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Arctic tourism: assessment of potential, directions of its development and security of its implementation in the European North

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***Abstract*—The paper presents the results of the study of the formation, development and realization process of the Arctic tourism potential in the European North, the problem of development of an integrated approach to the study of the Arctic tourism potential, including its assessment, the definition of development directions and implementation tools. Economic and technical solutions are proposed to eliminate this problem. Developed and tested the author's methodology for assessing the tourism potential of the Northern regions on the basis of criteria such as: the image of the tourist region, the degree of development of tourist infrastructure, the labour potential of tourism, transport accessibility and environmental friendliness of the territory, comfort and safety of tourists, competitive, institutional and innovative components of the tourism sector. The results of the assessment of tourist potential allowed to identify the Northern territories, which have the highest tourist potential and serve as the basis for the development of new tourist projects and complexes. Difficulties and prospects of development of tourist activity in the Arctic zones are designated. The significance of the research in the development of tourism theory is determined. One of the prospects of the Arctic touristic equipment proposed and developed recommendations for the use of scientific and technical development in the field of individual means of human protection in the practice of tour operator activities in the winter.**

Keywords—arctic tourism; European North; tourism potential; development.

I. INTRODUCTION

In modern conditions of development of the Arctic, one of the priority strategic directions of development of the Northern regions is Arctic tourism. The Russian Arctic as a tourist destination is a harsh and very picturesque nature of the Islands and archipelagos of the famous Northern sea route — the shortest water route between the European part of Russia and the Far East along the Arctic Ocean.

Currently, the hallmark of Arctic tourism in Russia is a cruise to the North Pole – an exclusive Russian tourist product. This project requires the use of special ice-class vessels - icebreakers capable of delivering tourists to areas closed to cruise ships. Despite the high cost of expedition cruises, tours are in demand among citizens of Germany, USA, Norway and China. It speaks about the importance of the study.

The European North, being the largest tourist region of Russia, unites the territories of the Vologda, Arkhangelsk and Murmansk regions, the republics of Karelia and Komi, and the Nenets Autonomous district. Cruise, ski, hunting, fishing and active tours are organized in the Arctic zone of the European North. The study of the tourism potential of the European North will help to determine the future development of the tourism sector. However, it is worth noting that nowadays there is a problem of assessing the tourism potential of the territory, associated with the divergence of views of scientists and specialists in different fields of knowledge on the components of the potential of the tourism sector.

The analysis in the work of Pashkevich [1], conclusions on the publications of Fay, Maher and Mason [2-4] were done, the portrait of the organizer of provincial tourism through the prism of the economy in previous works was studied [5-7]. At the same time, it should be noted that the full realization of the potential of Arctic tourism is hampered by practical difficulties associated with the formation of the tour package proposed by tour operators, fully taking into account the special climatic conditions of the Arctic. Thus, a number of studies conducted by the National tourist Union showed that 40% of Russian tourists are afraid to go beyond the Arctic Circle due to extreme weather conditions and prefer classic resorts. This fact indicates the need for scientific and technical developments in the field of personal protection against low temperatures. In this regard, the purpose of the study was to develop theoretical and practical recommendations to improve the efficiency of the process of evaluation, development and implementation of the tourism potential of the Northern territories, as well as the use of modern methods of ensuring the safety of tourists in the Arctic.

II. METHODS AND DIRECTIONS OF THE STUDY

In the research base there are two forms of evaluation of tourism potential: qualitative and quantitative. In this case, each of the many existing techniques has positive sides. Qualitative characteristics make it possible to logically justify the evaluation features based on the analysis of the Genesis and morphological structure of natural complexes, as well as to determine the "weight" of the factor when using mathematical methods. The advantages of quantitative

evaluation are the brevity of expression and the possibility of territorial comparisons.

From our point of view, it is advisable to use the following components of tourism potential as evaluation criteria to identify the prerequisites for the development of tourism in the Northern territories:

- Image of the tourist region;

- Degree of development of tourist infrastructure;

- The employment potential of tourism;

- Transport accessibility and environmental friendliness of the territory;

- Comfort and safety of tourists;

- Competitive, institutional and innovative components of the tourism sector [6].

The image of the tourist region is formed on the basis of such indicators as the presence of objects of tourist interest, the diversity of the species composition of tourism, the degree of development of tourist projects, their popularity among potential tourists and brand awareness. Important in this case are the objects of tourist attraction – attractors. Thus, the greatest interest among travellers in the Arctic is the North Pole.

The development of the tourist infrastructure is characterized by collective accommodation facilities, tourism organizations, catering, etc. Transport accessibility of the tourist centre is formed by a system of roads, air and waterways. Along with the tourist infrastructure, the most important element of resource provision and a factor in the development of the tourism sector is its labour potential, which includes a whole complex of real and potential abilities of the inhabitants of the tourist region, providing activities for the organization of tourism [7].

Environmental conditions, comfort and safety of tourists in the extreme conditions of the Arctic are also important components of tourism potential. At the same time, to ensure the comfort and safety of visitors in the framework of this study, a new device is proposed – a thermal mask that allows breathing heated air even in the most severe frosts. In the course of its development, General scientific approaches, empirical methods (measurement, comparison, experiment), as well as methods of mathematical modelling were used.

One of the important components of the tourism potential is the competitive component of the tourism market, which forms the environment for the functioning of tourism organizations. The institutional component of tourism defines a number of key characteristics:

- the stability of the institutions of tourism;

- approaches to the management of the tourism sector, management and coordination of tourism activities;

- consistency between the fundamental documents regulating tourism activities;

- scientific support for the development of tourism;

- symmetry geographically regional offices of tourism organizations in promotion of regional tourist product;

- mutual coordination of activities and operational tasks to enhance intra-and TRANS-regional cooperation in the tourism sector.

The innovative component of tourism combines the internal characteristics and external conditions of the innovation process in the tourism industry. The internal innovation component includes innovative potential (resources and opportunities for their use), capable of generating ideas and carrying out the process of their commercialization throughout the innovation cycle. The external innovation component is determined by the national innovation system that promotes the innovative development of the tourism sector.

The selected components of the tourism potential served as the basis for its expert evaluation on a 10-point scale in relation to the territories of the European North. The relative importance of the components and the level of their severity were determined on the basis of group assessments of experts - regional tour operators operating in the tourism market for more than 10 years.

The tourism potential index was determined by the following formula:

$$Pt = \sum_{k=1}^{n} \frac{Svk * Uvk}{Svk} \quad (1)$$

Where: *Pt* is the index of tourist potential of the territory; *Sv* is the degree of importance of the component (k) of the tourism potential; *Uv* is the level of expression of the component (k) of the tourism potential; *n* is the number of components (k) of tourism potential.

III. Results of the Study

The revealed estimated characteristics allow to distribute the territories of the European North according to the level of tourist potential in the Table 1. Thus, the Republic of Karelia and the Vologda region (Pt=6) are characterized by the highest level of tourist potential. These regions are distinguished by the formed image in the tourist market (7 points).

TABLE I. THE RESULTS OF THE ASSESSMENT OF THE POTENTIAL OF ARCTIC TOURISM IN THE EUROPEAN NORTH, THE AVERAGE SCORE

Subject	Image of the touristic region	Development of tourist infrastructure and suprastructure	Transport accessibility	Labour potential	Ecological auspiciousness	Economic interest of the tourist to the territory	Comfort and safety	Competitive component of the tourism market	The institutional component of the tourism industry	innovative component of the tourism industry	Tourist potential index
The Republic of Karelia	7.0	6.0	4.1	5.6	8.0	5.6	6.0	5.6	6.4	4.4	5.9
Murmansk region	4.2	5.0	4.6	5.0	7.6	5.0	4.0	4.0	6.0	3.8	4.9
Arkhangelsk region	5.2	4.8	4.2	5.2	8.0	5.4	4.0	4.0	6.0	3.8	5.0
Vologda region	7.0	6.2	4.6	5.6	7.0	6.2	6.0	5.8	6.5	3.2	5.8
The Republic of Komi	5.5	5.8	4.4	5.0	7.0	7.0	6.0	5.0	6.0	3.5	5.5

The lowest scores (3-4 points) can be traced by the innovative component of the tourism sector. The development of tourist infrastructure and suprastructure of the subjects of the European North is at the average level (5-6 points), which proves the lack of collective accommodation facilities and catering facilities that meet the requirements of international standards. The low level of transport accessibility indicates the need for the formation of the transport network of the European North.

The low average score of the comfort and safety level of tourists in the Murmansk and Arkhangelsk regions is due to the climate features. People who live in these areas permanently or temporarily have the full impact of the harsh Arctic climate.

Staying in the cold without special means of protection, people are faced with such problems as frostbite of open areas of the face, significant loss of heat and moisture by the body with exhaled air, as well as with active movements of the person inhales frosty air in large volumes, and, entering the respiratory system, the air does not have time to heat up, which causes hypothermia and spasms of the respiratory tract. Thus, in order to ensure the normal functioning of the body, and, as a consequence, good health and high efficiency in finding people in the climate of the European North and, especially, the Arctic zone, there is a need for effective solutions to protect the human thermal balance, able to protect people from the effects of frost and wind, as well as to minimize heat and moisture loss of the body, including losses with breathing [8].

The scientific and technical solution proposed by the Vologda state University to the problem of tourists staying in low temperatures is to develop a so-called thermal mask. According to the work [9], the constructive solution of the mask provides protection of the respiratory organs from frosty air, protection of the skin from frost, wind and precipitation, reduction of heat and moisture losses with exhaled air, capacity for air volumes necessary for comfortable use of the device at different levels of physical activity, as well as long-term continuous operation of the device without loss of efficiency of its operation.

The tests of such devices by the staff of the national Park "Russian Arctic" (near the archipelago of Franz Josef land in 2016) showed the effectiveness of such protectiofn.

IV. DISCUSSION OF THE STUDY'S RESULTS

As the results of the assessment of the Arctic tourism potential have shown, among the main problems a low degree of formation of tourist infrastructure and transport network can be identified. In assessing the importance and severity of the components of the tourism potential of most regions, significant differences are observed in the innovative component of the tourism sector, which proves the relevance of the problem of creating favorable conditions for the emergence of innovations in the industry. Therefore, in our opinion, for future tourist activities on the territory of the European North is necessary to develop new tourism projects, creation of modern infrastructure facilities, the implementation of inter-regional tourism routes, including the Arctic zone of the Northern regions with different levels of tourism potential.

Increasing the level of comfort and safety of tourists in the Arctic will contribute to the inclusion in the tour package of special tourist equipment, including a thermal mask, a model of which was developed in the framework of this study. The novelty of the scientific and technical idea lies in the design of the heat exchanger, which provides for the removal of condensed water vapor. Among the currently existing foreign analogues can be identified ColdAvenger

Fig. 1. Examples of the arctic equipment

(USA), respirator Lungplus Sport (Sweden) and AirTrim Cold Air Mask (Sweden). Analysis using the Google Trends tool revealed the dynamics of global popularity and popularity by region of the search query for the keywords "thermal mask", "heat mask" and "heat mask" for the period of 5 years, as well as the dynamics of global popularity and popularity by region of the search query for the keywords "ColdAvenger", "Lungplus" and "Airtrim" - the largest players in the market of thermal masks (fig.2).

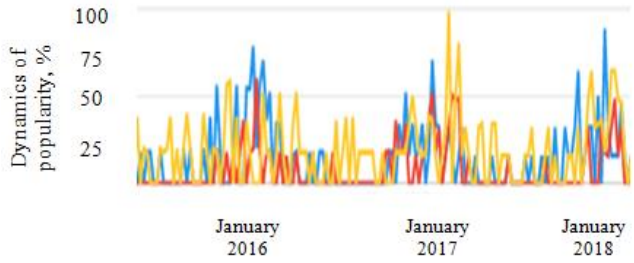

Fig. 2. Dynamics of popularity of the studied products

Among the keywords, the most popular is the "heat mask", while the number of requests for the specified period has a trend of increase, which indicates the prospects of demand for products. Canada, the United States and the United Kingdom can be singled out among the countries with a pronounced demand for the product under study. A leader in the queries (see Fig.3) is Airtrim (46%), with demand recorded in Sweden and Norway. On the second place is ColdAvenger (36%) with demand in Canada, Poland and the United States. The company Lungplus (18%), known mainly in Norway and Sweden, closes the rating. The dynamics of popularity also shows the seasonality of demand for goods and some of the highest peaks of requests (75-100%) in January.

Fig. 3. Zones of distribution of products of the largest players in the market of heat protection masks and comparison of requests by regions for the period from 2016

Thermal mask SIVER (LLC "Second Wind TM", Chelyabinsk) which is not common abroad, but known in Russia, is also seasonal consumption and is used in the Northern and North-Eastern regions of the country.

Comparative analysis showed that the developed thermal mask has the following specificity - removal of condensed moisture from the heat exchanger. Due to this, there is no decrease in the throughput of the device and an increase in aerodynamic drag when breathing. The main advantages of the proposed device are:

- high performance heat transfer device that allows you to use it during exercise, Hiking;

- ability to breathe both through the nose and through the mouth depending on the type of human activity;

- unlimited duration of continuous use of the device even in high humidity conditions;

- hygiene use, because a constructive solution allows you to easily and quickly disassemble the mask for cleaning and disinfection;

- the presence of several types and sizes of masks will ensure the safety of tourists of any age with certain preferences;

- Compactness, ease of use and attractive appearance even to the most popular user.

V. Conclusions

Summarizing the above, we can conclude that the methodology developed in the framework of this study and tested in relation to the Northern territories to determine the level of tourism potential develops and continues existing theoretical research in this area. The practical importance of scientific and technical development is to fill tour operators tourist package with special equipment that protects against the effects of low temperatures. The design of the proposed heat exchange device provides for the removal of condensed water vapor and protection from heat losses of the body, which determines its specificity.

It should be assumed that the effective functioning and development of the tourism sector of the European North will be facilitated by the creation of tourist infrastructure facilities corresponding to modern international standards, the development of interregional tourist routes, including the Arctic zones. At the same time, in order to increase and evenly distribute the tourist flow, it is advisable to combine the Northern territories with different levels of tourist potential identified in the process of its assessment within the framework of tourist projects.

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