and software.

• incorporation of domestic electronics purchases into government programmes.

In practice, however, the measures taken did not achieve the desired result. Key barriers at this stage appear to be:

• requirements for localization of industry products and point estimation of the level of localization of production. Shortcomings of the existing system encourage entrepreneurs not to develop domestic analogues of electronic products, but to insignificant adaptation of foreign samples in circumvention of requirements for localization of production.

• cancellation of tenders for funding scientific research in the electronic industry.

• non–strict implementation of existing regulations and de–facto use of selected components of foreign equipment in sectors where it should not be used.

In the current situation revealed the extremely low level of localization of electronics.

Domestic industry faced an acute shortage of components for products previously supplied from abroad. All sectors of instrument engineering and electronics industry were de–facto incapable of import substitution — the question arose of the lack of domestic products similar to imported quality. The most critical moment of formation of the program of rapid import substitution is the acute shortage of modern technologies in the Russian industry. In the absence of such access, the domestic electronics industry will be able to provide only a certain part of the service of previously delivered equipment. Accordingly, the fundamental task of an effective plan for technological import substitution in the long term is the need to organize the transfer to Russia of electronic industrial technologies existing abroad (by method of "parallel import" and through the branched link of third countries) concurrently with the intensification of research, development and engineering to develop their analogues. In this context, measures such as reducing the tax burden on small and medium–sized businesses that specialize in the development of critical electronics products will be appropriate.

It is also advisable to stimulate the program of repurchase by the management of abandoned foreign companies on the Russian market, abandoned enterprises, provided the development strategy, technological focus and the staff of these organizations are maintained. Currently, there is an agreement between the Ministry of digital development, connection and mass communications of the Russian Federation and Ministry of industry and trade of the Russian Federation with electronics manufacturers and software developers to submit authorities their specific proposals for the further development of the domestic electronic industry, which be added to the new national radio electronics project. The main funds of multi–billion–dollar state support under this national project will be directed to the development and production of domestic computer equipment for corporate and home use, navigation devices, medical electronics, intelligent transport systems, artificial intelligence and big data software.[6]

In September 2020, the state corporation "Rosteh" developed a road map for the modernization of Russian microelectronics, which states that 798 bln. rub. should be invested in the industry until 2024, for the

[6] Ministry of Digital Development and Ministry of Industry and Trade plan to launch a new national project in the field of microelectronics to support the industry. Habr — Community of IT-specialists (online resource). 13.02.2022. URL: https://habr.com/ru/news/t/651195/

development of the production of chips with topological norms 65 (55), 28, 14 norms, as well as elements for solid state accumulators with topological norm 25–30 norms.[7]

Plans for further development of the electronic industry are reflected in the Strategy for the development of the electronic industry of the Russian Federation for the period up to 2030.[8] Based on macroeconomic and sectoral prerequisites, 3 scenarios of industry development — conservative, targeted and innovative. Conservatives expect moderate long–term economic growth of only 2.8–3% per year; targeted — stable situation on the domestic market and average annual economic growth of only 3.1–3.2%; innovative — economic growth only on 3.4–3.6% [27]. Based on the target scenario of development of electronics, providing active import substitution and stimulation of development of new products with priority of projects of great importance for infrastructure. However, such a growth rate of the industry will not ensure the transition of the Russian economy to the modern level of management using digital platforms.

MACHINE–TOOL INDUSTRY

Sectoral Plan of measures for import substitution in the machine–tool industry of the Russian Federation for the period up to 2024 (further — Plan)[9] prepared and approved by the Order of the Ministry of Industry and Trade of Russia No. 2332 from 28.06.2021.[10] The Department of Machine Tools and Heavy Machinery implements the Plan, while the Department of Strategic Development and Corporate Policy coordinates the monitoring, expert analysis and methodological support of its implementation. Characteristic feature of this document is its formation in the context of individual product groups ("product name") with appropriate ciphers and codes according to the Russian Classification Register of Goods According to the Type of Economic Activities: OK 034–2014 (CPA 2008) — OKPD-2. According to these groups, the indicators of the share of domestic products before the implementation of import substitution plans (%) and the corresponding share until 2024 (%), indicating the volume of annual demand for the products of these groups and the responsible department of the Ministry.

This format does not fully correspond to the purpose of the document (indicated in its title), as it does not disclose the content and scope of import substitution measures in the industry, the subjects responsible for their implementation, the types of actors involved in their actions and their effectiveness.

This approach is broadly similar to the earlier format of the plan of measures for import substitution in the machine–tool industry of the Russian Federation, prepared in accordance with Order of the Ministry of Industry and Trade of the Russian Federation No. 650 from 31.03.2015.[11]

However, discrepancy in the details of these submissions: codes and ciphers, that

[7] See ibid.

[8] Order of the Government of the Russian Federation No. 20 from 17.01.2020 "On approval of the Strategy for the development of the electronic industry of the Russian Federation for the period up to 2030". URL: https://bazanpa.ru/pravitelstvo-rf-rasporiazhenie-n20-r-ot17012020-h4636415/?ysclid=l63kyvee9e678298835

[9] Plan of measures for import substitution in the machine-tool industry of the Russian Federation for the period up to 2024. URL: https://frprf.ru/download/plan-po-importozameshcheniyu-v-stankoinstrumentalnoy-promyshlennosti.pdf

[10] Order of the Ministry of Industry and Trade of Russia No. 2332 from 28.06.2021 "On approval of the Plan of Measures for Import Substitution in the Machine-Tool Industry of the Russian Federation for the period up to 2024". URL: https://base.garant.ru/401404102/?ysclid=l63l8c4kl1140435881

[11] Order of the Ministry of Industry and Trade of Russia No. 650 from 31.03.2015 (amen. on 12.12.2017) "On approval of the plan of measures for import substitution in the machine-tool industry of the Russian Federation". URL: https://legalacts.ru/doc/prikaz-minpromtorga-rossii-ot-31032015-n-650-ob-utverzhdenii/?ysclid=l63lizl4k6975897252

are linking to them; content of the indicators used (share of imports in consumption on the eve of the target period 2015–2020 in the above-mentioned document 2015 and share of domestic products before the implementation of import substitution plans in document), and the period in which they are oriented, *do not allow to fully correlate them, to assess the implementation of the 2015 Plan and the effectiveness of the 2021 Plan.*

Further refinement and justification of the assessment of the Plan 2015 and the Plan 2021, is accounting the latest actions that outlined in "Strategy for the development of the machine–tool industry to 2035" (Decree of the Government of the Russian Federation No. 2869 from 5 November 2020 "On approval of the Strategy for the development of the machine–tool industry for the period up to 2035").[12] In this regard, the importance of import substitution and the implementation of special measures for this purpose has been identified in connection with the need to ensure the industry transition to a new level of development.[13] And to enhance national security in general and reduce threats to technological security that persist in the use of imported inputs and component basesы, and also protect the military–industrial complex as the main consumer of the machine–tool industry from possible external influence.[14]

In turn, solving the problems of reducing the level of sectoral import dependence presupposes creation of appropriate institutional conditions, growth and development of domestic demand, providing domestic producers with access to the necessary technologies, changes in the quality of machine–tools production.[15] Its characteristic features are:

- overcoming the low level of technological and economic efficiency of domestic enterprises;
- increasing the competitiveness of Russian production components by quality and price;
- preservation progressive trends in cutting and a number of other tools.

The Strategy aims to implement these facilities and reduce import dependence through the following actions[16]:

- implementation of modernization programmes and the creation of a competitive internal supply (price and technology);
- creation of scientific and technical groundwork (including through the implementation of large-scale cross-cutting integrated R&D on the development and mastery of serial tool production of a wide range of world–class);
- elimination the shortage of human resources and incompetence;
- creation of domestic innovative high–performance technologies and special equipment, attraction of foreign technologies (with transfer of technological solutions) and equipment, as well as new instrumental joint–type enterprises;
- development of exports of Russian instrument products;
- strengthening state support for the development of production (financial, regulatory, tax incentives, prioritization of promising technologies for the industry);
- regular introduction of innovation in the organization of production, product innovation and technology.

[12] Decree of the Government of the Russian Federation No. 2869 from 5 November 2020 "On approval of the Strategy for the Development of the Machine-Tool Industry for the period up to 2035". URL: https://www.garant.ru/products/ipo/prime/doc/74769183/

[13] See ibid, part III, p. 1.

[14] See ibid, part II, p. 1, part V., p. 1.

[15] See ibid. part. II, p. 2.

[16] See ibid. part II, p. 2, 3, part IV, p. 1, part V, p. 1.

The impact of such efforts is expected to be not only the successful implementation of the Strategy, but also a significant contribution to national development goals.[17]

Accounting and detail of the import substitution plan actions identified in the above-mentioned Strategy should also be complemented by an operational monitoring system. This will allow an effective assessment of the contribution of import substitution to the risk management for sector development from the perspective of its scenarios highlighted in The Strategy.[18]

Some developments for such actions have already been included in the plan of measures for the implementation of the "Strategy for the development of the machine-tool industry up to 2035", approved by the Decree of the Government of the Russian Federation No. 2869 from 05.11.2020 (Order of the Ministry of Industry and Trade of the Russian Federation No. 4526 from 17.11.2021).[19]

These include, for example, the adjustment of requirements for products of the machine–tool industry, necessary for their classification into industrial products produced in the territory of the Russian Federation within the Decree of the Government of the Russian Federation No.719 from 17.07.2015 "On confirm of production of industrial products in the territory of the Russian Federation"[20, 21]; carrying out activities aimed at discussing the key issues of the development of the tool industry[22]; development and (or) updating of professional standards[23]; preparation of proposals to increase labour productivity in the machine–tool industry[24]; monitoring the execution of the action plan for the implementation of the Strategy for the development of the machine–tool industry until 2035 year.[25]

In addition to the important import substitution activities contained in these documents, measures and steps for their implementation should be taken into account when working on Plan, that implemented under the Industrial Development Fund and major development institutions essential for strengthening import substitution (for example, Resolution of the Government of the Russian Federation No. 522 from 31.03.2022 "On the amendment of the Rules for subvention from the federal budget of an autonomous non–profit organization "Agency for Technological Development" to support projects involving the development of design documents for components required by industries"),[26] as well as relevant tasks of the Ministry.

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[17] See ibid. Part V, p. 4, part VII.

[18] See ibid. Part VIII.

[19] Order of the Ministry of Industry and Trade of the Russian Federation No. 4526 from 17.11.2021 "On approval of the Plan of Measures for the Implementation of the Strategy for the Development of the Machine-Tool Industry for the period up to 2035, approved by the Decree of the Government of the Russian Federation No. 2869 from 5 November 2020". URL: https://legalacts.ru/doc/prikaz-minpromtorga-rossii-ot-17112021-n-4526-ob-utverzhdenii/?ysclid=l63mv3cyg3326914630

[20] Decree of the Government of the Russian Federation No.719 from 17.07.2015 "On confirm of production of industrial products in the territory of the Russian Federation". URL: https://base.garant.ru/71139412/?ysclid=l63myd85cm444984641

[21] Order of the Ministry of Industry and Trade of the Russian Federation No. 4526 from 17.11.2021 "On approval of the Plan of Measures for the Implementation of the Strategy for the Development of the Machine-Tool Industry for the period up to 2035, approved by the Decree of the Government of the Russian Federation No. 2869 from 5 November 2020". Goal III, p. 8. URL: https://legalacts.ru/doc/prikaz-minpromtorga-rossii-ot-17112021-n-4526-ob-utverzhdenii/?ysclid=l63mv3cyg3326914630

[22] See ibid. Goal III, p. 11.

[23] See ibid. Goal V, p. 14.

[24] See ibid. Goal V, p. 15.

[25] See ibid. Goal VI, p. 16.

[26] Resolution of the Government of the Russian Federation No. 522 from 31.03.2022 "On the amendment of the Rules for subvention from the federal budget of an autonomous non–profit organization "Agency for Technological Development" to support projects involving the development of design documents for components required by industries. URL: http://publication.pravo.gov.ru/Document/View/0001202204040037?ysclid=l63ndhm3pl130394549

Taking into account the above circumstances allow to expect both improvement of validity and clarity of the Plan as the most important document of import substitution management in the machine–tool industry, and efficiency of tactical and strategic actions implemented with its help.

MECHANICAL ENGINEERING

The Consolidated Strategy for the Development of the Manufacturing Industry of the Russian Federation until 2024 and until 2035 are provided, inter alia, an integrated impact on the industry through technological, investment, financial, personnel and foreign trade policy, and demand stimulation as a separate segment of the Strategy.[27] This is a consequence of the assessment of the industry and recognition of the existence of problems such as technological backwardness, insufficient presence in foreign markets, etc. one of the causes of which is the low profitability of Russian engineering.

The analysis shows that the tools of implementation of state support for the development of the manufacturing industry are insufficient to solve the problems of stabilizing the domestic market of industrial goods.

The state program "Development of industry and its competitiveness" provides that for the period 2016–2024 the volume of production will grow by 28%.[28] However, 55% of manufactured goods consumed are imported. Therefore, a 28% increase volume of production (even with import substitution) is not enough to stabilize the market [28]. An important task — increasing export capacity — can be solved only by increasing productivity, which is more than 3.5 times lower than in the major economies.

Research in the development of import substitution in various segments of the mechanical engineering industry presented in the works [29–32].

Mechanical complex in the structure of production is 22%, and the segment of the internal market of mechanical products — 42%. The share of the chemical industry in the structure of production is — 9,8%, and in the structure of the domestic — 14%. This imbalance is the main reason for increasing dependence of the Russian economy on foreign supplies. It is noteworthy that in the mechanical engineering complex of all sectors of manufacturing industry the lowest labor productivity — 3 times less than the average in the industry. The industrial development program lacks relevant target indicators describing the degree of solving complex tasks to increase the efficiency of mechanical engineering. Thus, its backwardness is actually preserved. The proposed measures for import substitution in the mechanical engineering complex:

1) procurement of components for the production of final products in countries outside the sanctions list (China, India, South–East Asian countries), which will require the establishment of new supply logistics schemes from Asian countries;

2) cooperation with small and medium–sized enterprises to provide the components of the industrial corporations that previously purchased in Europe. In this case, information, institutional, infrastructure and financial support are needed;

3) concessional lending to small and medium–sized enterprises by industrial development institutes (VEB.RF and SME

[27] Order of the Government of the Russian Federation No. 1512 from 06.06.2020 "On approval of the Consolidated Strategy for the development of the manufacturing industry of the Russian Federation until 2024 and until 2035". http://static.government.ru/media/files/Qw77Aau6IOSEIuQqYnvR 4tGMCy6rv6Qm.pdf

[28] The state program "Development of industry and its competitiveness". URL: http://government.ru/rugovclassifier/862/events/

Corporation), tax breaks, moratoriums on inspection of production enterprises, etc.;

4) the need for federal and regional executive bodies responsible for the development of industry to create a unified information and industrial network system that will respond quickly to emerging supply problems in production, coordinate the construction of new production chains.[29] This structure should unite together the State and the business community to exchange information in order to achieve the following objectives:

- production cooperation (creation of new production sites);
- logistics cooperation (search of optimal ways of delivery of raw materials and products);
- cooperation to optimize the purchase of raw materials and the production of components and materials (previously imported and currently — unavailable due to sanctions). These issues are in the competence of regional engineering centers;

5) localization of the main production segments of the mechanical engineering industry;

6) stabilization of the domestic product market:

- ensuring the stabilization and subsequent development of the engineering, chemical and food industries by replacing imported products with domestic products that are not inferior in their functional characteristics; with price–quality ratio at the level of world standards;
- orientation of the chemical complex for the accelerated development of petrochemical production, deep processing processes so that most of the energy resources (oil, gas, coal) are used as raw materials for petrochemical production [33];
- ensuring the State food security through support for engineering for the agricultural and food processing industry.

DIRECTIONS OF IMPROVEMENT OF INDUSTRIAL POLICY IN RUSSIA

Analysis of state support tools, implemented in the state programs, shows the lack of a systemic approach to creating conditions for the breakthrough development of the manufacturing industry and increasing its socio–economic significance as a leading factor in the development of the national economy.

State support should focus on the following areas:

1. Creation of a system of technological re–equipment of the economy of the Russian Federation on the basis of intersectoral interaction of high–tech, medium-technology and traditional branches of manufacturing industry:

orientation of the mechanical complex on production of products for machine–tool building, heavy mechanical engineering, electronic industry, For technological support of development of information infrastructure, pharmaceutical industry, medical equipment, equipment for petrochemical complex, aviation industry, engineering and agriculture [34];

transition to intensive development of the agricultural sector, which requires the provision of modern machines for harvesting and tillage; equipment for livestock complex, as well as creation of technological conditions for selection and seed production;

meet the requirements of domestic medicine in equipment and necessary materials [34].

2. Transfer of technologies from industries where there is some groundwork and

[29] Import substitution in mechanical engineering: which segments will dominate. RB.ru — business network (online resource). 29.03.2022. URL: https://advis.ru/php/view_news_ajax.php?id=D 70362E 6–1A2D-764A-B 405–9428C 400508D

competitive advantage in international markets (defense and industrial complex, nuclear energy and power engineering, aviation and space engine industry) In the catching–up sector of technological development, which is one of the most important tasks of Russian industrial policy.

3. Creation of an effective system of management of interdisciplinary interaction, development of a network model of an integrated system of state regulation of development of manufacturing industry on the basis of formation of an interdepartmental center of interdisciplinary interaction.

4. Development of an indicative plan for meet the requirements of domestic economy in complex technology for the most popular nomenclature groups.

5. Creation of a value chain system for the production of complex equipment:

- departure from the support model from one enterprise or group of enterprises and the transition to value chain development in multi–industry and to create a high–tech products [34];
- creation of its own material base (equipment for the digital economy, electronic industry and computing).

At present, it is not individual enterprises that compete in the global manufacturing market, a value chains in which technology and production linkages, diversification of demand markets, optimization of business processes helps to sharp improvement enterprise competitiveness, which should lead to more cost–effective operation. This is the only way to increase the competitiveness of domestic products in this segment of complex equipment at the international level under conditions of destabilization of the domestic market (the recession in the major economies, the decline in the level of international trade and the decline in income from commodity exports).

Value chains should be the main instrument for implementing the industrial policy of the State. They can be created through cross–industry cooperation, for example, in manufacturing with the digital economy, energy and transport sectors, for which a project needs to be developed as a governance body. China, South Korea, the Philippines, Taiwan, Japan and Malaysia have positive experiences with such industrial restructuring. In Russia, value chains were implemented in the system of the corporation "Rosatom", which allowed it to become the leading enterprise for the construction of nuclear power plants in the world. Value chains were also created in the automotive and aviation industries through localization programmes.

7. Focus on developing a system of agreements between domestic consumers and producers, an interaction of development institutions with the management company of value chains in import substitution and in this context. The agreements define the level of investment, the volume of production, the system of interaction with consumers, leasing payments, the organization of service maintenance of complex equipment and investment protection measures [27].

TASKS OF INCREASE THE TECHNOLOGICAL SOVEREIGNTY OF RUSSIA

At the moment, proactive preparations for existing and new sanctions measures by unfriendly countries are required to minimize losses in the economy. Below are proposals for the organization of relevant activities under this agenda:

1. Creation of a mechanism for management of enterprises of foreign investors, which have ceased their economic activity in the Russian Federation due to the imposition of sanctions

against Russia for conducting operations on foreign economic activity and its isolation from the world market of goods and services.

2. Holding in Russia of stress test for economic resilience to sanctions (similarly to the Chinese initiative[30]), both sectoral and regional (by entity of the Russian Federation). In the framework of this audit, organize targeted surveys of experts representing business and domestic science, taking into account the already introduced and possible sanctions. This will help to identify the sectoral and regional vulnerabilities of the economy; the main factors preventing the elimination of vulnerabilities as targets of targeted anti–stress economic policies; directions of expanding, correcting and complementing already introduced systemic and targeted measures of anti–stress economic policy.

3. In the medium term, it is proposed to focus not only on analogues (prototypes), but also on the original developments of domestic scientists, possibly in tandem with partners from friendly countries. It is recommended to extend the financing of the development of design documentation for import substitution beyond 2022 for original components capable of surpassing the level of foreign analogues and oriented to the competitive advantage of the country. Here it is necessary to take into account the later readiness to develop design documentation (beyond 2022 year) on the results of scientific research, which are breakthrough nature.[31] This will improve the efficiency of the import substitution program and the sustainability of the national economy in the medium term.

4. Introduction of a preferential regime for the import into the Russian Federation of high–tech and investment goods from friendly countries and the development of an incentive mechanism.

5. Creation of a scientific and technological platform (hub) to solve the relevant problems to strengthen the technological sovereignty of the Russian Federation. Monitoring of scientific, technical and technological capacities will identify both areas where the indicators are higher than the global ones and where cooperation with countries with technological superiority (China and South–East Asia) is required.

6. Formation of the economic and political course for the development of domestic industrial software and servers and/or modernization of foreign by creating specific functionality in Russia — platforms that meet domestic production needs and reduce national security risks.

7. International cooperation with friendly and reliable economic partners — EAEC countries and BRICS. Emerging markets in China, India, Brazil and South Africa demonstrate high economic, trade, production and technology performance in recent years. In this regard, the strengthening of trade and economic relations with these countries opens new opportunities for Russia and is of special value.

In conclusion, it should be noted that it takes at least 3–4 years to restructure high–tech industries and deepen

[30] China conducts stress test of economy in case of sanctions. Vestu.ru (Online resource). 05.05.2022. URL: https://www.vesti.ru/finance/article/2724683.

[31] According to Resolution of the Government of the Russian Federation No. 522 from 31.03.2022, amendments to the Government Resolution No. 208 from 18.02.2022. If earlier to receive a grant from "Agency for Technological Development" developer had to attract at least 20% of own funds for the implementation of a specific project, now this condition is removed. The state, represented by the agency, is ready to allocate up to 100% of the funding for the creation of Russian analogues of components. However, the document stipulates that such a procedure would be in effect only in 2022 year. URL: http://publication.pravo.gov.ru/Document/View/0001202204040037?ysclid=l650ts2dnv604803441

import substitution. It is necessary to work together with regional ministries, associations, development institutions, business associations in such areas as joint monitoring of the situation and even regulation of individual processes in a manual mode, for example, distribution of components by industry.

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REFERENCES

1. Manturov D., Nikitin G., Osmakov V. The Russian government approach to import substitution planning in industry. *Voprosy ekonomiki*. 2016;(9):40–49. (In Russ.). DOI: 10.32609/0042–8736–2016–9–40–49
2. Mokin V.N., Kapustina I.V., Stepanova T.V. et al. Analytical study of import substitution processes in the Russian economy: Theory and practice. St. Petersburg: Politechnical University Publ.; 2017. 174 p. (In Russ.).
3. Biryukov P.A. The import substitution in Russia: Trends and sustainability. *Finansy: teoriya i praktika = Finance: Theory and Practice*. 2016;20(5):45–57. (In Russ.).
4. Leontyev B.B. Import substitution: View of a problem. *ETAP: ekonomicheskaya teoriya, analiz, praktika = ETAP: Economic Theory, Analysis, and Practice*. 2014;(6):85–96. (In Russ.).
5. Ryazanov V.T. Import substitution and new industrialization of Russia, or how to overcome stagnation. *Ekonomist*. 2014;(11):3–19. (In Russ.).
6. Sorokina A.I., Mozharova E.I., Bordova A.A. Import substitution in modern conditions. *Sbornik nauchnykh trudov Angarskogo gosudarstvennogo tekhnicheskogo universiteta*. 2022;(19):360–367. (In Russ.).
7. Fal'tsman V.K. Import substitution in the economic sectors of Russia. *Studies on Russian Economic Development*. 2015;26(5):452–459. (In Russ.: *Problemy prognozirovaniya*. 2015;(5):52–62).
8. Chernikova A.A., Vertakova Yu.V., Plotnikov V.A. Import substitution as a tool of economic policy for import substitution risk management: Choosing an approach. *Ekonomika i upravlenie = Economics and Management*. 2016;(10):28–39. (In Russ.).
9. Vatolkina N., Gorbunova N.V. Import substitution: International experience, instruments. *Nauchno-tekhnicheskie vedomosti Sankt-Peterburgskogo gosudarstvennogo politekhnicheskogo universiteta. Ekonomicheskie nauki = St. Petersburg State Polytechnical University Journal. Economics*. 2015;(6):29–39. (In Russ.). DOI: 10.5862/JE.233.3
10. Grabchak E.P., Medvedeva E.A., Golovanov K.P. Import replacement — driver for evolution or forced measure. *Energeticheskaya politika = The Energy Policy*. 2016;(3):74–85. (In Russ.).
11. Borisov V.N., Pochukaeva O.V. Developing import substitution as a result of the growth of the competitiveness of investment equipment. *Razvitie territorii = Development of Territories*. 2021;(2):10–18. (In Russ.). DOI: 10.32324/2412–8945–2021–2–10–18
12. Polovinkin V.N., Fomichev A.V. Fundamentals and prospects of import substitution policy in the domestic economy. PRoAtom. Sept. 18. 2014. URL: http://www.proatom.ru/modules.php?file=article&name=News&sid=5541 (In Russ.).
13. Ganichev N.A., Frolov I.E. Long-term development of the Russian high-tech complex in terms of unstable growth of the world economy (model and forecast). *Studies on Russian Economic Development*. 2010;21(6):573–588. (In Russ.: *Problemy prognozirovaniya*. 2010;(6):3–22).

14. Kokhno P.A. High-tech industry in the context of import substitution. In: Russia: Trends and development prospects. Yearbook. Moscow: Institute of Scientific Information for Social Sciences of RAS; 2016:323–327. (In Russ.).
15. Vertakova Yu.V., Plotnikov V.A. Prospects for import substitution in high-tech industries. *Analiticheskii vestnik Soveta Federatsii Federal'nogo Sobraniya Rossiiskoi Federatsii*. 2014;(27):7–19. (In Russ.).
16. Klochkov V.V., Kritskaya S.S. Prediction of the long-term economic impact of the sanctions against the Russian high-tech industry (a case of civil aviation industry). *Natsional'nye interesy: prioritety i bezopasnost' = National Interests: Priorities and Security*. 2014;10(41):14–25. (In Russ.).
17. Silinskii V. Harmonization of sales and operations of high-tech industrial enterprise in the conditions of uncertainty and instability. *Ekonomicheskii zhurnal = Economic Journal*. 2015;(1):6–17. (In Russ.).
18. Faltsman V.K. Prerequisites for import substitution and export development of high-technology products. *EKO: vserossiiskii ekonomicheskii zhurnal = ECO Journal*. 2016;(4):56–74. (In Russ.).
19. Kokhno P., Kokhno A. Problems of import substitution at enterprises of the military-industrial complex. *Obshchestvo i ekonomika = Society and Economy*. 2022;(4):82–103. (In Russ.). DOI: 10.31857/S 020736760019574–0
20. Volkodavova E.V., Zhabin A.P. The methodology of assessing the need for import substitution at an industrial enterprise. *Organizator proizvodstva = Organizer of Production*. 2016;(3):5–17. (In Russ.).
21. Smirnova D. The head of the Ministry of Industry and Trade of the Russian Federation listed priority areas for import substitution. Gazeta.ru. Mar. 10, 2022. URL: https://www.gazeta.ru/business/news/2022/03/10/17407963.shtml (In Russ.).
22. Abdikeev N.M., Bogachev Yu.S., Trifonov P.V., Dontsova O.I. Priority areas for the aviation industry development. *Polet. Obshcherossiiskii nauchno-tekhnicheskii zhurnal = All-Russian Scientific-Technical Journal "Polyot" ("Flight")*. 2020;(9):24–31. (In Russ.).
23. Dontsova O.I., Abdikeev N.M., Bogachev Yu.S. The development of managerial mechanisms to ensure a technological breakthrough in the Russian economy. *Upravlencheskie nauki = Management Sciences in Russia*. 2019;9(4):15–31. (In Russ.). DOI: 10.26794/2304–022X-2019–9–4–15–31
24. Dubolazov V.A., Silinskii V.S. Import substitution in the market of special-purpose computer equipment: Possible ways of implementation. *Ekonomicheskii zhurnal = Economic Journal*. 2017;(1):15–27. (In Russ.).
25. Bendikov M.A., Ganichev N.A. Dependence on electronic components import and ways to overcome it (the space industry case). *Ekonomicheskii analiz: teoriya i praktika = Economic Analysis: Theory and Practice*. 2015;(3):2–17. (In Russ.).
26. Shuvalova M. Import substitution in the field of IT. Garant.ru. May 04, 2022. URL: https://www.garant.ru/article/1542142/ (In Russ.).
27. Kalmykov Yu.P., Abdikeev N.M., Bogachev Yu.S., Trifonov P.V. Directions of improving industrial policy in Russia. *Vestnik mashinostroeniya = Russian Engineering Research*. 2021;(9):82–88. (In Russ.). DOI: 10.36652/0042–4633–2021–9–82–88
28. Abdikeev N.M. On some problems of the activities of development institutions aimed at supporting high-tech sectors of the manufacturing industry. Finansovaya gazeta. Sept. 28, 2021. URL: https://fingazeta.ru/authority/state-regulation/473310 (In Russ.).
29. Balashov M.M. Import substitution in the power engineering industry. *Strategicheskie resheniya i risk-menedzhment = Strategic Decisions and Risk Management*. 2020;11(2):182–195. (In Russ.). DOI: 10.17747/2618–947X-2020–2–182–195

30. Pochukaeva O.V., Pochukaev K.G. Import substitution in the engineering industry under the conditions of growing demand. *Nauchnye trudy: Institut narodnokhozyaistvennogo prognozirovaniya RAN = Scientific Articles: Institute of Economic Forecasting. Russian Academy of Sciences*. 2019;17:192–209. (In Russ.). DOI: 10.29003/m817.sp_ief_ras2019/192–209
31. Borisov V.N., Pochukaeva O.V., Balagurova E.A., Orlova T.G. The role of import substitution in the RF engineering. *Nauchnye trudy: Institut narodnokhozyaistvennogo prognozirovaniya RAN = Scientific Articles: Institute of Economic Forecasting. Russian Academy of Sciences*. 2015;13:300–323. (In Russ.).
32. Miller A., Miller M. Study of the problems of technological integration in the manufacturing industry in Russia. *Strategic Management*. 2019;24(3):33–42. DOI: 10.5937/StraMan1903033M
33. Trifonov P.V. Analysis of the competitiveness of products of high-tech sector of the manufacturing industry of the Russian Federation in domestic and foreign markets. *Nauchnye trudy Vol'nogo ekonomicheskogo obshchestva Rossii = Scientific Works of the Free Economic Society of Russia*. 2021;230(4):196–203. (In Russ.). DOI: 10.38197/2072–2060–2021–230–4–196–203
34. Abdikeev N.M., Bogachev Yu.S. Improving state support for the manufacturing industry taking into account the influence of various factors. *Ekonomika. Nalogi. Pravo = Economics, Taxes & Law*. 2020;13(6):77–85. (In Russ.). DOI: 10.26794/1999–849X-2020–13–6–77–85

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