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The Market of Traditional Food Products of Indigenous Minorities of the European North of Russia: Big Data Analysis

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Abstract. In recent years, the entrepreneurial activity of Small Indigenous Peoples of the North (SIPN) has increased significantly due to favorable economic climate through the development of programs of subsidizing traditional economic activities. Their representatives are involved in the production and promotion of traditional products on global and local markets, including through the Internet. This is the result of the transformation of the traditional lifestyle and adaptation to digital innovations. The study aimed to analyze the market of the SIPN' traditional food products in the European North of Russia in the Internet on the basis of big data. The materials of the study were text messages related to the traditional economy of indigenous minorities, uploaded using methods and tools of automated data collection from the "VKontakte" social network. Data processing was based on innovative methods for analyzing large-scale data, the assortment of products of the traditional economy of the indigenous peoples of the European North of Russia, the offers for the sale of which were posted on the social network for the period in 2019–2022, were studied. Recently, the activation of producers of SIPN' traditional food products in the Internet became the result, on the one hand, of restrictions due to the coronavirus pandemic, on the other hand, of increased interest to the SIPN' culture and the Arctic biological resources, which provide their high adaptability, health and well-being. As a result, these northern products have acquired the status of a delicacy. It has been revealed that the most popular product on the Internet market in the European North of Russia is fish and seafood. The practical significance of the study is connected with the possibility of applying the results in the drafting and adjustment of strategic and program documents aimed at the development of the Arctic territories, preservation of the traditional way of life and economic activities of the indigenous peoples of the European North of Russia.

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Introduction

The preservation of traditional forms of economy and life activities of the representatives of Small Indigenous Peoples of the North (SIPN) is extremely important for achieving sustainable development of society. This ensures the maintenance of the history and culture of the peoples, enriches current perceptions of the surrounding world, and allows material artefacts and spiritual traditions to be passed on to future generations.

In recent years, the entrepreneurial activity of indigenous minorities has increased significantly due to favorable economic climate through the development of programs of subsidizing traditional economic activities. Their representatives are involved in the production and promotion of products in global and local markets, including through Internet resources. This is the result of the transformation of traditional lifestyles and adaptation to digital innovations.

Trade relations (buying and selling goods and services) are the most popular area of manifestation of indigenous peoples' traditional forms of economic activity. However, in this study, communications with the participation of indigenous minorities, using the results of traditional economic practices, are not limited to trade and affect much more diverse areas of interaction between parties to market relations in other areas, such as exchange relations (exchange in kind, barter), labor relations, including formal and informal employment, subsidies and other financial support from the state and business, as well as material assistance from relatives and other motives and intentions of communication participants.

The purpose of the article is to analyze the market of traditional indigenous food products of the European North of Russia in the Internet space based on big data arrays. This will expand knowledge about the practices of these peoples in terms of economic relationships with various stakeholders (government authorities, business community, non-profit organizations, population, etc.). At the same time, this will help to obtain information about the extent to which indigenous peoples are ready to enter the market and offer the results of their traditional economic activities for sale, whether they are familiar with the functionality and capabilities of modern digital platforms (in particular, social networks) that help them conduct entrepreneurial activities, and which types of products from traditional forms of economic activity are the most popular. More specific questions are also of interest, for example, what types of products of the traditional economy are most often offered on the market on the Internet (fishing, reindeer herding, hunting, collecting

and processing forest products — berries and mushrooms, folk arts and crafts, including souvenirs and etc.).

Our research is limited by the general methodology, as we are analyzing data that is linked to individual northern regions and has signs indicating that the actor is a representative of the indigenous peoples of the North (through appropriate identification of the community in a social network, the use of linguistic markers). Nevertheless, this approach does not exclude the possibility that the range of observations includes cases where the real party offering goods resulting from the traditional economy of indigenous peoples is not ethnic representatives, but ordinary trade intermediaries.

Review of marketing practices for selling traditional food products of indigenous peoples of the North

The market of traditional food products of indigenous peoples includes products from reindeer husbandry, fishing, hunting, and gathering (berries, mushrooms, nuts, medicinal herbs, etc.). In modern conditions, the traditional economic activities of indigenous minorities are primarily aimed at both ensuring their livelihoods and at producing and selling traditional goods (with significant state support).

The geography of the study is marked by the borders of the European North of Russia. Not enough research has been devoted to the functioning of the market for traditional indigenous food products in this territory. In this regard, we will consider the existing marketing practices for the sale of traditional indigenous food products in the northern and Arctic regions of the country where SIPN live. Traditional products are sold through agro-industrial enterprises, national communities, slaughtering complexes, factories, peasant farms, individual and private reindeer farms, as well as private intermediaries who purchase products in bulk from indigenous people, etc. [1, Bogdanova E.N., Andronov S., Asztalos Morell I.].

Currently, the sale of reindeer herding and fishing products is officially possible by concluding contracts at a set price, which is usually below the market price, which often does not suit reindeer herders, fishermen and hunters. In this case, the Khanty, Mansi and Nenets have difficulties with the sale of fishery products associated with existing quota systems that limit sales volumes, and local residents express concern that they only accept fish from “insiders” [2, Martynova E.P.].

In order to stimulate reindeer herders, hunters, and wild plant gatherers to sell products at an affordable price in some northern regions, the state provides subsidies. The condition for receiving a subsidy is the acceptance of products of traditional crafts by legal entities at a price that is recommended by regulatory legal acts at the regional level and is the sum of the subsidy rate and the purchase price paid to individuals by the receivers at their own expense [3, Loginov V.G., Ignatieva M.N., Balashenko V.V.]. However, under the terms of state support, sellers should deliver their products only to “authorized enterprises” at a fixed (often reduced) price. Reindeer herd-

ers try to avoid such channels for selling their products, since they suffer significant losses when delivering meat associated with the "grading game" [4, Pilyasov A.N., Kibenko V.A.].

The next way to sell products of a traditional economy, in particular among the Dolgans, Evens and Evenks, is its sale through private entrepreneurs [5, Kaduk E.V.], acting as intermediaries between product manufacturers and consumers. Delivery of handicraft products through entrepreneurs has certain positive aspects:

- businessmen offer the most favorable prices than when delivering products to enterprises;
- sellers (representatives of indigenous peoples offering their products) receive immediate cash;
- saving money on transporting meat and fish to the consumer, as entrepreneurs come to buy the products themselves;
- barter of traditional food products for other goods necessary for indigenous people [2, Martynova E.P.].

This method is popular among residents of the North (for example, in 2018, the sale of antlers to illegal buyers exceeded the sale to the state through the Yamalskiy state farm by 5 times [1]). However, such a distribution channel carries its own risks, as it creates conditions for manipulating prices towards lower ones. Nevertheless, it is worth recognizing the value of this "barter", as it is a vital source of essential goods for indigenous peoples leading a nomadic way of life.

Another marketing channel for traditional indigenous food products is independent (spontaneously organized) trade in urban and rural areas. This can be implemented at city fairs (for example, in honor of Reindeer Herder's Day), at markets and trade "from a sleigh". This is in fact illegal trade (except for official city events). In this regard, some representatives of indigenous minorities register as individual entrepreneurs or choose other organizational and legal forms for conducting official business activities, which ensures their control over the harvesting of deer meat and the sale of products. A striking example is the entrepreneurial model of Yamal reindeer husbandry. Medium- and small-sized reindeer farms (for example, peasant farms or individual reindeer herding farms) are largely dependent on state support and have the opportunity to sell their products either to slaughter stations or to agricultural production cooperatives according to a predetermined (not always fair) price, or to the population (mainly ethnic villages) at a price, which they set themselves [6, Bogdanova E., Lobanov A., Andronov S.]. Large reindeer herding farms are self-sufficient and can influence pricing during negotiations on the sale of products with intermediaries or enterprises engaged in the subsequent processing of meat products [7, Andronov S.V., Bogdanova E.N., Lobanov A.A.].

[1] Olenevody Yamala nachali sezonnuyu kompaniyu po sboru pantov [Yamal reindeer herders have started a seasonal campaign to collect antlers]. URL: https://www.1tv.ru/news/2003-07-02/251310-olenevody_yamala_nachali_sezonnuyu_kampaniyu_po_sboru_pantov?start=auto (accessed 15 May 2023).

In the Khanty-Mansi Autonomous Okrug–Yugra, the creation of entrepreneurial structures is also proposed as the most effective tool for the functioning of traditional economic sectors among indigenous peoples [3, Loginov V.G., Ignatieva M.N., Balashenko V.V.].

The prerequisites for the development of the market for traditional indigenous food products are created by the expansion of digitalization of the traditional economy. Thus, in 2014, Russia started implementing a program to eliminate the digital inequality, especially in hard-to-reach areas where a high proportion of indigenous peoples live. As part of the implementation of the first stage of this program, more IT camps were created [2]. S.Yu. Belorussova notes that "users of ethnic communities demonstrate adaptability to the Internet space: on the one hand, they actively participate in virtual life, on the other, the real world remains the true support of their identity" [8, Belorussova S.Yu.]. The researcher also points out that indigenous peoples have different attitudes towards the processes of digitalization and informatization: some believe that this contributes to the "unity of the people", others think that this has a "negative" effect. However, despite large-scale digitalization, a high proportion of remote areas remain without or with limited access to the Internet. In this regard, "tundra radio remains the most reliable and fastest means of communication among the indigenous peoples, since cellular communications and the Internet work only near fuel and energy infrastructure facilities, trading posts and settlements" [3].

However, the processes of digitalization and informatization in the Arctic region are gradually changing the distribution of traditional indigenous food products. Networks of sellers and buyers began to be created among reindeer herders, fishermen, hunters and gatherers of wild plants via the Internet, mobile communications, instant messengers, etc.

In turn, L.V. Elmendeeva notes the great demand among indigenous minorities for the use of online platforms for the sale of wild plants and other national products (mushrooms, nuts, venison, etc.) in Yugra [9]. V.V. Simonov and I.V. Samsonova also confirm this fact, pointing out that the Evenks of Southern Yakutia began to actively use digital platforms, primarily WhatsApp, to accept orders for picking berries, herbs, mushrooms and their further implementation (exchange, sale) [10]. Digitalization conditions have accelerated the transition of the process of contracts and transactions with non-timber resources into the virtual space and thereby demonstrated the ability of this traditional practice to modernize, and therefore its sustainability. The Internet played the role of a trigger for reflection on the tradition and culture associated with ethnomedicine and historically rooted everyday practices of using herbs and berries. Traditional knowledge was thus "scaled" and became the property of the local "mass market" [10, Simonova V.V., Samsonova I.V.].

[2] V Rossii nachalsya vtoroy etap ustraneniya tsifrovogo neravenstva [The second stage of eliminating the digital divide has begun in Russia]. URL: https://digital.gov.ru/ru/events/40814/?utm_referrer=https%3a%2f%2fwww.google.com%2f (accessed 16 June 2023).
[3] The Economy of the North — ECONOR 2020. URL: https://oaarchive.arctic-council.org/handle/11374/2611 (accessed 16 June 2023).

Besides, many fishermen form “friendly” client networks through mobile communications and messengers and take orders for fish [2, Martynova E.P.].

Researchers often note that the exchange of traditional food products for other goods (petrol, sugar, etc.) is common [11, Arzyutov D.V.], and the lack of goods in stores in rural areas is compensated for through various forms of exchange, for example, among Dolgans and Nganasans in Taimyr [12, Davydov V.N.; 13, Vasilyeva V.V.]. In the western part of Taimyr, a multi-level structure of product exchanges has been developed, including traditional food, between the tundra and the village, between the village and the city, inter-village and intra-village exchange [12, Davydov V.N.].

The scientific literature identifies the following types of market exchange and practices of sharing traditional food products in the northern regions:

- tradition of “sharing” in market conditions: hunting and fishing products are traditionally shared among the peoples of the North [14, Ventsel A.]. However, it is worth noting that this type of product sharing, as a rule, is carried out only within traditional communities and extends more to the products of hunting, fishing and gathering, both among the Evenks and the Khants, Mansi, and Nenets [15, Kaduk E. V.; 2, Martynova E.P.];
- barter exchange is often repeated with one partner on the basis of trust and stable social ties [16, Humphrey C.]. This type of exchange is preserved in the absence of an acute shortage of funds as a convenient form of interaction, when each of the parties can immediately get the necessary things, sometimes used when repaying a commodity loan in a store;
- commodity loan and trust in relations between sellers and buyers: this phenomenon is still observed in remote northern settlements. It should be noted that goods are “provided on credit” only to those in whom the seller has confidence; the term of payment for the goods is not stipulated in advance;
- charity as a form of product sharing has been implemented by some entrepreneurs, for example, in the Anabar region of the Republic of Sakha (Yakutia) [15, Kaduk E.V.].

The sale of traditional food products is influenced by mining companies. Serving the working settlements of extractive companies creates a guaranteed market for the sale of products produced by indigenous peoples. Informal trade with “gas workers” and “oil workers” provides income for reindeer herding farms. But here an ambiguous situation arises. On the one hand, wealthy “shift workers” represent sales markets for indigenous minorities, but on the other hand, there is a non-equivalent exchange of goods [17, Kryukov V.A., Shishatsky N.G., Bryukhanova E.A. et al.].

All the above-mentioned fully corresponds to the realization of reindeer husbandry products. However, there are some distinctive features with regard to the marketing of fishing, hunting and wild plants. Fishing is often an activity that accompanies reindeer husbandry. Fishermen from the northern settlements and villages have mastered private outbound trading: they deliver fish to

regional centers and large towns, and sell it near markets and supermarkets [2, Martynova E.P.]. However, such trade forms part of the "shadow" market. Fish is often an exchange commodity for other food products, fuel, etc., because in order to sell it in monetary terms it is necessary to obtain a sales license under a quota, which is established annually [15, Kaduk E.V.].

It is more difficult for representatives of indigenous minorities to organize the sale of wild plant products, which are much less profitable compared to reindeer herding and fishing products and form their added value mainly at the stage of processing and production of biologically-active preparations. Gathering is perceived as a cultural practice and trade. The Evenks often sell wild plants in the form of "sharing" between relatives and friends [18, Simonova V.V.]. According to some researchers, their collection and sale is currently the only source of income for indigenous peoples of remote rural settlements [19, Malysheva M.S.; 20, Taskaev A.I., Pautov Yu.A.]. Predominantly, the population sells collected berries and mushrooms to pickers, from whom the products are later bought by enterprises. A.N. Pilyasov notes that in Soviet times, despite the Arctic natural nonstationarity, the idea of creating a stationary conveyor belt for large-volume processing of wild plants was discussed [4]. However, this idea was never realized, and currently the processing of these products is carried out mainly by small enterprises.

In the conditions of the European North of Russia, the market for hunting products as a traditional economic activity of indigenous peoples is practically leveled, since the importance of hunting as a commercial trade in this territory is lost, and hunting itself becomes a demanded commodity on the market of tourist services [21, Anufriev V.V., Mikhailova G.V., Davydov, et al.]. Currently, hunting in the European North is mostly an amateur activity [20, Taskaev A.I., Pautov Yu.A.]. However, for the autochthonous population living in the territories of the European North, hunting resources are most often obtained for intra-family consumption and occupy a leading place in the diet of rural residents [21, Anufriev V.V., Mikhailova G.V., Davydov et al.].

Thus, we can conclude that the marketing behavior of traditional food producers is influenced by a set of different factors: severity of natural and climatic conditions, settlement system, availability of a resource base, transport and settlement networks, volume and forms of government support, industrial activities in the territory, technological equipment, procurement infrastructure, income level and others. Researchers note that northern entrepreneurs currently have a high rate of adaptation to changing conditions.

A comparative analysis of the scientific literature devoted to the issues of the market for traditional food products of indigenous peoples shows that research on this topic was carried out mainly in different northern territories, often in one direction of the traditional economy and mainly using sociological research methods. At the same time, there are no comprehensive studies that examine the issues of marketing the products of traditional forms of management in the European North of Russia through various marketing channels, including the use of digital technologies. This confirms the relevance of this study. The introduction of the digitalization process into the economic activities of indigenous minorities, as well as the accelerated development of the

methodology for analyzing large data sets, makes it possible to apply new research methods to analyze the range of traditional food products offered on the market and identify the behavioral trajectories of indigenous peoples of the European North of Russia in the sale of these products in the Internet.

Theoretical approaches to the use of "big data" for the analysis of socio-economic phenomena and processes

The methodology of this research is based on the concept of big data, where the term "big data" means not only a set of large-dimensional data, but also a set of methods and tools with which this data can be processed.

The concept of big data has no generally accepted documented history. Its origins can be traced back to 1880, when the US government was faced with the need to process the results of the population census [22, Ohlhor F.]. In the 20th century, the concept was further developed in Western science, in parallel with the implementation of space programs and projects in the field of biotechnology. This concept represents a growing area of developing methods for studying the ever-increasing volume of information due to the development of the field of information and communication technologies in general and the giants of the technical industry in particular. The term "big data" was created by analogy with definitions that in the English-speaking tradition characterize various spheres of public life ("big science", "big business", "big pharma", etc.). Let us consider the key features of this concept.

Firstly, the key characteristics of big data are: volume; complexity and diversity of data types and structures (for example, digital traces left on the Internet and other digital repositories for subsequent analysis); high speed of creation (in "real" time) and analysis of new data [23]. These features "fit" into the "3V" formula, which is formed by combining the attributes of "big data": Volume, Variety and Velocity. However, it should be clarified that there are currently no generally accepted requirements for the volume of big data. Only a few works propose hypotheses about the permissible volume of databases of this type [for example: 24, Shal A.V.].

Secondly, the lack of a clear, proven algorithm for working with the primary data itself. It is about the approach to the information itself (how to collect, document and store it), and not about working with the data and the applicability of certain proven scientific methods (grouping, comparison, etc.). The publication of a special issue of Nature in September 2008 is considered to be a turning point in understanding big data as a source of new opportunities and challenges and, at the same time, a separate field of research [25]. The editorial column of this issue noted that the formation of the information society makes increasing demands both to scientists and scientific organizations, and to society as a whole, connected with scientific activity. The establishment of a separate field of knowledge (conditionally "data management") as a new discipline and at the same time a protocol for the actions of scientists and scientific personnel is becoming increasingly relevant. More and more data are being created and analyzed every day, and science as a cogni-

tive practice and a social institution has yet to adapt to this and create the necessary infrastructure.

Thirdly, focusing on current processes, actions, changes, etc. rather than on accomplished events in the past. For comparison, some areas of research within the framework of "big data" have recently become more and more developed: for example, approaches to big data analysis, which help commercial organisations to make business decisions to increase productivity and profitability [26, Balusamy B., Abirami R.N., Kadry S., Gandomi A.H.]. However, being focused on past events and creating reports and various "dashboards", this area of activity is only indirectly related to the scientific research of big data (Data Science). The latter are mainly aimed at analyzing the present or recent past and are aimed at drawing conclusions about the future [23].

Fourthly, pronounced interdisciplinarity. The concept of big data as the basis of the methodological approach finds application in a variety of scientific disciplines — natural, social and humanities. Here are examples of studying and using "big data" in various fields of scientific knowledge.

Economic research using big data examines how the use of big data in reverse logistics helps to track the movement of goods and reduce costs [27, Butt A.S., Ali I., Govindan K.]. Social science studies the use of big data on mobile positioning to identify changes in the dynamics of entertainment tourism in China [28, Zhao Z., Yuan Z., Zhao S., et al.]. In cultural science, the dilemma of balance between preserving the ecological health of popular cultural sites and the interests of visitors is considered [29, Whitney P., Rice W. L., Sage J., et al.]. In medicine, "big data" is used to generalize the processes of establishing reference intervals based on real data [30, Ma S., Yu J., Qin X., et al.]. In geography, the foundations for creating large-scale information panels for mobility data are being developed [31, Conrow L., Fu C., Huang H., et al.]. In behavioral sciences, big data is used to conduct timely analysis of diseases [32, Singh K., Li S., Jahnke I., et al.]. Local history studies research the risks of establishing digital control over the population in India [33, Paunksnis Š.]. In financial analysis, "big data" becomes a source of information for making decisions on mergers and acquisitions of companies [34, Fanning K., Drogt E.], in agriculture — to reduce waste in supply chains of agri-food products [35, Ouro-Salim O., Guarnieri P., Leitão F.O.]. In anthropology, one of the most interesting areas of application of big data is the analysis of social networks [36, Tindall D., McLevey J., Koop-Monteiro Y., et al.], and in chemistry — methods for modeling the chemical roasting process [37, Yan F. et al.]. Thus, it is not an exaggeration to say that the scope of the concept of big data is almost universal.

In domestic scientific works, the concept of "big data" is also very popular and is widely used in interdisciplinary research: healthcare, journalism and public relations, linguistics, rhetoric and communication strategies, statistics and cybernetics. There are also review studies and applied articles on the topic of directly working with a large amount of information [38, Vaseva G.S., Baldina M.Yu.].

Fifthly, the use of software both at the stage of data collection and processing, and the minimization of "manual" methods of analysis, with the participation of a "human" only when setting tasks and at the stage of interpreting the results obtained. From the view of scientific research methodology, the concept of "big data" is gradually becoming one of the most promising areas for expanding scientific knowledge and creating research programs with the potential to obtain new information that cannot be accumulated without the use of methods for automatically collecting and processing a large array of disordered data, which is one of the essential characteristics of the general concept of big data arrays. Many analysts also pay attention to this [4].

Thus, the main criteria of "big data" are the volume, variety and high speed of data creation; lack of a recognized algorithm for working with the data itself within a particular study; current relevance of the data (they continue to be generated in the present time); applicability in all scientific disciplines and mandatory use of software for work. Market research certainly lends itself to big data methodology and is a promising area of research. Of particular interest is the study of sales of traditional food products of the indigenous peoples of the North, which are sold not only on the wholesale market, but also through Internet resources.

Materials and methods

The material for the study was messages on the social network VKontakte (https://vk.com/), which are thematically related to the sale of products from the traditional economy of indigenous peoples in the regions of the European North of Russia (Murmansk Oblast, Komi Republic, Republic of Karelia, Nenets Autonomous Okrug, Arkhangelsk Oblast). Data upload period: from 01.01.2019 to 05.06.2022.

As part of the study, methods to analyze big data arrays were used, that is, structured or unstructured data of large volumes and significant variety, processed by horizontally scalable software tools in order to use them for generating statistics, analysis, and forecasts and decision making [39]. This study involved the collection, processing and intelligent content analysis of an array of unstructured text data.

According to the classification of big data analysis methods recommended by McKinsey Global Institute [5], the following methods were used:

- methods of the Data Mining class: learning association rules, regression analysis (calculation of significance indicator);
- artificial neural networks (automatic checking of grammar, spelling, work with dictionaries);
- spatial analysis through the use of topological and geographic information in the data;
- statistical analysis;

[4] Manyika J. Big Data: The Next Frontier for Innovation, Competition, and Productivity. McKinsey Global Institute Report, 2011. URL: https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/big-data-the-next-frontier-for-innovation (accessed 13 May 2023).
[5] Ibid.

- visualization of analytical data (presentation of analysis results in the form of spatial tables and graphs).

For uploading social network posts, the upload source was determined: thematic communities or user profiles. Searching for communities and uploading content was carried out using a platform for working with social network data (https://www.elibrary.ru/item.asp?id=40880722, patent registration number 2019662001). The platform is developed in the Python3 programming language. The program uploads and analyzes data using the public API VKontakte (Application Programming Interface; https://dev.vk.com/api/overview). This method allows making requests directly to the social network database, which makes it possible to upload content in a convenient form. Linguistic markers were developed, on the basis of which search queries were compiled. After this, using the VK API groups.search method (https://dev.vk.com/method/groups.search), thematic communities were selected using search queries. Thus, a list of thematic communities was obtained. Next, posts were unloaded from community walls. The VK API method (wall.get) was used to upload content from the walls of communities and users.

For data processing, the Russian DSML (Data Science & Machine Learning) class platform PolyAnalyst was used, which includes "tools for collecting and aggregating data, analyzing them, generating reports and interactive visualization of results based on BI technologies" [6]. As part of our research, the methodology was adapted to specific scientific tasks [40, Petrov E.Yu., Sarkisova A.Yu.], which emphasizes the novelty of this research.

The processes of collecting, processing and subsequent analysis of data include the following stages: collecting an array of big data (using an open API), processing big data (on the PolyAnalyst platform) and interpreting the results of data mining.

The search query was formed on the basis of the research goals set at the initial stage of the work, and taking into account the given words, which are linguistic markers, combined into 3 groups: products of traditional farming (for example: "reindeer", "antlers", "horns", "fish", "mushrooms", "berries", "honey", "fur", etc.), an indication of the geographical region and indigenous peoples (for example: "Komi", "Sami", "Murmansk Oblast", "Karelia", etc.), as well as linguistic markers that represent a typical "purchase and sale" situation (for example: "sell", "selling", "sale", "price", etc.). Based on the results of the download, a large data base with a volume of 77 GB was formed. After tagging and filtering, 89.970 community messages were selected for further processing.

The sample of messages and subsequent analytics were prepared using the PolyAnalyst platform. Using natural language processing algorithms and statistical tools, text analytics made it possible to solve such analysis problems as preparing texts for analysis (in particular, indexing, removing duplicate records, correcting spelling errors in data tables, etc.), recognition and extraction of named entities (in relation to our research — "geographical locations") and keywords extraction.

[6] PolyAnalyst 6.5. Megaputer Intelligence. 2021. URL: www.megaputer.ru (accessed 01 June 2022).

After filtering keywords and entities representing the range of products of a traditional economy and corresponding to the situation under study, the results of the analysis were visualized in the form of graphs and then interpreted using PolyAnalyst software solutions.

Thus, the methodological features of this study meet all the criteria of the "big data" concept. First of all, this is a large volume of primary information (77 GB), which represents unstructured data of significant diversity that cannot be analyzed without special software tools — in this case, a platform for working with social network data, developed in the Python programming language, the VK API method (searching for thematic communities and downloading content from the walls of communities and users) and the Russian DSML class platform PolyAnalyst. There is still no critical point in the volume of data that separates the applicability of "big data" methods and qualifies the study as such, even when analyzing social networks [36, Tindall D., McLevey J., Koop-Monteiro Y., et al.]. However, we especially note that the result of uploading in our case, which in itself is very large and can be analyzed exclusively using software, is only the final result of the work carried out at one of the stages of this research.

Let us also note other important qualifying features of the work carried out, corresponding to the above-mentioned criteria of "big data": the lack of an established algorithm for working with the data itself, primarily due to the novelty of the approach to studying the market for indigenous people's products; we are analyzing current processes that continue to accumulate new units of observation and have not undergone any qualitative changes at the moment.

Internet market of Arctic traditional food products of the European North of Russia

The object of the study was the offers for the sale of products of traditional economy (reindeer breeding, fishing, hunting, collection of wild plants, etc.) in the subjects of the Russian Federation belonging to the European North of Russia (Fig. 1).

Fig. 1. European North of Russia as an object of research [7].

In the regions under study, big data analysis was used to collect data on the offerings of traditional food products of the indigenous peoples. The most active regions in which these products are offered on the Internet market through the social network VKontakte are the Komi Republic (41.2%), the Republic of Karelia (38.9%) and the Murmansk Oblast (16.2%). Producers of traditional food products in the Arkhangelsk Oblast (2.3%) and the Nenets Autonomous Okrug (1.4%) are less active.

Based on the results of analyzing a large array of data on offers of traditional food products using the PolyAnalyst platform, a cloud of keywords was built (Fig. 2), which shows that the most popular product on the Internet market of the European North of Russia is fish and other seafood.

[7] Source: Fig. 1–8 are prepared by the authors using the PolyAnalyst platform.

Fig. 2. Cloud of keywords characterizing traditional food products offered on the Internet market of the European North of Russia.

The most significant types of fish products are smoked, dried and salted fish, cod liver, various types of caviar (red and black caviar, for example, pike, nerka, pink salmon, trout, chum salmon, herring, etc.), shrimp, scallops, etc. In the social network “VKontakte”, offers of such types of fish as trout, cod, pink salmon, sea bass, chum, nerka, salmon, etc. predominate. Keyword relationships demonstrate that portioned fillets, steak and fish caviar are more in demand on the market (Fig. 3).

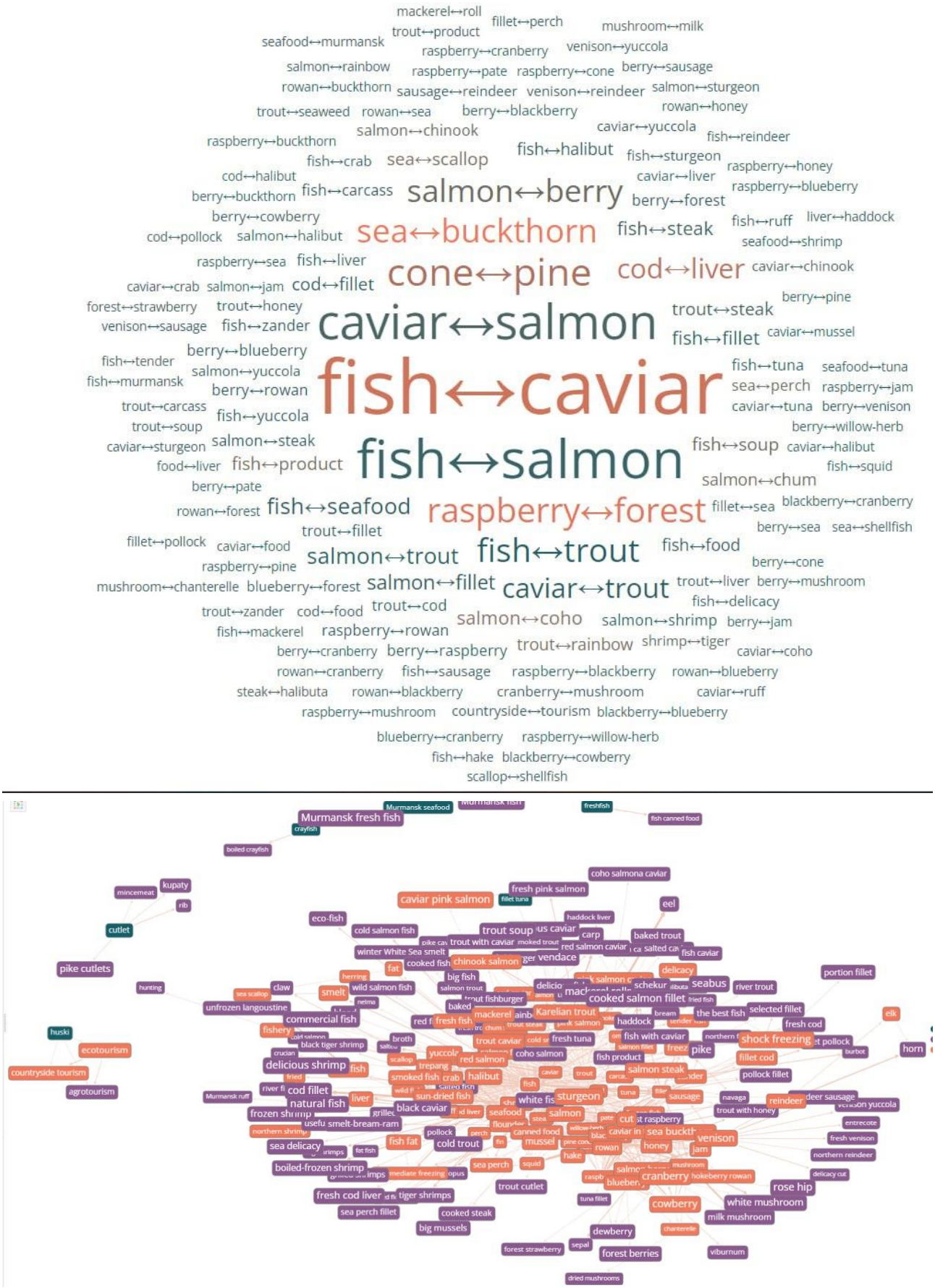

Fig. 3. Relationship of keywords characterizing traditional food products offered on the Internet market of the European North of Russia.

At the same time, products of reindeer husbandry and wild plant collection are the least represented on the market. All types of wild berries are on sale: lingonberries, cranberries, cloudberries, blueberries, sea buckthorn and raspberries. The connection of keywords characterizing traditional indigenous food products demonstrates that the main specialization of the Internet market of the European North of Russia is northern fish products — both ready-made and fresh (or fresh frozen), which are promoted as a delicacy. No comprehensive offer of traditional products of the North in the assortment based on big data analysis has been identified, as no connection between different types of products (venison, fish, wild plants) has been noted.

Using the PolyAnalyst platform, a graph (Fig. 4) was constructed characterizing the degree of support for a traditional product in the Internet market (that is, the number of posts on a social network in which this product is offered).

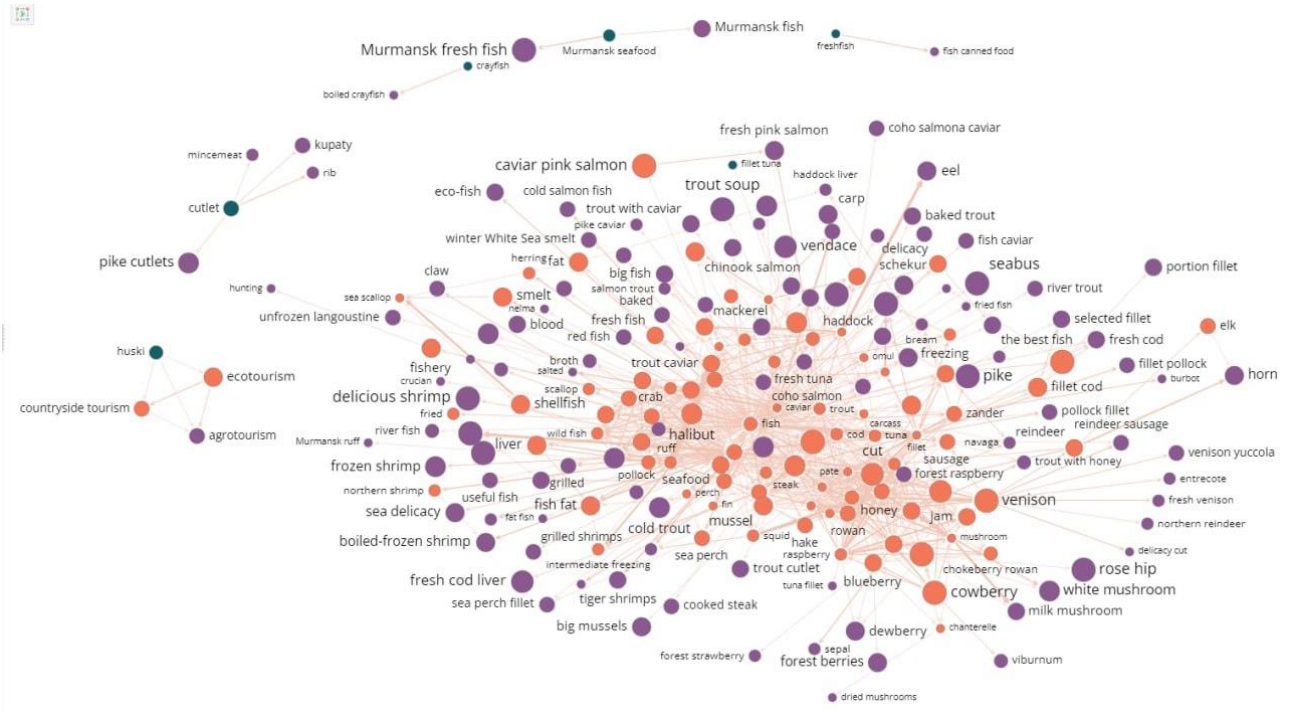

Fig. 4. Graph: traditional food products offered on the Internet market of the European North of Russia.

The graph reveals the geographical affiliation of traditional food products offered on the Internet market: for example, “Karelian trout”, “Murmansk fish”, “Murmansk ruff”, “Murmansk seafood”, etc. At the same time, services that are indirectly related to the traditional economic activities of indigenous peoples are visualized: “rural tourism”, “ecotourism”, “agro-tourism”. Certain nodes of the graph characterize the range of traditional food products offered on the Internet market of the European North of Russia (Fig. 5–8).

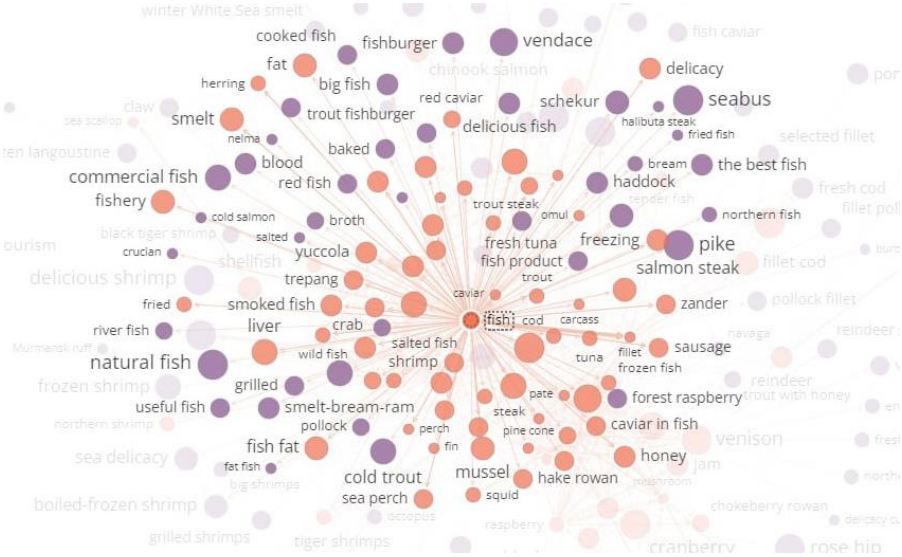

Fig. 5. Node of the “Fish” graph.

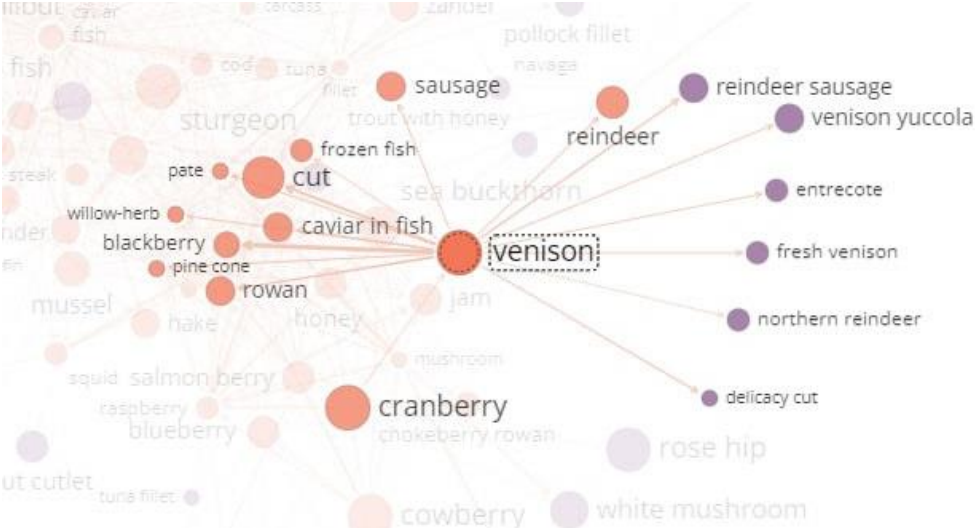

Fig. 6. Node of the “Venison” graph.

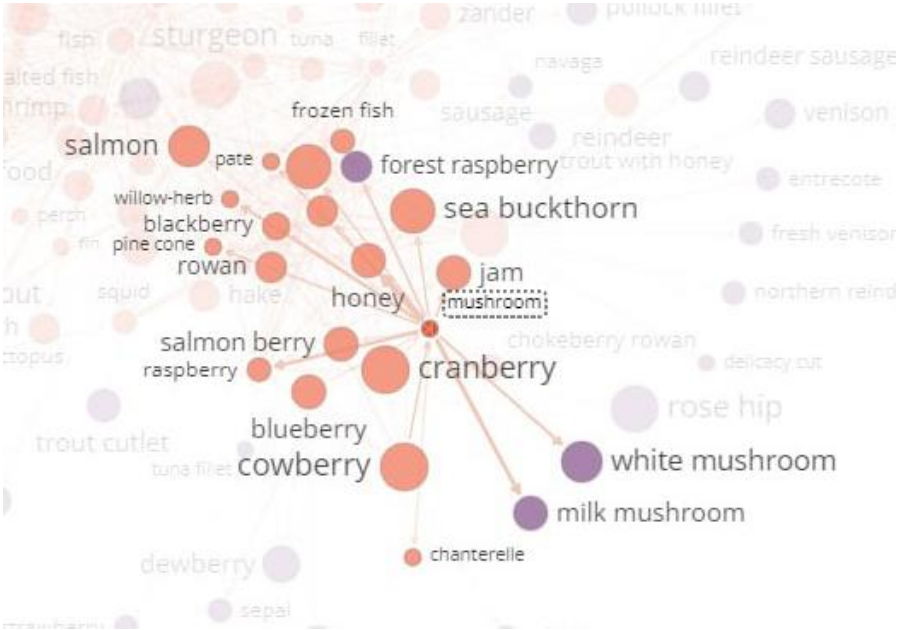

Fig. 7. Node of the “Mushroom” graph.

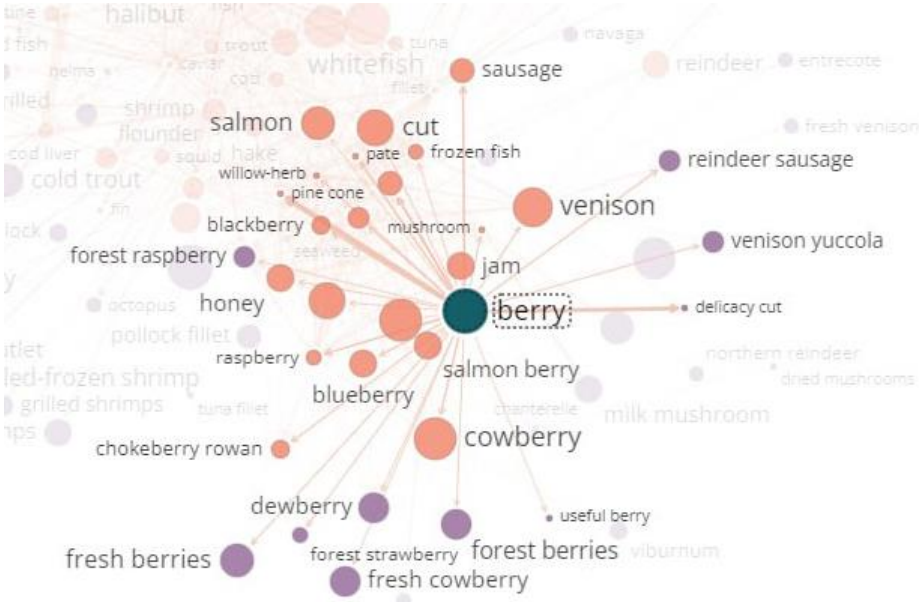

Fig. 8. Node of the “Berry” graph.

Analysis of the nodes of the graphs characterizing proposals for the sale of traditional food products of indigenous minorities of the European North of Russia through the social network “VKontakte” shows that the most popular products are fish (smoked and fried fish, fishburgers, yukola, fish soup, etc.) and venison (sliced meat, sausage, pate, entrecote, yukola). The assortment of mushrooms is small, and they are offered along with other “gifts of the forest” (berries, pine cones, etc.). At the same time, berries are a popular product, sold both separately and as an addition to fish and meat products.

Conclusion

Information and communication technologies have entered all spheres of public life. Northern entrepreneurs now have a high speed of adaptation to changing conditions and are generally very successful in adapting to the challenges of the new times. It is not surprising that the digitalization of economic activity has also affected the economic practices of indigenous minorities. In the modern world, retail sales of traditional products are increasingly carried out via the Internet. This was not only the motivation for the research presented here, but also provided an opportunity to apply innovative technology for collecting and analyzing big data to study this market segment. The range of traditional food products of indigenous peoples offered through the social network “VKontakte” was analyzed, and the marketing trajectories of indigenous peoples of the European North of Russia were partially identified in terms of the sale of traditional food products in the Internet.

It has been established that the most popular product on the Internet market of indigenous minorities in the European North of Russia is fish and seafood: smoked, dried and salted fish, cod liver, various types of caviar, shrimp and scallops. Northern fish products, both ready-made and fresh (or fresh frozen), are the main specialty of the Internet market of the European North of Russia with the participation of indigenous minorities.

The scientific novelty of the research is the identification of the structure of the traditional food products market of the indigenous peoples of the European North of Russia, represented in the Internet, using an innovative methodology of analysis. The practical significance lies in the prospects for applying the results in the development and adjustment of strategic and program documents for the development of Arctic territories and the preservation of the traditional way of life and economic activities of the indigenous peoples of the European North of Russia: in particular, the adaptation of programs for the introduction of digital technologies in places of traditional residence and economic activity of SIPN, taking into account the specifics of zoning to increase the accessibility of state and municipal services, including programs to support the traditional economy of the SIPN; expanding the use of big data analysis technologies (including data from Internet trading platforms and social networks) to monitor the state of the traditional food market in order to ensure the food security of the population; on the basis of the analysis of the assortment range and price formation for traditional food products, development of a set of measures to support the sale of traditional products in order to increase their economic and physical accessibility for the population.

The results of the scientific research were tested within the framework of the work “Development of risk models of the impact of climate change and traditional nutrition on the health and adaptation of the indigenous population of the Arctic region of the European North of Russia” of the world-class scientific and educational center “Russian Arctic”.

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