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STRATEGIC DEVELOPMENT OF THE ARCTIC REGION IN THE CONTEXT OF GREAT CHALLENGES AND THREATS

The paper examines the possible concepts for developing the potential of the Russian Arctic that can be used for elaborating the regional development strategy. The research aims to analyse the opportunities and limitations of environmentally friendly, socially and economically sustainable development of the Arctic region. The multidisciplinary research methodology includes analytical, statistical and econometric methods, as well as the method of scientific synthesis. The analysis is based on the source data obtained from public sources. The study results fully confirm the hypothesis and show that, for the development of the Russian Arctic, it is inadvisable to use only the resource-rental pattern. The findings demonstrate that, in near future, the Russian Arctic will not be able to develop the research, transport and tourism sectors due to the lack of efficient logistics, adequate infrastructure and stable telecommunications. Private investors are not interested in the Arctic region, while public investment in environmentally friendly, socially and economically sustainable development is minimal. In the context of limited budgetary resources, as well as the tasks that require immediate action (e. g. recovering from the COVID-19 pandemic), the optimal solution is to restructure the activities of two natural monopolies in the region (PJSC Rosneft Oil Company and PJSC Gazprom). The research results can be used for establishing a new development strategy of the Russian Arctic. Further research should focus on methods and approaches to using modern digital technologies in the region for enabling environmentally safe, socially responsible and economically sustainable development of the Russian Arctic.

Keywords: regional economy, Arctic, ecology, economy, society, resources, rent, Northern Sea Route, tourism, strategy

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Introduction

In the context of the coronavirus pandemic, the global economic recession showed the inconsistency of the rental pattern of socio-economic development, which Russia continues to use. In conditions when hydrocarbon raw materials and fuel are losing their value as a key resource for economic growth, the problem of diversification of rental development patterns becomes more and more urgent. This decision should consider not only the mainland, but also the Arctic part of Russia. For the latter, the rent problem is an obstacle for national, geopolitical, economic and military interests, which, by and large, are opposed to global trends and ideas for the development of industrial and social development of the Arctic region.

The Arctic has accumulated three types of resources, namely, hydrocarbon, biological and transport ones; for each of them, legal and regulatory disputes have not yet been resolved, despite the establishment of a special Arctic Council. This, however, did not affect the interstate competition for legal and economic control in the region. Therefore, the issues of diversifying the development patterns of the Arctic are becoming more relevant. In this article, we will consider three concepts of developing the potential of the Russian Arctic, as well as the possibilities and limitations in each of them.

The concepts under consideration conform to the professional opinion of the President of the Russian Federation, who believes that further preservation of the rental model of the economy at the

regional and national levels is not advisable[1]. In addition, the concepts of developing the potential of the Russian Arctic proposed in the article correspond to the main provisions and directions of the Scientific and Technological Development Strategy of the Russian Federation, in particular, in the context of the possibility of «effective response of Russian society to major challenges, taking into account the interaction between man and nature, man and technology, social institutions at the present stage of global development, including using the methods of the humanities and social sciences»[2].

Materials and methods

The study uses an interdisciplinary research approach to substantiate the hypothesis. A wide range of publicly available statistical data was used as an information base. The study also used econometric methods of analysis and assessment, cluster analysis, strategic analysis PEST. Table 1 presents data for exponential and polynomial forecasting of production volumes in the Arctic.

Table 1

Hydrocarbon production in the Russian Arctic (thousand barrels of oil equivalent)*

Year	Production per day
2000	19
2005	38
2010	320
2015	592
2020	918

* Neftegaz.RU: Analitika 2020 [Neftegaz.RU: Analytics 2020]. Retrieved from: https://neftegaz.ru/analisis/ (Date of access: 12.03.2020); Rossiyskiy sovet po mezhdunarodnym delam (RSMD) [Russian International Affairs Council (RIAC)]. (2020). Razrabotka morskikh neftegazovykh resursov Arktiki. Tekushchee sostoyanie I perspektivy [Development of offshore oil and gas resources in the Arctic. Current state and perspectives]. Retrieved from: https://russiancouncil.ru/arcticoil (Date of access: 12.03.2020).

The forecast of the production of hydrocarbon resources in the Arctic using the second-degree polynomial model was:

$$\hat{y}^*_{2025} = \hat{y}^*_{2020+L} = -26,2 - 23,66 \times 643,14 \times 6^2 = 1385 \ \ thousand \ \ bar. \quad (1)$$

$$\hat{y}^*_{2030} = \hat{y}^*_{2020+L} = -26,2 - 23,66 \times 643,14 \times 7^2 = 1922 \ \ thousand \ \ bar. \quad (2)$$

$$\hat{y}^*_{2035} = \hat{y}^*_{2020+L} = -26,2 - 23,66 \times 643,14 \times 8^2 = 2546 \ \ thousand \ \ bar. \quad (3)$$

The exponential model forecast was:

$$\hat{y}^*_{2025} = 7,1049e^{1,0501 \times 6} = 3871 \ \ thousand \ \ bar. \quad (4)$$

$$\hat{y}^*_{2030} = 7,1049e^{1,0501 \times 7} = 11064 \ \ thousand \ \ bar. \quad (5)$$

$$\hat{y}^*_{2035} = 7,1049e^{1,0501 \times 8} = 31621 \ \ thousand \ \ bar. \quad (6)$$

In addition, the research used data and materials published by two major Russian companies involved in the development of the Arctic shelf: PJSC Rosneft Oil Company and PJSC Gazprom. The obtained analytical results create basic scenarios for the development of the Russian Arctic, namely, resource-rental, research and transport-tourism.

Literature and research review

Natural reserves of oil, gas, biological resources in the global Arctic are recognised as very significant. Simultaneously, there are less detected and explored reserves (primarily hydrocarbon) that are available for extraction, even though they have been known for a long time, and the importance of the Arctic and its resource and transport potential for socio-economic development has been proven

[1] Putin utverdil osnovy gospolitiki RF v Arktike do 2035 goda [Putin approved the foundations of Russian state policy in the Arctic until 2035]. (05.03.2020). Znak.com. Retrieved from: https://www.znak.com/2020–03–05/putin_utverdil_osnovy_gospolitiki_rf_v_arktike_do_2035_goda (Date of access: 29.05.2020).

[2] O Strategii nauchno-tekhnologicheskogo razvitiya Rossiyskoy Federatsii. Ukaz Prezidenta RF ot 01.12.2016 № 642 [On the Scientific and Technological Development Strategy of the Russian Federation. Executive order of the President of the Russian Federation dated 01.12.2016 № 642].

half a century ago [1]. However, due to difficult climatic conditions, relative transport inaccessibility and infrastructural underdevelopment, the resource potential of the Arctic has remained neglected for a long time.

The introduction of technologies and equipment, capable of operating for a long time in difficult climatic conditions, gave a powerful growth impulse for scientific and commercial interest in the Arctic. Largely, it was facilitated by energy crises associated with both the restriction and delivery of hydrocarbon raw materials to the world market. The need to diversify the supply of this raw material has become objective, because hydrocarbon reserves concentrated mainly in Russia and the Organization of the Petroleum Exporting Countries (OPEC) countries are used not only as an economic, but also as a political commodity. Additionally, they are used as a tool for creating and resolving geopolitical conflicts. The resource base of the Arctic is a source of competitive advantages and pressure on the world economy for those countries that have direct access to the Arctic zone [1–4]. However, the mentioned OPEC countries, the states of the Southern Sea Route, and the territories leading in the supply of fish and seafood (China, Indonesia, and India) are not interested in the development of the Arctic potential. That is why the legal and economic statuses of the Arctic are now being discussed. There can be no simple solutions here, because even in the Arctic Council the countries are fighting for the shares (territorial and commercial) of the resource potential of the Arctic [5–6].

Thus, at this point in the study, we can make the following conclusions:

1) the resource potential (hydrocarbon, biological and transport potential) of the Arctic is very significant, but still physically and economically inaccessible;

2) the lack of regulation of the legal aspects of economic management in the Arctic between the Arctic countries, as well as other states, does not allow rationalising and coordinating international scientific and economic activities in the region;

3) the technologies that can be used in the Arctic for science and development of the resource potential require additional testing and assessment of the their economic feasibility;

4) the observed climatic changes have already negatively affected the stability of the Arctic biosystem, and in the future, a catastrophic deterioration in the quality of the Arctic natural environment may occur [7–8].

It is necessary to consider these provisions when creating the concepts for developing the resource potential of the Arctic region under the jurisdiction of the Russian Federation.

Results

The resource potential of the global Arctic includes three main components: hydrocarbon potential (oil and gas reserves), biopotential (northern fish and seafood), and transport potential (the Northern Sea Route (NSR)). It is advisable to take a closer look at each component. The hydrocarbon potential of the Arctic is based on oil and gas reserves, whose territorial distribution is shown in Figure 1.

All proven oil reserves in the Arctic are approximately equal to the total onshore reserves of Russia, which will last for about a quarter of a century. This is about 4 % of the world's oil reserves, which may last for 350–400 years[3]. The share of Russia in the proven oil reserves of the Arctic is high (approximately 27 %), but almost half of these reserves is concentrated in the waters of the Beaufort Sea and the Chukchi Sea (Figure 2).

The Beaufort Sea is under the jurisdiction of Canada and the United States, between which there is an unresolved maritime dispute. The Chukchi Sea is the border between Russia (Chukotka) and the United States (Alaska). In other words, in the context of territorial and maritime disputes, the development of oil reserves in this place is hardly possible. However, by far, Russia has the largest share and the most significant amount of natural gas reserves in the global Arctic. Here, the share of Russia is almost 57 % of all proven world reserves of natural gas concentrated in the Arctic (Figure 3).

However, about a thousand times more explored and proven natural gas reserves are concentrated on the mainland of Russia, which will be enough for approximately 50 years of production, considering the growth rates achieved by 2019. Simultaneously, natural gas reserves of the Middle East are twice the volume of the Russian ones. Thus, for Russia, the extraction of hydrocarbon raw materials in the

[3] British Petroleum: Group chief economist's analysis. Oil. 2019. Retrieved from: https://www.bp.com/en/global/corporate/energyeconomics/statistical-review-of-world-energy/oil.html (Date of access 12.03.2020). British Petroleum: Group chief economist's analysis. Natural Gas. 2019. Retrieved from: https://www.bp.com/en/global/corporate/energy-economics/statistical-review-ofworld-energy/natural-gas.html (Date of access: 12.03.2020).

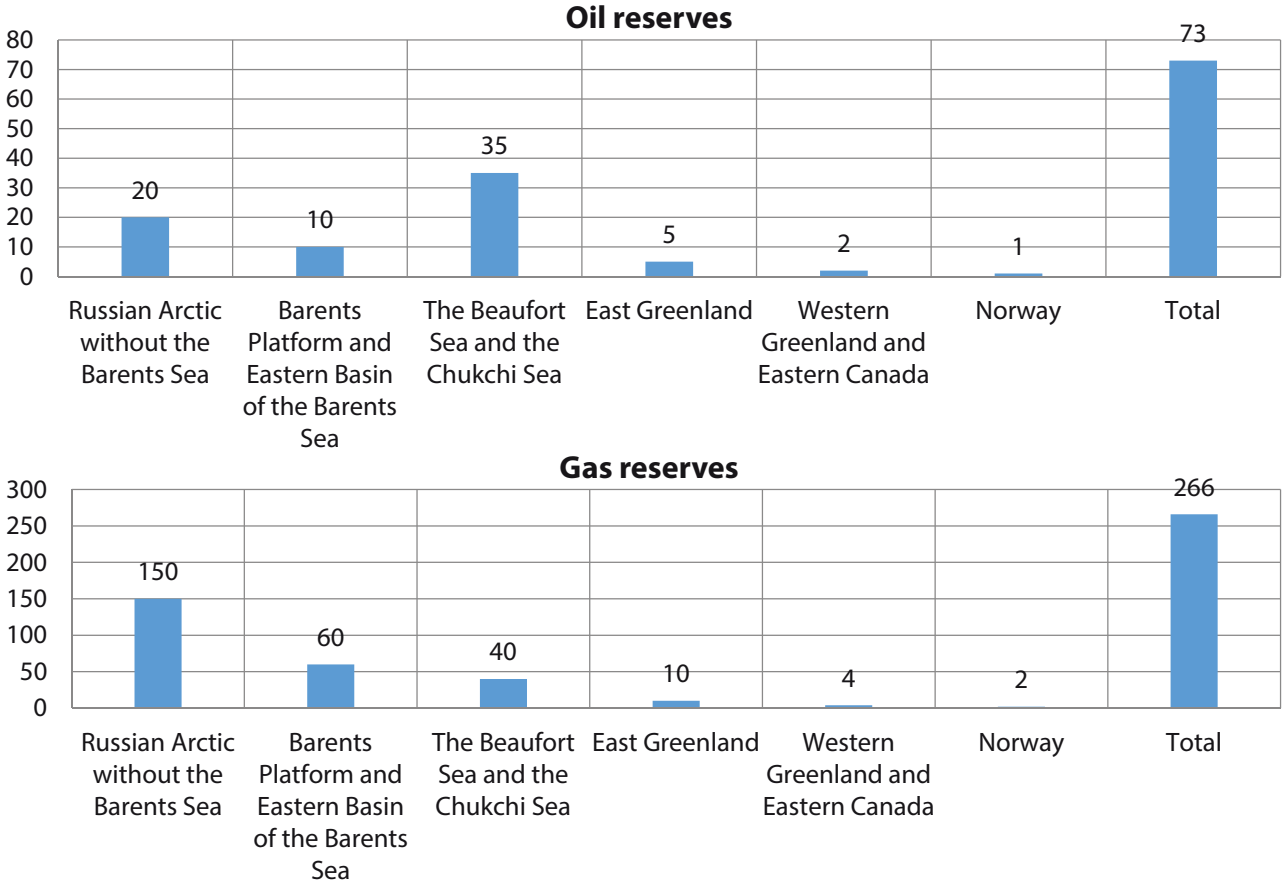


Fig. 1. *Proven oil and gas reserves in the global Arctic, billion barrels of oil equivalent [9]*

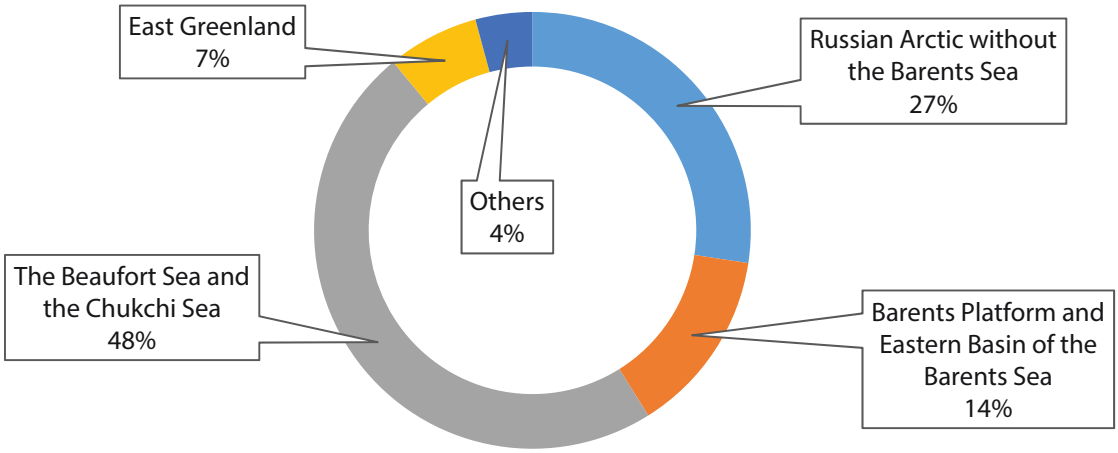


Fig. 2. *Distribution of oil on land and water areas of the global Arctic [9]*

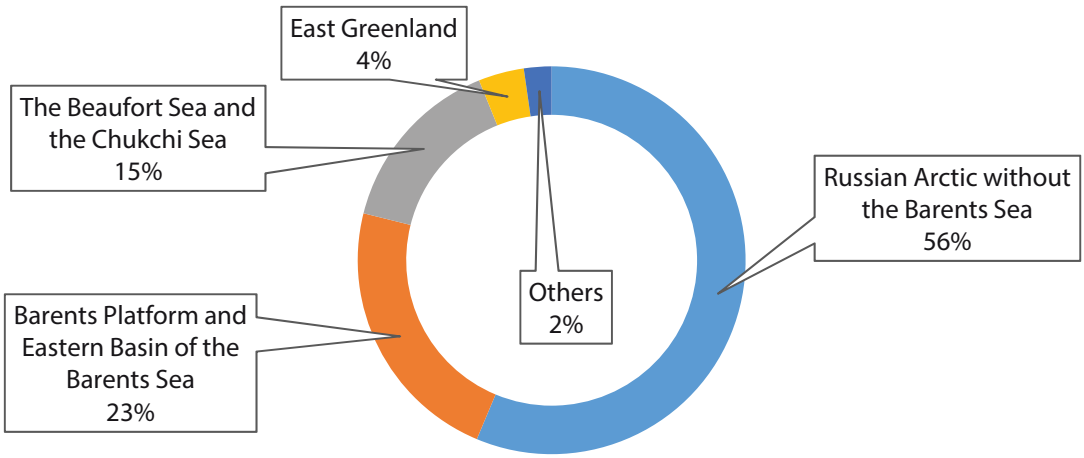


Fig. 3. *Distribution of gas on land and water areas of the global Arctic [9]*

Translation

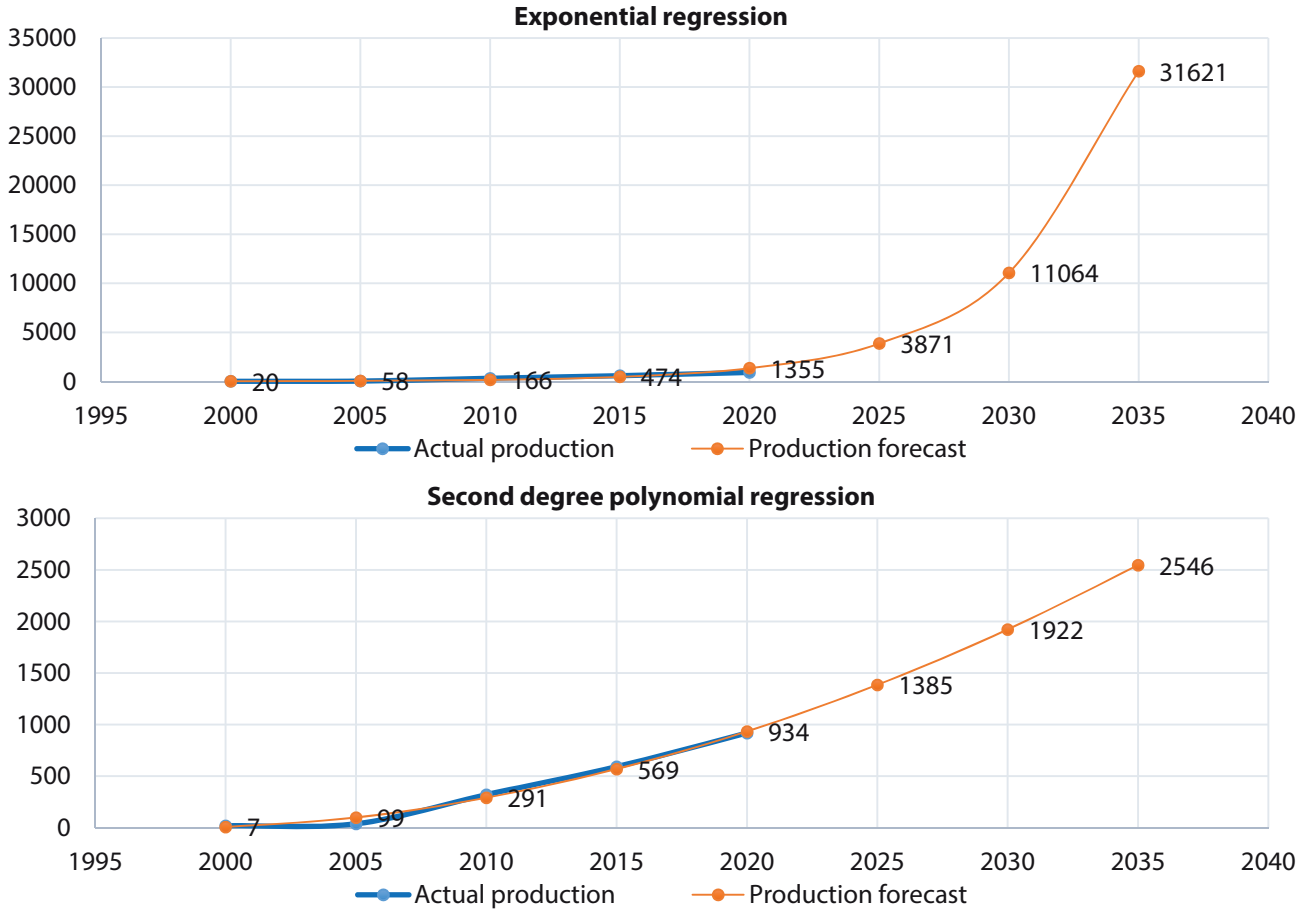
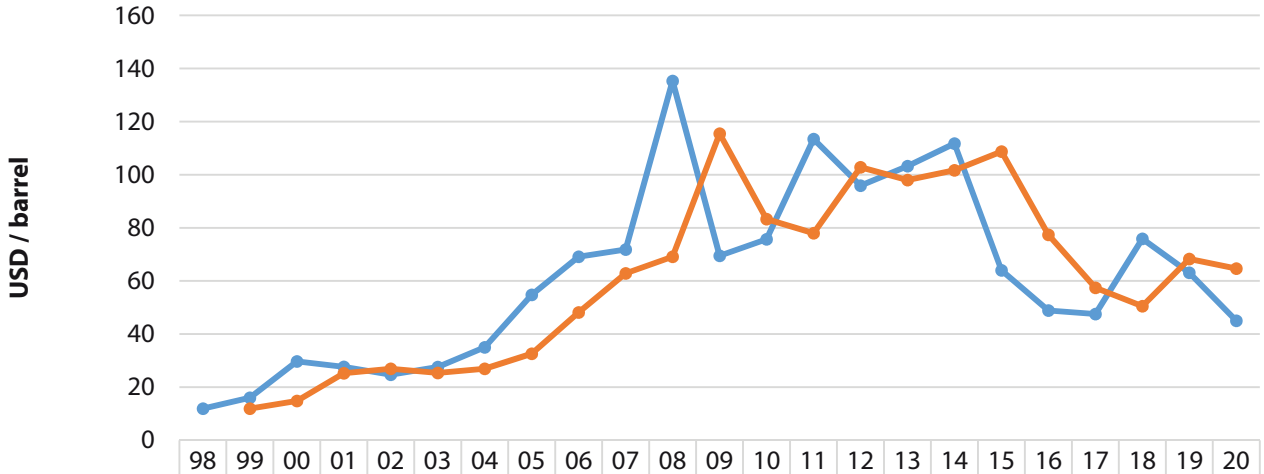


Fig. 4. *Forecast of hydrocarbon production, thousand barrels of oil equivalent (compiled by the authors based on Table 1)*

Arctic zone will not provide significant energy benefits; key suppliers of hydrocarbon resources in the world market will be the Arab countries, including the so-called oil monarchies (Bahrain, Qatar, Kuwait, UAE, Oman, and Saudi Arabia). In particular, using the exponential and polynomial models to forecast the hydrocarbon production in the Russian Arctic, we see that, all other things being equal, by 2035, production will grow to 31.6 billion barrels per year in the first case, and up to 2.5 billion barrels per year in the second case (Figure 4).

There is a twelve-fold difference between the two models, even though the R^2 of each model has a value greater than 0.91–0.94, indicating an accurate selection of regression parameters and a relatively



	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Actual	12	16	30	28	25	28	35	55	69	72	135	69	76	113	96	103	112	64	49	48	76	63	45
Forecast		12	15	25	27	25	27	33	48	63	69	115	83	78	103	98	102	109	77	57	50	68	65

Fig. 5. *Exponential smoothing of the price for a barrel of Brent crude oil (Yandeks. Novosti: Dinamika tsen na fyuchersnyy kontrakt na neft Brent (MOEX, USD za barrel) [Yandex. News: Dynamics of prices for a futures contract for Brent oil (MOEX, USD per barrel)]. Retrieved from: https://yandex.ru/news/quotes/1006.html?mar=1 (Date of Access: 12.03.2020))*

Translation

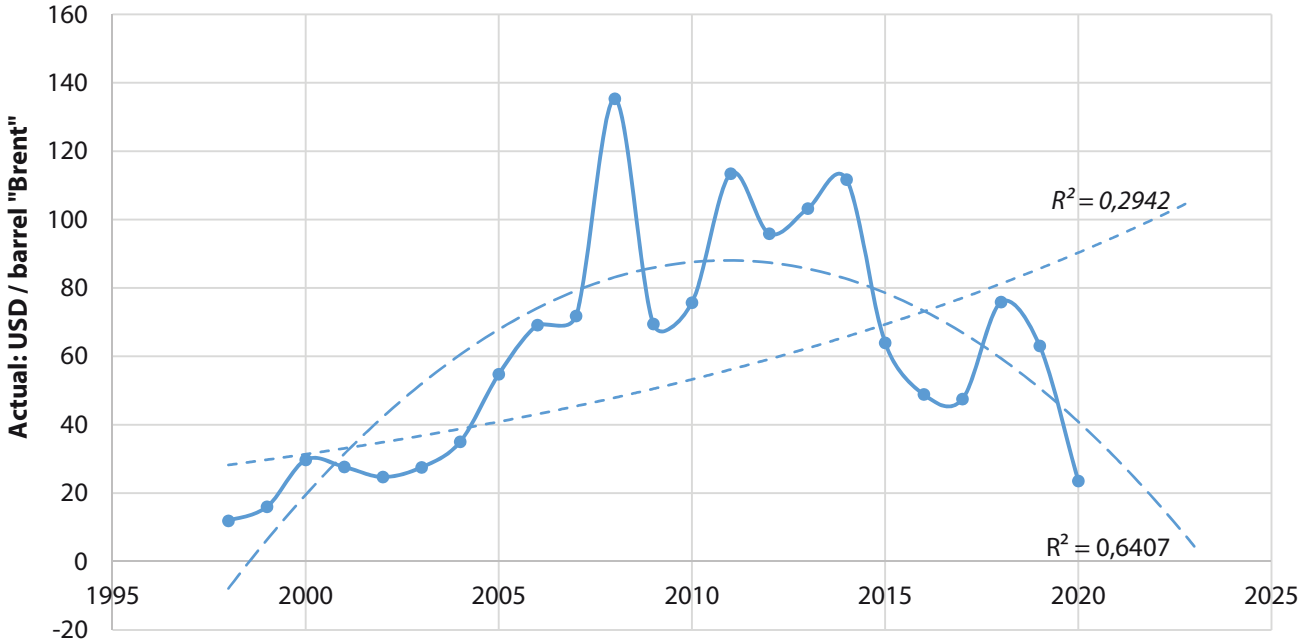


Fig. 6. *Short-term price forecasting for a barrel of oil using exponential regression (short dash) and second-degree polynomial (long dash)*

reliable forecast. However, the most important factors, namely, the volatility of prices for hydrocarbon raw materials and demand for these materials, were not taken into account. Accordingly, while, on the one hand, the econometric models presented above support the increase in production, on the other hand, the raw material super cycle in the world economy is ending; therefore, prices for hydrocarbon raw materials will constantly decline [10]. For example, using exponential smoothing, we see that before the 2008 crisis, the actual price of hydrocarbons was much higher than the forecasted one, having reached an almost two-fold increase at the time of the crisis.

The second, but less significant peak in the price of hydrocarbons was in 2011 during the post-crisis growth of the world and national economies, when the demand for energy raw materials and resources was very high (Figure 5).

It is necessary to note that in the middle of 2020, the price per barrel of oil should have been around $ 64. In fact, it is currently expected that the price of a barrel of oil in mid-2020 will not exceed $ 24–32. Polynomial forecasting for the upcoming three-year period shows that the price for hydrocarbons will indeed decrease; the reliability of such a forecast is very significant ($R^2 = 0.64$; Figure 6). In contrast, an exponential regression for the next three years shows a possible increase in prices for hydrocarbons and resources, but the reliability and probability of such a forecast is very low ($R^2 = 0.29$). Such a significant difference between the actual and expected values of the price for a barrel of oil is explained by the influence of two factors that should be recognised as joker events (i.e. the unlikely events that have a strong impact on the economy and society). The first one is Russia's exit from the OPEC+; the second is the unpreparedness of countries for the COVID-19 pandemic caused by the SARS-COV-2 virus.

In addition, it is necessary to consider the economic mainstream, according to which the European Union (the key consumer of Russian hydrocarbon raw materials and resources) is going to renounce fuel energy, for which a special long-term programme has been adopted [11, 12]. Moreover, in April 2020, the world economy faced the paradox of negative oil prices, and, according to Russian experts, this was the first, but not the last time when oil futures showed negative prices[4]. At present, companies producing traditional hydrocarbons and companies producing shale oil and gas are increasing the cost of production, while the price of products is decreasing. When the price of a futures contract for a barrel of oil is below $ 30, investments in the expansion of hydrocarbon energy resources become

[4] Pochemu tseny na neft neizbezhno snova uydut v otritsatelnuyu zonu? [Why will the oil prices inevitably go into negative zone again?] (2020). Rossiyskaya gazeta [Russian newspaper]. Retrieved from: https://rg.ru/2020/05/01/pochemu-ceny-na-neft-neizbezhno-snova-ujdut-v-otricatelnuiu-zonu.html (Date of access: 29.05.2020).

impractical[5]. Unfortunately, on average in 2019, the cost of producing a barrel of oil varied at the level of $ 10–15[6].

Moreover, China, who is another significant consumer of Russian hydrocarbon raw materials and resources, will probably reduce the volume of oil and gas imports because, along with the European Union, the country has already been developing the renewable energy industry.

During the period from 2000 to 2018, China increased the capacity of energy generation from renewable sources by almost 10 times (from 75 thousand MW to 696 thousand MW). In the same period, the capacity of generating energy from renewable sources in Russia increased by only 24 % (from 44 thousand MW to 55 thousand MW). Simultaneously, the cost of generating energy from renewable sources is constantly decreasing; for example, it reduced by 3.85 times in the field of solar energy, and approximately 1.5 times in the wind energy industry.

In contrast, the cost of hydropower, which is a key type of renewable energy for Russia, is increasing. Considering the fact that after the COVID-19 pandemic, it is possible that remote jobs, robotic and cyber-physical technologies of material production will appear everywhere, the demand for fuel energy, even with the resumption of global economic growth, may remain significantly low. What is more, the electric green world model [13] is becoming more and more probable, and the transition can occur in the next decade.

The second most important resource that forms the Arctic potential is biodiversity, in particular, commercial fishing. Until 2018, the Arctic produced approximately 10 % of the total volume of fish and seafood supplied to the world markets. However, the vessels of not only the Arctic countries, but also Japan, China and South Korea were fishing in the central waters of the Arctic Ocean. This has already led to the depletion of stocks and reduction in biodiversity of fish species in the region [14, 15]. Therefore, in October 2018, five Arctic states (Russia, Norway, Canada, the United States, and Denmark representing the interests of Greenland and the Faroe Islands) and a group of states that do not have direct access to the Arctic (China, Iceland, South Korea, Japan, and the European Union) signed a special agreement on the prevention of unregulated fishing in the open waters of the central Arctic Ocean[7]. In other words, fishing is actually prohibited in the neutral waters of the Arctic Ocean.

In the exclusive economic zones of the Arctic countries, fishing quotas are determined by national interests and the rule of law. The commercial fishing in the Arctic has never been a priority for the Russian Federation. For example, until 2010, the average annual catch here was about 400–500 tonnes per year, which is less than 0.1 % of the total volume of commercial fishing by the type of economic activity «Fishing». For 9 months of 2019, the volume of commercial fishing in the Arctic was 141 tonnes, which did not affect either the food security of the mainland of the country or the provision of the population with fish products[8].

It is obvious that the biological resources of the Arctic, located within the exclusive economic zone of the Russian Federation, do not have high commercial and industrial value, despite the fact that northern fish species have high nutritional value. Considering the development of the industrial and logistics infrastructure of the Russian Arctic, it is necessary to examine the third component of the Arctic potential, namely, its transport.

Global warming, which caused some softening of ice and contributed to the reduction of the ice cover of the land and water areas of the Arctic, creates the prerequisites for the active use of the transport potential of the Northern Sea Route. The Northern Sea Route is the best alternative to transcontinental transportation, which is currently mainly conducted through the Suez and Panama Canals, united under the common name of the Southern Sea Route (SSR). The length of the NSR is 13.7 thousand km, while the SSR has a length of 20.9 thousand km. This difference allows reducing the

[5] Skolko stoit dobycha nefti v Rossii [How much does the oil production cost in Russia]. (01.05.2020). BCS Express. Retrieved from: https://bcs-express.ru/novosti-i-analitika/2020627080-skol-ko-stoit-dobycha-nefti-v-rossii (Date of access: 29.05.2020).

[6] Russian Producers Are Ready to Survive Flood of Saudi Crude. (12.03.2020). Bloomberg. Retrieved from: https://www.bloomberg.com/news/articles/2020–03–12/russian-oil-producers-are-ready-to-survive-flood-of-saudi-crude?srnd=premium-europe&sref=dDS68C2O (Date of access: 29.05.2020).

[7] Ob odobrenii Pravitelstvom Rossiyskoy Federatsii proekta Soglasheniya o predotvrashchenii nereguliruemogo promysla v otkrytom more v tsentralnoy chasti Severnogo Ledovitogo okeana. Rasporyazhenie Pravitelstva Rossiyskoy Federatsii ot 31. 08. 2018 №1822-r [On the approval by the Government of the Russian Federation of the draft Agreement on the Prevention of Unregulated High Seas Fishing in the Central Part of the Arctic Ocean. Order of the Government of the Russian Federation of 31.08.2018 No. 1822-r].

[8] Federalnoe agentstvo po rybolovstvu: Statistika i analitika 2020 [The Federal Agency for Fishery: Statistics and Analytics 2020]. Retrieved from: http://fish.gov.ru/otraslevaya-deyatelnost/ekonomika-otrasli/statistika-i-analitika (Retrieved from: 12.03.2020).

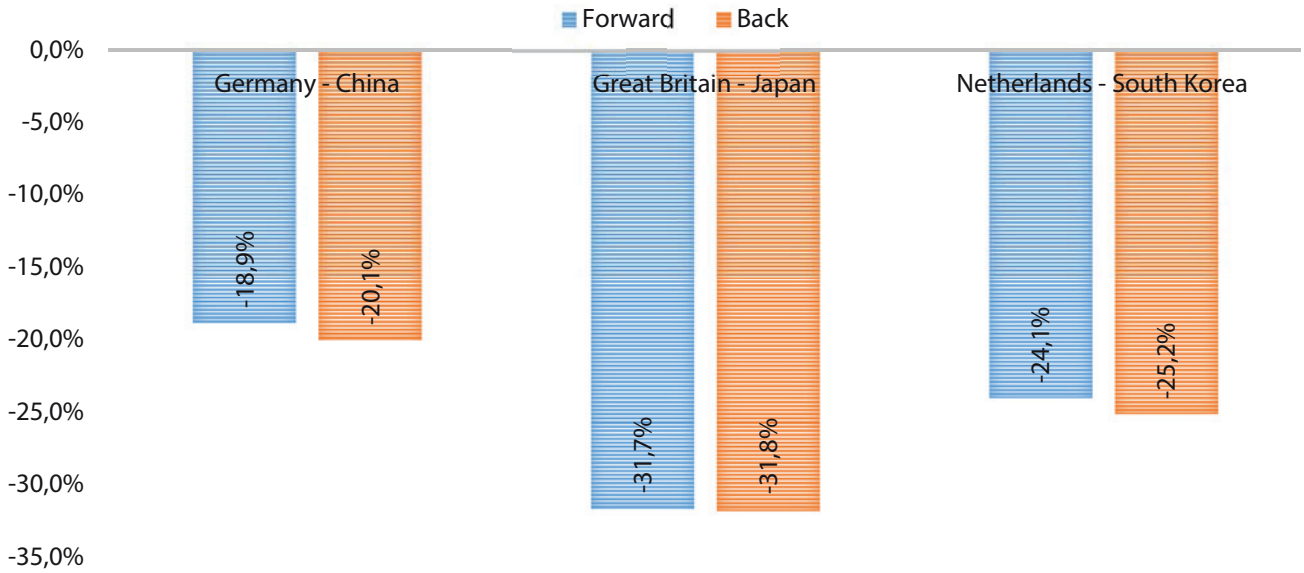


Fig. 7. *Reducing trade costs in some areas of the Northern Sea Route [18]*

time for sea travel; for example, the travel time was reduced by 23–25 % between China and Western Europe, and by an average of 30 % between Japan and Western Europe [16]. Trading costs are reduced accordingly. Economic and mathematical modelling conducted by Western European scientists shows that in some directions of the NSR trade costs are reduced by 20–30 %. Simultaneously, there is a direct and reverse cost reduction, which makes the economic cross-border appearance mutually beneficial for both points of the route, regardless of the initial or final points (Figure 7). However, the NSR can increase the emissions of carbon dioxide into the Arctic atmosphere, which can lead to negative consequences for its unique ecosystem, which has already received impetus for the destruction.

Simultaneously, the operation of the NSR will reduce CO2 emissions both at the SSR and in the other land, water and air directions, leading to mutual environmental compensation [16, 17]. Other, more detailed studies show that the total climatic losses from the active operation of the NSR can range from 25 % to 83 % of the total global volume of potential economic benefits [18]. In addition, active exploitation of the NSR may reduce the populations of endemic species of Arctic marine mammals: to one degree or another, 42 out of 80 species became critically vulnerable [19]. This fact requires, first, more advanced logistic tools for the construction of shipping routes, and, second, a more thorough and systematic socio-ecological and technical and economic assessment of the benefits and limitations of the active operation of the NSR.

By now, we can examine three possible concepts for the development of the resource potential, which can be used as the basis for the strategy of socio-economic and scientific-technological development of the Russian Arctic:

1) resource-rental pattern, implying the extraction of mineral resources and increasing commercial fishing of northern fish in the exclusive economic zone;

2) scientific research model that presupposes the conservation of the Arctic ecosystem and the deployment of specialized scientific landings in the Arctic;

3) transport and tourism model, involving the active exploitation of the NSR and the development of tourism in the Arctic region.

Discussion

We have examined the three most likely concepts for the development of the resource potential of the Russian Arctic. Each concept (Table 2) has its own list of opportunities, but the limitations will be common for all of them; these limitations can become a threat not only to socio-economic projects in the Arctic, but also to the life, health and population of ethnic groups.

The first concept of developing the resource potential of the Arctic is already being implemented. In the future, the following directions of its implementation are possible:

1) the most complete development of the energy and industrial-production (including the infrastructure and logistics) potential of the Russian Arctic;

Table 2

Threats and opportunities for the development of the Russian Arctic in the context of the proposed strategic concepts [developed by the authors]*

The list of opportunities and threats	The Arctic development concepts		
	Resource-rental model	**Scientific research model**	**Transport and tourism model**
The key opportunities for the implementation of development concepts	1) the development of the energy and industrial-production potential of the Arctic; 2) the formation of a strategic national reserve of hydrocarbon raw materials and fuel resources; 3) the creation of research and production and socio-economic clusters with the attraction of private investments	1) the creation of international research clusters and collaborations, which will enable a northern technological breakthrough; 2) the development and pilot testing of special programmes of the social and demographic development of the Far North; 3) the development and pilot testing of green economic models of the development of the Arctic	1) the replacement of (resource) hydrocarbon rent by service (tourist and transport) rent; 2) an alternative and competitive (relative to the SSR) source of economic income for the region and the state; 3) the increase of the share of Russia in international trade and tourism, development of domestic tourism
The list of the main threats	1) the demand and prices for hydrocarbons and energy resources are low and probably incapable of sufficient growth in the future; 2) technological and infrastructural threats (including the logistics underdevelopment of the region) requiring separate and large investments; 3) high environmental and social risks associated with any (industrial, scientific, transport, tourist) expansion into the region; 4) a shortage of investment resources, both public and private, the unwillingness of private investors to invest in a sufficiently unexplored region; 5) the lack of adequate Internet and cellular (mobile) communication in the region minimises any communications with the region, makes it difficult to control the implementation of any projects, does not allow interacting with the region in real time if there is an objective need for this		

2) the formation of a strategic reserve of hydrocarbons and fuel in case of force majeure or other circumstances, including the diversification of storage and transportation of stocks due to the development of infrastructure and logistics;

3) the creation of unique research and production clusters at the expense of private investment, national and international public-private partnerships, foreign direct investment from countries interested in entering the economic space of the Russian Arctic.

The second concept considers the Arctic as an international research base. There are also three directions:

1) the creation of clusters and collaborations based on the multilateral participation of representatives of various countries to conduct research in the Arctic and develop promising technical and technological ideas that will have at least a dual purpose;

2) the development and pilot testing of programmes on the social and demographic development of the Russian and world Arctic, including programmes to increase population density, preserve living conditions and create conditions for the growth of the population of indigenous peoples

3) the development and pilot testing of environmental and social security models of economic development of the Russian and world Arctic. Such models can imply ethnic, ecological health tourism, the creation of a logistics hub in the Arctic on the base of harmless vehicles and green infrastructure.

The third concept is the concept of transport and tourism development of the Arctic, which has the following main directions:

1) the use of the NSR as a highly profitable and competitive alternative to the SSR, that is, the replacement of natural resource rent by transport rent;

2) the creation of infrastructure for the development of internal and external tourism;

3) the creation of a distributed logistics network, which will allow, in particular, to increase the share of Russia in world trade.

Translation

Certainly, each concept is beneficial for Russia from an economic and political perspective. However, the development of the resource potential of the Arctic region has significant limitations:

— the decreasing demand for hydrocarbons and their falling prices make their production in the Arctic economically unprofitable, calling for the reconsideration of energy sources for the planned Arctic logistics and infrastructure. Environmental safety requires abandoning the use of fuel energy in the Arctic;

— there is stagnation in the global and national economies due to the COVID-19 pandemic, which may last for a long time;

— the absence of a normal engineering, technical and logistic infrastructure requires a long preparatory stage for developing the potential of the Russian and world Arctic, which, in the context of the investment deficit, can be considered as the main restraining factor and threat to any Arctic project;

— the Arctic is characterised by a specific biological and social endemic situation. Therefore, the expansion of various infections and latent forms of infectious diseases from the mainland of Russia and other countries can lead to a cultural tragedy;

— the development of the Arctic is impossible without advanced technological support, including the technologies for the use of Arctic renewable energy sources, remote access technologies and sustainable communication in difficult climatic conditions, exploration technologies without human participation and assistance providing technologies in emergency cases, etc.

Obviously, there are significantly more limitations than opportunities. Moreover, the elimination of restrictions should be started precisely with the solution of technological problems, the first being the problem of communication, remote access, and the use of unmanned and cyber-physical systems.

For the development of the Arctic potential, its digitalisation is necessary, which expresses not only the author's opinion, but is also supported by the opinion of Russian scientists ([20–22] and others). All progressive digital technologies can be divided into three main classes, based on their functional purpose:

1) economy-oriented technologies;

2) research-oriented technologies;

3) technologies focused on ensuring social stability and maintaining law and order in the region.

The first class includes such prospective but underdeveloped in Russia technologies as:

a) industrial Internet of things (IoT), including neural network and cyber-physical technologies, to one degree or another using artificial intelligence, big data and cloud computing;

b) logistics technologies combining RFID technologies and Fifth Party Logistics (5PL) systems;

c) technologies for remote servicing of individuals and legal entities.

The most important here is material service, i. e. delivery of products, components, raw materials with the use of unmanned technologies, as well as supply services using the so-called small generation units, namely, local power stations that extract energy from renewable sources and supply it to a specific limited circle of consumers. The entire set of the aforementioned technologies fits into the concept of environmentally friendly smart industrial parks, the scientific and practical design of which is actively developing abroad [23–25], including in the Arctic territories [26–28]. To implement the concept of smart industrial environmentally friendly parks in the Russian Arctic, sustainable telecommunications are needed (either satellites or optical fibre lines).

The British company One Web planned to provide the Arctic (including its Russian part) with sustainable satellite telecommunications by the end of 2020; in particular, such solutions have already been implemented in the United States (Alaska) and Norway. However, in 2019, Russia introduced new requirements regarding the use of satellite communication systems under the jurisdiction of foreign states[9], so it is likely that the One Web project in the Russian Arctic will not be implemented. There is still hope that the Russian system of satellite communications Express-RV will solve the issue of telecommunications in the Arctic, but this will not happen earlier than in 3–5 years. In turn, the use of optical fibre lines, which are being developed by PJSC Rostelecom, is only a medium-term solution.

[9] O vnesenii izmeneniy v Pravila ispolzovaniya na territorii Rossiyskoy Federatsii sputnikovykh setey svyazi, nakhodyashchikhsya pod yurisdiktsiey inostrannykh gosudarstv. Postanovlenie Pravitelstva RF ot 21.02.2019 № 175 [On the amendments to the Rules for the use of satellite communication networks in the territory of the Russian Federation under the jurisdiction of foreign states. Resolution of the Government of the Russian Federation of February 21, 2019 No. 175].

Therefore, it is still very early to talk about the possibility of creating smart and environmentally friendly industrial parks in the Arctic.

The lack of a stable connection does not allow the implementation of research projects in the Russian Arctic, for which the digital resources of the Arctic Council could be the information and analytical base[10]. Moreover, in May 2017, an Agreement on Enhancing International Arctic Scientific Cooperation was adopted and signed by the Russian Federation[11]. Even though the agreement has been in effect since 2018, there are very few research results realised and scaled in accordance with it. During this time, the Russian side (according to Google Scholar) has published more than 4,000 scientific papers on Arctic topics, but the overwhelming majority of them concern not the results of Arctic scientific cooperation, but the analysis of organisational and legal aspects [29]. The Russian side cannot actively support the International Arctic Scientific Cooperation with the use of the most advanced technologies, including:

a) scientific blockchain, neural network computing, unmanned reconnaissance and natural scientific research of territories;

b) analysis of the obtained data using cloud computing, big data capabilities;

c) remote video, audio conferences, exchange of scientific opinions, ideas and solutions in real time.

The technologies focused on supporting social stability, on the one hand, cannot be implemented without sustainable telecommunications:

a) the telemedicine technologies that could increase the availability of health services in the region;

b) the distance learning technologies that could meet the needs of the regional community in cognitive development, retraining, self-education, etc.;

c) the remote provision of public services, which would contribute to solving many legal problems in civil circulation, including business.

On the other hand, remote law enforcement technologies are largely criticised, as they are based on the concept of digital surveillance of citizens and visitors to the region. Considering that public scientific knowledge about sustainable development in the Arctic is in its infancy (in Russia), the use of remote law enforcement technologies should be limited.

The conducted analysis shows that, at present, any proposed scenarios of the development of the Russian Arctic cannot be implemented for two main reasons:

— the lack of investment resources and weak interest of private investors in investing funds for the development of the region;

— the lack of stable communication structure, which completely negates any attempts to develop the Russian Arctic on the basis of environmental and social responsibility.

Probably, these tasks could be solved by repurposing some of the activities of PJSC Rosneft Oil Company and PJSC Gazprom in the region. In this case, it is necessary to abandon the exploitation of resource rent and support the investments in science, an environmentally friendly economy, social development, engineering, logistics and telecommunications infrastructure. However, these decisions should be made by the main shareholder of these companies that is the Russian government, which is currently tackling an objectively more significant problem, namely, the COVID-19 pandemic.

Conclusion

The article examines the three most promising concepts for the development of the potential of the Russian Arctic: resource-rental, scientific research, and transport-tourism models, which can be used as the basis for dynamically sustainable and environmentally friendly development of this region. The research model for the development of the Russian Arctic is the most environmentally friendly and sustainable from a social and economic perspective. Resource-rental and transport-tourism models require additional scientific research, as well as the complete and reliable social, environmental and economic substantiation of their efficiency. Thus, in the presented study, we considered each possible strategic concept in terms of opportunities and limitations. It is noted that while the opportunities

[10] Arctic Council: Digital resources. Retrieved from: https://oaarchive.arctic-council.org/bitstream/handle/11374/2113/2018–08–28-Arctic-Council-digital-resources-INTERACTIVE.pdf?sequence=13&isAllowed=y (Date of access 16.03.2020).

[11] Soglashenie po ukrepleniyu mezhdunarodnogo arkticheskogo nauchnogo sotrudnichestva [The Agreement on Enhancing International Arctic Scientific Cooperation]. Retrieved from: http://docs.cntd.ru/document/542624227 (Date of Access: 16.03.2020).

for each concept differ, the list of limitations is general. It can be reduced to two main provisions: the lack of available investment resources and the lack of stable communication structure in the region. Solving the problem of sustainable development of the Russian Arctic through its digitalisation should become a priority for the government of the Russian Federation after the end of the pandemic of a new coronavirus infection.

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