Management of Technological Component in Development Programs of the Russian Arctic Zone

N.I. Komkov and N.N. Bondareva

Russian Federation, Institute of Economic Forecasting, Russian Academy of Sciences, Nakhimovsky Prospekt, 47, 117418, Moscow, Russian Federation (RF), Natalia N. Bondareva, corresponding author, bonna2005@mail.ru

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Abstract. The study defines the program-targeted and project approach to Russian Arctic strategy management to Arctic complex as a large system of tasks and challenges in the unstable and high-risk environment. Characteristic of current conditions (sanctions), preventing Russia from reaching the economy 4.0 level via national projects of digitalization and import substitution are given as well as Russia’s technological partners, including China. It is proposed to define Arctic zone projects: on the targeting basis - as a set of global, regional and national goals and social tasks, and on the content basis - as a set of consulting, technological and infrastructure solutions. Sources of innovation, Arctic trending forecast, a role of Russia as a producer of exclusive goods from scratch (icebreakers) have been revealed. Also the 22 flagship technological projects in Russian Arctic of 2019, including AI projects, collected by the authors are analyzed as a big system. The illustration of revolutionary technological leap from automation to artificial intellect level through adaptation of the existing military and civil technologies to Russian Arctic’s needs is given. The study shows how important today is not only to be the Arctic experts but Arctic creators and educators with eco-philosophy, based on global collaboration and responsibility for global ecology. Arctic insurance business is forecasted as a new trend. The levels of project subordination and reasons for Russia’s linking to the long-term technological chains without an international labor division have been identified, including the situations when the dependence on imported technologies have been reduced. The methods of creating conditions for technological breakthrough are proposed, including the non-anchor (non-sanctions) approaches.

1. Introduction

The aim of the study is to develop, on the basis of an analysis of the socio-economic and technological current and future status of the Russian Arctic region and the global challenges, the peculiarities and trends of the Arctic project management taking into the account resources, ecosystems, modern forms and methods of public regulation of the processes of improving the situation in the Russian Arctic. The study analyses how more effective to use Arctic resource base...
for Russian economy benefit, the international cooperation and peace. Also the study examines the Russian business, private initiative and state corporations’ contribution into the different levels of the national Arctic strategies.

*The subject* of the study is the technological development of Russian Arctic Zone. The *object* of the study is a choice of the most effective methodological approaches to the Arctic technological project realization under the sanction pressure.

**Analysis of the problem studied**

The problem of Arctic (Polar) technology management remains important. The theoretical problems of interrelationships of economy, technology, safety, society and ecology were considered in the works of scientists-economists J. Forrester [1], D. Meadows and coauthors [2], Taylor F.W. [3], Conley H., Kraut J.U.S. [4], Dawson. J. [5], Ivantser V. V., Porfirov B. N., Leksin V. N., Arkticheskii [6], Didenko N.I. [7], Komkov N.I. [8] and Vladimir Kvint [9]. In 2015 Vladimir Kvint opened a new era in the global market analysis. His approaches can be applied to successful Arctic management and development of the Arctic business road maps.

Fundamentals of the Russian Federation policy in the Arctic are the following documents:

1) “The Strategy of Development of the Arctic Zone of the Russian Federation and Ensuring National Security Until 2020” of February 20, 2013;
2) “The Comprehensive Plan of Upgrade and Expansion of Trunk Infrastructure Until 2024”;
3) “The Decree of the Russian President of October 10, 2019 No. 490 “About the Development of Artificial Intelligence in the Russian Federation” [10], adopted in October, 2019.

It is projected that the total volume of investments into the Arctic will make 5.5 trillion rubles till the year 2024. So, till year 2050 the current investment programs will reach 13.5 trillion rubles, of which 12.6 trillion rubles will come from the non-budgetary sources. However, there is a vivid shortage of funds for the stated purposes. Also, the elimination of accumulated environmental damage in the Arctic by the army, state corporations and volunteers is critical, regarding the fact that 4.5 thousand tons of scrap metal were removed from the Russian Arctic in 2019.

In general, now more than 160 investment projects of different forms of ownership have been implementing in Russian Arctic, of which 90% of their budget have been spent on the development of transport infrastructure, energy, mining, processing industry and shipbuilding. Those projects are really needed because the Russian Arctic population have decreased in 300,000 people during the period of 2004-2019. It should be noted that 10% of GDP of Russia is formed by the Arctic gas and oil mining. So the Russian Government’s task consisting in creation of 200,000 new jobs and 100 new projects in the Russian Arctic by 2035 can be seen as a big challenge. The reasons for the non-achieving the plan can include a low human life length in Arctic due to the hard climate and non-effective Arctic economy support model. [11].
It should be noted that the Russian Federation, in the context of the global economy growth to 4.0 level due to digitalization projects which accelerate import substitution, has been carrying out a revolutionary technological leap from automation level to artificial intellect level. In some fields Russia is bypassing intermediate stages due to an adaptation of the existing military and civil technologies to the Arctic needs, robot and additive technologies introduction (3D printing). In Russia only the competitive companies with innovative technologies of 4.0 economy level which are integrating into national needs and social responsibility can be able to rationalize the volume of extraction of natural resources in the Russian Arctic. They can take benefits of new complex formats of non-sanctions free international cooperation, including the Northern Sea Route [12], [13], [14].

Apparently, the Arctic huge reserves allow “Rosneft” to increase its annual hydrocarbon production by 50 percent by 2025. Besides, “The North Atlantic Drilling Ltd”, “General Electric” and many international companies are interested in Russian Arctic projects. The “Expert Center”, “Arctic Union”, “The Project Office for Arctic Development”, “Association of National Arctic Scientific and Educational Consortium” and many organizations are established to support young scientists and hundreds of projects for the Russian Arctic Zone.

It is assumed, the Arctic projects are becoming a catalyst for important changes in the largest Russian oil and gas and infrastructure companies. They will have to be transformed into the some types of the national service incubators. This type of a technological hub links technology with such industries as electricity, mechanical engineering and transport.

The effective management in nuclear engineering, defense sector, space and mining industries allows the Russian Federation to combine the status of a technological and agricultural power, a world mining sector leader due to its historically strong scientific school and a new vision of its technological development. However, the Russian market can be characterized as the unsaturated one with lack of commercialized innovations and a low demand for artificial intellect from business and society.

The market needs investment for the national projects. All these factors slow down the Russian Arctic development. By producing the exclusive goods from a scratch (including ice breakers) under sanctions terms and mostly seized from the international labor division, Russia is trying to insert its potential into the international long-term technological chains and local regional projects (Africa, Latin America). But it is hard to be effective in the undeveloped Russian standardization and certification market, which is being developed apart from the global certification and patent law.

The “Diversification Program of Defense and Industrial Complex” and “The Components’ Development Program” in the framework of the Industrial Development Fund (set in 2017) have become very progressive measures of public support. The Fund had invested 40 billion rubles into 160 import-substituting projects, which helped to increase the business localization level. The introduction of the industrial outsourcing principles (80,000 high-precision machines had been purchased by Russian enterprises during last 5 years) involves the national production potential into the civil plans’ solution to benefit
the Arctic zone. Methods of diversification of industrial defense complex (machinery, pharmaceuticals and electronics) and innovate Arctic marketing can be used to reach the 4.0 economy level. Strategic and tactical, purpose-orientated and project-orientated management of ecological, social, economic and security tasks along with the effective technological component management based on the best world experience and in the framework of international collaboration should be seen as the essence of innovative Arctic marketing of Economy 4.0 level [15].

The self-sustaining sub-program on creation of the equipment and technologies for oil, gas and mechanical mining engineering is aimed at developing the Russian Arctic till year 2020. The total cost is 23.7 billion of budget rubles and 11.7 billion rubles of non-budgetary sources. The accurate mechanism of manufacturing equipment subsidies is applied. Due to the self-sufficiency of the program 51.7 billion rubles of return contributions will be returned to the Russian budget and non-budgetary funds.

The mentioned above sub-program will partially liquidate the current 80% dependence of Russian mining and oil and gas sectors on import equipment and its 90% dependence on the software. Also it will reduce the risks of data leakage. Besides it will help to substitute the import of almost totally lacking modern technologies for new Arctic resources search and investigations.

It should be noticed that in the power engineering, electro-technical and cable industries, the indicator of Russia’s dependence on import is lower and constitutes 25.7%, but in the naval seismic exploration and 3D - investigations field Russia really lags behind the world level (with an exception of “SevMorGeo” and “GeoTech” belonging to “RosGeo”). The problems of Russia’s continental shelf borders, the catastrophic phenomena and ecological situation forecast in the Arctic are critical due to the lack of technologies. Collaboration with the circumpolar countries can have a positive impact for the coming technological breakthrough in Russia.

Long technological lag stops Russia from the full-scale exploration on the Arctic shelf. We forecast that it will start after 2025-2030, after years of the active accumulation of critical mass in IT-competences and artificial intellect all-round introduction. So Russia’s technological breakthrough is being forecasted after 2035.

The urgent replacement of Russian obsolete drilling fleet by 40%, an introduction of new 1000 wells until year 2020, drilling of 51 shelf wells (2/3 of them are the searching wells) according to the given before licenses, passing with 2D-seismic 193,000 linear km and 39,000 km with 3D-seismic can be seen as the impossible for the realization tasks under the current sanctions in Russia.

China cannot sell the full range of spare parts for drilling equipment and offer a full cycle of drilling operations to Russia. The localization of oil service partner corporations in Russia is hard to achieve, because they (“Halliburton”, “Schlumberger”, “Baker Hughes” and “Weatherford International, Ltd”) are registered in the USA and Europe. The reasons also include a lack of personnel, new field decisions and Russia’s dependence on whole technological units from import.
The growing demand for Arctic robots in the Russian Federation (“Gazprom” is interested in robots to service the drilling wells on the shelf at a depth of up to 500 m) is still being replaced by the old ship-based television-controlled vehicles due to the economic inefficiency of the available technologies.

In 2016 there were 39 industrial clusters in 27 Russian regions with 1330 industrial enterprises and 616,000 workers. The mentioned companies have already achieved 20% production cooperation level. The distinctive feature of the joint projects of Russian industrial clusters is that they often simultaneously represent the definite industrial sector’s plans on import substitution. This multi-purpose benefit management approach is especially important in the long-term sanctions period aimed at limiting foreign technologies from using in Russian Arctic. Besides, the ecological problems in Arctic cannot be set without the effective management instruments and global innovative technologies. Eco-philosophy is a new approach in Arctic management. It will become the essence of economy 4.0 in Russia. Eco-energy production, responsible eco-consumption and climate change challenge must become the core spheres of global education transformation [16].

The task of Arctic management is to valorize the technologies implemented into the national projects into the vivid all-national and long-term benefits. Knowledge (technology) valorization is the transformation of knowledge (technology) into economic and social benefits through targeted actions, usually due to the government support (government interventions, investments). Eco-technologies and health-saving technologies must become the essence of the national projects in Russia.

2. Methods of research

This study was carried out using the method of systemic, complex analysis, methods of scientific abstraction, formal logic (induction and derivation), classification and simulation of reproductive processes, evolutionary approach, and empirical methods of economic research. The study uses thematic, statistic materials and open sources of governmental and business information.

3. Results

Representation

The analysis of the new Arctic technological trends and sector scale analysis, analysis of decision-making on innovations for Arctic needs within the framework of technological and national projects in the Russian Arctic (Table 1) has been carried out.

Table 1. Flagman Technological Projects of Russian Companies in Arctic (2019)

| Project Name | Company Name |
|--------------|--------------|
| 1. Installation of a network of seismic sensors for prediction of new funnel and gas emissions. Yamal. | Interregional Expedition Center “Arctic”, United Geophysical Service of the RAS. |
| 2. Joint Russian –French summer researches of | Tomsk University, |
|   |   |   |
|---|---|---|
| 1. | Studies of permafrost, the tundra feeding base for deer, the population of polar bears and other animals and birds. Yamal. | “BioKlimLand”, Midi-Périnese Observatory of the National Center for Scientific Researches of France (Tuluza) |
| 2. | Supply of import substituting components to “Prirazlomnaya” plant. Pechora Sea. | Interregional Expedition Center |
| 3. | Development of Arctic version of L-410 aircraft with ski landing gear. | Urals Plant of Civil Aviation. |
| 4. | Creation of mobile drilling rigs of up to 3 km depth type. 2018. | “Kungursk Machine-Building Plant”, Perm region. |
| 5. | Opening of plant of “Volga” type drilling rigs production with a loading capacity of 320 tons. 2015. | “Kostroma” Vogorechensk (Kostroma region). |
| 6. | Production of reagents for drilling fluids, including lubricants, emulsifiers for reverse emulsions. Capacities allow the production of up to 30 tons of products per day. 2016. | “Scientific and Production Company “ReaSib”, Tomsk region. |
| 7. | High speed rotator with through spindle for ZBO S15 has been launched. 2019. | Orenburg Plant of Drilling Equipment. |
| 8. | Development of Arctic robots including an anthropomorphic model for dealing with atomic waste. 2017. | “Android Technology”, Central Research and Development Institute of Robotics and Technical Cybernetics, “Enterprise for Radioactive Waste Management” of “RosRAO” |
| 9. | Development of robots for rescue operations in the Arctic. 2018-2020. | Central Scientific – Research Institute of the Ministry of Risk and Emergency Situations. |
| 10. | The energy efficient technology of liquefaction of “Arctic Cascade” natural gas field due to the maximum use of the Arctic climate was created and patented with the expected use of Russian vendors’ equipment in 2019. | “NOVATEK” company |
| 11. | Construction of Pavlovsky zinc and lead mining and processing integrated plant on the New Earth. Investment constitutes 27 billion rubles. Projected capacity of the new plant is 220 thousand tons of zinc and 50 thousand tons of lead concentrates and 16 tons of silver a year. Construction of a port in 2021-2022. | “Rosatom”, “Atomredmetzoloto”, “Rosatomflot” and managing company “Vostokugol”. |
|   |   |   |
|---|---|---|
| **14.** | Creation of "Arctic Scientific and Design Center of Shelf Developments, LTD" according to ISO 9001 standard in 2018. | National Company “Rosneft” |
| **15.** | Localization of production of equipment, pipelines and large-volume modules of condensed natural gas plants in the Russian Federation, including that one made of new domestic steel brands in 2019. | “Atomenergomash”, “NOVATEK” |
| **16.** | Construction of three (one-head and two-serial) universal nuclear ice breakers of Project 22220. | Baltic Plant, “Afrikantov Experimental Design Office” (Nizhny Novgorod) |
| **17.** | Development of subsea modular plant for subsea exploration and extraction of various organic raw materials. | “Afrikantov Experimental Design office” (Nizhny Novgorod), Fund of Perspective Researches, “Rubin” Central Experimental Design Office. |
| **18.** | The project of the autonomous nuclear power plant “Aisberg” for underwater and sub-ice drilling complexes for energy supply for drilling and mining complexes with capacity of 8-25 mw (30 year-service period). | “Afrikantov Experimental Design Office” (Nizhny Novgorod) |
| **19.** | Development of digital-projects with artificial intellect for gas-working facilities (floating nuclear power plants), control system on the basis of fuzzy logic and mathematics. Development of smart systems to detect hydrates in pipelines and networks to prevent accidents in 2019. | “Gazprom Mining Yamburg, LTD” (Yamal-Nenets Region) |
| **20.** | First Floating Nuclear Thermal Power Plant (PATES) Project with a capacity of 70 mw in 2019. | “Rosaenergoatom” |
| **21.** | Development of unmanned commercial vehicles in 2020. | “Volgabus” |
| **22.** | Development of smart greenhouse technology of hydroponics vegetables growing in Arctic in 2018. | Tomsk Polytechnical University, “iFarm”. |

Produced by authors on the basis of the open information sources.

The study discovers a wide range of really highly technological business that can be the basis for new economy knowledge accumulation and eco-philosophy implementation in Russia. At the same time the problem of lack of innovation demand from SME exists. The limited off-line access of SME to development of Arctic mineral and raw centers is compensated by active SME attraction to R&D platforms and on-line idea generation, including forums and Arctic competence training opportunities, tourism, Arctic agriculture, local business supply, and ecological projects [17].
The express analysis shows the mass appearance of dozens of new participants in the Arctic market. Their interests lie in the field of export-oriented high technologies for the Arctic needs to get quick and big revenues. The dominant number of projects is implemented in the field of transport infrastructure, robotics, resource extraction and import substitution. Steady interest and preservation of scientific and cooperative ties with foreign partners despite sanctions, preservation of continuity of scientific approaches to Arctic R & D, accumulation of field scientific and production potential for independent launch of the Russian Arctic trends are proved in the study [18].

The reasons for changing the circle of Russia’s technological partners due to the sanctions and the format of partners’ interaction are stated. Thus, the South Korea will participate in “NOVATEK” Arctic “LNG-2” natural gas liquefaction project. “Total S.A Corporation” bought 10% of Arctic “LNG-2” at $2.6 billion from “NOVATEK”. This deal has made it easier for foreign investors to enter the project (it will start in 2022) and to get the formal protection against the sanctions. At the same time, Russia supports Arctic “LNG-2” via the construction of ice breakers. Thus, in 2018 “NOVATEK” agreed to cooperate (via the value chain) with “Marubeni”, “Mitsubishi” and “Mitsubishi” companies/ It signed an agreement with the “Chinese National Petroleum Company” (“CNPC”). Now “CNPC” controls 20% of the “Yamal LNG project”. Also other partners include “CNOOC Limited” (10%), “Japan Arctic LNG”, Consortium “Mitsui & Co” and “JOGMEC” (10%). Soon “NOVATEK” will launch the “Arctic LNG Project-3”.

“Rosatom Corporation” in the Russian Arctic provides the power supply to Arctic regions (Bilibin Atomic Station). It is done with the help of nuclear ice breakers, which carry out all the ships in the Northern Sea Route. Also it controls the radiation situation in the region. Its projects are included in the governmental program within the framework of the “Federal Target Program on Nuclear and Radiation Safety”.

We see the transformation of minds into the eco-oriented philosophy as the only way to save the Arctic. In Russia there are several communities of Arctic experts, but it is obvious that Russia needs the global and national ecologically responsible communities of Arctic technology creators, innovators and educators. It will need really new approaches to the training of such future Arctic developers.

The technological component of the project should consider the Arctic as a complex of tasks and challenges, a large system in the unstable and high-risk environment. It is advisable to take into account the following: budget of expenses, royalties (revenues) from operation of intellectual property (IP), Arctic marketing (clients, markets and consumers), and promotion of protected IP facilities, strategy, engineering, technologies, processes, personnel and planning. At the same time, the main component of projects for Russian Arctic needs is the innovative technology itself and the means and ways of technology consumption. Eco-philosophy must become the major vision and platform for the national projects in the situation of influence of gas and oil production on climate and ecology [19].

Subordinated public administration of projects of the Russian Arctic remains the same, that is the traditionally directive one (Table 2).

Table 2. Levels of Subordination of the Russian Arctic Projects
Levels of Planning

1. The Comprehensive Plan containing the levels:
2. Projects of the Northern Sea Route
3. Federal projects
4. Passports of projects of the Northern Sea Route
5. Detailed plans of implementation

In modern conditions the historically-based strict directivity policy must be changed to benefit the planned results of projects. At the same time, it is noted the growth of weakness of interregional and horizontal cooperation ties among Russian companies, the lack of regional universities offering the Arctic management programs, the reluctance of business to exchange experience and share risks.

The study reveals the main methodological approach to the development of strategic directions of state policy from the side of government and business – the program-targeted and project approach. They are enshrined in the Resolution of the Government of the Russian Federation dated of October 31, 2018 No. 1288. Thus, the Russian Federation implements:

1) National projects to be developed in accordance with the Presidential Decree No. 204 of May7, 2018 “On National Goals and Strategic Objectives for the Development of the Russian Federation up to the Year 2024”.

2) Federal projects ensuring achievement of goals, targets and tasks of national projects.
3) Regional projects.

Methodologically the functions of the federal project office are assigned to the Department of Project Activities of the Government of Russia. The “Center of Competence of Project Activity” is the Scientific and Educational Center of Project Management of the “Russian Academy of National Economy and Public Service under the President of Russia”.

The research proves that management of the technological component of the development programs of the Russian Arctic requires a full consideration of global and national conditions, markets, development tasks and challenges, investment risks and potential of the Russian Federation and its partners.

We believe that the competitive innovation environment in the period 2018-2024 has been quickly creating on the base of the Russian Federation budget, national projects funds and regional budgets, private and state partnership participants’ funds, state corporations and SME funds. The conditions of sanctions, funds deficit, innovative management shortage, technologies and experience deficit cannot add more potential advantages to future Russia’s benefits which will appear due to the climate change and total transformation of the global energy markets and international cargo transportation routes in 2025-2040.

In new less harsh conditions of the Arctic problems of Arctic agriculture and water supply from Arctic will need more research [20]. Unified standards for the Arctic R&D must be set up. Technology component must be naturally implanted into the technological chains of national projects on digitalization of the Russian economy and valorization of its collective
knowledge. We believe that the main market approach in the creation of Arctic technologies should be to focus on the criteria defining the international “ISO 9001 Standard“ as well as on the most advanced partners outside the sanctions, exclusivity of ice breaker and defense products and activation of risk management in state-and-private partnership.

Also we propose that Russia needs innovative Arctic management, *including new Arctic system maintenance, system reforms, Arctic vision building, innovative prototyping management, Arctic network creation and building of new ecosystems and thinking.*

The study forecasts that the introduction of a unified control mechanism and standards of scientific research in the Arctic and public procurements of innovative technologies in the field of horizontal well bores, unmanned geophysics, polar medicine and agricultural development in the framework of national projects will allow to avoid duplication and unsustainable spending of budget funds.

It is assumed that the main market approach in the development of Arctic technologies should be to focus on the criteria defining the international “ISO 9001 Standard”. The Standard is based on 8 principles of effective quality management: 1) Consumer orientation; 2) Leadership management; 3) Staff involvement; 4) Process approach; 5) A systematic approach to management; 6) Continuous improvement; 7) Fact-based decision-making; 8) Mutually beneficial relations with suppliers. These approaches of build-in competitiveness and patentability principles should be implemented into the technical tasks on the R&D stage of all Russian national projects, including the Arctic ones.

It is believed, the attraction of Russian and foreign investors for the development of the Russian Arctic zone is expedient under a number of important conditions [21], [22]:

1) Excluding the possibility of any damage to ecology and national security interests of Russia;

2) Effective stimulation of socio-economic development of Arctic regions;

3) Reasonable distance of Arctic projects companies from Russian government budget resources during the implementation of a number of projects in order to avoid bans and sanctions.

It is noted the expediency of adapting the experience of Asian developed countries of the economy 4.0 level, which succeeded by purchasing the global R&D in 1960-1970s. Today, under the sanctions Russia cannot buy globally R&D results for its strategic projects like Arctic, defense, artificial intellect and resource – oriented export. Only the national projects, public and private investment into the national R&D institutes can save the country from the collapse of industry science. Russia has been increasing its potential to 4.0 economy level via active import substitution and remained sources of international cooperation [23].

Reduction of the easy-access resources requires new technologies for remote mining in Russian Arctic [24]. We believe that the experience of the Norwegian Integrated Observation System (Svalbard Integrated Observation System, SIOS) can be applied in the Russian Federation. Russia is lacking international eco-oriented technological innovations to speed up its economy. But the effective all-
level control over the budget of the national projects including the Arctic budget is also a real social and political demand today.

4. Discussion

The problem of technology management is revealed in many documents of the Arctic-connected organizations, forums and in the research works of Russian scientists. The authors discuss the problem in the Institute of Economic Forecasting of the Russian Academy of Sciences, in the St. Petersburg Polytechnic Institute named after Peter the Great and other institutes.

5. Conclusion

In conclusion it is important to notice the complexity and system approach of Arctic eco-oriented management, the growing role of the state in defending national interests in joint projects with businesses, the growth of social and ecological orientation of projects and the increase of a role of legislation development to protect the interests of the Russian Federation in the world.

The sanctions against the Russian Federation have already reduced many options and chances for effective solutions for servicing oil and gas production contracts. All this has increased the cost of oil and gas production, reduced the scale of future export and profits in the forecasted future oil market of below $ 42-44 per a barrel. The current negative conditions force Russian business to compensate their current and future losses by saving on ecology and social projects. That is why eco-philosophy in Arctic must be implemented in Russian Arctic by special legislation by Government and supported by the global society.

It has been revealed that private investors are not yet ready to bear the full risks of Arctic Zone development. So a growth of Arctic insurance business, raise of public guarantees and reduction (ignoring) of environmental costs of companies are the obvious processes. It is obvious that Russia needs the global and national ecologically responsible communities of Arctic technology creators, innovators and educators.

Traditional sources of technological innovations for Arctic needs (field scientific research institutes, military industrial complex, higher education institutions, technological parks, technological clusters, industrial parks and the joint ventures) are defined. Ways of innovation consumption must be ecologically friendly. So, in 2019 in Russia 124 technological parks have been working and 111 new ones have been creating.

During the last decade R&D finance and technology commercialization for Arctic needs have been conducted on the basis of scientific and research institute’s own funds, the state budget, public funds of support and via the sponsor's national and global organizations. Also funding comes from the companies interested in R&D results at the expense of innovative development programs, in the framework of joint research and development.
In the conclusion the authors note that all Arctic projects should be developed and managed as the consulting, technological and infrastructure eco-projects. They must be rolled into a purpose–oriented complex of global, regional and national goals and social tasks. The solving of these tasks must create new Arctic trends and new businesses. All Arctic projects should get the innovative and responsible eco-oriented management in order to protect the sovereignty and effective inclusion of the Arctic Zone resources in economic life of the Russian Federation.

The study proves that conditions for a technological break have been partly created in the Russia. The active accumulation of national and international technological competences and the creation of industrial clusters often become the core parts of public projects and business industrial plans of import substitution. Russian Arctic development can bring the huge geopolitical, economic and social achievements in case of quick economy digitalization, knowledge (technologies) valorization, intellectual property commercialization and technologies transfer. The study raises the important problem of ecology safety and big resettlement campaign of 200,000 people to Russian Arctic zone due to the climate change and new projects and jobs creation by 2035.

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