The Effectiveness of the Import Substitution Policy in the Oil and Gas Engineering Industry of the Russian Federation at the Present Stage

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Abstract. This article analyses the state support effectiveness in the field of the oil and gas engineering industry development at the current stage. Low competitiveness of the oil and gas equipment made in Russia has been linked to technical and economical specifics of the industry sector (high equipment capacity; low level of reliability; non-compliance with the international standards, including ecological standards; obsolete design and non-compliance with the ergonomics standards; virtual absence of customer service system; frequent shipment delays and failure to ensure shipment completeness; lack of client awareness of output products and their characteristics), as well as current situation in related industries, such as metallurgical industry. The author highlights the key issues in the development of this sector, including those inherited from the Soviet time, analyses the main goals of the import substitution policy implementation in the leading technological areas of oil and gas engineering development.

1. Introduction

Oil and gas, energy engineering industry is a flagship of scientific and technological development for every oil-producing country. Oil and gas engineering industry market, that has been one of the key oil and gas industry segments, defining and shaping main direction of development, was estimated at USD 168 billion in 2015 with the forecast growth to USD 205 billion by 2020.

Despite the fact that the oil and gas engineering industry has existed already for almost 90 years in Russia, the level of locally built oil and gas equipment supply for Russian customers is really low. Part of the reason for this is that main industry development issues were formed in the soviet period, but still have not been resolved at the current stage: a significant deterioration of main production assets makes it impossible for the businesses to manufacture high quality products. As a result, they manufacture products with low competitiveness which then leads to low sales records and lack of the working capital, in which case it becomes difficult to invest into required equipment and technology upgrades. Loans for Russian companies are almost inaccessible without state support (especially for small and medium-sized businesses). And investors are reluctant to invest into projects without state support due to long return of investment and high material and capital consumption. This results in a lack of opportunities not only for innovative performance, but also even for maintaining the present output growth. [1]
Lack of sufficient technology commercialization expertise in both project organizations and the business itself hinders the industry development even more: it is impossible to analyze different technologies, take their implementation specifics into account while developing business strategies, and to put them into practice.

2. Materials and methods
An analysis of the regulatory framework for the development of the industry and statistical data of federal executive bodies, including the Ministry of Industry of the Russian Federation, reflecting key economic indicators of the work of industry enterprises, became the methodological basis for assessing the effectiveness of the development of production of oil and gas equipment in Russia in the context of the implementation of the import substitution policy. These included: the number of enterprises, production volumes, export volumes by various types of production and various regions.

There are a few stages in the Russian oil and gas engineering development during the post-soviet time. One of the most obvious indicators of the change of stages was the number of enterprises put on tax accounting (Figure 1)

![Figure 1. Number of oil and gas engineering companies created in Russian Federation (1992-2017). Source: this chart is made by the author in accordance with the data from the Ministry of Industry and Trade of the Russian Federation [2].](image)

In 1991-1998, at the stage of formation of the industry in changing geopolitical, regulatory, financial, organizational and economic conditions, the development of oil and gas engineering in Russia was associated with a number of problems that arose in the Soviet period. On the one hand, in the conditions of the loss of key areas of oil and gas engineering, own capacities were sorely lacking, and on the other hand, the produced oil and gas equipment did not meet the quality requirements of mining companies. The development of the industry in the context of growing energy consumption. After the peak of the fall in 1995-1998. and default of 1998, the output of enterprises of the domestic engineering complex, including oil and gas engineering, began to grow. The main factors contributing to this increase in production were: the development of import substitution processes (due to the devaluation of the ruble and the switching of demand from imported to cheaper products of domestic manufacturers), the adaptation of machine-building enterprises to market conditions, work to optimize capacities, and legislative and executive authorities to streamline taxation, including a reduction in tax rates.

The increase in energy prices, which ensured an increase in the income of Russian oil and gas companies and, accordingly, an increase in demand for oil and gas equipment, led to the fact that oil and gas engineering enterprises turned out to be leaders in the domestic engineering complex in terms of production growth rates. In the period from 1999 to 2001, a number of Russian manufacturers of oil
and gas equipment increased production several times. Then, starting in 2002, the effect of import substitution was gradually leveled, and the favorable period of growth of the industry, which lasted three years, ended. The decline in production has begun. As a result, a large group of domestic enterprises focused on the production of oil and gas equipment was again in a crisis state.

One of the main reasons for this situation was the strategy in the domestic oilfield services market of the largest oil and gas producers in Russia, whose annual market capacity in 2007 was estimated at $10 billion with an annual growth of about 20% (excluding the construction of pipelines and the production of oil and gas equipment). The main direction of the transformation of the oilfield services market in the country was the disposal of large oil and gas companies from non-core service assets, as a result of which foreign companies absorbed the most efficient enterprises.

In 2004-2005 the growing increase in oil prices on world markets has again led to a revival of the situation in the production of oil and gas equipment, the growth in some segments of which in 2005-2008 amounted to tens of percent.

In 2008-2014 development of the industry in the context of declining demand from oil and gas producers, caused by the financial and economic crisis and falling hydrocarbon prices. Due to the sharp drop in oil and gas prices caused by the global financial and economic crisis of 2008, there was a reduction in demand for oil and gas equipment from the largest oil and gas companies [3]. As a result, according to the Union of Oil and Gas Equipment Manufacturers, for the first 6 months of 2009, production of the main types of equipment decreased by 30%.

3. Discussion
By 2014 the dependence of Russian oil and gas producers on foreign equipment accounted for more than 60% (on high-pressure pumps – 80%, oil and gas well equipment – up to 77%, services – 67%, software – up to 100%). German, Swiss and US companies supplied Russian market with 30% to 100% of downhole equipment; US, British, French, German and Austrian companies were supplying with 70% to 100% of energy production equipment, and US software accounted for up to 100% on the oil and gas production market. Almost all gas-conditioning equipment was of a Canadian origin, and 85% of compressors were exported from the USA and Germany [4]. By 2017 the dependence on foreign equipment had reduced to 52%. Market growth rate in various industry segments (from 4% to 14%) were significantly higher than the average growth rate in the Russian industry (around 1%).

Almost 4 years of sanctions on Russian Federation imposed by Western countries in 2014 have resulted in localization of production and substantial growth in oil and gas engineering industry in Russia. From 2014 to 2017 the market size of oil and gas equipment engineering in Russia increased by almost 8%, and production output increased by more than 23%. 2015 saw the highest growth rates: 5.78% and 11.3% respectively. But even such strong growth was significantly lower than the inflation rate (almost 13% in 2015) which almost leveled out such growth.

From 2014 there were implemented more than a few dozens of investment projects in gas and oil engineering as a part of the action plan for import substitution in oil-and-gas engineering industry of the Russian Federation (the order of the Minister of Industry and Trade of the Russian Federation №645 dated March 31, 2015). The key goal of the import substitution program was to reduce the import of foreign equipment for oil and gas industry from 60% to 43% by 2020.

Production localization in Russia resulted in a significantly wider product range which then led to a decline in conventional equipment share in the production structure. If in 2014 the share of oil drilling and exploitation equipment accounted for nearly 25% of all Russian oil and gas engineering industry, in 2017 it was less than 22%. The share of export in aggregate Russian output continues to grow: if in 2014 the oil and gas engineering companies supplied 8% of their manufactured equipment to the global market, in 2017 they supplied 10.5%. But the total export volume in USD remains unchanged and is around USD 0.4 billion per annum. By 2015 the oil and gas engineering industry in Russia has basically gained back its potential that it has lost in the early 1990s.

But it was mainly related to resource-intensive equipment (pipes, drilling rigs, pumps etc) that was able to compete with European and Chinese manufacturers on the global market. Thus far Russian
manufacturers have managed to provide 80-95% of the equipment for the needs of Russian oil and gas producers in the passive equipment (material intensive equipment). But the dependence of innovative active equipment production (such as drilling process control and exploration systems) on foreign components remains high (around 30-40%). It is particularly difficult in the offshore gas and oil fields in the Arctic where producers tend to choose foreign equipment at almost all stages of production [5]. Current technological gap required extensive financial, institutional, organizational, and informational support (firstly in R&D, innovative technologies and professional training areas).

4. Conclusion
Despite the fact that certain activities to substitute foreign equipment by high quality Russian equivalents has been constantly implemented for the last 10 years, the financial support for such projects was intermittent and sporadic, and import substitution became a government policy only in 2014 after Western countries imposed financial and economic sanctions on Russia [6]. Government import substitution policy was designed based on three time periods: short-term (2015-2016), medium-term (2017-2018), long-term (2019-2020). The plan for each period was to take into consideration certain priority technologies: hydraulic fracturing technology, well completion systems and equipment tracking technologies in short-term period; issues of integrated service in well drilling in medium-term period. For the long-term period the plan is to fully master the technology and equipment for offshore oil and gas wells exploitation, in particular in the Russian region of Arctic [7].

In the import substitution policy in the oil and gas engineering industry that has been implemented by the government of the Russian federation since 2015 there were ambitious goals set to manufacture enough products to cover 70-80% of the domestic demand for oil and gas equipment. More than 50% of various oil and gas equipment (26 items), that was to be produced locally as a part of the sectoral plan for import substitution, was expected to be replaced within 2-3 years [8, 9]. As a result import share in oil and gas equipment purchases has significantly decreased over the analyzed period, but still amounts to around 50% according to the informational and analytical agency Neftegaz (a joint project of national oil and gas forum and exhibition Neftegaz) (Table 1).

### Table 1. Import share in various technological sectors of the oil and gas engineering industry in the Russian Federation.

| Technological area                                      | 2014 | 2018  | 2020* | 2024** |
|--------------------------------------------------------|------|-------|-------|--------|
| Technologies, equipment and service in well exploitation, enhanced oil recovery | 67-95 | 55-85 | 50-80 | 25-30  |
| Equipment and technologies of slant, horizontal and multilateral well drilling | 60-83 | 50-70 | 45-60 | 15-35  |
| Gas to liquids technology                              | 50-100 | 55-95 | 40-80 | 30-75  |
| Hydrocarbon refining technologies and equipment for oil and gas transportation | 40-90 | 50-70 | 30-70 | 20-40  |
| Technologies and equipment for exploration             | 30-80 | 40-45 | 20-65 | 5-30   |
| Technologies and equipment for exploration             | 40-85 | 50-65 | 30-70 | 20-25  |

* - Action plan for import substitution in the oil and gas engineering sector, 2015
** - Action plan for import substitution in the oil and gas engineering sector, 2019

The table is made by the author based on the data from the Ministry of Industry and Trade of the Russian Federation and the informational and analytical agency Neftegaz [10]

At the same from 2014 Russian manufacturers, while increasing output rates, still cover not more than a half of all local market needs. Thus, the share of imported insulated tanks for liquefied natural gas (LNG), air cooler heat exchangers, liquid expander generators still accounts to 90%. [11]
Meanwhile, spiral heat exchangers for medium- and large-tonnage LNG production are still not manufactured in Russia.

5. Results
Further increase in state measures effectiveness should be linked to intensifying measures for customs and tariffs regulation, including collaboration with the FAS (Federal Antimonopoly Service) in import substitution policy implementation; to implementing staff training and retraining programs for the oil and gas engineering companies; to developing co-financing tools for projects dedicated to priority technologies development and implementation in gas and oil industry and exploration in the short and long terms, and to promoting competition among gas and oil equipment manufacturers in Russia [12, 13].

The main reason for low efficiency of the action plan for import substitution is lack of indigenous technological designs in the industry due to low interaction between the state, business and scientists (universities). New technologies development, as well as upgrading of the existing ones requires considerable investments of money, time and highly qualified labour force. [14]

We see the most effective collaboration happening within technological partnerships, and this will enable not only commercialize scientific and technological developments, but also increase the efficiency of scientific application, reduce dependence on foreign equipment, which will eventually result in higher economic and energy security in oil and gas complex.

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