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ОТРАСЛЕВЫЕ ПРОБЛЕМЫ

Optimizing the consolidated budget of the development Program for a diversified industrial complex

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Abstract. In a situation of economic downturn, complicated by COVID-19 pandemic, which has covered many countries in the world, including Russia, it is necessary to choose ways to ensure more or less sustainable economic growth. The condition in the Russian chemical complex is analyzed. The choice of the chemical complex as one of the priority ways of the Russian economic development has been substantiated. A conditional long-term development Program for the Russian chemical complex is worked out. This Program takes into account the shortcomings of fragmented government measures for the development of chemical and petrochemical industries. It is argued that the implementation of the Program will allow increasing the domestic supply for high-value-added hydrocarbon products, generally contributing to the reduction of the raw material share in Russian exports. The authors' earlier research to optimize structure of the development program for a large industrial complex in conditions of limited resources is developed. In particular, an approach to the choice of the optimal structure of the development program`s budget, consisting of such sources of financing as assignments from the national budget, private capital, long-term credits, as well as reinvested profit from investment projects participating in the Program is proposed. The results of economic and mathematical modeling and computer experimentation for optimizing structure of this Program`s consolidated budget, which make it possible to significantly improve its target indicators, as well as to involve socially significant low-profit investment projects of small and medium-sized businesses, are presented.

Keywords: chemical complex, investment project, development program, program budget, sources of financing, reinvestment, long-term credit, optimization, modeling.

JEL Classification: E27, L52, C61, C88.

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INTRODUCTION

Long before the coronavirus pandemic experts considered the economic situation in the country as difficult. At the same time, some experts expressed cautious optimism. For example, the late Academician V.V. Ivanter, mentioning the low growth rates of the Russian economy (1.5–2%) after the economic recession and subsequent stagnation, believed that there are areas of the national economy with high development potential that are capable of pulling the entire economy forward. These are the agricultural sector, developing “quite fantastic pace”, the military-industrial complex as well as the chemical industry. These are also successfully developing regions, to which V.V. Ivanter ranks Belgorod, Voronezh, Rostov regions and some other subjects of the Russian Federation (Ivanter, 2018).

We believe that at the current stage of the Russian economic development, such drivers of economic growth can also be mechanical engineering, primarily the precision one, the pharmaceutical industry, and information technologies.

The authors focus on the Russian chemical complex, the growth rates of which at all stages of its development outstripped the growth rates of GDP. The development of the chemical complex can significantly change the raw material nature of the domestic economy, since the rich internal reserves of hydrocarbon raw materials can increasingly be consumed by its petrochemical division.

RUSSIAN CHEMICAL COMPLEX: SITUATION AND PROSPECTS OF DEVELOPMENT

Experts predict that global demand for oil in the future will grow by 1% per year (Long-term forecast..., 2019; Kopytin, 2020), while for the products of the chemical complex (chemical and petrochemical industries) this figure will be at least 3% (Rajeev, Pati, Padhi, 2019; Spitz, 2019). The chemical complex is the link between the production and processing of oil and gas and such industries as mechanical engineering, all types of construction, high-tech, etc. The products of the chemical complex are, to a certain extent, used in all sectors of the economy and spheres of life, and are involved in achieving the goals of all existing national projects. It should be noted that chemical complex of the USSR was second only to the United States and in various years ranked no less than fourth in the world, competing only with Japan and Germany. Nowadays, the chemical complex of Russia is in the middle of the world second ten, giving place not only to the United States and China, but also to Japan and a number of European countries, as well as to such developing countries as India, Saudi Arabia, the Republic of Korea, Brazil, and Iran.

The greatest decline in the development of the Russian chemical complex occurred in the 1990s, when the enterprises of the complex were privatized and their new owners mercilessly, to the point of complete wear and tear, exploited the existing equipment. A relatively reasonable production policy was typical for the producers of mineral fertilizers, as well as for the producers and processors of mass-use polymers and rubber. In order not to degrade completely, the enterprises of the chemical complex began to unite into commercial and industrial groups (this was done by the producers of mineral fertilizers) or became part of the emerging vertically integrated oil companies and “Gazprom”. In the conditions, when the main task was survival, there was no opportunity to develop long-term development strategies. As a result, the country’s chemical complex has lost its main advantages: high growth rates and efficiency. Some improvement was observed in the early 2000s (the so-called “fat years”), but the global economic crisis of 2008–2009 pushed the Russian chemical complex back again (Braginsky, 2018; Nikitin, Makeeva, 2011).

In the early 2010s, the government long-term programs, widely used in the USSR, began to be developed for the chemical complex (Development plan..., 2013). In 2012, the Ministry of Energy of the Russian Federation set up a long-term plan for the petrochemical industry, and the Ministry of Industry of the Russian Federation developed a similar plan for the chemical industry.

It should be noted that both long-term programs were not linked to each other, which was a characteristic feature of the practice of program management in the USSR, when strategies for the petrochemical industry and the production of chemicals and their derivatives were formulated, respectively, by the Ministry of Oil Refining and Petrochemical Industry and the Ministry of Chemical Industry (Klepikov, Moskvitina, 2012; Slavninskaya, 2013).

At the same time, the revived long-term planning for the already Russian chemical complex was aimed at eliminating structural imbalances and was supported by measures of economic, organizational, technical and legal support.

The main goal of the aforementioned development programs for the branches of the chemical complex was the creation of large industrial clusters, i.e. geographically localized, interconnected industries, institutions and organizations, formed into a single organization structure.

To date, a number of large investment projects have been implemented in the Russian chemical complex, in particular, such as “Rusvinil”, “Tobolskpolimer”, “ZapSibNeftekhim”. The production capacities for mineral fertilizers, paints and varnishes, polymer products, rubber goods, tires have been expanded (Danilova, 2020). However, the growth in the production of the chemical complex slowed down after 2018. The reason is specialization of Russia in low-conversion products, mostly exported, led to serious imbalances in the structure of the national chemical complex.

The above-mentioned large projects ensured an increase in the production and export of mass-use polymers (i.e. polyethylene, polypropylene), which, on the one hand, led to saturation of the domestic market with these products, and, on the other hand, to reduction in the domestic supply of products with higher added value, such as engineering and other plastics, as well as a variety of chemicals. Apparently, this situation was caused by an error in determining the aggregate demand for mass-use polymer products, when the

per capita demand for such polymers was taken into account, but the structure of demand was ignored. For example, in Russia the main consumers of polymers are producers of containers and packaging for food and industrial goods, but in the world these are practically all branches of the manufacturing industry.

In order to meet the ever-increasing demand of both traditional and new high-tech sectors of the Russian industry for high-value chemical products, the government, along with large cluster-forming projects, for example "ZapSibNeftekhim" project, should encourage the creation of medium and small projects. No less important is the organizational activity to improve the system of norms and rules that ensure the possibility of using high value added chemical products in various sectors of the Russian economy. These proposals should become the basis of the Russian economic policy aimed at changing the structure of the economy in favor of labor-intensive manufacturing industries, as well as changing the structure of exports and increasing its volume, generally contributing to technological progress.

Reorientation to the domestic market will require large investments. Given the limited capacity of the national budget, it is necessary to concentrate its resources on the "growth points" of the economy and create a flexible instrument for distributing these funds between special investment projects.

It is advisable to concentrate financial resources on investment projects in such a way that social problems are solved at the same time. The development of "heavy" manufacturing industries will create additional highly skilled jobs, since these are the industries that produce labor-intensive products. Another advantage of such an economic policy is the possibility of creating jobs not only in places of mining, but above all in places where the labor force is concentrated. Finally, it must be emphasized that mere manufacturing industries will provide sustainable growth rates, opening up the opportunity for scientific and technological progress.

SELECTING THE OPTIMAL COMBINATION OF FINANCIAL SOURCES FOR THE DEVELOPMENT PROGRAM (EXAMPLE OF RUSSIAN CHEMICAL COMPLEX)

In previous works (Braginsky, Tatevosyan, Sedova, 2017, 2019, Braginsky et al., 2020; Braginsky, 2017), the authors proposed the idea of creating a budget for an industry or a region development program, which includes resources of the national budget, private capital for initiating investment projects, reinvesting profits, as well as long-term credits. Similar ideas concerning electric power enterprises are expressed in (Kuznetsov, 2014).

Development programs may become interesting to investors under the following conditions:

— programs should be regulated by a special law that both enshrines the rights and obligations and protects the interests of all its participants;

— it is necessary to select only the projects in which the specific tasks of the program are solved to participate in the program (Braginsky, 2017; Braginsky et al., 2017, 2020).

Let us briefly describe each source of financing the budget of a development program.

1. Funds originated from the National budget in post-Soviet Russia have always been extremely limited. Even in the years of favorable economic conditions, there were not enough funds to finance governmental programs. Since 2014, the situation has worsened dramatically (Aganbegyan, 2019). Nevertheless, the role of this source of financing the development programs is very important. The fulfillment of official obligations, primarily observing the principle of funding sufficiency, creates an atmosphere of mutual trust and disciplines for all the participants.

2. Private capital plays an important role in financing development programs based on the principle of public-private cooperation. Executive bodies initiate development programs for industries or regions, offering favorable legal regimes and substantial financial assistance, namely, budgetary investments in infrastructure and various types of subsidies. In turn, private entrepreneurs develop investment projects and apply for participation in these programs, pledging to invest a certain amount of their own funds.

3. Another necessary condition for achieving the planned results of development programs, the duration of which is usually 15–30 years, is a long-term credit. However, the share of long-term credits in the operations of the Russian banking sector (which has huge funds) is insignificant. This circumstance prevents the accelerated development of the Russian chemical complex, which has a favorable business climate. The conclusion of a tripartite program agreement between the national government, business and banking communities would make it possible to change the current situation for the better.

4. The next source of investment resources for development programs is profit from investment projects. The level of profitability is substantiated for every investment project in the development program; it is included in the prices for program products. Profitability should provide the minimum profit margin for the current needs of producers. The other parts of the profits should go to the consolidated program budget.

The four listed sources of financing the development program provide significantly better results when they are optimally combined. The optimization multicriteria model which is designed to form the structure of the development program and is described in detail in (Sedova, 2015; Braginsky et al., 2020), makes it possible to determine the size of each source and allocation of the total amount of investments over the years.

Below are the results of experimental calculations of versions for a conditional nineteen-year development program for the Russian chemical complex (referred as the Program) according to two criteria: the maximum of the gross discounted profit for the entire Program period and the maximum of the gross output for the same period.

The Program includes 22 investment projects (referred as Project), set by an expert method using the initial information given in the current governmental long-term plans for the development of the petrochemical and chemical industries. Each Project was characterized by its starting year, the amount of investments and its allocation over the years, the annual output when reaching the design capacity, and the coefficients of production development. These 22 Projects with the specified parameters made up a version of the Program, which is called the original one. It is believed that this version is financed only from the national budget.

It was assumed that each Project can be carried out in several versions, differing in the amount of investment and date of start. In this regard, for each Project, the upper limit of the volume of investments and the time period for the possible start of construction were set. In the given calculation, the moment of the start of the Project was limited by only one condition — it must be completed during the period of the Program.

To calculate prices for Program products, three levels of profitability of investment are set: minimum (15%), increased (20%) for import-substituting projects, and high (40%) — for Megaprojects. It is believed that both output and profit change in direct proportion to the amount of investment. The budgetary investment limits are set for each year within the Program at half of the same values in the original version. The total amount of the credit is limited; the credit rate is set at 5%. The body of the credit is returned at the end of the Program. Another essential condition of the experimental calculations is: the interest on the credit shall be paid only from the profit received.

Note that the maximum values of the selected criteria are not considered to be the best option. Formal criteria here are tools for the formation of alternative versions of the Program. The substantiation of this position is given in the above articles. The criterion for the best variant of the Program structure is achieving non-formalized goals.

The main indicators of the optimized version of the Program in comparison with its original version are summarized in Table 1.

Table 1. Performance indicators of the Program

Indicator	Original version	Optimized version	Ratio of column 2 to column 3, %
1	2	3	4
Total investment, RUB bln	520.618	1862.291	357.7
Including			
National budget funds	520.618	260.302	50.0
Reinvested profit		1082.562	
Commercial credit		519.427	
Discounted profit, RUB bln	294.711	775.621	263.2
Output, RUB bln	4333.866	13339.275	307.8
Return on investment, %	146.02	137.26	
Share of import-substituting projects, %	8.80	22.55	
Gross profit, RUB bln	1921.416	5220.861	271.7
Credit interest, RUB bln		358.674	
Retained earnings, RUB bln	1921.416	3779.625	196.7

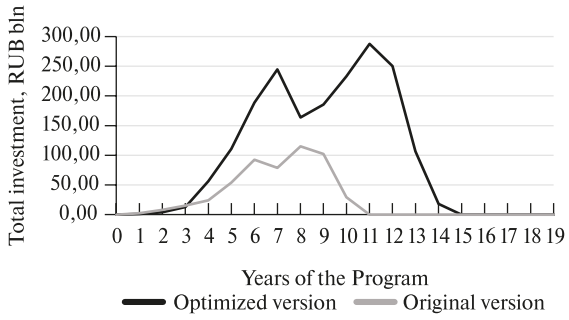

Fig. 1. Annual distribution of the total Program`s investment

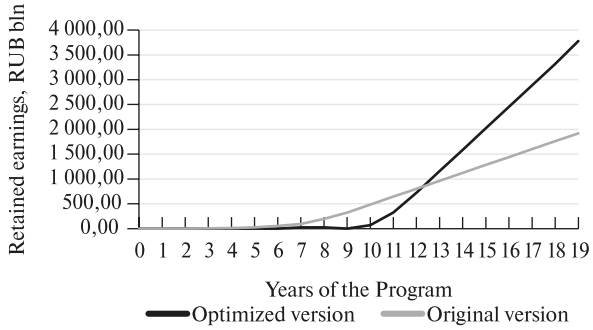

Fig. 2. Retained earnings, cumulative

Fig. 1–2 shows, respectively, the distribution of investments and accumulated retained earnings over the years of the Program in its original and optimized versions.

The main result of the optimization is: 18 projects out of 22 attract maximum amount of investment through long-term credits and profit reinvestment. At the same time, the optimized version has a longer investment period (Fig. 1).

The mechanism for optimizing the Program is: four low-profit projects for which investments have not reached the upper bounds due to scarce national budget funding should be launched in the first two years of the Program. The profit from these projects made it possible to take a credit in the third and fourth years of the Program in order to start two highly profitable Megaprojects, firstly, at the upper investment limits, and secondly, two and one year earlier than in the original version. Reinvestment of profits from the last two Megaprojects made it possible for the remaining projects to enjoy the upper budget limits and to attract fewer credits. In conclusion, we note that the amount of accumulated retained earnings in the optimized version of the Program, minus liabilities, exceeds the gross profit of the original version of the Program.

CONCLUSION

The chemical complex is one of the priority sectors of the Russian economic development. The current government long-term strategies for petrochemical and chemical industries, albeit with a lag behind the deadlines, are still moving towards the set goals. At the end of 2020, SIBUR Group launched the «Zapsibneftekhim» Megaproject for the production of large-tonnage mass-use polymers (i.e. polyethylene and polypropylene). This made it possible for the near future to almost completely substitute import of these products and to increase exports.

At the same time, monitoring of the actual governmental measures for development of the Russian chemical complex revealed the following significant negative aspects. First, the deadlines of many investment projects are not met. Secondly, individual facilities are put into operation, and not their interconnected chains, which contribute to the growth of the value added. Third, we observe chronic lack of financial resources.

The methodology of economic and mathematical modeling and computer experimentation, proposed in this article, allows more effectively using the financial capabilities of the national budget, private entrepreneurs, credit institutions, as well as reinvested profit from the Program's investment projects.

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Оптимизация консолидированного бюджета программы развития многоотраслевого комплекса

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Аннотация. В ситуации экономического спада, осложненного пандемией COVID-19, охватившей многие страны мира, включая Россию, необходимо выбрать пути, позволяющие обеспечить более или менее устойчивый рост экономики. Анализируется современное состояние химического комплекса России. Обоснован выбор химического комплекса в качестве одного из приоритетных направлений развития экономики России. Предлагается условная долгосрочная Программа развития российского химического комплекса, учитывающая недостатки фрагментарных правительственных мероприятий по развитию входящих в него отраслей химической и нефтегазохимической промышленности. Утверждается, что реализация указанной Программы позволит нарастить внутреннее предложение углеводородной продукции высокого передела, в целом содействуя сокращению сырьевой части российского экспорта. В развитие предложений авторов об оптимизации программы развития крупного промышленного комплекса в условиях ограниченных ресурсов предложен подход к выбору оптимального сочетания таких источников финансирования, как средства государственного бюджета, средства предпринимателей, долгосрочный кредит, а также реинвестированная прибыль, получаемая от реализации инвестиционных проектов, участвующих в такой программе. Представлены результаты экспериментальных расчетов варианта данной Программы с оптимальным сочетанием источников финансирования, позволяющим существенно улучшить ее целевые показатели, а также задействовать социально значимые низкорентабельные инвестиционные проекты малого и среднего бизнеса.

Ключевые слова: химический комплекс, инвестиционный проект, программа развития, бюджет программы, источники финансирования, реинвестиции, долгосрочный кредит, оптимизация, моделирование.

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