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Issue Article

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FEATURES OF ARCTIC TOURISM TO GUARANTEE THESE REGIONS EFFECTIVE SOCIO-ECONOMIC DEVELOPMENT

Abstract: *in the article the authorsexplore the features of Arctic tourism for the most unusual region on our planet, an incredibly beautiful and mysterious region that amazes with its originality. This region attracts not only scientists and researchers, but is also an object of frequent tourist visits, so the term has appeared, which in recent decades has become increasingly popular not only within our country, but also in the world community - "Arctic tourism". The relevance of these studies lies in the fact that the Arctic is one of the most significant, promising and controversial places on our planet, which is of interest to a large number of tourists. The goal is to explore the concept of "Arctic tourism". The objectives of the scientific article: to study the reasons for the popularity of tourists to the Arctic, to identify the features of Arctic tourism.*

The Arctic is one of the few corners of the Earth where the unique nature in its original form has been preserved, as well as the traditional way of life of the indigenous peoples. Therefore, the Arctic, in recent years, has attracted more and more tourists. The Arctic territory of Russia contains significant potential for the development of Arctic tourism. This article is devoted to studying the tourism potential of the Russian Arctic and identifying the opportunities and limitations of such development. Also presented is an analysis of the main competitors of Russia in the field of Arctic tourism (Norway, Finland and Sweden), as well as the formats of their international cooperation in its development, combined with the preservation of the fragile ecosystem of the Arctic and the sustainable development of the region. Studies show that the development of Arctic tourism in Russia is difficult due to the lack of infrastructure, underdeveloped logistics, as well as high cost. Simplification of the visa regime can significantly increase the flow of foreign tourists.

Key words: *Arctic, tourism, prospects, threats, Arctic tourism, attractions, tourism potential, Russian Arctic.*

Language: *English*

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Introduction

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Arctic tourism, as a conceptual concept, has been studied by many Russian figures in various fields. For example, D.A. Medvedev in his work "Arctic Tourism" noted the prospects of this direction of tourism: "The unique historical, architectural, cultural and natural heritage of the Arctic opens up great opportunities for attracting tourists. Over the past five years, there has been a positive growth in the tourist flow, new infrastructure facilities are being built, jobs are being created, and a full-fledged tourist and recreational complex is being formed. Almost all major analytical reports on the development of the Arctic in recent years mention the importance and prospects of this direction." Artika is an amazing place to relax. This region is an exotic place that everyone should visit. In addition to its beauty and splendor of the landscape, Artika is currently one of the cleanest ecological territories on the planet. It is for these reasons that every year more and more tourists from different countries come there.

But of all the countries I would like to single out Russia. After all, it is she who owns most of the territory of the Arctic. The total area of the Arctic possessions of Russia is about 3 million square meters. km (18% of the entire territory of the Russian Federation), including 2.2 million square meters. km of land, where about 2.4 million people live. This is less than 2% of the population of Russia and about 40% of the total population of the entire Arctic. There are vast plains covered with tundra and forest-tundra, islands with icy deserts, mountains, lakes and rivers, forests with rich flora and fauna. Here you can see: polar bears, arctic foxes, walruses, bowhead whales, beluga whales, seals, reindeer and more than a thousand species of plants. Therefore, at present, the interest in tours to the Arctic among Russians is increasing. According to the statistics of the Federal Tourism Agency, in the early 2000s, about 90% of the participants in cruises and other types of tourist programs to the Arctic were foreign tourists, and at present the number of Russian citizens on such trips has increased significantly. Moreover, Russian tour operators note that in group trips to the Arctic, the number of tourists from Russia averages 25-30%. Tours to Wrangel Island, Svalbard Island and Franz Josef Land are very popular with Russian tourists.

In addition to Russia, tours to Artik in Canada are actively developing. Despite the fact that Canada owns a small part of the Arctic territories, Canada provides tourists with the opportunity to visit many nature reserves where you can see polar bears, musk oxen, polar wolves, walruses, whales, arctic birds. For those who love outdoor activities, Canadian tour operators offer ski expeditions, mountain climbing, cruises, boat trips and kayaks, diving and many other activities.

Norway is also another country with developed tourism in the Arctic. This country offers tourists a cruise, as well as the opportunity to visit the Svalbard archipelago and land on the ice. Here, tourists can engage in outdoor activities from hiking and skiing to Arctic diving.

All countries offer tourists to visit many interesting and amazing places in the Arctic. It is this territory that is the cleanest ecological zone, so there is always clean and fresh air here, which cannot but attract tourists to visit this place. Many tourists go there just to enjoy the clean air and see many interesting plants and animals. Therefore, it is for these reasons that the growth of tourists to the Arctic is growing every year, which cannot but rejoice. For a number of states, the Arctic represents not only strategic, natural and energy interests, but also recreational ones. The Arctic is a harsh, but very picturesque nature of the islands and archipelagos, where a large number of people from different countries strive to get and look at the beauty of such a remote part of our planet, despite the high prices for visiting this region. The waters of the Arctic Ocean wash the shores of four countries, namely: Russia, Canada, the USA and Norway. Therefore, these countries are faced with the task of ensuring the safe and high-quality organization of tourism. And to do this is very difficult because of the peculiarities of the Arctic, which are very ambiguous. So, let's look at these features, namely:

* inaccessibility and remoteness of many tourist-attractive areas. In connection with this feature, the cost of visiting the Arctic is extremely high;

* strong dependence of the organization of tourist activities on seasonal circumstances. This feature is manifested in the fact that there is an inaccessibility of some tourist places for long periods during the year;

* the need to take into account natural and climatic factors in the planning and organization of tourism.

Namely, polar day and night, severe weather conditions, the presence of permafrost, etc.;

*socio-economic specifics of the Arctic zone. The low density of the population and the uneven distribution of it, the patchy nature of the infrastructure, the uneven role of some sectors of the

economy, the presence of the military and the command post;

*administrative restrictions on visiting some areas. Border zones and closed territories, closed administrative-territorial units.

In connection with the current features of the Arctic, the state is obliged to carefully and efficiently organize a visit to the Arctic, guaranteeing the safety of travelers. Therefore, unfortunately, not everyone will be able to visit such a beautiful region, because Arctic tourism is an expensive pleasure. Tourism is not just a hobby or a fashion, it is also a vital need for most people. At different times and eras, about the same thing attracted them to tourism: the romance of travel, which means an escape from the ordinary, and even the possibility of informal communication. Each participant of such trips begins to feel like a discoverer and explorers. Since a large territory in the Arctic belongs to Russia, it turns out that it is in Russia that there are many types of tourism. But many of them can be a threat.

Among the threats and risks for the effective development of the tourism industry in the Arctic, the following can be identified, namely:

* the domestic potential of cruise sea tourism in the waters of the Northern Sea Route, the North Pole, the Arctic islands in the Arctic Ocean, Solovki in the White Sea, Wrangel Island is not always correctly used, taking into account the balance of ecology and economy, the cost of tours.

*on the world market of tourist products, the promotion of Russian national parks, federal nature reserves and other protected areas, UNESCO World Natural and Cultural Heritage sites is not effective enough;

*domestic demand, in times of crisis, for expensive Arctic tourism products is hindering its development due to an elementary lack of funds and a decrease in the standard of living of a significant part of the Russian population. At the same time, the Russian state, its departments, the constituent entities of the Russian Federation are still insufficiently supporting social, environmental, cultural and historical domestic tourism in the Arctic and the Far North of Russia, including for children, students, pensioners;

* The next particularly important threat is the lack of generally valid (reliable) and verified information about Russian tourism products, including, of course, the Arctic;

*not only the construction of nuclear icebreakers at domestic shipyards is relevant, but also the search for investments, design, construction of the most modern ships for the tourist business of reinforced ice class, which can be used on sea routes in harsh conditions, both in the Arctic and Antarctic at different times of the year;

* the promotion of Russian national parks, federal nature reserves and other protected areas is not being carried out effectively enough on the world market of tourism products;

*leaves much to be desired the quality of tourist services (classification of hotels, certification of tour guides and interpreters, transport) in the regions of the Arctic and the Far North of Russia. There is not always enough professionalism, a sense of hospitality and order, pride in the place where we live.

The geographical position of the Arctic is of great interest to people who have been involved in tourism not only for many years, but also for beginners. Why is the Arctic so attractive? What is it that attracts people to the ends of the earth? The desire to find solitude in latitudes where there are no people, only white space around, constant winter and emptiness for many hundreds of kilometers. This is what is necessary in order for the mental state of a person to come to balance. With today's rhythm of life, especially in large metropolitan areas, the human brain is so busy that emotional unloading is necessary for rest and relaxation. For many people, it is not necessary to go to hot countries for the feeling of an emotional outburst; the conditions of the Arctic are more suitable for them. In addition, the extreme conditions of this climate allow you to get on such excursions, which are in great demand,

Hundreds of people want to get to that point in the Arctic, where they can experience the lowest temperature that was recorded in Yakutia. Also of interest is a trip on an icebreaker, which is one of the expensive pleasures for travelers. It is impossible to ignore one of the most beautiful natural phenomena, the northern lights, which can only be observed during the polar night. During the polar day, it is possible to use this climate for winter sports. On the territory of the continental Arctic in the forest-tundra and tundra, fishing and hunting are very successful.

In order to study and use not only the natural, but also the cultural and historical heritage of the insular western Russian Arctic, in 2009 the government of the Russian Federation created the Russian Arctic National Park on the Novaya Zemlya archipelago. On the territory of the park, an important object of archaeological importance is the wintering place of the Dutch expedition, and there are also buildings of a hydrometeorological station on Cape Zhelaniya. Along the coast there are facilities founded by Pomors.

Buildings and many other objects, including those of the Soviet era, which are of great interest to tourists, have survived almost untouched on the land of Franz Josef. But, unfortunately, the cultural monuments of the Arctic are destroyed over time under the influence of natural and human activity factors, which is one of the serious problems in preserving the cultural heritage of the Arctic today. The history of domestic tourism is divided into periods when interest in the Arctic direction has sharply increased, namely:

* In the 20th century, as a result of the activities of the Association of Arkhangelsk - Murmansk Shipping Company, flights to the Arctic became available to the entire population of Russia. "Guide to the North of Russia", which was published in 1898 and announced: "Our North <...> is equally interesting for a scientist, traveler, naturalist, ethnographer, artist, simple tourist - a nature lover, hunter, pilgrim and for an enterprising trading person < ...> a trip to Arkhangelsk and along the Arkhangelsk, as well as along the Murmansk, coast became a fast, easy and comfortable walk ";

* in the 1930s, the first sea cruises were created and, in the future, the tourist movement developed, as a result of which the foundations of tourism to the Soviet Arctic were laid;

* Interest in the Arctic direction at the beginning of the 21st century also occurred in a market economy. The tourism business forms the infrastructure and establishes new offers in the represented segment. It is important to note that part of the tourism products of the "Arctic" orientation was designed for a wealthy consumer.

Currently, there are serious problems in the Arctic tourism - environmental problems of tourism development. The negative signs of the impact of the tourism industry on nature include, namely:

a) environmental pollution due to the formation of tourism infrastructure;

b) damage or destruction of natural monuments;

c) the destruction of the flora of the tundra, which is carried out due to the large number of tourist routes. Tracked vehicles pose a huge threat to the soil layer;

d) depletion of biological resources due to the impact of nature - oriented varieties of tourism: fishing and hunting for animals;

e) the percentage of the probability of the occurrence of environmental disasters increases.

There are measures to reduce the negative impact on the nature of the Arctic, namely:

a) strengthening state control to comply with environmental legislation;

b) carrying out work aimed at raising the awareness of participants in tourism activities;

c) prompt response in case of a threat to nature;

d) taking measures in case of violation of the natural balance due to the large amount of consumption of biological resources;

e) systematization of tourist routes in order to reduce the negative impact on the soil layer of the tundra;

f) difficulties in applying the historical and cultural sphere in the tourism industry.

The integration of the historical and cultural heritage of the Arctic into tourism activities is accompanied by a number of possible threats. In addition to the dangers of infrastructure development, the historical and cultural heritage in interaction with the tourism industry faces special problems. Problems in the ecology of the Arctic associated with tourism: changes in cultural landscapes, destruction and damage to historical and archeological monuments, the problem of accessibility of Arctic tourism destinations.

Tourism activity is a way to diversify the economy of the territory. The tourism business faced a number of problems, one of which was the inaccessibility of the area. The complexity of maritime navigation, the lack of road communication with other regions of the Arctic - all this has become limiting factors for the development of the tourism industry.

Main part

Tourism is becoming an increasingly important component of export diversification for emerging and developed economies. This demonstrated the high potential for compensating for lost profits in many oil-exporting countries. The development of tourism is especially important for Russia at the present time, due to sanctions, there is a decrease in oil prices. According to the World Tourism Organization (UNWTO), with 24.3 million tourists in 2018, Russia ranks 16th in the world in terms of the number of foreign tourists and 9th in Europe (UNWTO, 2018). Between 2018 and 2022, Russia was in 9th place in terms of the number of foreign tourists arriving, in 2021 the total number of foreign tourists decreased to 24.6 million people (from 33.7 million in 2018) and Russia dropped by 15 place.

The main regions of Russia visited by foreign tourists in 2021 were Moscow (4.8 million foreign tourists in 2021) and St. Petersburg (3.75 million). Also popular among foreign tourists was the Krasnodar region (900 thousand tourists), Primorsky Krai (640 thousand, including 420 thousand from China), the Republic of Crimea (more than 500 thousand), the Republic of Tatarstan (278 thousand) and the Moscow region (230 thousand) (Turstat). Among the regions belonging to the Russian Arctic, only the Republic of Karelia entered the top 20. The Arctic is a region of the Earth with unique natural and climatic features, where tourists are attracted by landscapes with glaciers descending into the sea, Arctic tundra with colonies of migratory birds, seas inhabited by whales and seals, narwhals and polar bears. Due to inaccessibility, the Arctic has not lost its original purity.

Russia has the longest borders in the Arctic - 22,600 out of 38,700 km (58.4%). Russian land territories in the Arctic occupy 3.7 million square meters. km with a population of about 2.4 million people. It occupies 21.6% of the entire territory of the Russian Federation, but only 1.7% of the population lives here. The level of urbanization in the Russian Arctic is one of the highest in the country - 89. Despite its vast territory, the development of tourism has not

yet been mastered. At the same time, Arctic tourism is actively developing in Norway, Finland, Sweden, Iceland and other countries that offer unique, world-famous Arctic tours. Therefore, the purpose of this article is to analyze the tourism potential of the Russian Arctic along with the analysis of competitors, to identify the main opportunities, as well as the limitations of tourism development in the region. Research on Arctic tourism began in the 1980s, but there is still a wealth of literature that can be grouped into four broad themes: tourism patterns, tourism impacts, tourism policy and management, and tourism development.

The Arctic zone of Russia is characterized by territorial contrasts and contradictions of economic interests. In addition to the vast mainland, exceeding 3.7 million square meters. km, the Arctic zone of Russia includes 185 thousand square meters. km of archipelagos, including several large (Wrangel, Vaigach and Kolguev) and many small islands (Solovki Islands, Franz Josef Land, Novaya Zemlya, Severnaya Zemlya, New Siberian Archipelago). There are six types of administrative-territorial division of this vast territory. Overlapping economic activities of major corporations and traditional resource use, widespread and unique resettlement systems, an area of active economic development and a special conservation status coexist here. Soviet Arctic tourism began to develop in 1966, when the first ship "Vorovsky" made its voyage. After the Soviet period, from the early 1990s to 1998, the Russian government had no interest in developing Arctic tourism. By 1998, demand began to grow, but due to the global economic crisis in 1998, it fell again. Since the beginning of 2018, interest in the Arctic has been steadily growing again. The main problems complicating the development of Russian Arctic cruise tourism are the high cost of tours, the lack of ice-class vessels and coastal tourism infrastructure. For example, the price of the tour: The company "PoseidonExpeditions" on the route Svalbard - Greenland - Iceland started for $ 7,600 in 2018. The high price of Arctic tours is mainly due to the high cost of shipping. Far-Water - Cruises are operated on ice class ships or icebreakers so they can visit areas that are inaccessible to cruise ships due to ice. At the same time, there are usually from 50 to 110 tourists on board. The organization of cruises in the Russian Arctic is dominated by foreign companies. The total number of tourists in the segment of long-distance water cruises to the Arctic is small. Every year, about 1,000 foreign tourists visit the Russian Arctic and the North Pole on cruise tours. To further promote cruise tourism in the Arctic, it is necessary to develop a flexible system of tariffs for the entire Northern Sea Route and port dues rates for passenger ships. This will allow new Russian players to enter the Arctic tourism market.

In the Arctic regions, in the state rating of Russia for the development of tourism in 2021, compiled by Rostourism, the Scorecard includes the state of tourism infrastructure, the availability of accommodation facilities, management efficiency, economic mechanisms for stimulating tourism development, attracting investments and implementing investment projects, developing transport infrastructure, promotion of regional tourism products, availability of tourism information, centers, participation of the region in Russian and international exhibitions, development and promotion of tourism brands and tourism products. The rating included 85 regions of the country and the first places were taken by Moscow (93.8 points), St. Petersburg (93.0 points), the Republic of Tatarstan (93.0 points) and the Krasnodar Territory (90.3 points). A group of regions with relatively high rates of tourism. The Republic of Karelia belongs to the development of the Arctic regions. Krasnoyarsk Territory, Arkhangelsk Region, Republic of Sakha (Yakutia), Murmansk Region, Yamalo-Nenets Autonomous Okrug. In regions with average indicators of tourism development. Chukotka Autonomous Okrug. At the bottom of the ranking are regions with relatively low rates of tourism development.

Russia has great potential in Arctic tourism, but for its development it is necessary to relax visa rules. According to the leadership of Rostourism, it is necessary to ensure a visa-free stay in Russia for 72 hours for passengers of cruise ships arriving in Russia (including transit passengers) through international airports. This measure will allow tourists to stay in Russian port cities for 2-3 days before boarding a ship or after a cruise. In addition, the Federal Agency for Tourism proposes to consider the possibility of a visa-free stay in Russia for up to 15 days for river cruise passengers traveling in organized groups and living on board, as well as expanding the bilateral practice of issuing group visas. Then the issuance of group visas, as experience has shown, leads to a 20-30% increase in the tourist flow to Russia. Segment of organized tourism. An important state task for the Russian government is to promote ecological Arctic tourism. Business in Russia needs government assistance to promote the sights of the Russian Arctic. If properly managed, the tourism sector can contribute to the economic growth of Russian regions, social integration and the protection of cultural and natural heritage.

The heads of the constituent entities of the Russian Federation are aware of the need to have their own regional brand in order to work towards the growing interest in legal entities. A tourist brand allows you to form the recognition of a certain territory, increasing its attractiveness for domestic and inbound tourism. Regional departments of culture and tourism are instructed to draw attention to their tourist sites, routes and events. The creation and promotion

of tourism brands is a good example of public-private partnership, joint work of government and business.

In 2021, according to the National Tourism Portal, four Arctic brands entered the top 100 tourism brands: Solovetsky Archipelago (Arkhangelsk Region) - 51st place, White Sea (Arkhangelsk Region) - 56th place, Stroganina (Republic of Sakha (Yakutia) - 80th place and "Arctic Circle" (Yamal-Nenets Autonomous Okrug) - 100th place.

The development of Arctic tourism in Russia is complicated by infrastructure and logistics problems, as well as the high cost of the tourism product. In addition, according to experts, the factors hindering the development of Arctic tourism include natural and climatic factors: short-term favorable; long cold, rainy and snowy period throughout the year, strong wind, high humidity; lack of a primary health care system and a tourist security system. Arctic tourism as a special segment of the tourism industry, which has special harsh, often extreme conditions in the Arctic, can be effectively developed only with the active cooperation of business and government. In 2018, the Union of "Northern Industrialists and Entrepreneurs" represented by the chairman Fedotovsky A.V. and Kanavina A.V. presented a draft strategy for the development of Arctic tourism until 2035, National experts believe that tourism in the Arctic, a zone of the Russian Federation, can become as popular as in Alaska, Canada and Norway, Iceland and Finland. As a goal, the strategy proclaims the creation of a modern competitive tourist complex throughout the Russian Arctic (including nature reserves and specially protected natural areas), ensuring an increased ability to meet environmental, aesthetic, educational and recreational needs.

Russian and foreign citizens contribute to the development of the conservation of natural complexes in the Arctic. Among the priority areas for the implementation of the Strategy in the AZ of the Russian Federation will be, namely:

1) development of crafts of small peoples of the North and the Far East;

2) event and ethnographic development of tourism, creation of ethnic settlements;

3) simplification and harmonization of ski and adventure tourism routes, traveler liability insurance;

4) development of domestic (intracity) tourism in the cities of the Russian Arctic;

5) educational tourism and development of ecotourism;

6) creation of a unified telecommunications system "Electronic Arctic" for the needs of tourism.

After the creation of separate digital spaces in each region of the Russian Arctic, their integration within the entire Arctic, and the emergence of a new system "Electronic Arctic". It unites all coastal and continental settlements, including the Northern Sea Route.

According to the authors of the Strategy, the Electronic Arctic system will provide safe tourist routes throughout the Russian Arctic. Creation of a recreational cluster will develop simultaneously. Several tourist segments will contribute to the comprehensive promotion of the territory of the Russian Arctic. In the future, it will be able to receive more than 100,000 Russian and international tourists annually.

The main competitors of Russia in the Arctic tourism are Sweden, Norway, Finland, Denmark and Canada. Each of them has a strong position in the international tourism market. The competitive advantage of the Scandinavian countries and Finland is that they are located in the Schengen area and, excluding Norway, in the European Union. The Schengen area currently includes 26 European countries with a population of more than 400 million people, for which there are no visa restrictions, which simplifies cross-border movements and has a positive effect on the growth of tourist flows.

In the northernmost counties of Sweden, there are many companies involved in ecotourism - Norrbotten ("Swedish Lapland") and Västerbotten. The competitive advantage of the Swedish regions is accessibility compared to other Arctic regions. There are regions with well-developed public roads and daily flights from Stockholm (up to nine airports), as well as a railway along the coast to the mountains in northern Sweden. Tourism growth in Sweden, measured by hotels, has increased. In 2022, the growth of the international tourism sector in Sweden was 115%. In addition to nature and culture, Sweden's attractiveness is enhanced by the high quality of services, including medical care and well-developed infrastructure in the northern regions of the country, which creates potential for tourism development.

Finland started developing tourism in Lapland in the 1980s. Snowmobile trips, reindeer visits and dog sledding are very popular among tourists in Finnish Lapland. In 1990, 1.3 million tourists visited Finnish Lapland, but by 2018 the number had almost doubled to 2.4 million. The real numbers are likely higher as a significant proportion of hotels are unregistered. In 2022, foreign tourists came to Lapland mainly from the UK, Russia, Germany and Japan.

It should be noted that the number of Russian tourists to Finnish Lapland is also growing at a faster pace. The main tourist season runs from February to April. Summer and autumn seasons attract primarily tourists. The Christmas season with British and Russian tourists starts in November and continues until January. The turnover of tourism companies in Lapland in 2021 amounted to 471 million euros. Significant contribution to the economic development of the northern regions of Finland. Recently, employment in tourism in Finland has grown by 3.5%, which is 1.5 times more than growth in forestry and almost 4.5 times than in mining. As a result of

government policy, young people find work in the tourism sector. The importance of tourism in terms of employment is emphasized in the municipalities of Western Lapland, where the share of the tourism industry in employment ranges from 39% to 46%. The strategy for the development of the Arctic zone of the Russian Federation and ensuring national security for the period up to 2035 was developed in pursuance of the fundamentals of the state policy of the Russian Federation in the Arctic for the period up to 2035 and beyond, approved by the President of Russia on September 18, 2018.

The strategy defines the main mechanisms, methods and means of achieving the strategic goals and priorities for the sustainable development of the Russian Arctic zone and ensuring national security. As part of the implementation of the Strategy, the consolidation of resources and efforts of federal state authorities, authorities of the constituent entities of the Federation, the territories of which are wholly or partially included in the Arctic zone, local governments and organizations to solve key problems of the development of the Arctic zone and ensure national security in the Arctic, is ensured. Priority areas for the development of the Arctic zone and ensuring national security, namely:

- integrated socio-economic development of the Arctic zone of Russia;
- development of science and technology;
- creation of a modern information and telecommunication infrastructure;
- ensuring environmental safety;
- international cooperation in the Arctic;
- ensuring military security, protection and protection of the state border of the Russian Federation in the Arctic.

The integrated socio-economic development of the Arctic zone in accordance with the Fundamentals provides for the improvement of the system of state management of the socio-economic development of the Arctic zone, the improvement of the quality of life of the indigenous population and the social conditions for economic activity in the Arctic, the development of the resource base through the use of advanced technologies, the modernization and development of infrastructure in the Arctic transport system, modern information and telecommunication infrastructure and fishery complex.

In the 1990s, little attention was paid to the development of the Arctic in our country. There was not a single drifting station here, scientific research was practically curtailed, icebreakers gradually fell into disrepair or began to serve foreign tourists. However, the Arctic zone did not cease to be a strategic region and the basis of national security, despite all the difficulties that the country was going through. It remains so today, in conditions where nuclear warheads can reach anywhere in the world in a few minutes, and the situation in the world is becoming more and more tense.

In the 2000s, Russia gradually began to return to the Arctic, year by year increasing its presence there, restoring what was lost, creating a new one in accordance with the new conditions of existence in the changed world. Taking into account all these factors, in 2018 the Strategy for the Development of the Arctic Zone for the period up to 2035 was approved, the main priorities of which are:

- efficient use of the resources of the North;
- improving people's lives;
- transformation of the Northern Sea Route into a transport highway of national importance;
- more rational public administration.

The strategy touches upon global issues that must be addressed at the legislative and executive levels. It provides for the restructuring of the work of government bodies, the development of new laws and mechanisms for their implementation. Even a change in statistical reporting is envisaged so that you can track the development of the Arctic in numbers and percentages.

Particular attention is paid to issues of national security. To ensure it, it is planned to revise the tasks of the defense complex, create a unified system for the protection of seaports, increase the effectiveness of measures to protect against external threats, as well as to prevent terrorist attacks.

In order to outline specific steps for the implementation of strategic plans and objectives, the State Program "Social and Economic Development of the Arctic Zone of the Russian Federation", which is the main mechanism for implementing the Strategy, provides for three main subprograms. The first is aimed at creating the so-called support zones, which are designed to become the basis for the social and economic revival of the region; the second deals with the development of the Northern Sea Route and ensuring regular shipping; the third concerns the development of real sectors of the economy, the introduction of innovative technologies in the development of the Arctic resources.

In September 2018, a new version of the Program "Social and Economic Development of the Arctic Zone of the Russian Federation" was adopted, in which the execution period was extended by 5 years, and it is also expected to allocate additional funding in the amount of 150 billion rubles. The priority tasks are: the development of the continental shelf with the help of new technologies and the involvement of businessmen in solving the main issues of the Program implementation. Environmental issues are also among the main ones, especially during the construction and commissioning of new industrial facilities.

Thus, the Program in its current version is divided into three stages: the first one is over; the implementation of the third will begin in 2021. If the

first three years were devoted mainly to solving organizational issues, then this year it is planned to allocate almost 800 thousand rubles from the Federal budget. Further, the amount will grow annually and in 2025 will amount to almost 26 million rubles.

The Program has qualitative and quantitative indicators that must be achieved in stages. Among them, namely:

- increasing the share of goods produced at the enterprises of the Arctic basin in the total GDP of Russia;
- reducing the level of use of imported radio-electronic equipment;
- growth in the share of science-intensive innovative goods and services;
- increasing the reliability of meteorological forecasts (this is necessary to ensure uninterrupted traffic flow and people's safety).

The task of the government in the implementation of this program is to monitor its implementation and the achievement of the targets. In 2018, in order to protect the national interests of the Russian Federation in the Arctic and improve the management of the Arctic region, the State Commission for the Development of the Arctic was established, within which working groups were organized in the main areas of the commission's activities.

Over the past 20-30 years, truly dramatic changes have taken place in the Arctic. Scientists are sounding the alarm: observations from space of the northern ice cap of the Earth indicate that the ice covering the ocean is thinning - global warming has also affected this traditionally very cold region. Moreover, the Arctic is more sensitive to solar activity than other areas. If, as a result of global warming, the average annual temperature in the world rises by 1 degree, then for the Arctic region this figure is 2-3 times higher. Today there is no need to explain how important it is to maintain the ecological balance on the planet - even a schoolboy knows this. The active melting of ice in this region is regarded as an ecological disaster. It is believed that human activities play an important role in global warming. Therefore, the Strategy for the development of the Arctic zone, along with its active development, provides for control over the state of nature. In particular, it provides:

- ensuring environmental marine supervision;
- increasing energy efficiency, developing natural resources with a minimum amount of harmful emissions into the atmosphere;
- development and improvement of the monitoring system for pollution of water, land, air;
- protection of the population and nature from hazardous waste disposal sites.

Thus, the environmental problems of the Arctic should be under constant state supervision. Summing up, we can say that, in general, the strategy for the development of the Arctic is the solution by the government of the Russian Federation of several key tasks: ensuring national security, increasing the economic and social attractiveness of the region, introducing knowledge-intensive, innovative methods of coal, oil and gas production, introducing effective measures aimed at preservation of the environment and improvement of the quality of life of people. In order to ensure military security, protection and protection of the state border of the Russian Federation, it is envisaged, namely:

a) ensuring a favorable operational regime in the Arctic zone of the Russian Federation, including maintaining the necessary level of combat readiness of groupings of general-purpose troops (forces) of the Armed Forces of the Russian Federation, other troops, military formations and bodies in accordance with the existing and predicted nature of military dangers and military threats Russian Federation in the Arctic;

b) comprehensive provision of combat and mobilization readiness at a level necessary and sufficient to solve the problems of preventing forceful pressure and aggression against the Russian Federation and its allies, ensuring the sovereign rights of Russia in the Arctic and the possibility of unimpeded implementation of all types of its activities, including in the exclusive economic zone and on the continental shelf of the Russian Federation in the Arctic, neutralizing external and internal military dangers and military threats in peacetime, ensuring strategic deterrence, and in the event of an armed conflict, repulsing aggression and cessation of hostilities on terms that meet the interests of the Russian Federation;

c) improving the structure, composition, military-economic and logistical support of the Armed Forces of the Russian Federation, other troops, military formations and bodies, developing the infrastructure for their deployment in the Arctic zone of the Russian Federation, as well as the system of operational equipment of the territory in the interests of deploying a group of troops (forces) designed to perform tasks in the Arctic;

d) improving the control of airspace and surface conditions;

e) the use of dual-use technologies in the interests of a comprehensive solution to the problems of defense, security and sustainable socio-economic development of the Arctic zone of the Russian Federation;

f) carrying out hydrographic work in order to determine the need to make changes to the list of geographical coordinates of points that determine the position of the baselines for measuring the width of territorial waters, the economic zone and the continental shelf.

“The presence of interest for this region is typical for the Republic of Korea, Japan and China.

Consequently, along with tension in some traditionally energy-rich regions - the Middle East, Latin America, the Arctic, the role of a new region is also assigned, in which the energy and military-political interests of the main world states have already begun to collide and will continue to collide. That is why the Arctic is a strategically important object.

The development of the Arctic zone and ensuring national security is very important for our country. The Arctic has very large reserves of industrial raw materials, which can significantly affect the economic component of our country. Also, the Arctic is able to transport various kinds of cargo through its waters in the shortest possible time, which can also strengthen our economy, as well as create favorable conditions for joint activities with other countries. Well, we can not say about the military direction. The Arctic is a strategically important zone, because military installations located on its territory are capable of reaching any part of the world in the shortest possible time. In this regard, Russia cannot leave the Arctic without observations. “This is a territory that is directly related to Russia, these are its borders,” said Vladimir Volfovich Zhirinovsky about the Arctic.

The goal of the development of the Arctic zone of Russia in the forecast period is to ensure national security in the water area and on land of the macroregion, as well as the personal safety and security of the population living here, on the basis of innovative modernization of the economy and sustainable economic growth, to strengthen the role and place of the Arctic in the economy of the Russian Federation. Its achievement is ensured by the solution of several strategic tasks.

The first innovative task is to provide fundamental and applied scientific research on the accumulation of knowledge and the creation of modern scientific and geoinformation foundations for the management of the Arctic territories, as well as the reliable functioning of life support systems and production activities in the Arctic. The problem of developing and introducing new technologies and types of equipment, new materials for the effective development of mineral deposits and aquatic biological resources in the marine area and on land in the Arctic is sharply updated. It is necessary to introduce new resource-saving (relevant primarily for labor resources) technologies and technical solutions in the social sphere and the communal sector of the Arctic zone.

The second task provides for dynamic economic growth and diversification of economic activity in the Russian Arctic, the implementation of large-scale research 28 (geological geophysical, hydrometeorological, hydrographic and cartographic) works on the Arctic shelf, land and the Spitsbergen archipelago, the creation of an integrated security system to protect the population from the threats of natural and man-made emergencies nature, the implementation of measures for the energy independence of isolated villages and towns in the Arctic. “But it is imperative to find a combination formula, to build a hybrid economy,” wrote V.V. Zhirinovsky ... ".

The third institutional and managerial task is to form a regulatory legal system that ensures the attractiveness of the Arctic territories for economic activity and residence; introduction of innovative partnership forms of management in the Arctic.

The fourth task provides for the improvement of the human capital of the Russian Arctic as a result of the modernization of targeted educational programs for the training and retraining of specialists in the system of higher and secondary specialized education, ensuring the availability and quality of medical care for all groups of the population living and working in the Arctic zone of Russia, clarifying state social guarantees and compensations for persons working and living in the Arctic zone of Russia, primarily the indigenous peoples of the North.

The fifth task provides for the involvement in the commodity circulation of the resource base of the Arctic zone of Russia in the interests of meeting the needs of the country and world markets in hydrocarbon, water biological resources, strategic mineral raw materials based on sustainable and rational environmental management (the principle of eco-system management) and expanded reproduction. “Russia should move away from the endless sale of resources, and start producing its own technologies…” - noted in his work, Doctor of Historical Sciences Professor V.V. Juban.

The sixth infrastructure task provides for measures to revive the Northern Sea Route and commercialize the newly created transport corridor through state support for the construction of icebreaking, rescue and auxiliary fleets, reconstruction of coastal infrastructure, navigation, hydrographic and hydrometeorological support, and other objects of the Arctic service; creation of objects of commercial innovation infrastructure in the Arctic - intellectual territories, technology parks, business incubators, technology transfer centers, technology and innovation zones, venture funds and companies.

The seventh environmental task is aimed at preserving the natural environment of the Arctic (balancing the need to preserve the natural environment of the Arctic and use its natural resources) for the benefit of present and future generations as a result of the establishment of special regimes for sustainable environmental management; expanding the network of specially protected natural areas and water areas; disposal of toxic industrial waste and other activities.

The eighth task is aimed at increasing the economic return from Russia's bilateral and

multilateral international cooperation with other polar countries as a result of improving existing norms and proactively developing new international treaties and agreements.

The state program is the main mechanism for implementing the Strategy for the Development of the Arctic Zone of the Russian Federation and Ensuring National Security for the period up to 2035 (approved by the President of Russia on February 8, 2018).

The first stage of the state program was of an analytical nature and did not provide for financial support. The first stage (2018–2025) provided for the creation of the State Commission for the Development of the Arctic, the allocation of the Arctic zone as an independent object of statistical observation, the development of legal, organizational and technical conditions for the formation of support zones for development.

The signed resolution approved a new version of the state program, changed its name and implementation period. Now the state program is called "Socio-economic development of the Arctic zone of the Russian Federation." The implementation period of the state program has been extended until 2035.

The state program includes three subprograms: “Formation of support zones for development and ensuring their functioning, creation of conditions for accelerated socio-economic development of the Arctic zone of the Russian Federation”, “Development of the Northern Sea Route and ensuring navigation in the Arctic”, “Creation of equipment and technologies for oil and gas and industrial engineering necessary for the development of mineral resources of the Arctic zone of the Russian Federation”. In the previous version, the state program had one subprogram - "Coordination of the activities of state authorities in the field of socio-economic development of the Arctic zone of the Russian Federation." The tasks of the state program are defined, namely:

- improving the quality of life and security of the population in the Arctic zone;
- creation of conditions for the development of the Northern Sea Route as a national transport route of Russia in the Arctic and the development of a system of hydrometeorological support for navigation in its water area;
- development of science, technology and increasing the efficiency of using the resource base of the Arctic zone and the continental shelf of the Russian Federation in the Arctic;
- improving the efficiency of public administration of the socio-economic development of the Arctic zone.

The development of the Arctic zone of the Russian Federation and ensuring national security for the period up to 2035 is a system of public administration measures based on long-term priorities, goals and objectives of the policy of federal and regional authorities in this Russian territory. The period of implementation of the Strategy should be the time to create here a new economy based on knowledge and innovation. The modernization of the economy and the social sphere is becoming the core of the socio-economic development of the Arctic zone in the forecast period. Its principles and key directions were formulated in the program speeches of the President of the Russian Federation and the Chairman of the Government of the Russian Federation, strategic planning documents of federal authorities. The main success factor of the Strategy is the stability of these principles under the influence of political or economic conditions. At the same time, the very specific actions of the subjects of the Arctic economy and national strategic decisions can be adjusted taking into account new emerging problems and circumstances. However, the strategic direction of the development of the Arctic zone towards an innovative economy should remain unchanged.

The Arctic is one of the most important regions in the development of the economy of many countries, including the Russian Federation. First of all, this is due to the fact that the extraction of resources in already developed deposits is becoming more and more complex every year due to the depletion of sources.

However, the development of northern deposits causes climate changes that affect life on the entire planet. It is the need to restrain human activity in the Arctic that has aroused the interest of the scientific community in this region. Some of the most influential modern Russian explorers of the Arctic are Candidate of Geographical Sciences Ruslan Sharafutdinov, Doctor of Geological and Mineralogical Sciences Vladimir Makarov, Doctor of Biological Sciences and Academician of the Russian Academy of Sciences Evgeny Vaganov, Doctor of Biological Sciences Alexander Kirdyanov. Thus, the influence of the Arctic on all key areas of life: the economy and the environment, makes it necessary to constantly monitor this region. This explains why any study of the Arctic is relevant in the modern world. The Arctic plays a special role in the development of the economy of the Russian Federation, because the region is rich in natural resources. However, many resources are located in hard-to-reach regions. An example of such inaccessible resources is water areas.

However, the territory of the Arctic is rich not only in hydrocarbons. This land contains unique reserves of ferrous metals, tin, tungsten, platinoids, gold and diamonds. Most of the reserves of these resources are located on the Kola Peninsula.

Summing up, it can be noted that the Arctic lands of Russia are the richest source of minerals that can play a key role in strengthening the economy of our country.

In addition to mining, the northern regions have a unique ecosystem. Unique representatives of the fauna live in the Arctic regions: polar bears, walruses, seals, musk oxen, sea elephant. Many representatives of these animals are endemic and live only in this region and are listed in the Red Book. The environmental problems of the modern Arctic are primarily caused by two factors: global warming and massive mining. An example of the consequences of resource extraction is the territory of Vilkitsky Island in the Kara Sea. Research conducted in 2018 by the Green Arctic organization showed that 80% of the water on the island exceeded the amount of oil products. Regarding the environmental situation, Academician of the Russian Academy of Sciences and Doctor of Biological Sciences Evgeny Alexandrovich Vaganov prepared a speech. In his speech, the biologist made a special emphasis on the need to make quick decisions to save the Arctic region, since the situation is getting worse with every minute of delay. “These are problems that need to be addressed, for which serious funds will have to be spent. And they will be aggravated by the fact that this is happening against the backdrop of fairly rapid climate change, ”said a member of the Academy of Sciences.

Thus, the Arctic is a rather fragile global ecosystem that needs protection in order to save the unique representatives of the animal world. In addition to protecting the wildlife and ecosystems of the planet, the protection of the Arctic can also cause economic growth. This is due to the fact that the rescue of this region will increase the sources of commercial production of animal products, primarily fish. In addition, the Arctic region is able to attract tourists who are interested in studying the nature of the planet due to the uniqueness of this biome. Therefore, ensuring the safety of wildlife is an investment in the future economic development of our country.

The Arctic is also an important trading region. Therefore, the Northern Sea Route is one of the most important routes for modern Russia. Its role and importance are due to a number of factors, namely:

1) poor development of land routes;
2) The North Sea route connects the north of Europe and Asia;
3) special strategic importance.

In the future, the value of this path can only grow. This is facilitated by the development of oil and gas deposits, which open up new opportunities for the development of transportation of these resources. In addition, the Northern Sea Route can become a key in the formation of a unified transport system between the countries of Europe, Asia and America. In addition to influencing foreign policy, the Northern Sea Route is of great importance for the development of the northern regions of Russia. Its importance for the development of adjacent regions is due to the need for the economic development of the northern lands. At the moment, sea transport is the only way to deliver the necessary equipment and goods to the Arctic zones of the country. Thus, the impact that the Northern Sea Route has on the development of our country can hardly be overestimated. Since it unites the largest routes of Siberia into a single network. At the same time, for particularly remote regions, such as Chukotka, the sea route is the only possible way to transport goods. At the same time, the Northern Route helps to maintain trade relations with many countries of the world, such as Norway, Denmark, China, Sweden, Canada.

Thus, the Arctic is one of the most important regions in the modern world. Since the resource base of the northern region is able to provide the whole world with the necessary minerals. However, behind the economic benefits lies a potential environmental catastrophe that could lead to the extinction of many representatives of the animal world and lead to irreversible climate change. That is why the protection of the fragile Arctic biome is one of the priorities of the entire scientific community.

Conclusion

Thus, it can be concluded that it is necessary to conserve, conserve and sustainably use the oceans and marine resources, protect the terrestrial ecosystem and promote their sustainable use.

The Arctic is an ambiguous region of our planet, on the one hand, it is very promising in terms of geopolitics, economics and recreational resources, but, on the other hand, a large number of threats arise in this region. In this regard, it is necessary to rationally use the marine resources and waters of the Arctic, to organize tourism activities with minimal damage to the region, it is necessary to protect and restore the terrestrial ecosystem.

Summing up, it can be noted that the forming tourism industry in the Arctic today shows a variety of directions and features of tourism. Regardless of the existing difficulties in this activity, namely the environmental risks of tourism development, the problems of using the historical and cultural environment and the problem of accessibility of tourism destinations. In solving the above problems, the state sets tasks for the tourism industry in the formation of an economically viable development model that takes into account the interests of all parties: the indigenous population and international organizations.

“In the south, Egypt, Turkey - they sell the sun, the air is not theirs, it's nature. What can we sell? Cold! There is no such cold anywhere - I don’t mean Moscow, where it’s minus seven, I’m talking about Yakutia, where it’s minus 60. People will come once in a lifetime to see what minus 60 is, ”said Vladimir Zhirinovsky on Wednesday, January 20, 2021 , in the State Duma after the parliamentary hour with the head of Rostourism.

Therefore, for the development of Arctic tourism in Russia, it is necessary to develop infrastructure, logistics, and also reduce the cost of tourism. Also, the simplification of the visa regime can significantly increase the flow of foreign tourists. Therefore, it is necessary to ensure a visa-free stay in Russia for a month for passengers of cruise ships arriving in Russia (including transit passengers) through international airports. Also, in order to increase the tourist flow to the Russian Arctic, it is possible to increase the issuance of group visas.

The Arctic, or the "Land of White Silence" is the northern polar region of the planet, one of the most inaccessible regions in the world. The topic of studying its regions has become very popular in the world community. They say about the Arctic that "... it is located at the very top of the planet and is of tremendous importance for the ecological development of Europe, Asia and America." Researchers focus on the natural diversity of both mineral and biological resources. Namely: fresh water reserves, energy resources. It should also be noted that Artik is the main transport hub of the planet. I must say that the Russian Federation captures an exclusive geopolitical position in the Subpolar region. The Russian Arctic contains islands, northern seas, the continental shelf and coastal regions of the Eurasian continent. The Arctic coast of Russia stretches from the border with Norway on the Kola Peninsula to the Bering Strait, and is washed by the Barents, Kara, East Siberian, Chukchi and Laptev Seas. The length of the coastline along the Arctic Ocean reaches almost 40 thousand kilometers. It is also important that the Northern Sea Route is of great importance in the Russian Arctic - a historically formed state common road transport connection (the shortest sea route between the European part of Russia and the Far East).

“Now there is a fashion for exotic Arctic tourism in various forms, which previously did not exist at all. It is now in a growing trend. People are looking for authenticity, ecology, thrills, clear skies and all this they are looking for in the Arctic. Behind this demand, behind this fashion, behind this human need, the industry naturally came. First of all, the world cruise industry. And this is a very powerful and very mobile sector,” said Korneev.

Indeed, the demand for “active recreation” is increasing every day. People are interested in the natural diversity of the Arctic region, the unusual climate for them. Currently, the interest in tours to the Arctic among Russians is increasing. According to the statistics of the Federal Tourism Agency, in the early 2000s, about 90% of the participants in cruises and other types of tourist programs to the Arctic were foreign tourists, and at present the number of Russian citizens on such trips has increased significantly. Russian tour operators note that on group trips to the Arctic, the number of tourists from Russia averages 25-30%. Russia pays great attention not only to the development of its polar territories, but also cares about the protection of lands and water areas. On the territory of Russia, a large number of specially protected natural areas (PAs) have been created in the Arctic zone.

What is the concept of "Arctic tourism"? The basis of the tourist attractiveness of the Arctic is its geographical position and natural and climatic features. “Emptiness” is often associated with the Arctic regions of the Earth: the absence of land in the North Pole region, color monotony, vast spaces without people and settlements. For this "emptiness" many tourists go to high latitudes, seeking to get emotional relief. The North Pole itself has a high tourist attraction.

The negative aspects of the influence of the tourism industry on nature include, namely:

- environmental pollution due to the presence of people and the formation of tourist infrastructure in areas previously little affected by anthropogenic influence;
- increased risk of deliberate or accidental destruction of geological, paleontological and other natural monuments;
- causing damage to the soil and vegetation cover of the tundra, the regeneration of which takes a considerable time, as a result of an increase in the number of tourist routes and the lack of a clear systematization of them. The threat to the soil layer is posed by all types of movement on it - on foot, horse-drawn, using wheeled vehicles - but the use of tracked vehicles causes the greatest damage;
- depletion of bioresources due to the influence of nature-oriented types of tourism - hunting and fishing;
- violation of the ecological balance due to the intensive collection of wild plants, which can be carried out by tourists themselves or organized by the tourist industry to ensure the gastronomic originality of the destination;
- an increase in the likelihood of environmental disasters and other similar risks.

As measures that can reduce the negative impact of tourism on nature, we can name:

- Strengthening the control of the state and society over the observance of environmental legislation;
- educational work aimed at increasing the environmental awareness of all participants in tourism activities;
- regular monitoring of the environmental situation in the territories actively involved in the tourism industry; prompt response in case of threats or problems;
- popularization of forms of nature-oriented tourism, not related to the withdrawal of resources; adoption of restrictive measures in case of violation of the natural balance due to excessive consumption of biological resources;

- activities to systematize tourist routes, in order to reduce the negative impact on the soil layer of the tundra; providing areas with high tourist traffic with infrastructure aimed at preserving the natural environment.

The next problem is the problem of the availability of Arctic tourism. The geographical location, the underdevelopment of transport and hospitality infrastructure, as well as the pricing policy of business have led to the fact that tourism in a significant part of the Arctic has become inaccessible to the majority due to the very high cost of services. If the transition of the transport network of the circumpolar region to a qualitatively new level is a distant future prospect, then the solution of issues of stimulating and promoting relatively accessible areas of Arctic tourism, as well as the removal of administrative restrictions on visiting territories in cases where this is a clear relic of the past, can already be started. currently. Problems of using the historical and cultural environment in the tourism industry. The integration of the tangible and intangible historical and cultural heritage of the Arctic into tourism activities is associated with a number of potential threats. In addition to the dangers associated with an increase in traffic and the development of infrastructure, similar in their genesis to the problems created by tourism for the environment (the risk of changing valuable cultural landscapes, damaging or destroying monuments of history and archeology), the interaction between the historical and cultural environment and the tourism industry faces a set of specific challenges.

A counterbalance to such trends can be the intensification of activities to identify, protect, restore and popularize genuine historical monuments, as well as to preserve and update the intangible heritage of the aboriginal and old-timers. Educational work in this direction, including among representatives of indigenous peoples, can only have an impact if there are simultaneous measures to stimulate and support traditional forms of nature management and culture.

The rapidly developing industry of Arctic tourism today demonstrates a variety of forms, types and directions. Objectively existing difficulties in this area, due to the geographical, climatic and economic specifics of the circumpolar world, are complemented by negative trends caused by the fact that the ecological and socio-cultural systems of the Arctic can be easily unbalanced under the influence of external factors. The listed challenges set the tourism industry to the task of forming an economically viable, sustainable model of its existence and development, taking into account the interests of all stakeholders: international organizations, states, indigenous and old-timers, local communities and business entities.

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Issue Article

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SEARCH FOR EFFECTIVE ASPECTS OF TOURISM DEVELOPMENT IN THE REGIONS OF THE ARCTIC ZONE OF THE RUSSIAN FEDERATION

Abstract: *in the article the authorsconsider the development of the Arctic zone of the Russian Federation (AZ RF) in the context of the implementation of the principles of sustainable development of the territory, including aspects of ensuring the national security of society and the state. In this connection, the object of the study was the state policy of the Russian Federation in the Arctic, and the subject - economic, organizational and legal mechanisms that ensure the sustainable development of the Arctic territories within the framework of the policy being implemented. Particular attention is paid to aspects of the implementation of the Arctic policy in foreign countries, as well as key challenges and opportunities for sustainable development of the RF AZ. In conclusion, the article defines the priorities and prospects for the implementation of state policy in the Arctic, taking into account the importance of preserving both the socio-economic interests of the state and the possibilities of strengthening national security. This article touches upon an extremely urgent problem of our days - as the basis and development of tourism in the Arctic region of the Russian Federation. Since we can improve this resort so that it becomes one of the main incomes of our country and a landmark, because of which people went to rest to us from different parts of the world. It is also necessary to maintain the state of the environment, glaciers. Every year their number decreases, which can lead to global problems of mankind. You need to relax not only with care for yourself, but also for the environment. The main concepts considered in the work - "tourism" and "recreation" - are one of the most important components of the social life of any person, providing happiness and unforgettable emotions.*

Key words: *state strategic planning, ecology, society, sustainable development, national security, development support zones, Arctic zone of the Russian Federation, state policy, investment, strategy, tourism, recreation, environment, Arctic region, cruise.*

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Introduction

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For a long time, the northern region has attracted the attention of many scientists and specialists. The theme of tourism in the Arctic region was chosen for the reason that in modern times the North Pole is visited not only by researchers for scientific purposes, but also by tourists for another interesting trip. Today, tourism in the Arctic is one of the fastest growing areas in this area. This is precisely the relevance of the topic. The subject of the study is the Arctic region. The object of research is tourism in the Arctic.

The Arctic is the northern polar region of the Earth and is one of the most inaccessible in the world. This area occupies literally a sixth of the planet's surface. The Arctic region includes the Arctic Ocean, six seas - Greenland, Barents, Kara, Laptev, East Siberian, Chukchi. In addition, many bays belong to this region. Among other things, the Arctic includes land in the form of Greenland, some archipelagos and islands, as well as the northern coast of Eurasia and North America.

The climate in the region is severe, presenting frosts and winds. However, between June and October, the Arctic experiences mild and warm summers. The average temperature at this time ranges from -10 to +10°C. In winter, the sun never rises over the region. The temperature here can be as low as -45°C. Researchers and tourists come here in the summer.

In modern times, the study of the Arctic region is of great importance. Many large states are showing great interest in the development of this territory. Some of the states were ready to redistribute the Arctic region. Russia became the first state to apply to the UN to establish the outer limits of the continental shelf in the Arctic Ocean. According to this application, it is planned to clarify the territory of this shelf, which has an area of more than a million square kilometers.

LDPR party leader Vladimir Zhirinovsky defended the view that the Arctic region is a full-fledged territory of Russia, when the scientist Sergei Medvedev spoke about the transfer of the Arctic under international jurisdiction. Zhirinovsky said: "This is a territory that is directly related to Russia, these are its borders." Valery Valeryevich Dzyuban, Doctor of Historical Sciences, has a similar opinion on this matter: “The Arctic was annexed to Russia with the help of gigantic labors. Russia and the Soviet Union created a grandiose polar civilization, including a military aspect ... No country has done so much for the Arctic.” Russia pays great attention not only to issues related to the development of northern lands, but also to the nature of the Arctic, protecting it. On the territory of Russia there are many specially protected natural areas in the Arctic zone.

The main features of the Arctic region, which form its uniqueness, include climatic conditions, flora and fauna, polar night and/or polar day, high frequency of auroras, etc. The Arctic has certain features that have a significant impact on tourism:

- remoteness and inaccessibility of many attractive places for tourists, which leads to a high cost of visiting them;
- significant dependence of the organization of tourism activities on seasonal factors;
- the need to take into account climatic conditions when planning tourism;
- socio-economic specifics of the Arctic zone (low population density and uneven distribution, focal infrastructure, the dominant role of certain sectors of the economy, the presence of the military, etc.);
- administrative restrictions on visiting some areas.

Today, interest in tours to the Arctic among Russian residents is growing. According to the statistics of the Federal Tourism Agency, in the early 2000s, only about 10% of Russian tourists visited the Arctic region on cruises and other types of tourist programs. The rest 90% of the tourists were foreigners. However, in modern times, the number of Russian tourists on such trips has increased significantly. Russian tour operators note that the average number of tourists from Russia in group trips to the Arctic is 25-30%.

The basis of the tourist attractiveness of the Arctic is its geographical and natural features. Often, the Arctic is associated with emptiness and the absence of land in the North Pole region, the monotony of color, wide expanses without people. Many tourists tend to visit the Arctic for the purpose of emotional relief. The North Pole itself has a special attraction. This point has an exclusively symbolic meaning, since the conditions of its climate and nature do not differ from other places within a radius of hundreds of kilometers.

The climatic features of the Arctic region, which complicate living, are considered an integral part of its tourist attraction. Many tourists want to experience extreme cold conditions.

An important part of the tourism brand of the Arctic is the polar night and polar day, during which the sun does not rise or set for more than 24 hours.

These phenomena are considered a real phenomenon that interests many tourists.

An important factor in the attractiveness of tourists are also polar lights. Such a natural phenomenon is surrounded by various legends, which attract some tourists.

In particular, the auroras attract people with their incomparable beauty.

In addition, the object of tourist attraction is the Arctic natural landscapes, which have significant differences from each other. For ocean tourism, these are oceans and seas covered with ice or available for free navigation (depending on the time of year and region). The coast and islands are mostly arctic desert or tundra, with corresponding flora and fauna. It is in this natural zone that you can see representatives of the fauna that most correspond to the mass ideas about the nature of the Arctic: cetaceans and pinnipeds, marine mammals, as well as the polar bear, which has actually become a symbol of the circumpolar territories.

Continental Arctic tourism is organized in the climatic zones of tundra and forest-tundra, where snow cover is present for a significant part of the year. The natural world here is much more diverse than in the oceanic sector of the Arctic, therefore, in addition to educational forms of tourism organization, mainly related to observation, such areas of the tourism industry as hunting and fishing are widespread. The animal associated in the mass consciousness with the tundra zone is the reindeer, which can be observed here both in its natural habitat and as an object of agriculture.

The territories of the Arctic differ significantly in their historical and cultural resources. On the islands, archipelagos and the coast of the mainland, the material heritage is formed from several major components:

- archaeological evidence left from the most ancient inhabitants of these areas;
- artifacts associated with indigenous peoples, for which sea crafts are traditional;
- the historical and cultural heritage of the old-timers (on the Arctic coast of Russia, the ethnographic group of Russian Pomors, as well as the descendants of pioneers of various ethnic origins, can be attributed to the old-timers);
- objects associated with the centuries-old history of geographical discoveries, exploration and development of the Arctic: the material heritage of the Viking Age, traces of research expeditions, artifacts related to the pioneers (burials, territories of temporary and permanent historical settlements, navigation signs, etc.);
- monuments of the industrial development of the Arctic zone in the 20th–21st centuries (hydrometeorological stations and research bases, lighthouses and other navigation aids, transport and energy infrastructure facilities, industrial and military facilities).

In the material heritage of the continental part of the Arctic, in addition to objects comparable to those mentioned above (archaeological monuments, objects of the industrial period), the following groups can be distinguished:

- artifacts associated with indigenous peoples leading a nomadic or sedentary lifestyle in the tundra and forest-tundra natural zones, as well as the legacy of the old-timer population;
- objects of the period of development and colonization of the northern spaces (historical settlements, centers of trade and crafts, fortifications, as well as other material heritage of that era);
- monuments of the history of the Second World War (the Arctic regions where large-scale battles took place on land were Norway and the Murmansk region of the USSR).

A characteristic feature of the material cultural heritage of the Arctic is that a significant part of it does not have an independent tourist attraction. To integrate some monuments into the practices of the tourism industry, their purposeful updating is necessary: inclusion in excursion routes, popularization, etc. At the same time, some objects of historical and cultural value are not suitable for use in mass tourism (for example, existing or mothballed military infrastructure facilities, most archaeological sites).

In connection with the growing interest in northern tours, Rostourism experts, together with tour operators and representatives of the Government of the Murmansk and Arkhangelsk regions, held a meeting on the development of an interregional Arctic tourism product in order to attract Russian and foreign tourists. According to experts, the North-West of Russia has a variety of cultural, historical and natural heritage sites and deserves the development of new, unique tourism programs and offers. This is confirmed by the growing demand for offers developed jointly by foreign cruise companies and Russian tour operators.

According to the leaders of the Federal Agency for Tourism, Arctic tourism in the Russian north in the future can provide income no less than mining.

Thus, the Arctic region is open for tourism. In modern times, this northern part of the Earth is one of the most unique in the whole world. It has been mastered and studied for many years. Today, the Arctic is protected by a large number of states, since its territory is considered an incredible and unique place. Arctic tourism in Russia is a great opportunity for all Russian tourists and travelers to visit the most amazing places in the north.

The strategic importance of the Arctic for the modern and future development of the world and Russia is multifaceted and generally recognized, and the region itself has concentrated 30% of the territory

of Russia, 20% of GDP, 22% of export products, 30% and 13% of undiscovered gas and oil reserves, respectively, more than 30% world reserves of fresh water. As noted by N.K. Kharlampiev and M.L. Lagutin, the modern institutional architecture of the Arctic cooperation is formed in the form of two interconnected organizational clusters: sub-regional (a network of intergovernmental and non-governmental organizations focused on deepening the integration of the states of Northern Europe and expanding cross-border cooperation) and international (a set of international structures related to the global issues of the Arctic zone). The organizational core of the last cluster is the Arctic Council (1996) (AC), whose founding countries were Canada, the USA, Russia, Denmark, Iceland, Norway, Sweden and Finland. When studying the policy of developing new territories pursued by the majority of the Arctic states, the trend of changing capital investments in various sectors of the economy becomes visible: if in the early 1970s.

According to the Doctor of Historical Sciences, Professor Dzyuban V.V., “Natural resources are not unlimited, despite the fact that the development of scientific and technological progress and new technologies stimulate the exploration and production of energy resources, sooner or later their reserves will run out, which will lead to environmental degradation”. Due to the realization that resource limitations are a consequence of human evolution, the concept of sustainable development emerged at the end of the 20th century. In turn, the term "sustainable development" became widespread after the establishment of the UN International Commission on Environment and Development (1983) and the publication of the report "Our Common Future" (1987), in the Russian version of which the term sustainable development was translated as "sustainable development".

Researchers identify four main models of the Arctic economy - American, Canadian, Russian (inherent in states with a federal structure, characterized by the joint involvement of federal and regional authorities in economic processes) and European (inherent in unitary states such as Denmark, Iceland, Norway, Finland, Sweden, where responsibility for the development of the Arctic regions lies with the central government). It should be noted that the industrial perception of economic and regional problems is uncharacteristic for developed Western countries. Western experts analyze the entire market complex and the economic agents operating on it. In developed countries, industries are perceived as areas of activity that require individual measures of state regulation.

In 2018, at a visiting meeting of the Presidium of the State Commission for the Development of the Arctic in Murmansk, it was noted that the new version of the state program "Socio-economic development of the Arctic zone of the Russian Federation" will include a new approach - the creation of a number of "support zones of development" of the Arctic Zone of the Russian Federation. The novel is designed to provide favorable conditions for the implementation of infrastructure projects, intensify navigation along the Northern Sea Route (NSR), ensure the modernization of transport and other infrastructure, and create security and communication facilities in ports. It is important that the creation of reference zones is based on the territorial principle of the development of the Arctic, which has replaced the sectoral principle, as previously planned. In general, it is planned to form 8 support zones: Kola, Arkhangelsk, Nenets, Vorkuta, Yamalo-Nenets, Taimyr-Turukhansk, Severo-Yakutskaya and Chukotskaya, the development of which will be a holistic project that ensures the consistency of sectoral activities at the stages of planning, goal-setting, financing and implementation. These will be projects of federal significance, aimed at developing the Arctic macroregion as a whole, and not solving individual sectoral tasks.

Work on their creation in each Arctic subject of the Russian Federation will be carried out in three stages: the first (2018 - 2025) - provides for the development of the concept of support zones; the second (2026–2030) is aimed at launching pilot projects of support zones and filling them with scientific and technological solutions; the third (2031 - 2035) - should ensure the start of full-fledged operation of the support zones. As part of the creation of support zones based on proposals from federal and regional authorities, as well as a number of large companies (OJSC Russian Railways, PJSC MMC Norilsk Nickel, AK ALROSA, PJSC Gazprom, PJSC Lukoil, PJSC NOVATEK) has already compiled a list of 145 projects in areas.

In the late 2000s On the part of the Arctic states, actions have begun to be taken aimed at restricting Russia's access to the development and development of Arctic deposits. Under these conditions, at the turn of 2009–2010. The Government of the Russian Federation began to change the Arctic strategy, making a turn towards the involvement of foreign organizations with the necessary resources and technologies in the development of the Arctic deposits. In particular, agreements were signed with French Total, British BP, American ExxonMobil, Italian Eni. Changes in policy were caused by the lack of necessary technologies in Russia, special ice equipment, and financial resources for the development of offshore fields. The key idea of all agreements was to reach agreements on the provision of financing and technologies by foreign oil and gas companies in exchange for access to Arctic deposits. However, such expectations did not come true and were suspended due to the situation in Ukraine and the imposition of international sanctions against Russia.

The sanctions affected 90% of Russian oil companies and almost the entire gas sector, after which European companies in Russia stopped providing drilling, well testing and geophysical services in deep water and shale fields, as well as in the Arctic.

Today, the opportunities for the widespread use of modern Western technologies, combined with the innovative development of the national industrial and scientific base, have been largely missed, while the share of foreign equipment in the Russian oil and gas industry is about 25%, and the needs for offshore operations are 95% met by imported equipment.

According to the Russian Ministry of Industry and Trade, there are more than 200 oil and gas equipment manufacturers in the country, but import substitution in most categories will not be possible until 2026-2030. (to date, out of 45 positions, only five can be replaced). At the same time, since the beginning of the sanctions struggle, alternative foreign suppliers, for example, from China, South Korea, India, Belarus and Singapore, are ready to provide assistance to Russia, which provides prospects for the formation of new drivers of territorial development. Against this background, import substitution is becoming a key development strategy, which, with an objective prioritization, will make it possible to create a set of necessary technologies for oil production on the continental shelf. An example here is Norway, which developed competition in the oil and gas industry against the backdrop of stimulating oil and gas companies. From 1972 to 1974 the use of national goods and services in oil and gas projects was determined by law, which ensured the share of Norwegian supplies at 90%. In turn, joint ventures in the service sector provided national engineering companies with access to advanced technologies, providing a solution to the technological, economic and social problems of the state.

An important direction in the implementation of the state Arctic policy should be the strengthening of information work for the comprehensive promotion and protection of Russia's interests in the media space, since only a few print publications and electronic resources systematically publish materials on the prospects for the development of the Arctic, which devalues the prospects for the development of this territory in the eyes of business and society, as happened earlier with the Far East.

The Arctic is a single physical and geographical region of the Earth, adjacent to the North Pole and including the margins of the continents of Eurasia and North America, almost the entire Arctic Ocean with islands (except for the coastal islands of Norway), as well as the adjacent parts of the Atlantic and Pacific oceans. The southern border of the Arctic coincides with the southern border of the tundra zone. “The area is about 27 million km; sometimes the Arctic is limited from the south by the Arctic Circle (66°33RWith. sh.), in this case, its area is 21 million km2. The Arctic is a northern region that occupies almost a sixth of the Earth's surface."

At present, the study of the Arctic region is of great importance, and an increasing number of states are showing interest in the development of the Arctic zone. Some major world powers have prepared for the redistribution of the Arctic space. Russia became the first state to apply to the UN for the establishment of the outer limits of the continental shelf in the Arctic Ocean. In accordance with this application, it is planned to clarify the territory of the Arctic shelf with an area of more than a million square kilometers.

The climate in the Arctic is quite severe - frosts and strong winds. But for several months of the year, from June to October, the Arctic experiences mild and warm summers. The average air temperature in summer ranges from -10° to +10°C. During the winter in the Arctic region, the sun never rises over this area. During these harsh months of the year, temperatures can drop below -45 degrees Celsius. In the warm season of the year, the sun warms the surface 24 hours a day. It is during this period of the year that scientific expeditions are organized here, as well as tourist programs and trips are offered.

Currently, Arctic tourism is beginning to develop actively in Russia, and an increasing number of Russian travelers want to discover this northern region. The demand for trips to Antarctica is no less popular in the world, but for residents of the Russian Federation, the Arctic is much closer and more accessible. Get to it closer and cheaper.

To date, there is no generally accepted, well-established definition of the term "Arctic tourism", although the concept itself has become widespread and is used in official government documents (for example, in the "Strategy for the Development of the Arctic Zone of the Russian Federation and Ensuring National Security for the Period until 2020" approved by the President of the Russian Federation). To analyze the problems and prospects of this tourist destination, it is necessary to clarify what exactly is invested in this phrase, to highlight the territorial scope of the phenomenon and its characteristic features.

The definition of Arctic tourism as visiting the Arctic for recreational, educational, sports, religious and other similar purposes, not related to making a profit and carrying out work, looks obvious and logical, but has a number of disadvantages, namely:

Firstly, the blurring of the very concept of "Arctic", which can have different geographical, climatic, biological, administrative, socio-economic, cultural and other interpretations.

Secondly, the perception by a part of society as "Arctic" of some areas of tourism that have only a conditional link to the Arctic. In some cases, the formation and promotion of such a perception may be part of a marketing strategy aimed at promoting local

destinations under the "Arctic" brand. Difficulties are also caused by the semantic and practical separation of the Arctic destination from the category of "northern tourism". The Arctic territories have a number of characteristics that have a significant impact on the tourism industry, namely:

- remoteness and inaccessibility of many areas attractive for tourists, which significantly increases the cost of visiting them;

- strong dependence of the organization of tourist activities on seasonal factors; the actual inaccessibility of some attractive places for long periods during the year;

- the need to take into account natural and climatic factors when planning and organizing tourism (polar day and night, weather conditions, etc.);

- socio-economic specifics of the Arctic zone: low population density and uneven distribution, high urbanization, focal nature of infrastructure, the dominant role of certain sectors of the economy (extraction of hydrocarbons and other minerals, heavy industry, etc.), the impact of ongoing mega projects (transport, energy and others), the presence of the military, etc.;

- administrative restrictions on visiting certain areas (border zones, closed territories, etc.), which actually takes them out of the scope of the mass tourism industry.

From the point of view of branding and organizing tourism, the Arctic can be divided into two sectors, which, being interconnected and having a number of similar features, differ significantly from each other:

- oceanic (ocean areas, island territories, coastal zones): the prevalence of marine vehicles (including icebreakers), compliance with stereotypical ideas about the Arctic (ice shelves, icebergs, etc.), specific fauna associated in the mass consciousness with the Arctic territories (marine mammals, polar bears, etc.), the habitation of indigenous northern peoples, whose economic activity is traditionally connected with the sea;

- continental (inland Arctic regions of North America and Eurasia): the prevalence of land and river vehicles, the predominance of the tundra and the natural world characteristic of it, the specifics of traditional forms of nature management and management of indigenous peoples, including the widespread reindeer husbandry in the Eurasian Arctic.

An important factor of tourist attraction are the polar lights. This natural phenomenon, like many others in high latitudes, is surrounded by a halo of legends and mysticism, which is actively exploited by the tourism industry. At present, the “hunting for aurora”, which is especially popular among tourists from Southeast Asia, has actually taken shape as an independent direction within the Arctic tourism. This type of tourist practice is strictly determined by seasonal factors, since during the polar day and transitional periods, which occupy a significant part of the year in the Arctic, the auroras are not available for observation.

In the history of Russian (Soviet) tourism, periods can be distinguished when there was a sharp increase in mass interest in the Arctic destination:

1) turn of the XIX-XX centuries. Thanks to the activities of the Partnership of the Arkhangelsk-Murmansk Express Shipping Company, voyages to the Arctic (along the Barents Sea along the coasts of Northern Norway and the Kola Peninsula, up to Novaya Zemlya) became available to the general population of Russia. The “Guide to the North of Russia” published in 1898 reported: “Our North ... is equally interesting for a scientist, traveler, naturalist, ethnographer, artist, simple tourist - nature lover, hunter, pilgrim and for an enterprising trading person ... a trip to Arkhangelsk and Arkhangelsk , as well as along the Murmansk coast became a fast, easy and comfortable walk ”;

2) 1930s. During this period, the first Soviet sea cruises to high latitudes were carried out, and also, against the backdrop of the rapid development of the tourist movement, the foundations of mass tourism were laid in some regions of the Soviet Arctic;

3) the beginning of the XXI century. A new surge of interest in the Arctic direction of tourism occurred already in a market economy. The tourist industry, responding to the emerging demand, began to form the infrastructure and create new proposals in this segment. It should be noted that, despite the demand, a significant part of the tourism products of the “Arctic” orientation turned out to be designed for the rich and super-rich consumer.

The geographical location, the underdevelopment of transport and hospitality infrastructure, as well as the pricing policy of business have led to the fact that tourism in a significant part of the Arctic has become inaccessible to the majority due to the very high cost of services. If the transition of the transport network of the circumpolar region to a qualitatively different level is a distant future prospect, then addressing the issues of stimulating and promoting relatively accessible areas of Arctic tourism (for example, localized on the coast of the Barents Sea and nearby islands), as well as the removal of administrative restrictions on visiting territories in those cases , when it is a clear relic of the past, can be started already at the present time.

Main part

Currently, increased attention is being paid to the economic development of the Arctic zone of Russia. At the state level, a number of programs were adopted for the long-term development of certain areas of this region. In particular, the state program "Socio-economic development of the Arctic zone of the Russian Federation - Support for the National Action

Plan for the Protection of the Arctic Marine Environment" was adopted, calculated until 2035, as well as the program "Development of the transport system", which provides for the revival of the Northern Sea Route (NSR), which indicates the accelerated economic development of eight selected support zones of the Arctic zone of the Russian Federation (AZRF) (Figure 1).

Picture 1. Supporting zones of economic development of the Arctic zone of Russia

The Arctic zones of the Russian Federation have a rich tourism potential. Various types of active tourism can be developed on their territory: rafting, fishing, yachting, cruise tourism, diving; skiing, mineralogical, ecological, snowmobile, extreme tours, mountaineering, route tourism (skiing, water, cycling, hiking) and much more. According to the data of the Federal Tax Service of the Russian Federation for the regions of the Arctic zone of the Russian Federation for 2022, more than 130 organizations providing tourism services operate in the regions, and only half of them have tourism activities as the main type of economic activity. According to statistics, about 75% of the total number of travel agencies in the region are engaged in outbound tourism, 43% are focused on selling tours in Russia and 40% are promoting an internal regional product. There are also a large number of tour operators and travel agencies in St. Petersburg, Moscow and Petrozavodsk that sell travel packages to the regions of the Arctic zone of the Russian Federation. The great interest of companies and tourists is associated with the unique geographical position of the region and the wealth of recreational resources.

According to the rating of domestic tourism compiled by the TurStat analytical agency in 2022, the Arkhangelsk (491 thousand people) and Murmansk regions (420 thousand people) are inferior to the Vologda Oblast (more than 2900 thousand people) that are the most popular among tourists in the regions of the European North of Russia (more than 2900 thousand people) and the Republic of Karelia (more than 800 thousand people). The other six regions of the Arctic zone of the Russian Federation still have a lower rating. Of this flow, a significant part is made up of unorganized tourists who prefer to plan their vacation on their own in order to significantly save on the trip, using the services of individuals (accommodation in the private sector, transfer, various excursions, including snowmobiling), also plays a big role accessibility of the region (no language barrier, good transport infrastructure). Inbound foreign tourism in the region is based mainly on the coastal position of the region: the possibility of developing cruise tourism. It is from the port of Murmansk that the routes to the North Pole, the Svalbard archipelago, along the Northern Sea Route and to Franz Josef Land begin. In addition, hunting and fishing are popular among foreign tourists. To date, travel companies offer about 80 destinations in the regions of the Arctic zone of the Russian Federation, which, of course, can be attributed to active types of tourism.

According to the Federal Statistics Service, in the regions of the European North of Russia, the number of travel companies from 2018 to 2022 has increased significantly. In 2022, more than 600 tourism enterprises functioned. The basis of the tourism industry in the regions under consideration is collective accommodation facilities (CFR). The volume of tourist services for the period from 2018 to 2020 increased from 425.3 to 1190.1 million rubles. The volume of services rendered in 2020–2022 has grown rapidly and has recently been declining.

In the regions of the Arctic zone of the Russian Federation, the following dominant types of tourism are distinguished:

- ski tourism;
- fishing and hunting tourism;
- cruise tourism;
- natural tourism;
- business.

Recently, ecological and ethno tourism has been gaining momentum, mainly foreign tourists who want to live in places in Lapland where no human foot has set foot (for example, a camp site near Yokanga).

Mineralogical and extreme tourism are also popular in the regions.

Russian tour operators organize sea cruises, boating, hunting and fishing, rafting, hiking and skiing trips and much more. Currently, the interest in tours to the Arctic among Russians is increasing. According to Rostourism statistics, at the beginning of 2023, about 90% of the participants in cruises and other types of tourism programs to the Arctic were foreign tourists, and now the number of Russian citizens on such trips has increased significantly. Russian tour operators note that on group trips to the Arctic, the number of tourists from Russia averages 25-30%.

Despite the various difficulties and novelty of the tourist destination, Russian tour operators are organizing cruises to the Arctic. So, in 2022, five cruises were organized on a nuclear-powered icebreaker, one to Wrangel Island, and one to Chukotka. American, British and New Zealand companies also take part in organizing cruises.

The most popular tour to the North Pole among Russian tourists is the tour: Murmansk - Franz Josef Land - North Pole - Murmansk (Figure 2).

Figure 2. The most popular tour to the North Pole among Russian tourists is the tour: Murmansk - Franz Josef Land - North Pole - Murmansk.

The problems of tourist complexes in the Arctic zone of the Russian Federation can be grouped as follows.

1. Problems of using the potential of natural tourism resources. These include:

- the problem of non-use of natural recreational resources due to the existence of a system of closed territories and departmental restrictions on visiting them by foreign and Russian tourists;
- exhaustive use of natural recreational resources without observing the standards of anthropogenic recreational load in the "green zones" of settlements;
- the actual lack of protection of specially protected natural areas and, above all, natural monuments;
- anthropogenic pollution of the environment and others.

2. The problem of formation of the tourist market of the region:

- the capacity of the market of tourist services is strongly correlated with the income of the population and its age structure;
- the level of tourist services that meets the needs of customers is relatively higher than in other sectors of the Russian economy; for outbound tourism, it meets international standards;
- a part of the socio-economic effect obtained from the most profitable types of tourism is withdrawn and circulated in the shadow economy;
- the tourism business in the region is not competitive in all types of tourism compared to foreign competitors and Russian leaders of the national market, who are mastering the tourism market in the region,
- there is a tendency to include the tourism business in the portfolio of large Russian corporations through the acquisition of tourist, sports and recreational facilities, and others.

3. The problem of administrative and information - analytical support:

- in the regional center of Murmansk and in the municipalities there are no management structures endowed with powers and functions to regulate the problems of travel companies;
- the tourism management body is not provided with human and financial resources adequate to the tasks.

- monitoring and information and analytical support of the process of state regulation of the tourism sector is not provided with labor and material resources

- the cadastre of natural recreational resources and others have not been developed.

4. The problem of regulatory support for the formation of the tourism sector:

- the regulatory and legislative framework for tourism issues does not correspond to the level of development of the tourism market and the achieved level of market relations in the country, does not take into account the peculiarities of international and interregional cooperation;

- differentiated rates of payments (fees) for the use of recreational natural areas have not been developed;

- there are no regional standards and rules for the design and construction of recreational natural areas and facilities in the Far North, and others.

It should be noted that these problems to some extent hinder the development of tourism in the regions of the Arctic zone of the Russian Federation, so the solution of these issues will contribute to a more intensive development of regional tourism.

The total number of tourists visiting the regions of the Arctic zone of the Russian Federation has decreased tenfold after the collapse of the USSR. Due to the economic crisis, the flow of tourists from Russia and neighboring countries has decreased. The mass tourist from far abroad is repelled by the negative image of Russia as a whole, in the regions of the Arctic zone of the Russian Federation, to a greater extent due to the underdevelopment of the provided tourist services, the environmental situation, which has developed to a greater extent due to the industry located on the territory of the peninsula, and the lack of information about the tourism opportunities of both regions. But despite this, the government is adding to the list of its investment projects the costs of developing tourism in these regions, because, as you can see, interest in the regions remains stable, especially among tourists from East Asia.

- Arctic maritime (cruises to the North Pole, Spitsbergen archipelago, Franz Josef Land), cruise and ferry tourism due to the renovation of the Murmansk port infrastructure in previous years and the introduction of a simplified visa regime for tourists;

- a tourist cluster in the Khibiny, which today is a dynamically developing territory.

Also, the growth in demand for regional tourism products in the forecast period will be stimulated by:

- development of international cooperation in the border areas;

- promotion of the region's tourism potential to new markets, including attracting the largest tour operators to the region and including the formed regional branded routes in the sales line of tour operators;

- development of the tourism potential of the region, including within the framework of the territory of advanced socio-economic development in the city of Kirovsk and the implementation of the regional priority project “Master Plan for the Development of the Village Settlement, Teriberka, Kola region.

Due to the growing interest in northern tours, Rostourism experts, together with tour operators and government representatives, held a meeting on the development of an interregional Arctic tourism product in order to attract Russian and foreign tourists. According to experts, the North-West of Russia has a variety of cultural, historical and natural heritage sites and deserves the development of new, unique tourism programs and offers. This is confirmed by the growing demand for offers developed jointly by foreign cruise companies and Russian tour operators.

According to the leaders of the Federal Agency for Tourism, Arctic tourism in the Russian north in the future can provide income no less than mining.

Currently, there is an increase in the tourist flow in certain areas of the regions under consideration, in particular, to the Solovetsky Islands, the coast of the Barents Sea (Teriberka settlement), in the ski center of Kirovsk (Khibiny), and the Tersky coast of the White Sea. This is facilitated by the creation of a new tourism infrastructure and improved transport accessibility.

This tourism is one of the leading sectors of the world complex. There are daily departures to different parts of the world. Tourism in the Arctic is one of the developing ones. Arctic - The territory of the Arctic Ocean. The area is 21 million km^2. People have been interested in the Arctic even since ancient Greece. In the center is the North Pole, which includes the outskirts of the continents of North America, as well as Eurasia.

It is worth noting that parts of the Pacific and Atlantic oceans also adjoin the Arctic. Summer in the Arctic is quite cold, but this does not interfere with plant life. In summer, northern flowers, dwarf shrubs, lichens and mosses bloom on the coast. The Arctic desert is the northernmost of the natural zones.

The Arctic is characterized by long winters and short summers. Strong gusty winds are normal, but even this does not bother tourists. It is Norway that offers cruises with landings on the ice. Svalbard offers a variety of entertainment such as spas and nightclubs. Russia is also not far behind. “Don’t worry, you will still get tired of our tourists,” V.V. jokingly writes in his work. Zhirinovsky. Russia can offer to look at the volcanoes of Chukotka, Cape Dezhnev. This list includes Wrangel Island, which includes an amazing flora and fauna. “It is the beauty of the Arctic that has always attracted not only tourists, but also researchers,” said Professor V.V. Juban. Now it is worthwhile to imagine the Arctic from the side of its beauties. Animals are adapted to a harsh environment.

One of the largest predators on earth is the polar bear. It is this animal that is associated with the Arctic.

The specifics of tourism and the increase in the load on the polar landscapes are analyzed.

Solutions:

1) reduce anthropogenic impacts on nature;
2) preserve cultural heritage sites;
3) Simplification of logistics;

This will lead to additional investments in infrastructure modernization. “It is necessary to direct all efforts to the development of the Arctic,” emphasized V.V. Zhirinovsky.

The most important thing for every tourist is landscaping. It is important to note that the environment is multifunctional, as well as accessible, so that the tourist has a repeated desire to return.

So why are we actively moving towards this? Our modern world provides tremendous opportunities for convenient and comfortable travel. A modern person always wants to strive for more and for the unknown, this is what the Arctic gives the tourist. It is also worth remembering that, despite the fact that there are many places, it is impossible to see everything. But it is still worth realizing that, going on a journey, we still open up an amazing and unique world.

One of the most inaccessible regions in the world, the Arctic is the undisputed tourist favorite for those who have "already seen it all." Snow-white expanses sparkling under the shining sun of a polar day, incredible silence and the complete absence of civilization for the next few hundred kilometers, and finally, for a long time, the most unattainable point on the planet - the mythical North Pole.

The Arctic is a huge region of the globe, which is a regular circle on the map, whose area varies from 21 to 27 million square meters. km. The area of the Arctic land consists of the northern territories of eight Arctic states - Russia, Canada, Greenland, USA, Iceland, Norway, Sweden and Finland. The water bodies of the Arctic include the Arctic Ocean, the seas - Greenland, Barents, Kara, Laptev, East Siberian, Chukchi, Baffin and Fox Bays, as well as numerous bays and straits of the Canadian Arctic Archipelago and the northern part of the Pacific and Atlantic oceans. The Arctic land includes Greenland, the archipelagos of the Canadian Arctic and Svalbard, Franz Josef Land, Novaya Zemlya, Severnaya Zemlya, the New Siberian Islands, Wrangel Island, the northern coast of Eurasia and North America. Russia in the Arctic territorially belongs to:

In general, it is customary to include areas stretching from the North Pole of the Earth to the Arctic Circle or the northern border of the tundra.

Today, tourism in the Arctic is one of the rapidly developing areas over the past few years. An increasing number of people from different countries seek to spend their holidays by going on exotic trips. Countries that have their own sector of the Arctic, to one degree or another, are developing it with regret more effectively in this direction.

For a long time, the Arctic has attracted the attention of researchers from different countries. Today the whole world knows the names of the Englishman John Franklin and the American Robert Peary, the Dutchman William Barents, the Norwegian Fridtjof Nansen and Roald Amundsen, the Italian Umberto Nobil, and our compatriots Fyodor Litke, Semyon Chelyuskin, the Laptev brothers, Georgy Sedov and many other brave explorers. Seas, islands and mountain peaks are named after them.

Currently, the study of the Arctic region is of great importance, and an increasing number of states are showing interest in the development of the Arctic zone.

The Arctic to this day remains one of the cleanest ecological territories on the planet. All countries that have their own Arctic sector also protect the nature of this unique region of the globe. In the Arctic there is a huge number of protected areas, the area of which is 2.5 million km^2. Each state, which owns even a small part of the territory of the Arctic, tries to use this opportunity to develop tourism and attract the attention of tourists.

The basis of the tourist attractiveness of the Arctic is its geographical position and natural and climatic features. “Emptiness” is often associated with the Arctic regions of the Earth: the absence of land in the North Pole region, color monotony (permanent or lasting for a significant part of the year). This “emptiness” is followed by many tourists seeking emotional relief. In addition, the Arctic coast in the physical and geographical sense most closely matches the mental concept of "Edge of the Earth", where you can "escape" from the routine of everyday life and current problems. The North Pole itself has a high tourist attraction. The climatic features of the Arctic, which complicate living and economic activities, are, paradoxically, an integral part of its tourist attractiveness.

The perception of the Arctic as a mysterious "kingdom of darkness and cold", formed in many cultures on the basis of myths, legends and fairy tales, provokes interest in getting to know "uncharted" lands.

An important factor of tourist attraction are the polar lights. At present, the “hunting for aurora”, which is especially popular among tourists from Southeast Asia, has actually taken shape as an independent direction within the Arctic tourism.

The object of tourist attraction is also the Arctic natural landscapes, which have significant differences from each other.

The Kingdom of Denmark offers a variety of tourist programs off the coast of Greenland - cruises, including the Whale Photo Hunting programs, hiking and sledge trips, helicopter expeditions. One of the most beautiful and exciting excursions is a trip to the

glacial fjords, where you can see how 100-meter icebergs set sail.

Norway invites tourists on a cruise and offers to visit the Svalbard archipelago and land on the ice. Here, tourists can engage in outdoor activities from hiking and skiing to Arctic diving.

Canada provides tourists with the opportunity to visit nature reserves where you can see polar bears, musk oxen, polar wolves, walruses, whales, arctic birds. For those who love outdoor activities, Canadian tour operators offer ski expeditions, mountain climbing, cruises, boat trips and kayaks, diving and much more.

At present, Arctic tourism is beginning to develop actively in Russia. An increasing number of Russian travelers want to discover this northern region. Despite the various difficulties and novelty of the tourist destination, Russian tour operators are organizing cruises to the Arctic. So, in 2022, five cruises were organized on a nuclear-powered icebreaker, one to Wrangel Island, and one to Chukotka. American, British and New Zealand companies also take part in organizing cruises. The most popular tour to the North Pole among Russian tourists is the tour: Murmansk - Franz Josef Land - North Pole - Murmansk. As well as a tour to Wrangel Island, to the island of Svalbard.

Russia owns the largest part of the Arctic territory, there are vast plains covered with tundra and forest tundra, islands with icy deserts, mountains, lakes and rivers, forests with rich flora and fauna.

However, the tourist infrastructure of the Russian Arctic today is very modest, as there are several hotels and a small restaurant on Svalbard. There is nothing on Franz Josef Land but a small scientific station, where a few people work - it is practically an uninhabited island. There is no tourist infrastructure on Novaya Zemlya, Severnaya Zemlya, Wrangel Island.

To date, the Arctic tourism industry has faced a number of challenges, the answers to which will determine the further development of the industry.

1. Environmental risks of tourism development.

Increased tourist traffic is putting pressure on the fragile ecological systems of the Arctic, especially those located in the tundra zone. The negative aspects of the impact of the tourism industry on nature include:

- environmental pollution due to the presence of people and the formation of tourist infrastructure in areas previously little affected by anthropogenic influence;

- depletion of bioresources due to the influence of nature-oriented types of tourism - hunting and fishing (even when fishing is organized according to the "catch and release" principle, unprofessional actions of participants can lead to the death of caught individuals);

As measures that can reduce the negative impact of tourism on nature, we can name:

- Strengthening the control of the state and society over the observance of environmental legislation;

- educational work aimed at increasing the environmental awareness of all participants in tourism activities.

2. Problems of using the historical and cultural environment in the tourism industry.

Stereotypical ideas about the Arctic territories that exist in the mass consciousness can form certain expectations from visiting them. Since the tourism business is primarily interested in meeting the needs of the client, this leads to the risk of distorting history and cultural traditions.

At present, tourism is very developed among our population. Now more and more doctors talk about a new disease - burnout at work. This is what a vacation is for, people need to take a break from the daily routine and annoying faces.

The Arctic is the northern region of the planet, one of the most inaccessible.

Arctic (from Greek.αρκτος - "bear",αρκτικός - "located under the constellation Ursa Major", "northern") - a single physical and geographical region of the Earth adjacent to the North Pole and including the outskirts of the continents of Eurasia and North America.

Recently, the Arctic has begun to attract the attention of various researchers and scientists. And because of this, at first, students began to go there with expeditions. And now such a direction as tourism in the Arctic is developing. People want new experiences and that's why they go there.

The Arctic is the northernmost region of the globe. This polar territory still remains unexplored to the end, attracting the attention of researchers from around the world.

Today the whole world knows the names of the Englishman John Franklin and the American Robert Peary, the Dutchman William Barents, the Norwegian Fridtjof Nansen and Roald Amundsen, the Italian Umberto Nobil, and our compatriots Fyodor Litke, Semyon Chelyuskin, the Laptev brothers, Georgy Sedov and many other brave explorers. Seas, islands and mountain peaks are named after them.

As we can see, there are unique resources in the Arctic.

The Arctic is the northern region, which occupies almost a sixth of the Earth's surface. The water bodies of the Arctic include the Arctic Ocean, the seas - Greenland, Barents, Kara, Laptev, East Siberian, Chukchi, Baffin and Fox Bays, as well as numerous bays and straits of the Canadian Arctic Archipelago and the northern part of the Pacific and Atlantic oceans. The Arctic land includes Greenland, the archipelagos of the Canadian Arctic and Svalbard, Franz Josef Land, Novaya Zemlya, Severnaya

Zemlya, the New Siberian Islands, Wrangel Island, the northern coast of Eurasia and North America.

In the Arctic, in its mainland, there are unique reserves and resources of copper-nickel ores, tin, platinoids, agrochemical ores, rare metals and rare earth elements, large ones, such as gold, diamonds, tungsten, mercury, ferrous metals, optical raw materials and ornamental stones.

Scientific and practical conference

The main mineral resources are located in the northern parts of the Kola, Taimyr-Norilsk, Maimecha-Kotui, Udzhinsk, Taimyr-Severozemelsk, Anabar, Yakutsk, Verkhoyansk and Yano-Chukotka provinces.

Every year the number of tourists who want to get to the Arctic is growing. And this destination is becoming quite popular, of course, the number of Russian tourists is much less than the number of foreign tourists.

Maritime polar tourism is currently actively expanding its boundaries. In 2018, the total passenger traffic of sea cruises in the Arctic was 1,300,000 people, while the Russian sector of the Arctic accounted for no more than 1% of the passenger traffic served by foreign cruise companies. Today, more and more countries are showing interest in the lands of the Arctic. Now 5 countries dominate there: Russia, Denmark, the USA and Norway. Russia owns almost half of the Arctic zone, and it was also the first state to apply to clarify the boundaries of the shelf in the Arctic Ocean. At the moment, Russia owns more than a million square meters.

As for the climate, in the Arctic it is very severe, frost and strong wind prevail there. But for a couple of months in summer it is warm there and during this period the average air temperature fluctuates ... In winter, the Arctic never gets sun, then the temperature can drop below -45 degrees Celsius.

In summer, the sun warms the Arctic 24 hours a day. It is in the summer that many teachings come here with their expeditions and, of course, trips are organized for tourists who want to visit such an unusual destination.

At the moment, the Arctic is one of the cleanest ecological territories. All countries that have at least a small part of the Arctic treat the nature of this unique region very carefully and tenderly. There is a huge amount of protected area in the Arctic.

The basis of the tourist attractiveness of the Arctic is its geographical position and natural and climatic features. “Emptiness” is often associated with the Arctic regions of the Earth: the absence of land in the region of the North Pole, color monotony (permanent or lasting for a significant part of the year), vast spaces without people and settlements. For this "emptiness" many tourists go to high latitudes, seeking to get emotional relief.

In addition, the Arctic coast in the physical and geographical sense most closely matches the mental concept of "Edge of the Earth", where you can "escape" from the routine of everyday life and current problems. The North Pole itself has a high tourist attraction.

This point has an exclusively symbolic meaning, since neither the climate, nor the landscape, nor the fauna distinguish it from any other place within a radius of hundreds of kilometers around. Icebreaking cruises to the Pole, being one of the most expensive areas of Arctic tourism, continue to be in steady demand.

The object of tourist attraction is also the Arctic natural landscapes, which have significant differences from each other. For ocean tourism, these are oceans and seas covered with ice or available for free navigation (depending on the time of year and region). The coast and islands are mostly arctic desert or tundra, with corresponding flora and fauna. It is in this natural zone that you can see representatives of the fauna that most correspond to the mass ideas about the nature of the Arctic: cetaceans and pinnipeds, marine mammals, as well as the polar bear, which has actually become a symbol of the circumpolar territories.

The development of a research methodology allows you to show the depth of the object and subject being studied. The object of the study is the ideological and conceptual justification for the development of tourism in the Arctic.

The subject of the research is the process of formation of safe tourism in the Arctic. The Russian Federation, as the owner of a large Arctic space, claims to become a platform for the development of tourism of a diverse nature.

The word "Arctic" is of Greek origin from the word "Arcticos", which means "bear land".

This is the northernmost and polar region of the Earth, one of the most inaccessible regions of the world. This region occupies almost a sixth of the planet's surface.

Such a vast territory includes the following water bodies: the Arctic Ocean, the Greenland, Barents, Kara, East Siberian, Laptev, Chukchi Seas, the Baffin and Fox Bays, as well as the bays and straits of the Pacific and Atlantic Oceans and the Canadian Arctic Archipelago. The Arctic lands include: Greenland, the Canadian Arctic and Svalbard archipelagos, Severnaya Zemlya, Franz Josef Land, Novaya Zemlya, the New Siberian Islands, Wrangel Island, the northern coast of North America and Eurasia.

The area of the Arctic zone consists of the northern territories of eight Arctic states: Russia, Canada, Greenland, Iceland, Norway, Finland and Sweden.

Russia, the USA, Canada and some Western European regions are beginning to show more and more attention to the Arctic region, due to its unique geographical location.

In the Arctic, Russia owns: Kolguev Island, Severnaya Zemlya, Novaya Zemlya, Franz Josef

Land, Wrangel Island, the New Siberian Islands, also the Republic of Sakha, the Murmansk and Arkhangelsk regions, the Yamal-Nenets, Nenets and Chukotka Autonomous Okrugs and the Taimyr Peninsula. “This is a territory that is directly related to Russia, these are its borders,” said Vladimir Volfovich Zhirinovsky about the Arctic.

The Arctic is still one of the most ecologically clean territories on the planet. All countries that have their own controlled Arctic zone are engaged in ensuring the environmental security of this region, both individually and through international cooperation.

The Russian authorities clearly understand the importance of preserving the nature of the Arctic. The country pays great attention not only to the development of its territories, but also cares about the protection of water areas and lands. To this end, a large number of protected natural areas have been created in the Arctic territory of the Russian Federation.

To date, there is no generally accepted definition of the term "Arctic tourism", although the concept itself has become widespread and is used in official state documents (for example, in the "Strategy for the Development of the Arctic Zone of the Russian Federation and Ensuring National Security for the Period up to 2035", approved by the President of the Russian Federation V.V. Putin).

To analyze the problems and prospects of tourism in this region, it is necessary to clarify what exactly is invested in this phrase, to highlight the territorial scope of the phenomenon and its characteristic features. The main feature of the Arctic regions, which form their uniqueness, is the climate. The climate in the Arctic is quite severe - frosts and strong winds. In winter, the sun does not rise over this area. During this period, the temperature drops to -45°C or even lower. But only a few months of the year, from June to October, are mild and warm summers. The average air temperature during this period ranges from -10° to +10°C. At this time of the year, the sun warms the surface 24 hours a day. It is at this time that tourist trips are organized to the Arctic.

The basis of the attractiveness of the Arctic for tourists and travelers is both its special geographical location and natural and climatic features, as well as its weak susceptibility to anthropogenic influences, as well as the "historical and cultural" significance of this region.

Currently, not only in Russia, but throughout the world, Arctic tourism is actively developing, and an increasing number of Russian travelers want to discover this northern region.

Arctic tourism, like any other tourist destination, is formed on the basis of a combination of existing factors of attractiveness and tourism products formed on their basis, focused on the end consumer. The creation of such products can be greatly influenced by the targets of both state and public structures, as well as business marketing strategies.

To date, the sphere of Arctic tourism has faced a number of problems, the solution of which depends on the further development of the industry. These include both environmental problems and the use of the historical and cultural environment, as well as the availability of Arctic tourism.

Environmental issues

1. Pollution of the environment due to the presence of people in areas previously little affected by anthropogenic influence;

2. Depletion of biological resources due to the influence of nature-oriented types of tourism - hunting and fishing.

3. As a result of an increase in the number of tourist routes and the lack of a clear systematization of them, damage is caused to the soil and vegetation cover, the regeneration of which requires considerable time.

4. Increasing the likelihood of environmental, man-made disasters and other similar risks.

5. Increased risk of accidental or deliberate damage or destruction of natural monuments.

Measures that can reduce the negative impact of tourism on the ecological situation include:

1) strengthening the control of the state and society over the observance of environmental legislation;

2) regular monitoring of the environmental situation in the territories actively involved in the tourism industry;

3) popularization of nature - oriented forms of tourism, not related to the withdrawal of resources;

4) prompt response in case of threats or problems of a different nature;

5) administrative and educational activities to systematize tourist routes in order to minimize the negative impact on the environmental situation.

Problems of using the historical and cultural environment

The integration of the tangible and intangible historical and cultural heritage of the Arctic into tourism activities is fraught with a number of threats.

Stereotypical ideas about the Arctic territories that exist in the mass consciousness often form certain expectations from visiting them. Since the tourism business is primarily interested in meeting the needs of the client, this leads to the risk of distorting history and cultural traditions.

The vulgarization of the heritage of the indigenous peoples of the Arctic "in the interests" of the tourist, which can be carried out, including by the representatives of ethnic groups themselves, leads to a gradual blurring of the differences between the traditional way of life and stylization for it. Material monuments can also be falsified: monuments, dwellings, sacred places, and so on.

In order to attract tourists, false ideas can also be created and disseminated that advanced civilizations and theories asserting the supernaturalness of this region previously existed in the Arctic. In order to "prove" such concepts, even structures are created that are presented later as "ancient artifacts". All this poses a great threat. A significant counterbalance to these trends can be the intensification of educational activities, activities to identify, protect and restore historical monuments. "In many ways, the further development of the region depends on the solution of this problem."

Also, an important problem for tourism activities in the Arctic region is the issue of accessibility of this activity. The increased public demand for visiting the Arctic has found a response in the business community, but this trend has faced objective difficulties, since the Arctic regions are among the most inaccessible on Earth. The lack of regular road and rail links with many regions of the Arctic, the difficulty of sea navigation and air travel, as well as the pricing policy of the hospitality business, have become the main deterrents to the development of mass tourism in this region.

Summing up all of the above, I would like to note that the Arctic undoubtedly has great attractiveness compared to other northern territories. However, the harsh natural conditions, the remoteness and inaccessibility of the region, the lack of a developed transport and logistics infrastructure to provide direct access for tourists, the high cost of the tourism product, undoubtedly hinder the active development of tourism in these regions.

Conclusion

Particular attention is paid to the interests of the Arctic regions in 12 national projects identified by the President of the Russian Federation Vladimir Putin, namely, demography, healthcare, education, housing and urban environment, ecology, safe and high-quality roads, labor productivity and employment support, science, digital economy, culture, small and medium business, international cooperation and export.

What specific measures for the development of the Arctic are provided for in Russian national projects, how their implementation will affect the economy of the region and the quality of life of people, and what problems may arise during their implementation, were discussed by Russian experts and politicians during the panel discussion "National projects in the Arctic zone of the Russian Federations: Implementation Mechanisms" of the international forum "Arctic – Territory of Dialogue" in St. Petersburg.

An important result of the discussion was the definition of the range of main problems that the Arctic regions face today. One of the key challenges for the Russian Arctic was the underdevelopment of the social sphere and infrastructure.

According to the data provided by the Minister of the Russian Federation for the Development of the Far East and the Arctic, Alexander Aleksandrovich Kozlov, life expectancy in all Arctic regions, except for Yamal, is lower than the national average. A consequence of the difficult social situation is a high level of migration. According to the Chairman of the State Duma of the Federal Assembly of the Russian Federation for Regional Policy and Problems of the North and the Far East, Nikolai Mikhailovich Kharitonov, 214 thousand people are ready to leave the northern regions of Russia today. Andrey Vladimirovich Chibis, Acting Governor of the Murmansk Region, considers migration a systemic problem. According to him, the Murmansk region has the necessary housing stock, however, despite this, several hundred thousand people have left the region over the past 30 years. Further, Andrey Chibis noted that, under Russian law, many problems in the social sector fall on the shoulders of business. As a result, high social pressure and an undeveloped consumer environment make doing business in the Arctic unprofitable and uncompetitive, which also completes the picture of negative socio-economic phenomena in the region.

Experts are unanimous in their opinion that, for these reasons, the implementation of national projects in the Arctic will require additional funding from the federal center. Without increased coefficients, it will not be possible to compensate for the additional costs associated with harsh natural conditions and difficult logistics, says Maxim Gennadyevich Filimonov, Deputy Director General of the Russian Information Agency TASS. Continuing the topic, Roman Valentinovich Kopin, Chairman of the Government of the Chukotka Autonomous Okrug, pointed out the disproportionate cost of building roads, housing and other infrastructure, which also increases financial obligations in the region.

In order to increase the effectiveness of national projects and ensure that their implementation brings tangible results, it is necessary to fully take into account the peculiarities of the Arctic. The Minister of Construction, Housing and Communal Services of the Russian Federation, Vladimir Vladimirovich Yakushev, is convinced that it is necessary to lay the Arctic problems at the very foundation of specific development programs. It is necessary to create a multifunctional environment for citizens in which they can painlessly endure local features - low temperatures, long winters, long nights, etc. Roman Kopin drew attention to the problems of the transport industry. In his opinion, additional resources should be directed to the modernization and development of air transport, which has historically demonstrated its effectiveness in the development of the Arctic. It is necessary to significantly upgrade the fleet, simplify

registration procedures, improve the equipment of airports, expand the use of air ambulance. Following the discussion, experts recognized national projects as the most important tool for improving the quality of life in the Arctic. As Roman Kopin noted, national projects are an important management mechanism that will help correct social imbalances and improve the quality of life of the population.

Russia has made great efforts aimed at the integrated socio-economic development of the Arctic, initiated a number of major energy and infrastructure projects. However, not everything is so smooth, in recent years the government has faced a number of external problems that threaten the successful economic development of the Arctic. Western sanctions have hurt the energy and transport industries, limiting access to financial resources and advanced technology, especially needed in offshore development. Another significant problem was the fall in prices for carbohydrates, which led to a decrease in the investment attractiveness of many energy projects.

Thus, in order to solve the socio-economic problems associated with the Arctic, Russia must implement such national projects as:

a) development of transport infrastructure;

b) job creation;

c) development of development programs taking into account the peculiarities of the Arctic;

d) increased funding;

e) attracting new business.

Russia continues to work on the implementation of Arctic projects, involving new players interested in the positive completion of these projects.

In conclusion, we note that the priority for our country is the preservation of the Arctic as a territory of peace, stability and constructive cooperation. Domestic programs to modernize the armed forces and increase the military presence are not directed against the Arctic states, but are designed to ensure the effective implementation of state policy, maintaining the balance of power in the region and countering the challenges and threats to national security. In order for the economy to grow, develop, and fulfill its primary duty, it must eliminate its problems and improve its qualities. The Arctic is the largest and most promising region of the planet. In Russia, the Arctic zone extends over 3 million km^2, which is about 18% of the entire territory. Therefore, the prospects for the development of the northern territories are of great importance for our country. And now the Arctic zone provides about 11% of Russia's national income. Since the climate there is not the most favorable, the territory is sparsely populated. A little less than 2 million people live in the Arctic Circle, which is 1.4% of the total population of the country. However, if you look at the number of all the peoples of the world living in the Arctic latitudes, then our country accounts for 54%.

In the Arctic region, almost all cities and settlements are scattered along the coast of the seas or in the lower reaches of the rivers. The largest cities: Murmansk (almost 305 thousand inhabitants). Then Norilsk, known for its plant (180 thousand), completes the top three - Vorkuta (85 thousand). And only then it was located in the list of Tromsø (Norway) with a population of only 62 thousand people.

In the Arctic region, a healthy lifestyle is of particular relevance. At the same time, O.V. Smychkova points out that a healthy lifestyle is based on the following factors:

- giving up bad habits: smoking, drinking alcohol and drugs;
- optimal motor mode;
- balanced diet;
- hardening;
- personal hygiene;
- positive emotions.

Speaking about the observance of healthy lifestyle rules in the Arctic region, it should be borne in mind that local residents can be conditionally divided into two groups.

1. Indigenous peoples of the North.
2. Residents of cities, shift workers, etc. - people who moved to the Far North.

In addition, a healthy lifestyle means at least clean water and air, but also safety for the individual, group and community. Changes in climate, environment and land use, together with socio-economic factors, affect the food and water security of the Arctic region. However, the quality of tap water is not always adequately controlled. Thus, studies of tap water in six cities of the Murmansk region (Nikel, Zapolyarny, Olenegorsk, Monchegorsk, Apatity, Kirovsk) showed that the requirements for sanitary protection zones for water sources are not met everywhere. In other cities, better water treatment is required, since disinfection currently only includes chlorination. In some settlements, an excess of the maximum permissible indicators of metals was found. So, in Kirovsk, a high level of aluminum was detected, and in Nikel and Zapolyarny - nickel. Water taken from the sources of the Pechenga region showed a relatively low level of metals, except for strontium and barium.

It is no coincidence that M. Mian notes that tourism is one of the key phenomena affecting the Arctic Circle. “Until a few years ago, the Arctic was one of the most inaccessible and uninhabited areas on the planet. But now the Far North is a new exotic. Tourists are on the rise seeking to see these disappearing landscapes before it's too late."

Cruise shipping companies offer arctic trips to various destinations: Norway, Greenland. European and American companies offer their clients trips along the iceberg ridge and promise to show the Arctic fauna. Similar tours are also organized in our country. For example, a cruise along the Northern Sea Route

along the coast of our country on the Russian nuclear-powered ship 50 Years of Victory. The price of a two-week tour varies from 20-30 thousand dollars per person. In 2020, five such cruises were organized on two routes: to about. Wrangel and Chukotka. According to the Federal Tourism Agency, in 2021 the total passenger flow of Arctic cruises is 1.3 million people, Russia accounted for only a thousandth of these tourists. If the travelers had not landed in Greenland or Norway.

Thus, it can be stated that Arctic tourism in our country is at the beginning of its formation, although public interest in the Arctic, as an exclusive product, is growing year by year. As Yu.F. Lukin, the possibilities of tourism activities are determined by the real offers of certain tourist products and their demand on the service market. As you can see, there is a demand for Arctic destinations, including among foreign tourists, which will have an extremely favorable effect on the economy of our country, because foreign citizens will purchase services and goods in the Russian Federation. However, there are not so many high-quality offers that can compete with foreign companies.

Obviously, with the growth of northern tourism and the popularity of the "Russian Arctic", as foreign tour operators call it, the question will inevitably arise of whose companies have the right to arrange tours, and which country's budgets should profit from this.

At the same time, ideas about the transfer of polar possessions under international control are expressed not only abroad.

For example, S. Medvedev in 2018 spoke out that “the Arctic must be taken away from Russia and transferred to international jurisdiction.” The proposal drew a flurry of criticism. So, V.V. Zhirinovsky, arguing with S. Medvedev in the media, pointed out that the Arctic "is a territory that is directly related to Russia, these are its borders."

Thus, Arctic tourism provides the potential for the development of both the regions and the indigenous peoples of the North. However, this is understood by the world's major tour operators. Therefore, it is necessary to develop the Arctic areas now, otherwise In this case, our country risks losing its share of the tourism market. Moreover, the specificity of Arctic tours is that they develop the scientific and physical potential of people.

Firstly, northern tours offer to replace beach vacations with travel related to physical activity and endurance.

Secondly, a significant part of the entertainment programs is related to the study: watching whales or birds, studying ice, etc., which contributes to the popularization of science.

The geographical location, the underdevelopment of transport and hospitality infrastructure, as well as the pricing policy of business have led to the fact that tourism in a significant part of the Arctic has become inaccessible to the majority due to the very high cost of services.

The listed challenges set the tourism industry to the task of forming an economically viable, sustainable model of its existence and development, taking into account the interests of all stakeholders: international organizations, states, indigenous and old-timers, local communities and business entities.

In general, we can make a general conclusion that the effective operation of the tourism business, high-quality service in the field of tourism in the Arctic, the creation of Arctic tourist and recreational clusters in all regions, an increase in demand for Arctic tourism products is a matter of the near future in the time interval up to one decades, maybe more.

In conclusion, it should be noted that Arctic tourism is undoubtedly gaining popularity among tourists. However, the harsh natural conditions, the remoteness and inaccessibility of the islands, the lack of transport and logistics infrastructure to provide direct access for tourists, the high cost of the tourist product, to some extent, hinder the development of tourism in this region.

In the end, I would like to say that: the development of tourism in the Arctic is a new topic in state strategic planning, in research and development, and in commercial activities in the Russian Federation. The implementation of this idea in life gives hope for the socio-economic development of the regions.

However, tourism activity, like any other economic sector, depends on many political and economic factors. Therefore, considering large investment projects for the development of tourism as long-term long-term plans, we will focus only on the methodology for researching a new direction - the development of tourism in the Arctic.

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Issue Article

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SYNTHESIS OF DICHLORODIAZADIENES AND HYDROZO DERIVATIVE OF α-KETOETHER AND ASSESSMENT OF THEIR ANTIBACTERIAL ACTIVITY: CRYSTAL STRUCTURE OF (E)-4-((1-(4-(TERT-BUTYL)PHENYL)-2,2-DICHLOROVINYL)DIAZENYL) BENZONITRILE (VII)

Abstract: *The new dichlorodiazadiene derivatives (I-VIII) and from solvolysis of II compound, which resulted in methyl (Z)-2-(4-(tert-butyl)phenyl)-2-(2-(p-tolyl)hydrazineylidene)acetate (**IX**) were synthesized, which exhibits a wide range of antimicrobial activity against grampositive and gramnegative bacteria. **IX** and (E)-1-(1-(4-(tert-butyl)phenyl)-2,2-dichlorovinyl)-2-(4-methoxyphenyl) diazene (**III**) showed high antimicrobial activity against Acinetobacter baumanii, Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa, Bacillus subtilis and Staphylococcus aureus, where the zone of inhibition was 1.3-2.6 and 1.3-2.1 times larger,respectively, compared with gentamicin. This substances have a wide range of inhibitory effect agent of gramnegative and grampositive bacteria and can be used as a disinfectant agent. In the crystal structure of **VII**, the molecules are connected by C—H···Cl, C---H…N, and C---Cl…π interactions, forming a 3D network.*

Key words: *dichlorodiazadiene derivatives, antibacterial activity, grampositive and gramnegative bacteria, Hirshfeld surface analysis.*

Language: *English*

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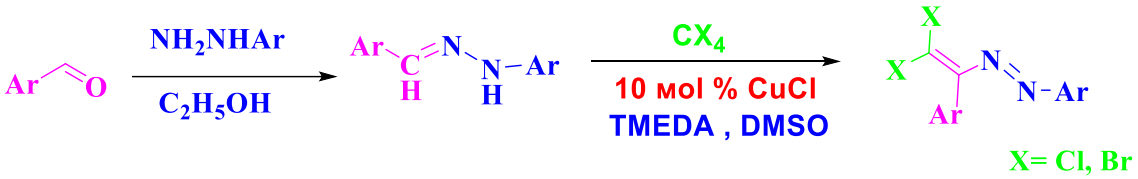
Introduction

The shortage of new antimicrobials and the rapid development of antimicrobial resistance pose a major challenge to health systems. In this regard, scientists are exploring new compounds of various origins as new antimicrobial substances. One –pot reactions are highly significant in industrial synthetic chemistry, and pharmaceutical chemistry applications for generation of structural diversity and libraries of drug-like molecules. These reactions as efficient methods have been widely used in the preparation of different bioactive compounds[1-5]

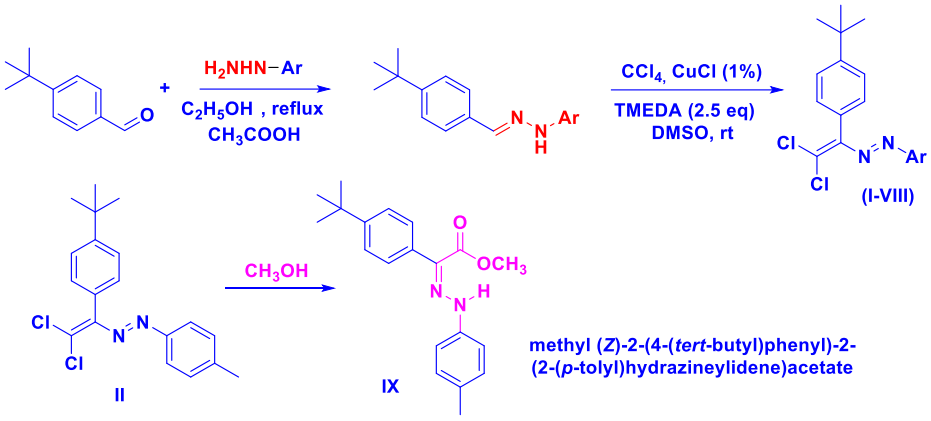
The synthesis of polyfunctional compounds, the study of their structure and properties is one of the directions of fine organic synthesis that have been studied in more detail in recent years. In this regard, the synthesis of dihalogendiazabutadienes from the reaction of N-substituted hydrazones of benzaldehyde derivatives with polyhalomethanes (CCl_4, CBr_4) in the presence of a CuCl catalyst[6-10], the investigation of their structural features by the RQA method[11-14] and the investigation of the factors affecting the direction of the reaction are distinguished by their relevance.



Scheme 1. Synthesis of dihalogendiazabutadienes

The presence of an attached diazadiene system in dihalogendiazabutadiene derivatives leads to their application as a new class of diazo dyes and the reaction of heminal halogen atoms with various nucleophiles to produce many important compounds (azidotriazoles, hydrozo derivatives of α-ketoethers, other nitrogen-containing heterocyclic compounds)[8,15] allows us to say how important this reaction is. Considering this, corresponding azo dyes (I-VIII) were synthesized based on 4-(tert-butyl)benzaldehyde and Hirshfeld surface analysis was studied[16]

At the same time, compound IX was synthesized from the solvolysis of compound II. In this study, the study of the antimicrobial properties of some of the newly synthesized dichlordiazadiene derivatives and the α-keto ether aryl-hydrazone like a solvolysis reaction product - and the results obtained from the structural studies of compound VII were discussed (Scheme 2).



Ar=4H (I), 4-CH_3 (II), 4-OCH_3 (III), 3-CH_3 (IV), 3,4-$(CH_3)_2$(V), 4-Cl (VI), 4-CN (VII), 4-I (VIII)

Scheme 2. Synthesis of dichlorodiazadienes and aryl hydrazone of α-keto ester

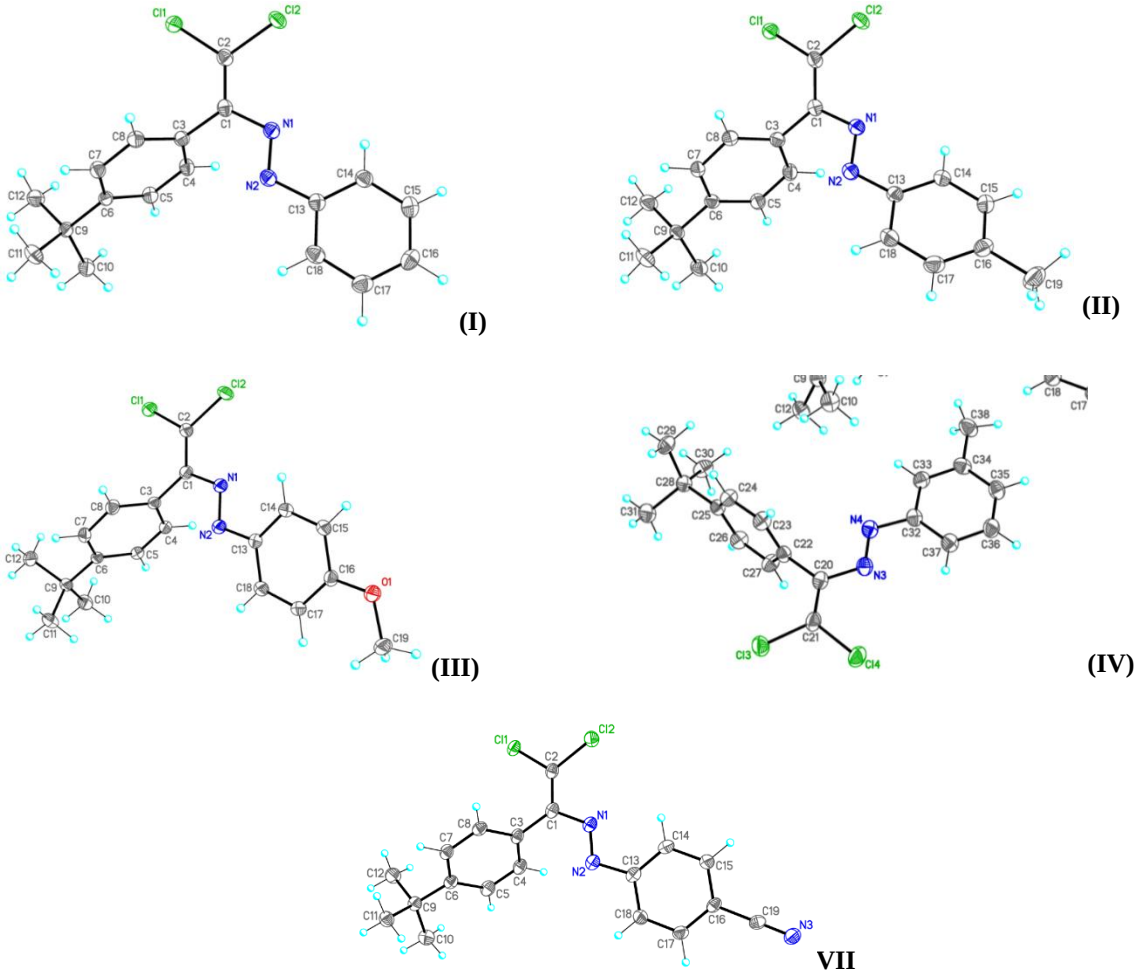


Figure 1. Molecular structures of compounds I-IV,VII

Result and Discussion

dichlorodiazadienes (**I-VIII**) were synthesized from the reaction of corresponding N-substituted hydrazones synthesized on the basis of t-Bu-benzaldehyde with CCl_4 in a catalytic amount of CuCl. Aryl hydrazones (**IX**) of α-keto esters were obtained from the solvolysis of dichlorodiazadiene in methyl alcohol at room temperature. Structures of obtained compounds were studied by NMR ^1H, ^{13}C spectroscopy and RSA analysis method. According to the NMR ^1H spectrum, signals of tertbutyl group were observed in the range of 1.39-1.44 ppm, and aromatic H atoms were observed in the range of 6.89-7.87 ppm. The signals of the groups (4-CH3, 4-OCH3, 3-CH3) in the hydrazine fragment were observed at 2.42, 3.88, 2.45 ppm. In the ^1H spectrum of substance (VIII), shift

to the weaker area (to the 12.45 ppm) due to the intramolecular H-bonding of the H atom in the NH group suggests us that it is in the Z-isomer form.

Antimicrobial activity of dichlorodiazadiene derivatives (I,III,IV) and methyl (Z)-2-(4-(tert-butyl)phenyl)-2-(2-(p-tolyl)hydrazineylidene) acetate IX.

The data obtained are presented in the table. All tested compounds exhibited antimicrobial activity to varying degrees against both gramnegative and grampositive bacteria.

Table 1. Antibacterial activity of dichlorodiazadiene derivatives

Test cultures		*Diameter of inhibition zone(mm), M ± m*				
		Compounds (0.3%)				Gentamicin (0.3%)
		I	**IX**	**III**	**IV**	
Gram negative bacteria	*Acinetobacter baumannii*	25.3±	30.0±	27.2±	28.8±	19.0±0.7
	Escherichia coli	26.2±	46.8±	38.2±	29.7±	18.0±0.6
	Klebsiella pneumoniae	23.5±	32.7±	33.3±	26.3±	20.0±0.1
	Pseudomonas aeruginosa	19.3±	33.2±	37.3±	17.5±	20.0±0.1
Gram positive bacteria	*Bacillus mesentericus*	23.2±	28.2±	27.3±	27.5±	26.0±1.3
	Bacillus subtilis	32.2±	31.0±	33.7±	34.3±	24.0±1.1
	Staphylococcus aureus	17.3±	35.3±	30.0±	19.8±	24.0±1.1

Note:
I (E)-1-(1-(4-(tert-butyl) phenyl)-2,2-dichlorovinyl)-2-phenyldiazene;
III(E)-1-(1-(4-(tert-butyl) phenyl)-2,2-dichlorovinyl)-2-(4-methoxy-phenyl) diazene;
IV (E)-1-(1-(4-(tert-butyl) phenyl)-2, 2-dichlorovinyl)-2-(m-tolyl) diazene
IX methyl (Z)-2-(4-(tert-butyl)phenyl)-2-(2-(p-tolyl)hydrazineylidene)acetate

Methyl (Z)-2-(4-(tert-butyl)phenyl)-2-(2-(p-tolyl)hydrazineylidene)acetate (**substance IX**) and (E) -1 - (1 - (4 – (tert-butyl) phenyl) – 2,2 – dichlorovinyl) – 2 – (4 – methoxyphenyl) diazene (**substance III**) showed high antimicrobial activity against *Acinetobacter baumanii*, *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Bacillus subtilis* and *Staphylococcus aureus*, where the zone of inhibition **IX** and **III** was 1.3-2.6 and 1.3-2.1 times larger, respectively, compared with gentamicin (control). (E) - 1 - (1 - 4 - (tert-butyl) phenyl) - 2,2 - dichlorovinyl) - 2 - phenyldiazene (**substance I**) and (E) -1 - (1 - (4 - (tert-butyl) phenyl) - 2,2 - dichlorovinyl) - 2 - (m - tolyl) diazene (**substance IV**) showed high antimicrobial activity against *A. baumanii*, *E. coli*, *K. pneumoniae*, *B. subtilis*, where the zone of inhibition was, respectively, 1.2 - 1.5 and 1.3 - 1.7 times more than with gentamicin. *Acinetobacter baumanii*, *Bacillus mesentericus* and *B. subtilis* showed moderate sensitivity to all tested substances. However, *E. coli*, *K. pneumoniae*, *P. aeruginosa*, and *St. aureus* showed the greatest sensitivity to **substances IX** and **III**. Thus, sensitivity to **IX** and **III** was, respectively, in *E. coli* 1.6–1.8 and 1.3–1.5 times; in *K. pneumoniae*, 1.3–1.4 times; in *P aeruginosa* - by 1.7 - 1.9 and 1.9 - 2.1 times, in *St. aureus* - 1.7 - 2.0 and 1.5 - 1.8 times more compared to **substances I** and **IV**. The maximum antibacterial activity was shown by **substance XI** against *E. coli*, where the zone of inhibition was 1.8, 1.2, and 1.6 times larger compared to **substances I, III,** and **IV,** correspondingly. Hence, ntimicrobial activity varied depending on the spescies of bacteria and the inhibitory substances.

It should be noted that some synthetic organic substances have a more specific effect on microorganisms. specifically acted only on gramnegative bacteria and did not act grampositive and vice versa[4]; dimethyl 5-acetyl-1,3-disiano-4-hydroxy-4-methyl-2,6-diphenylcyclohexane-1,3-dicaoboxylate is more active (MIC-62.5 μg/ml) on *Pseudomonas aeruginosa*[5]; 2-hidroxy -3-allyi -5-isodesilbenzil) dietnylammonium chlorid had a specific bactericidal effect against *Staphylococcus aureus*[17]; 3-(4-chlorobenzyl)-5-(iodomethyl)

thiazolidine-2-thione did not affect bacteria, but inhibited the growth of fungi[18].

The results of the substance we studied **(I,III,IV and IX)** agree with the data, where 3-(4-chlorbenzyl) -5-(iodomethyl) thiazolidine - 2-thione inhibited the growth of gram-positive and gramnegative bacteria[18].

Structural studies of VII

Crystal data, data collection and structure refinement details are summarized in Table 2. The single crystal data of **VII** was collected on a Rigaku's XtaLAB Synergy Dual Source Single Crystal Diffractometer with graphite-monochromated Cu-K_α (1.54184 Å) at 100 K. With the CrysAlisPro software package, reduction and integration of the gathered data was done[20] . The crystal structure was solved by direct methods using SHELXT[21], and refined on F^2 by full-matrix least-squares procedures using SHELXL-2015[22]. Eventually, data were reduced and corrected for absorption using CrysAlisPro[20] . The C-bound H atoms were positioned geometrically and treated as riding atoms, C—H = 0.95 Å with U_{iso}(H) = 1.2U_{eq}(C) for aromatic H atoms and C—H = 0.98 Å with U_{iso}(H) = 1.5U_{eq}(C) for methyl H atoms. Owing to poor agreement between observed and calculated intensities, twenty-five were omitted in the final cycles of refinement. The molecular geometry calculations and drawings were performed with ORTEP-3 for Windows[23]. Software was used to prepare material: PLATON[24] and WinGX[23] .

The aromatic rings C3–C8 and C13–C18 of compound **VII (Fig. 1)** form a dihedral angle of 51.59(13)°. The title molecule adopts an *E* configuration with respect to the N1=N2 bond. The N1/N2/C1–C3/C13/Cl1/Cl2 unit is approximately planar [rms deviation of fitted atoms = 0.0667 Å], and makes dihedral angles of 58.22 (5) and 6.64 (12)°, respectively, with the C3–C8 and C13–C18 benzene rings. The values of the geometric parameters of **VII** are normal and compatible with those of the related compounds *viz.*: 4-{2,2-dichloro-1-[(*E*)-2-(4-methylphenyl)diazen-1-yl]ethenyl}-*N*, *N*-dimethylaniline[25], 1-(4-chlorophenyl)-2-[2,2-di-chloro-1-(4-fluorophenyl)ethenyl]diazene[26], 1-(4-chlorophenyl)-2-[2,2-dichloro-1-(4-nitrophen-yl)ethenyl]diazene[27] and 1-[2,2-dichloro-1-(4-nitro-phenyl)ethenyl]-2-(4-fluorophenyl)diazene[28].

In the crystal of **VII**, molecules are linked by C—H···Cl, C---H…N (Table 2) and C---Cl…π [C2---Cl1...Cg1^a: Cl1...Cg1^a=3.8158 (13) Å, C2---Cl1...Cg1^a (1-x, -y, 1-z) = 157.02(9)°; C2---Cl2...Cg2^b: Cl2...Cg2^b = 3.4704 (13) Å, C2---Cl2...Cg2^b = 93.78(9)°; Symmetry codes (*a*) 1 - x, - y, 1 - z, (*b*) x, - 1 + y, z; Cg1 and Cg2 are the centroids of the C3--C8 and C13--C18 benzene rings, respectively] interactions, forming a three-dimensional network to make the crystal structure stable (**Fig. 2**). π-π stacking interactions were not observed in the crystal structure of **VII**.

Table 3. Hydrogen-bond geometry (Å, °)

D—H···*A*	*D*—H	H···*A*	*D*···*A*	*D*—H···*A*
C4—H4···Cl1^{i}	0.95	2.79	3.741 (3)	176
C15—H15···N3^{ii}	0.95	2.61	3.545 (4)	169.00

Symmetry codes: (i) *x*, *y*+1, *z*; (ii) −*x*+2, *y*−1/2, −*z*+1/2.

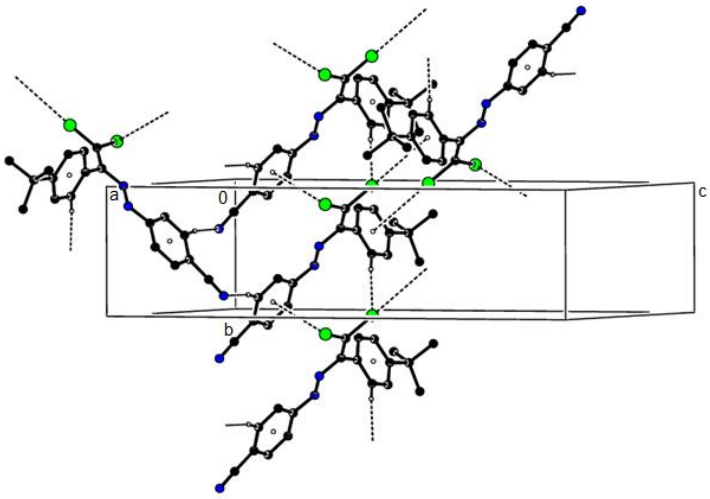


Fig. 2. A view of part of the molecular packing, showing C—H···Cl, C---H…N and C---Cl…π interactions.

Hirshfeld surface analysis of VII

The Hirshfeld surface analysis was carried out along the associated two-dimensional fingerprint plots generated using C*rystalExplorer17.5* [29]. The Hirshfeld surface is colour-mapped with the normalized contact distance, d_{norm}, from red (distances shorter than the sum of the van der Waals radii) through white to blue (distances longer than the sum of the van der Waals radii) with a fixed colour scale of -0.1260 (red) to +1.2999 (blue) a.u.

The Hirshfeld surfaces of **VII** mapped over d_{norm}, are given in **Fig. 3a**. The faint red spots indicate that short C---H…Cl and C---H…N contacts (Table 3) are significant in the crystal packing of the compound. **Fig. 3b, c** and d also exhibit the shape index (b), curvedness (c) and fragment paches surfaces of **VII**, respectively.

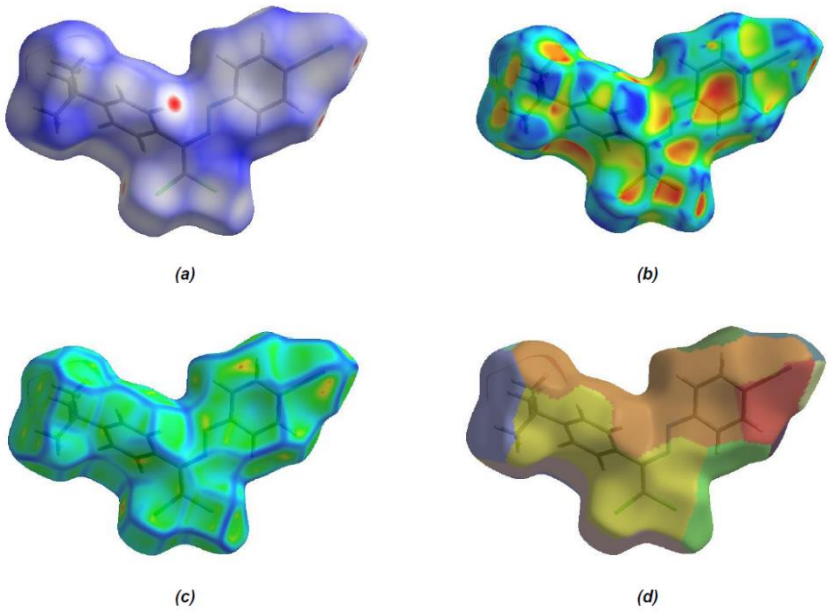


Fig. 3. (a) Hirshfeld surface mapped over d_{norm} with a fixed color scale in the range of -0.1260 au (red)– 1.2999 au (blue), based on the length of the intermolecular contacts with respect to the sum of the van der Waals radii (red: shorter; blue: longer; white: same). (b) Hirshfeld surface mapped over the shape index (color scale: −1.0000 au – 1.0000 au). Blue areas represent bumps, and red regions indicate hollows. (c) Hirshfeld surface mapped over the curvedness (color scale: −4.0000 au – 0.4000 au). Flat regions are in green, while edges are in blue. (d) Unique (colored) region representations (fragment patches) based on atoms outside the Hirshfeld surface designed to indicate nearest neighbor molecule (color scale: 0.0000 au – 17.0000 au).

The full two-dimensional fingerprint plots for **VII** are given in **Fig 4**. The H…H contacts comprise 36.4 % of the total interactions. Besides this contact, N···H/H···N (17.1 %) and C···H/H···C (13.2 %) interactions make significant contributions to the total Hirshfeld surface. The percentage contributions of the Cl···C/C···Cl, C…C, N···C/C···N, Cl…Cl and Cl···N/N···Cl contacts are 5.6, 5.5, 1.2, 0.9 and 0.7 %, respectively.

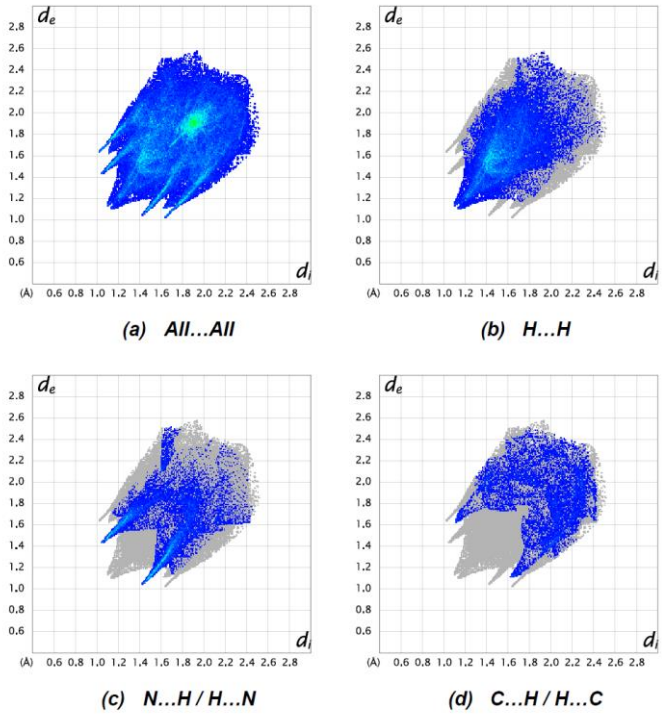


Fig. 4. Two-dimensional fingerprint plots of the Hirshfeld surface of VII, providing a visual summary of the frequency of each combination of d_e and d_i across the Hirshfeld surface. Points with a contribution to the surface are colored blue for a small contribution, and green for a great contribution. (a) All intermolecular contacts, (b) H···H contacts, (c) N···H/H···N contacts, (d) C···H/H···C contacts

Conclusion

The new dichlorodiazadiene derivatives were synthesized, which exhibits a wide range of antimicrobial activity against grampositive and gramnegative bacteria. **methyl (Z)-2-(4-(tert-butyl)phenyl)-2-(2-(p-tolyl)hydrazineylidene) acetate(substance IX)** and (E) -1 - (1 - (4 – (tert-butyl) phenyl) – 2,2 – dichlorovinyl) – 2 – (4 – methoxyphenyl) diazene (**substance III**) showed high antimicrobial activity against *Acinetobacter baumanii*, *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Bacillus subtilis* and *Staphylococcus aureus*, where the zone of inhibition was 1.3-2.6 and 1.3-2.1 times larger, respectively, compared with gentamicin. This substances have a wide range of inhibitory effect agent of gramnegative and grampositive bacteria and can be used as a disinfectant agent. In the crystal of VII, the molecules are linked by C—H···Cl, C---H…N, and C---Cl…π interactions, forming a 3D network to stabilize the crystal structure. π-π stacking interactions were not observed.

Experimental

General. The syntheses of compounds were carried out at the Organic Chemistry Department of Baku State University (Baku, Azerbaijan). The X-ray analyses of compounds I, II, III, IV and VII were carried out using the Bruker APEX II CCD (T 296 K, λMoK α - radiation, graphite monochromator, φ- and ω-scan) diffractometer. NMR 1H and 13C spectra were recorded using a Bruker Avance 300 (working frequency is 300 MHz) using CDCl3 solvent. SiMe4 (TMS) was used as an internal standard. Thin-layer chromatography (TLC) was performed on silhouette plate UB-254 and acidified KMnO4 solution; UV lamp rays were used to make spots visible. Column chromatography was performed on silica gel of Merk firm (63-200).

Synthetic procedure. Compounds (I)- (VI) were synthesized according to a literature protocol[6-7].

A 20-mL screw neck vial was charged with DMSO (10 mL), corresponding phenylhydrazones - ((E)-1-(4-(tert-butyl)benzylidene)-2-phenylhydrazine (252mg) for I, (E)-1-(4-(tert-butyl)benzylidene)-2-(p-tolyl) (266mg) for II, (E)-1-(4-(tert-

butyl)benzylidene)-2-(4-methoxyphenyl)hydrazine (276mg) for III, (E)-1-(4-(tert-butyl)benzylidene)-2-(m-tolyl)hydrazine for IV (266mg), (E)-1-(4-(tert-butyl)benzylidene)-2-(3,4-dimethylphenyl)hydrazine for V (280mg) and (E)-1-(4-(tert-butyl)benzylidene)-2-(4-chlorophenyl)hydrazine for VI (286mg), (E)-4-(2-(4-(tert-butyl)benzylidene)hydrazineyl) benzonitrile for VII (277mg), (E)-1-(4-(tert-butyl)benzylidene)-2-(4-iodophenyl)hydrazine for VIII (278mg) / (1mmol), respectively, tetramethylethylenediamine (TMEDA) (295 mg, 2.5mmol), CuCl (2 mg, 0.02 mmol) and CCl4 (20 mmol, 10 equiv). After 1-3 hours (until TLC analysis showed complete consumption of the corresponding Schiff base), the reaction mixture was poured into an ~0.01 M solution of HCl (100 mL, ~pH 2-3), and extracted with dichloromethane (3x20 mL). The combined organic phase was washed with water (3x50 mL), followed by brine (30 mL), dried over anhydrous Na_2SO_4 and concentrated in vacuo by rotary evaporator. The residue was purified by column chromatography on silica gel using appropriate mixtures of hexane and dichloromethane (3/1-1/1), and the corresponding diazenes were obtained. Compounds I-IV and VII were dissolved in dichloromethane (CH_2Cl_2) and then left at room temperature for slow evaporation; red and orange crystals of all compounds suitable for X-rays started to form after 2 day

I. (E)-1-(1-(4-(tert-butyl) phenyl)-2,2-dichlorovinyl)-2-phenyldiazene . Red solid (yiled 69%, 229.94mg); m.p. 87^{0}C. Anal. Calcd for C18H18Cl2N2 (*M* = 333.26): ^{1}H NMR (300MHz, $CDCl_3$) δ 7.87 (dd, *J* = 6.6, 2.9 Hz, 2H, arom), 7.54 – 7.47 (m, 5H, arom), 7.21 (d, *J* = 8.3 Hz, 2H, arom), 1.44 (s, 9H, -$C(CH_3)_3$). ^{13}C NMR (75MHz,$CDCl_3$) δ 31.8, 31.4, 123.3, 125.1, 129.0, 129.3, 129.7, 131.5, 135.1, 151.6, 152.2, 153.0: CCDC reference 2268431.

II. (E)-1-(1-(4-(tert-butyl)phenyl)-2,2-dichlorovinyl)-2-(p-tolyl)diazene. Red solid. (yield 71%, 246.56mg); mp 96^{0}C. Anal. Calcd for C19H20Cl2N2 (M = 347.28): 1 H NMR (300 MHz, CDCl3) δ 7.72 (d, *J* = 8.3 Hz, 2H, arom), 7.46 (d, *J* = 8.3 Hz, 2H, arom), 7.25 (d, *J* = 8.2 Hz, 2H, arom), 7.15 (d, *J* = 8.3 Hz, 2H, arom), 2.42 (s, 3H, -CH_3), 1.39 (s, 9H, -$C(CH_3)_3$). 13C NMR (75 MHz, CDCl3) 21.6, 31.3, 34.8, 123.3, 125.0, 129.4, 129.7, 129.7, 134.2, 142.2, 151.1, 151.5, 152.1. CCDC reference 2268430.

III. (E)-1-(1-(4-(tert-butyl) phenyl)-2,2-dichlorovinyl)-2-(4-methoxy-phenyl) diazene. Orange solid (yield 63%, 228.86mg); mp 127^{0}C. Analysis calculated for C19H20Cl2N2O (M = 363.28): 1 H NMR (300 MHz, CDCl3) δ 7.83 (d, *J* = 9.0 Hz, 2H, arom), 7.48 (d, *J* = 8.4 Hz, 2H, arom), 7.17 (d, *J* = 8.3 Hz, 2H, arom), 6.96 (d, *J* = 9.0 Hz, 2H, arom), 3.88 (s, 3H, -OCH_3), 1.41 (s, 9H, -$C(CH_3)_3$). 13C NMR (75 MHz, CDCl3) δ 31.3, 34.7, 55.5, 114.1, 125.0, 125.2, 129.6, 129.7, 132.9, 147.4, 151.4, 152.0, 162.5. CCDC reference 2268429.

IV. (E)-1-(1-(4-(tert-butyl) phenyl)-2, 2-dichlorovinyl)-2-(m-tolyl) diazene. An orange solid (yield 63%, 218.78mg); mp 66^{0}C. Anal. Calcd for C19H20Cl2N2 (M = 347.28): 1 H NMR (300 MHz, CDCl3) δ 7.66 (s, 2H, arom), 7.50 (d, *J* = 8.3 Hz, 2H, arom), 7.37 (dd, *J* = 9.7, 6.0 Hz, 1H, arom), 7.31 (s, 1H, arom), 7.19 (d, *J* = 8.3 Hz, 2H, arom), 2.45 (s, 3H, -CH_3), 1.43 (s, 9H, - $C(CH_3)_3$). 13C NMR (75 MHz, CDCl3) δ 21.3, 31.3, 34.8, 120.3, 124.0, 125.1, 128.8, 129.3, 129.7, 132.3, 134.7, 138.9, 151.5, 152.2, 153.0. CCDC reference 2268428.

V. (E)-1-(1-(4-(tert-butyl)phenyl)-2,2-dichlorovinyl)-2-(3,4-dimethylphenyl)diazene. An orange solid (yield 61%, 220.21mg); mp 97^{0}C. Anal. Calcd for C20H22Cl2N2 (M = 360.12). ^{1}H NMR (300 MHz, Chloroform-d) δ 7.61 (dd, *J* = 11.2, 3.2 Hz, 2H, arom), 7.49 (d, *J* = 8.4 Hz, 2H, arom), 7.24 (d, *J* = 8.0 Hz, 1H, arom), 7.18 (d, *J* = 8.4 Hz, 2H, arom), 2.35 (s, 6H, - 3.4-$(CH_3)_2$), 1.43 (s, 9H, - $C(CH_3)_3$). ^{13}C NMR (75 MHz, $CDCl_3$) δ 19.8, 19.9, 31.3, 34.7, 120.7, 124.5, 125.0, 129.5, 129.7, 130.2, 133.7, 137.3, 140.9, 151.4, 151.5, 152.1.

VI. (E)-1-(1-(4-(tert-butyl)phenyl)-2,2-dichlorovinyl)-2-(4-chlorophenyl)diazene. Red solid (yield 75%, 275.63mg); mp 109^{0}C. Anal. Calcd for C18H17Cl3N2 (M = 367.70). ^{1}H NMR (300 MHz, Chloroform-d) δ 7.76 (d, *J* = 8.7 Hz, 2H, arom), 7.44 (t, *J* = 9.4 Hz, 4H, arom), 7.13 (d, *J* = 8.3 Hz, 2H, arom), 1.38 (s, 9H, -$C(CH_3)_3$). ^{13}C NMR (75 MHz, $CDCl_3$) δ 31.3, 34.7, 124.4, 125.1, 129.0, 129.2, 129.6, 135.8, 137.4, 151.3, 151.7, 152.2.

VII. (E)-4-((1-(4-(tert-butyl)phenyl)-2,2-dichlorovinyl)diazenyl)benzonitrile. An orange solid (yield 65%, 232.7mg); mp 120^{0}C. Anal. Calcd for C19H17Cl2N3 (M = 358.27). ^{1}H NMR (300 MHz, Chloroform-d) δ 7.80 (d, *J* = 8.5 Hz, 2H, arom), 7.53 (d, *J* = 8.5 Hz, 2H, arom), 7.46 (d, *J* = 8.2 Hz, 2H, arom), 7.13 (d, *J* = 8.2 Hz, 2H, arom), 1.38 (s, 9H, -$C(CH_3)_3$). ^{13}C NMR (75 MHz, $CDCl_3$) δ 31.31, 34.77, 98.44, 124.78, 125.12, 128.40, 128.97, 129.65, 136.07, 138.28, 151.71, 152.24, CCDC reference 2284693.

VIII. (E)-1-(1-(4-(tert-butyl)phenyl)-2,2-dichlorovinyl)-2-(4-iodophenyl)diazene. Red solid (yield 57%, 261.63mg); mp 97^{0}C. Anal. Calcd for C18H17Cl2IN2 (M = 459.15). ^{1}H NMR (300 MHz, Chloroform-d) δ 7.87 (d, *J* = 8.5 Hz, 2H, arom), 7.75 (d, *J* = 8.5 Hz, 2H, arom), 7.47 (d, *J* = 8.3 Hz, 2H, arom), 7.12 (d, *J* = 8.3 Hz, 2H, arom), 1.38 (s, 9H, -$C(CH_3)_3$). ^{13}C NMR (75 MHz, $CDCl_3$) δ 29.71, 31.27, 34.80, 117.51, 120.32, 123.79, 124.60, 125.02, 125.25, 128.45, 129.54, 133.11, 162.32.

Compounds IX was synthesized according to a literature protocol[8]. (E)-1-(1-(4-(tert-butyl)phenyl)-2,2-dichlorovinyl)-2-(p-tolyl)diazene (II) (1 mmol, 347mg) and methanol (50 mL) were mixed at room

temperature. After completion of the reaction (until TLC analysis showed complete consumption of the corresponding dichlorodiazabutadiene, aproximetly 3-5h), the residue was purified by column chromatography on silica gel using appropriate mixtures of hexane and dichloromethane (v/v: 3/1).

IX. Synthesis of methyl (Z)-2-(4-(tert-butyl)phenyl)-2-(2-(p-tolyl)hydrazineylidene) acetate. Yellow solid (yield 56%, 181.67mg), m.p. 112^{0}C. Analysis calculated for C20H24N2O2 (*M* = 324.42), ^{1}H NMR (300 MHz, Chloroform-d) δ 12.45 (s, 1H,-NH), 7.64 (d, *J* = 8.4 Hz, 2H, arom), 7.46 (d, *J* = 8.4 Hz, 2H, arom), 7.24 (d, *J* = 8.5 Hz, 2H, arom), 7.17 (d, *J* = 8.5 Hz, 2H, arom), 3.91 (s, 3H, -OCH_3), 2.36 (s, 3H, -CH_3), 1.40 (s, 9H, -$(CH_3)_3$). ^{13}C NMR (75 MHz, $CDCl_3$) δ 20.7, 20.8, 31.2, 31.3, 51.6, 114.2, 124.9, 126.9, 128.2, 129.8, 131.9, 133.7, 140.9, 150.4, 164.3.

Test cultures and antibacterial assay

As test cultures, were used gram negative bacteria: *Acinetobacter baumannii* BDU-32, *Escherichia coli* BDU-12, *Klebsiella pneumoniae* BDU-44 and *Pseudomonas aeruginosa* BDU-49, and gram positive bacteria: *Bacillus mesentericus* BDU-51, *Bacillus subtilis* BDU-50, and *Staphylococcus aureus* BDU-23. All test cultures were taken from the collection of the Research Laboratory of Microbiology and Virology of Baku State University. Nutrient agar (Liofilchem) was used to cultivate bacterial species. Fresh 24 hours old cultures of bacteria were used in all experiments.

Methyl sulfoxide (DMSO) was used as solvant for the compounds. The test compounds solutions were prepared in concentration 0.3%.

The antibacterial activity of compounds were determined *in vitro* by standard agar well diffusion method[19]. A microbial suspension of test cultures (density 0.5 McFarland) in an amount of 0.1 µL was added in the surface of dense medium and smeared over the entire surface with a sterile glass spatula. Then, a hole with a diameter of 8 mm was opened with a sterile glass hole puncher. A solution of test substance in DMSO was added to the hole in an amount of 150 µL. Bacterial test cultures were incubated at 37°C for 24 hours. The zone of inhibition (the clear zone around the holes) was measured with a ruler in mm. DMSO and GENTAMICIN were used as a negative and positive control, correspondingly. All experiments were performed in 4 replicates and statistically processed.

Supplementary Material

1H and 13C spectra for compound I

1H spectra for compound II

1H and 13C spectra for compound III

1H and 13C spectra for compound IV

1H and 13C spectra for compound V

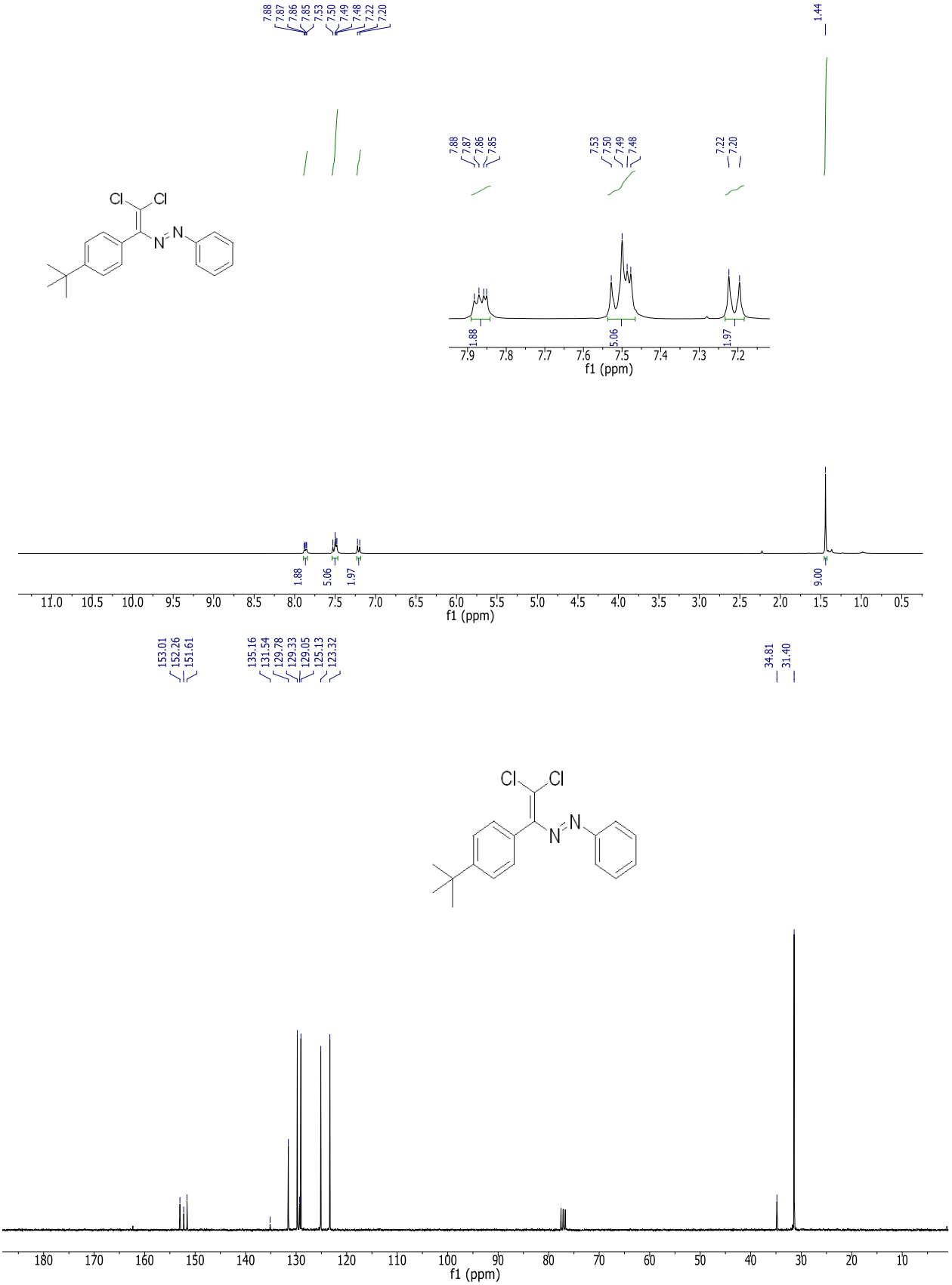
1H and 13C spectra for compound VI

1H spectra for compound VII

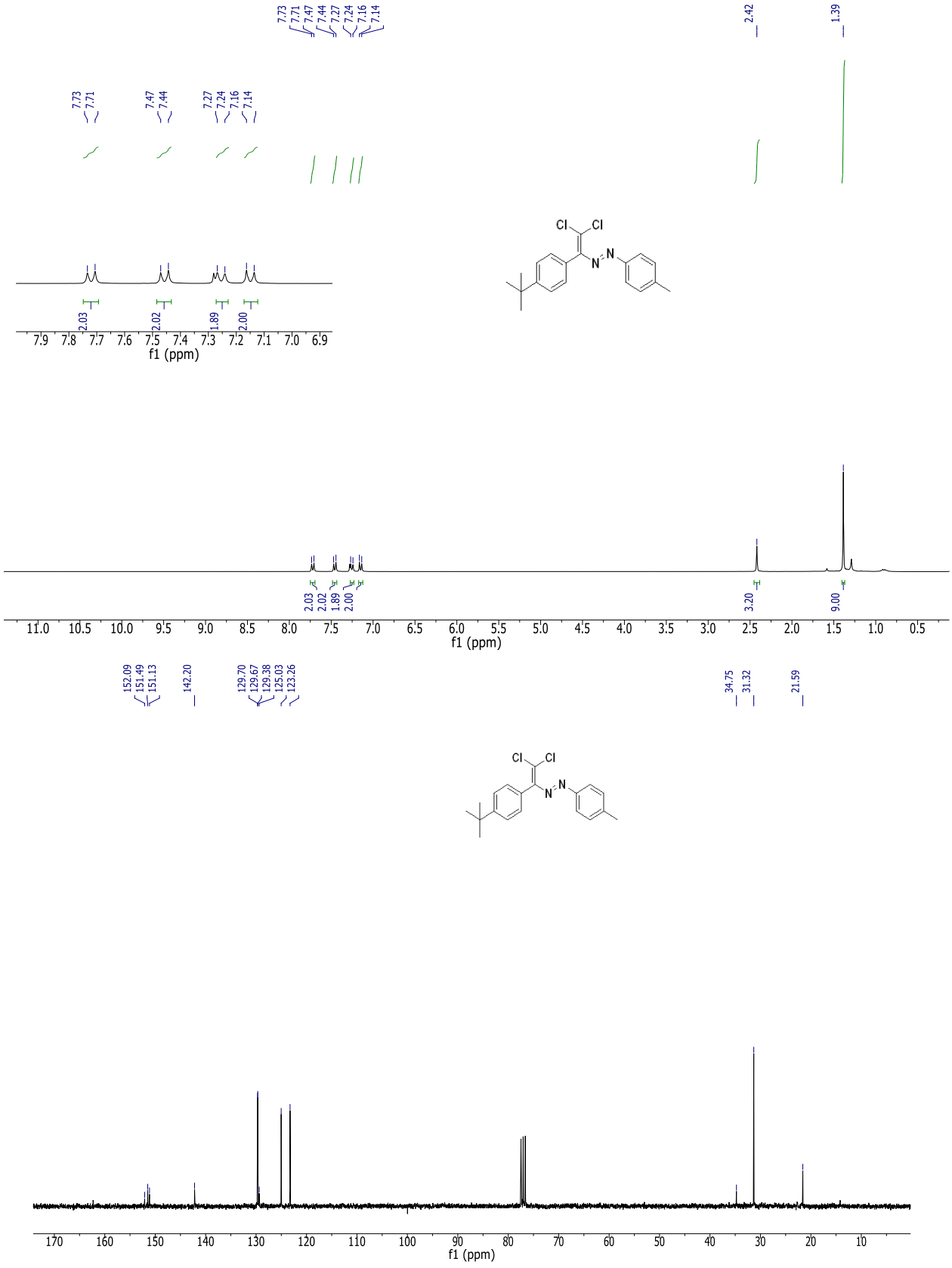
1H and 13C spectra for compound VIII

1H and 13C spectra for compound IX

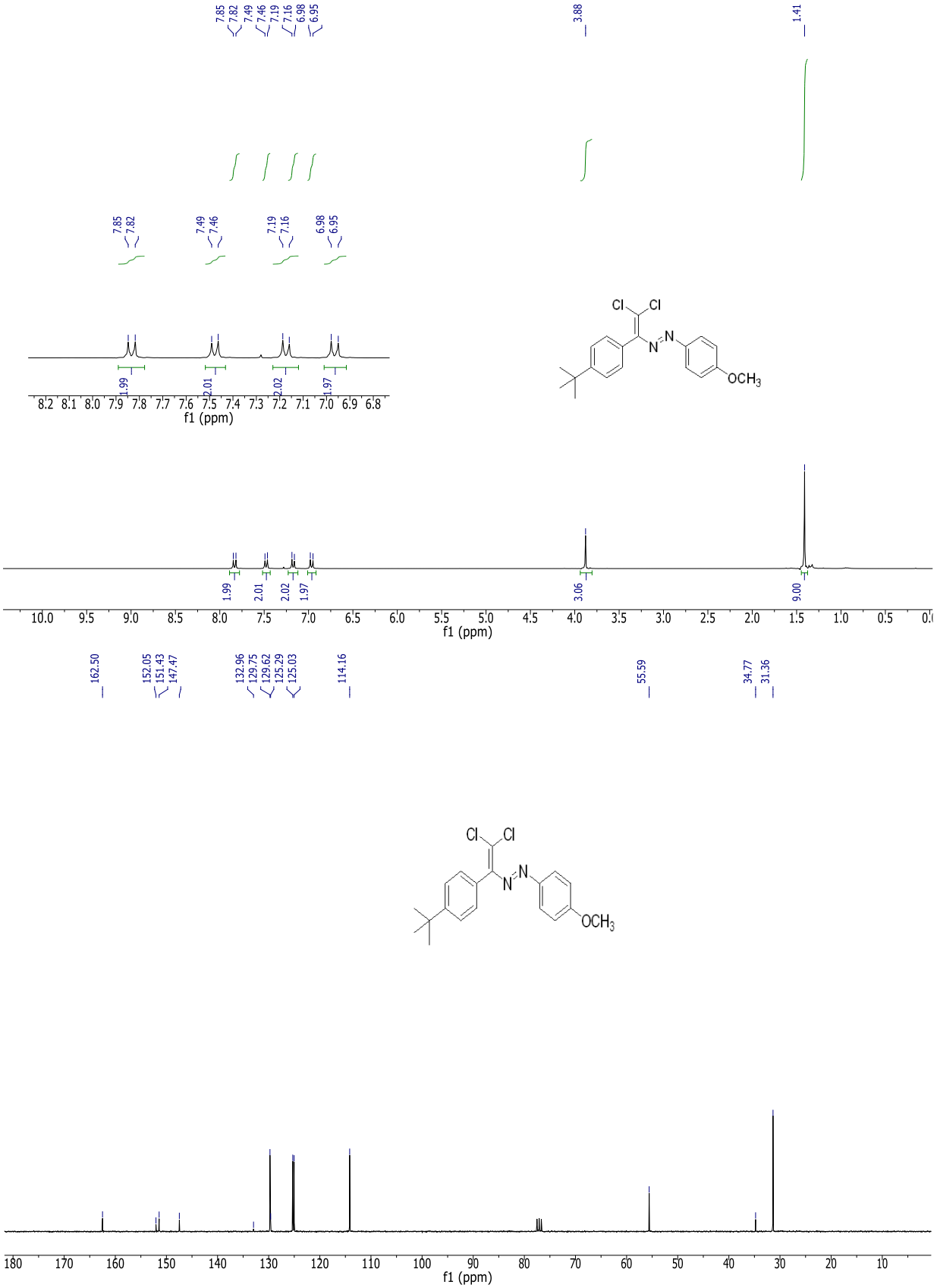
Crystal data, data collection and structure refinement details for compound VII



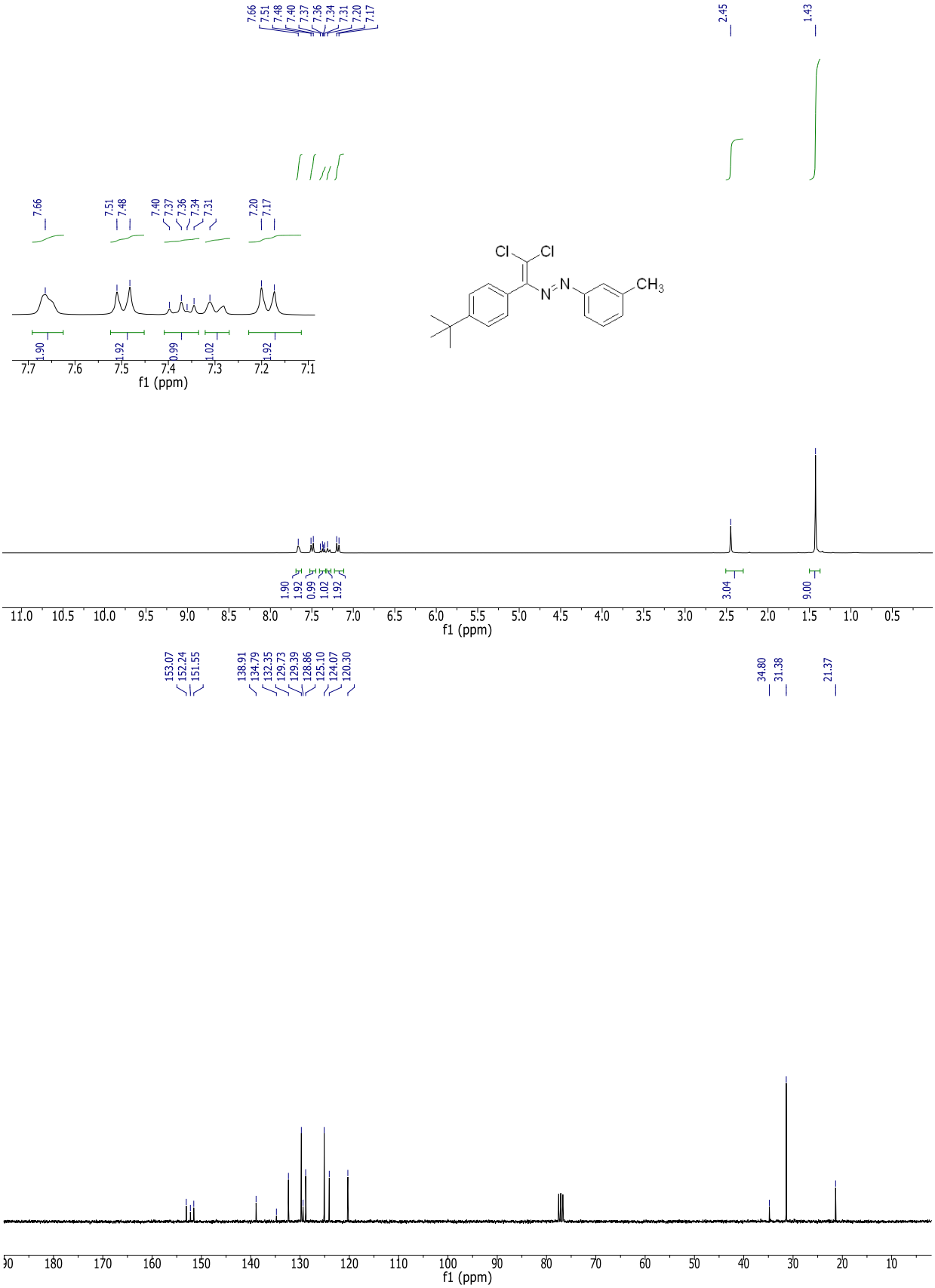
^{1}H and ^{13}C NMR spectrum of synthesized compound in $CDCl_3$ solution for I



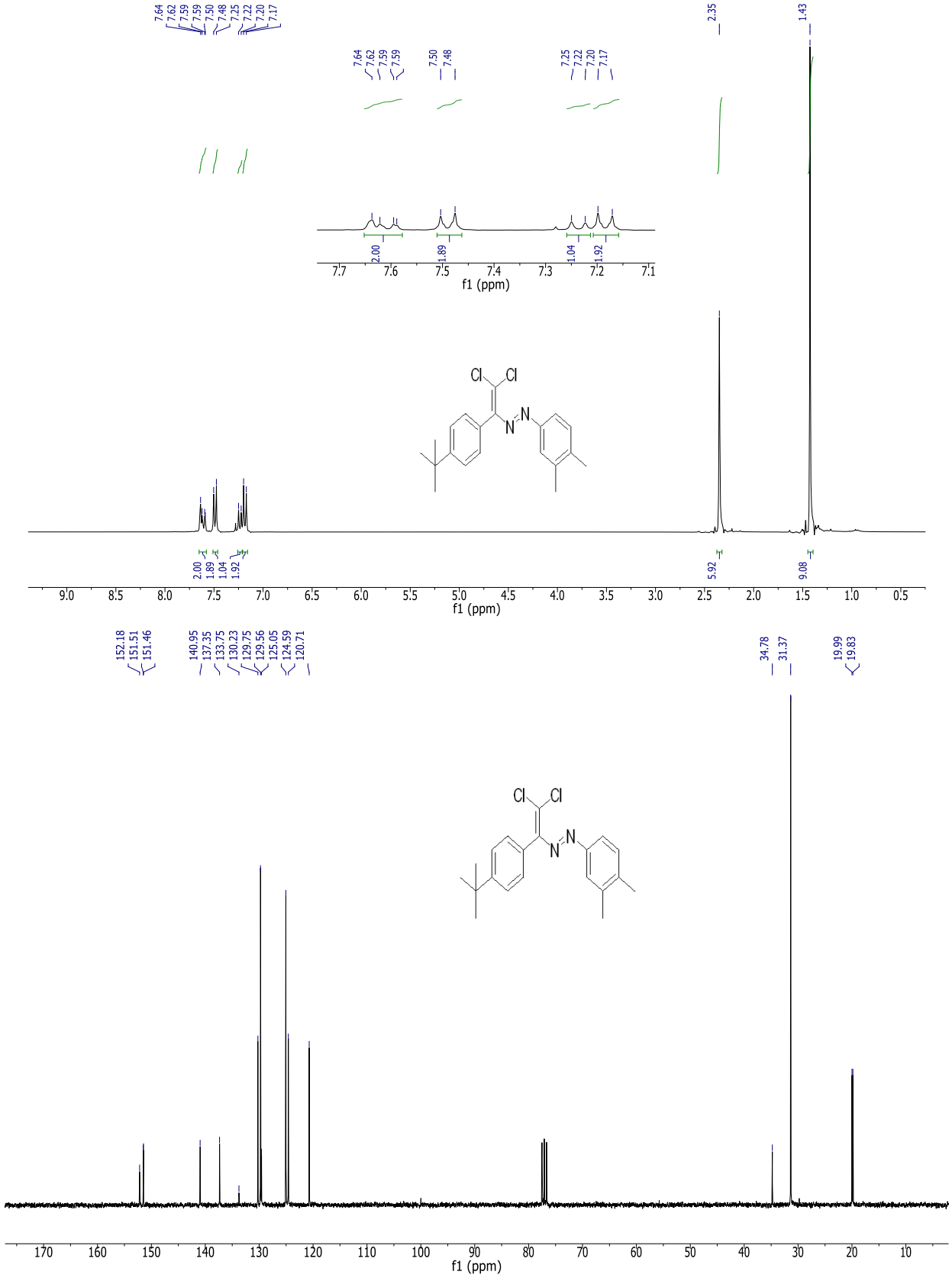
^{1}H and ^{13}C NMR spectrum of synthesized compound in $CDCl_3$ solution for II



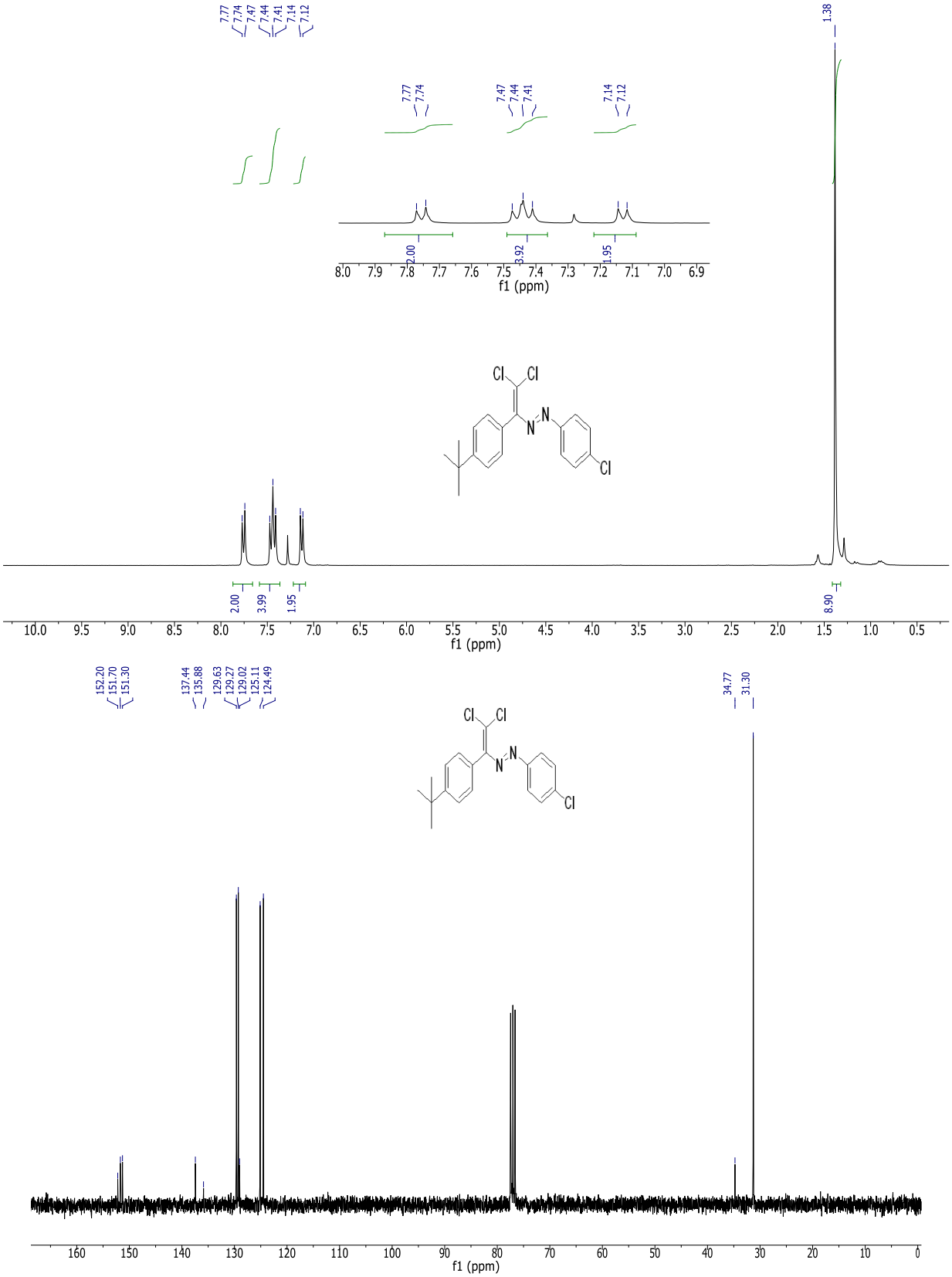
^{1}H and ^{13}C NMR spectrum of synthesized compound in $CDCl_3$ solution for III



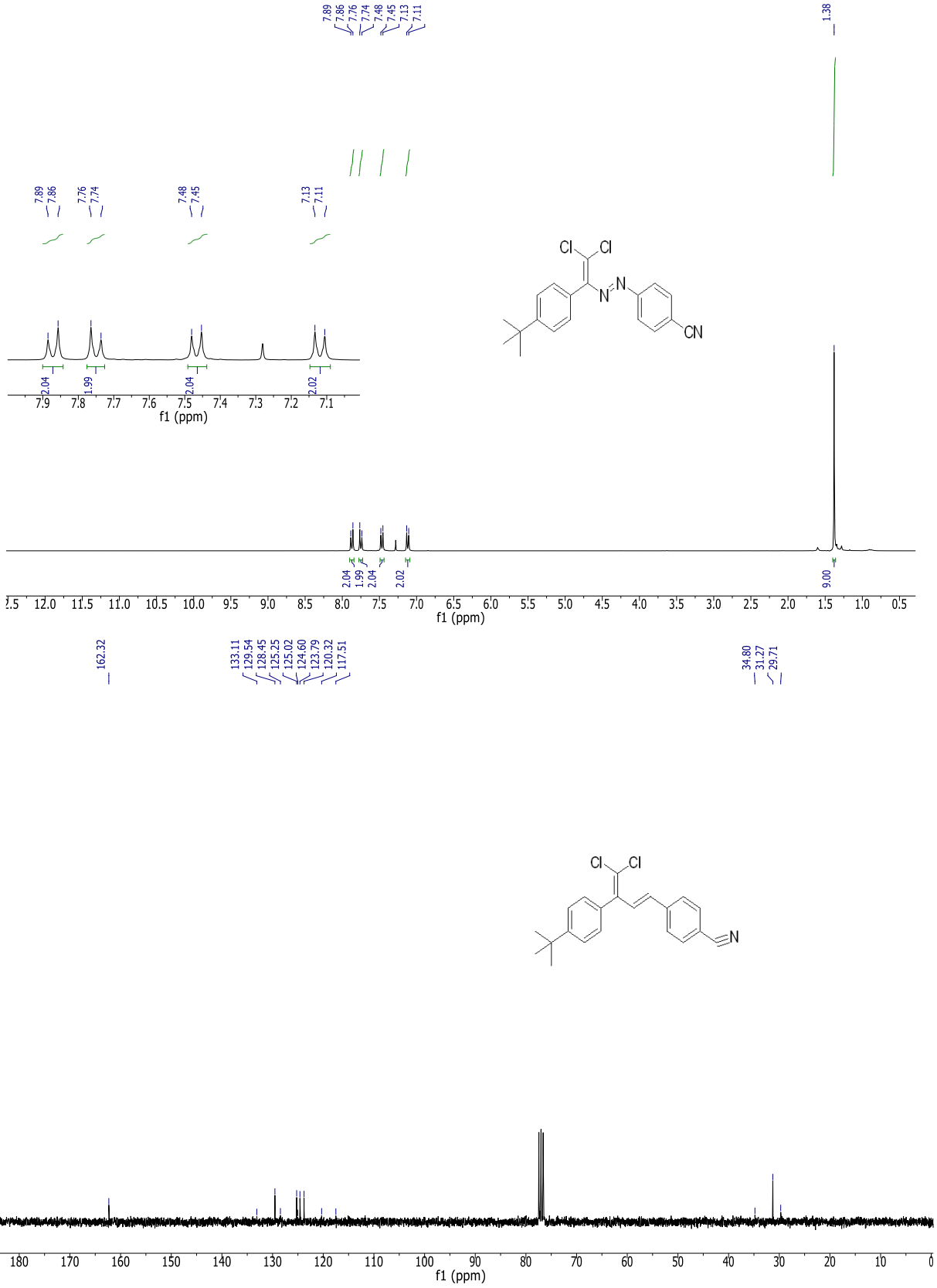
^{1}H and ^{13}C NMR spectrum of synthesized compound in $CDCl_3$ solution for IV



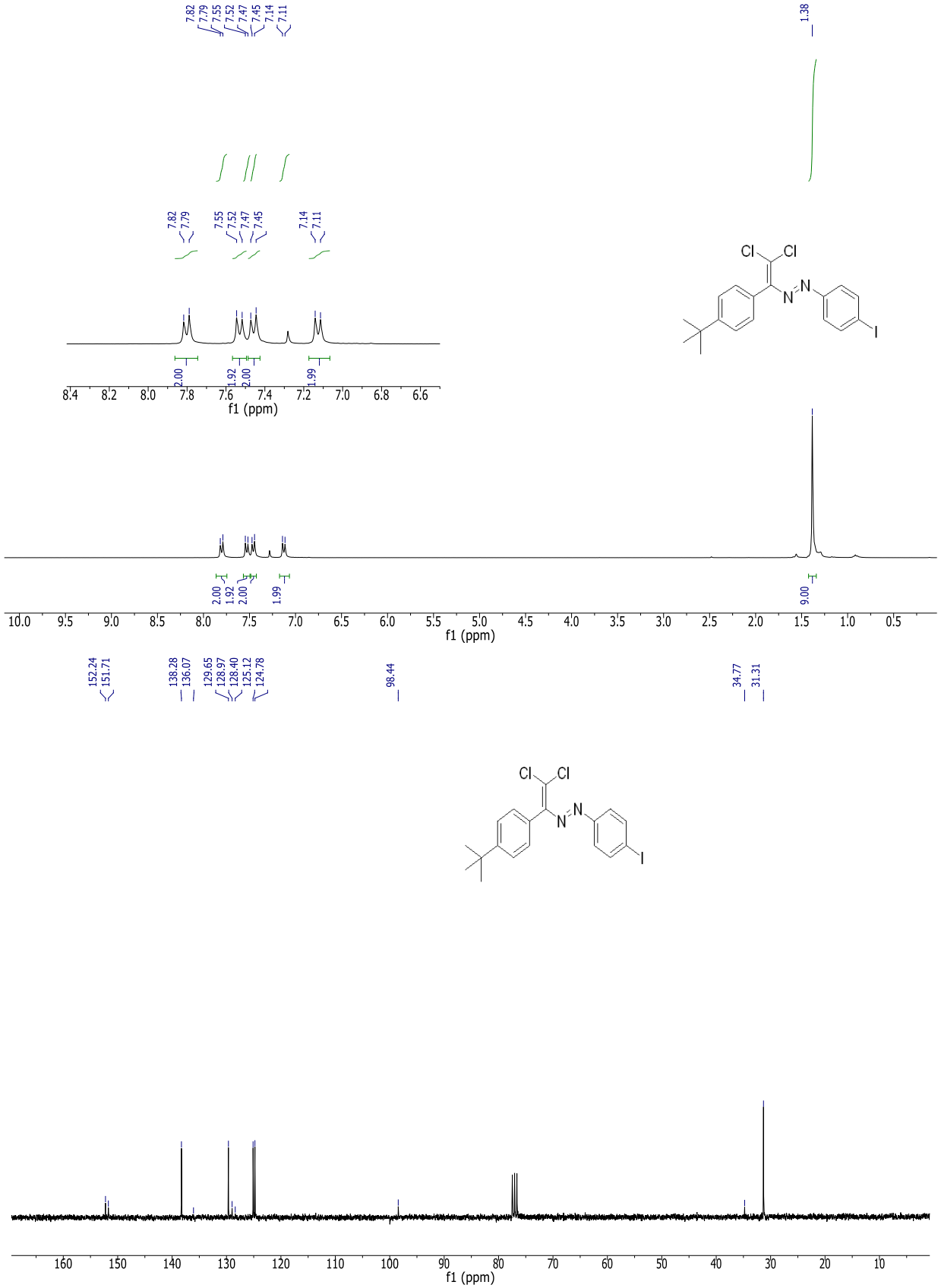
^{1}H and ^{13}C NMR spectrum of synthesized compound in $CDCl_3$ solution for V



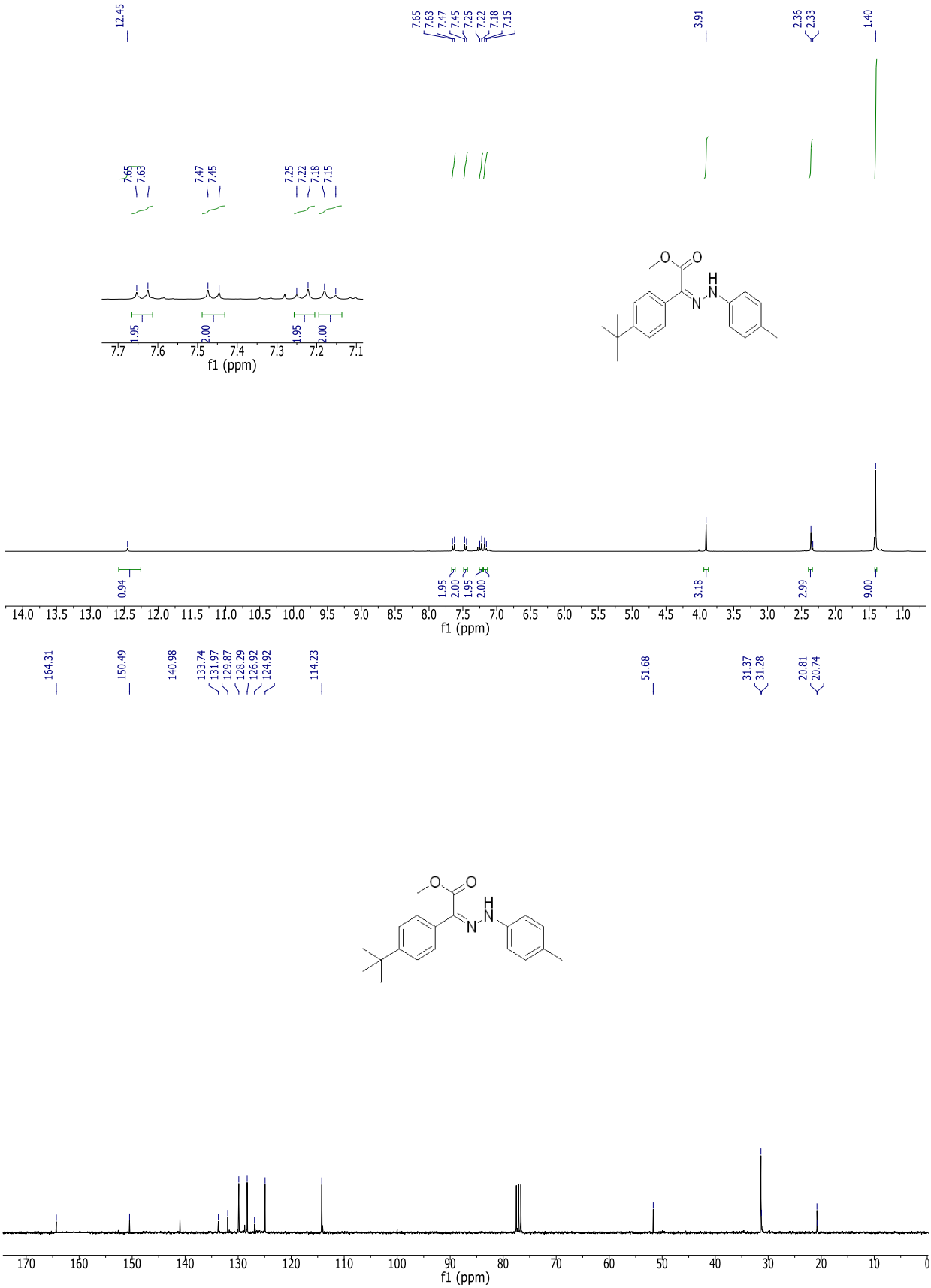
^{1}H and ^{13}C NMR spectrum of synthesized compound in $CDCl_3$ solution for VI



^{1}H and ^{13}C NMR spectrum of synthesized compound in $CDCl_3$ solution for VII



^{1}H and ^{13}C NMR spectrum of synthesized compound in $CDCl_3$ solution for VIII



^{1}H and ^{13}C NMR spectrum of synthesized compound in $CDCl_3$ solution for IX

Crystal data, data collection and structure refinement details for compound VII

Table 2. Experimental details

CCDC Deposition Number	2284693
Chemical formula	$C_{19}H_{17}Cl_2N_3$
M_r	358.26
Crystal system, space group	Monoclinic, $P2_1/c$
Temperature (K)	100
a, b, c (Å)	12.2479 (4), 6.30086 (18), 23.4804 (8)
β (°)	103.096 (3)
V (Å^3)	1764.91 (10)
Z	4
Radiation type	Cu $K\alpha$
μ (mm^{-1})	3.34
Crystal size (mm)	0.20 × 0.15 × 0.13
Diffractometer	XtaLAB Synergy, Dualflex, HyPix
Absorption correction	Multi-scan *CrysAlis PRO* 1.171.41.117a (Rigaku OD, 2021) Empirical absorption correction using spherical harmonics, implemented in SCALE3 ABSPACK scaling algorithm.
T_{min}, T_{max}	0.690, 1.000
No. of measured, independent and observed [$I > 2\sigma(I)$] reflections	20062, 3669, 3182
R_{int}	0.078
$(\sin \theta/\lambda)_{max}$ (Å^{-1})	0.634
$R[F^2 > 2\sigma(F^2)]$, $wR(F^2)$, S	0.066, 0.171, 1.02
No. of reflections	3669
No. of parameters	220
H-atom treatment	H-atom parameters constrained
$\Delta\rho_{max}$, $\Delta\rho_{min}$ (e Å^{-3})	1.21, −0.62

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Issue Article

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BASIC PRINCIPLES OF STUDYING WELL SECTIONS AND THE OCCURRENCE OF OIL, GAS AND WATER IN DEPOSITS

Abstract: *The article analyzes the compilation of a geological section and profile, as well as deposits for drilling directional wells for the Western part of the oil and gas fields of Turkmenistan in order to increase oil and gas production from productive layers of the horizons of the red-colored strata. To analyze the choice when drilling directional wells, materials of previously operated wells, geological and operational characteristics of deposits and analysis of comparative data of deposits from other countries, as well as the advantage of drilling horizontal wells in fractured deposits were used.*

The paper provides a detailed analysis of the study of the geological structure of various deposits, as well as recommendations for drilling directional wells in difficult mining and geological conditions. This work can be used and useful for the successful fulfillment of the tasks set in the development of fields with difficult mining and geological conditions and in order to increase the production of hydrocarbon resources from oil and gas wells.

Key words: *intensification, gas content, oil content, water content, metamorphic, formation, massive, lithological, tectonic, stratigraphic, deposit.*

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Introduction

The development of the oil industry in the continuous improvement of drilling, technology and technology of oil production require deep technical knowledge from oil engineers, wide application of theoretical provisions in solving practical problems, obtaining constant information about the development of technology and technology in the oilfield business.

In our country, the commissioning of new oil fields is ensured, the widespread introduction of highly efficient methods of field development with the maintenance of reservoir pressures, as well as the use of highly efficient equipment for production, and the widespread introduction of various methods of processing bottom-hole zones of wells in order to intensify oil production.

Compiled on the basis of data obtained from complex observations, mainly the results of core studies, electrical and radioactive logging.

The well section is depicted graphically, using conventional signs to show the lithological composition of the drilled rocks. At the appropriate depths in the section, signs of the presence of oil, gas and water, possible collapses of the walls of the well, cessation of fluid circulation, etc. are indicated.

In addition, the technical data indicate the depth of the casing descent, their diameter, the height of the cement lifting, etc.

When drawing up a geological section, wells are divided into formations, horizons and formations in the following order:

The formations are distinguished by stratigraphic feature, using data from microfauna, macrofauna and complex observations.

Within the stratigraphic formation, bundles of rocks are distinguished by lithological characteristics: sandy, clayey, sandy-clayey, carbonate, etc.

Within the lithological bundles, horizons are distinguished: gas-bearing, oil-bearing and aquifers.

Within the horizons, layers are distinguished: gas-bearing, oil-bearing, water-bearing, marking, etc.

A normal (or typical) well section for a field is made after a general correlation of the well sections of a given field. The correlation consists in the identification of support layers (horizons) and determining the depths of their occurrence in order to establish the sequence of occurrence of rocks, to identify the layers of the same name to track changes in their thickness, lithological and facies compositions and various directions.

The geological profile (section) of the deposit is a section of the deposit with a vertical plane.

The following geological profiles are distinguished:

a) Transverse (profile by fall), carried out in the cross of the prostration of rocks;

b) Longitudinal (parallel to the strike), carried out along the strike of rocks;

c) Diagonal with respect to the strike and fall of rocks.

A normal (or typical) section should reflect the average section of the field, i.e. inherent in most wells of this field.

d) Geological characteristics of the deposit and justification of the data for the design.

e) Justification of the development system (drilling of the field).

g) Determination of technological indicators of the deposit according to the options under consideration.

h) Justification of drilling methods, opening of formations and foundations.

The geological study of the deposit begins with the drilling of the first wells in it. The general geological characteristics of the deposit are determined, its stratigraphy and tectonics are established, oil-bearing, gas-bearing and aquifers are identified, a connection is established between them, as well as between individual layers within the same stratigraphic horizon, operational facilities are identified. For each object, the characteristics of rocks (porosity, etc.), their oil - water content, the gas content in oil, the quality of oil and its properties and reservoir conditions (saturation pressure, total coefficient, viscosity, etc.) characteristics of reservoir waters are determined. During the trial operation of exploration wells, reservoir pressure and well productivity are determined, the energy characteristics of the formations and their modes are studied. According to the data obtained, geological reserves of oil and gas are calculated, and industrial recoverable reserves are determined. After the accumulation of geological and physical data at the fields and the determination of oil reserves, the procedure for the development of individual operational facilities is established, and the development of its individual horizons and deposits is started.

The rocks composing the earth's crust, depending on their origin, are divided into three groups: 1) igneous, 2) sedimentary, 3) metamorphic sedimentary rocks. Newly formed rocks are called metamorphic. The main ones are quartzites, schists, gneiss, marble, amphiboles, etc. Metamorphic rocks are devoid of fossils, their crystalline-granular structure is similar to that of igneous rocks, and the parallel-linear arrangement of mineral grains resembles sedimentary rocks. The main difference between metamorphic rocks is shale, i.e. the property of the rock to split into thin parallel layers.

Industrial oil and gas reserves are mainly contained in sedimentary rocks (sands, sandstones, limestones and conglomerates). In igneous and metamorphic rocks, oil is rare and, as a rule, has no industrial significance.

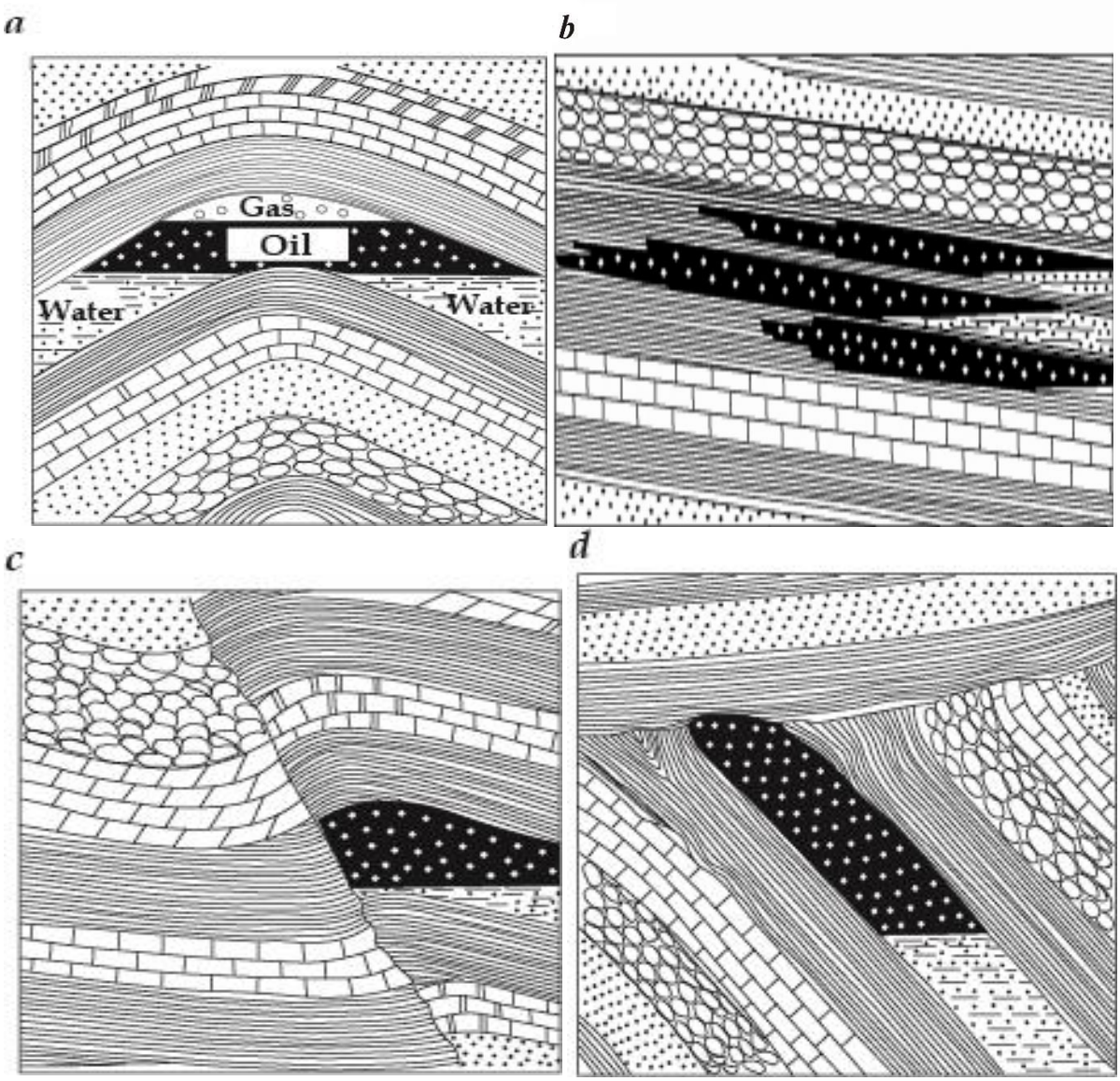

Figure 1. Accumulation of oil, gas and liquid.

Natural accumulations of oil and gas in the bowels of the earth are called oil or gas deposits. In the case when the reservoir rock contains only gas, the deposit is called gas. If both oil and gas are present in the deposits at the same time in a free state, then such a deposit is called an oil and gas one. An oil deposit or formation is usually limited above and below by impermeable rocks, clays, which do not allow oil and gas to spread throughout the thickness of the earth's crust. The thickness of oil (gas) reservoirs ranges from a few centimeters to several hundred meters.

The number of oil or gas reservoirs (deposits) in various fields can be very different - from one to several dozen. Depending on this, deposits can be single-layer or multi-layer. According to the conditions of occurrence, oil and gas deposits are divided into stratified, massive, lithologically, tectonically and stratigraphically shielded (Figure 1).

The most common reservoir deposits are vaulted, located in the vaulted parts of anticlinal structures (Fig.1a) Massive deposits are formed in reservoirs of large thickness (sometimes of different ages and composition) and are underlain by plantar waters. Lithologically shielded deposits are usually formed in the strata of poorly permeable rocks, where there are local porous and permeable lenses, cavernous zones, etc. (Fig.1b). Tectonically shielded deposits are located on the wings of anticlines or monoclines and are limited up the rise of the formation by tectonic disturbances (Fig.1b) or stratigraphic inconsistencies (Fig. 1d).

Oil, gas and gas-oil mixtures, depending on their composition, ratio, pressure and temperature, can be in deposits in various states: in liquid, gaseous or in the form of gas-liquid mixtures.

Due to the different porosity and permeability of oil and gas reservoirs, as well as due to the capillary

rise of water in the pores, there is no clear separation between the water and oil parts of the reservoir. The vertical water content gradually changes - from 100% in the aquifer to the residual water saturation in the elevated parts of the deposit. This part of the productive reservoir is called the transition zone. The thickness of the transition zone can reach 3-5 m, depending on the clay content and permeability of the reservoir. Therefore, the calculation of oil and gas reserves is carried out taking into account the size of the transition zone based on the porosity and permeability of the reservoir.

Liquids and gas in the reservoir are under pressure, which is called reservoir pressure. The reservoir energy reserve and the properties of liquids and gases in reservoir conditions depend on the magnitude of reservoir pressure. Reservoir pressure determines the reserves of a gas deposit, the flow rates of wells and the operating conditions of deposits.

The magnitude of the initial reservoir pressure depends on the depth of the productive formation. If the well is filled with liquid and does not overflow (does not gush), the reservoir pressure is defined as hydrostatic;

$$P_{res.} = H\rho g, \quad (1)$$

where P_{res} is the initial reservoir pressure, Pa;

H is the depth of the formation, m;

ρ is the density of the liquid, kg/m^3;

g is the acceleration of the free fall of the body (g=9.81 m^2/s).

If the well overflows (gushes), then the reservoir pressure can be determined by the formula

$$P_{res.} = H\rho g + P_{w.h.}, \quad (2)$$

where $P_{w.h.}$ is the pressure at the wellhead, Pa.

If the liquid level in the well does not reach the mouth, the reservoir pressure is determined by the formula

$$P_{res} = Hl\rho g, \quad (3)$$

where $H1$ is the height of the liquid column in the well, m.

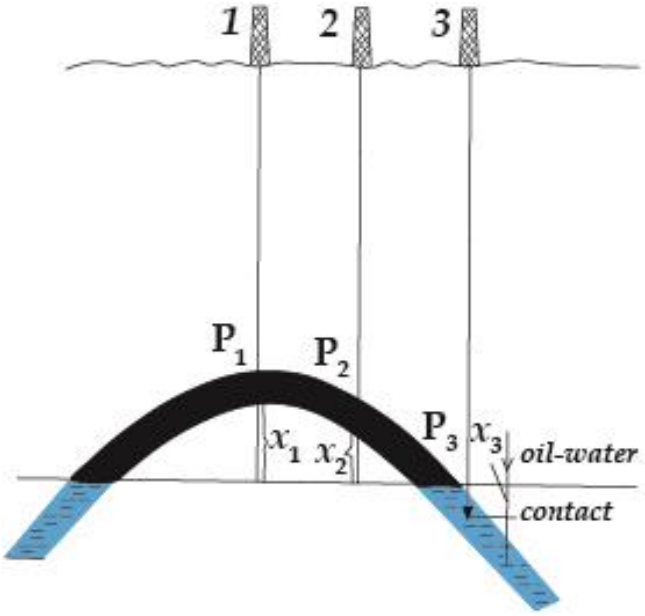

Figure 2. Determination of the reduced reservoir pressure

The scheme for determining the reduced reservoir pressure in the deposits. In a gas deposit or the gas part of an oil reservoir, the reservoir pressure is almost the same over its entire area.

In oil deposits with significant angles of incidence, the reservoir pressure in different parts of the deposit is different: on the wings - the maximum, in the vaults – the minimum. Therefore, the analysis of changes in reservoir pressure during the operation of the deposit is difficult.

It is more convenient to relate the values of reservoir pressure in the deposits to any one plane. For such a plane, the sea level or the conditional plane of the initial position of the oil-water contact is taken. The pressure in the formation attributed to this conditional plane is called the reduced reservoir pressure.

The given reservoir pressures are determined by the formulas (see Figure 2).

$$P_{red.res} = P_1 + \chi_1 \rho g$$

$$P_{red.res} = P_2 + \chi_2 \rho g$$

where p_1 and p_2 are the reservoir pressures measured in the well; x_1 and x_2 are, respectively, the distances from the initial position of the oil-water contact to the

point where the reservoir pressure was measured by the borehole pressure gauge.

Systematic monitoring of changes in reservoir pressure allows us to judge the processes occurring in the reservoir, and regulate the development of the field as a whole. Reservoir pressure in wells is determined using borehole pressure gauges, which are lowered into them on a scraper wire.

With an increase in the depth of the productive layers, the temperature also increases. The change in depth, which corresponds to an increase in temperature by 1 °C, is called a geothermal step. On average, it is equal to 34 m. However, the geothermal stage is not the same for different deposits. For example, in the fields of the North Caucasus, the temperature at a depth of 1000 m reaches 90-100 °C, and in Baku the geothermal stage is 50 m.

Currently, there continues to be a tendency to increase the volume of drilling horizontal wells. However, their flow rate is quite sharply different, although they are drilled at the same field. The flow rates of wells located even on a separate local site of the field often differ.

Considering that the cost of construction of horizontal wells is 2-3 times more expensive than vertical or obliquely directed, the question arises of the feasibility of further increasing the volume of construction of horizontal wells. The flow rate of horizontal wells most often depends on the length of the horizontal shaft in the productive thickness.

When the flow rate has not increased sharply, the first reason is considered to be the calcification of the permeable rock by the dispersed phase of the solution by particles of the selected rock or polymer introduced into the drilling mud as chemicals. In foreign practice, horizontal wells are often laid in such a way that their hole opens vertical cracks that secrete productive layers. At the same time, if the productive reservoir is limited by plastic rocks from above and below, anhydrous oil is obtained during the operation of wells for a long time. If the crack passes through nearby permeable aquifers, then the well is flooded during operation. Carrying out horizontal wells that open vertical cracks requires the creation of a special technique for determining the direction of the horizontal hole in terms of the site on which the well is supposed to be drilled.

The generality of the direction of fracturing within any of the structures under consideration depends on their type, shape, and formation features. However, within the local area of the field, the location of cracks can be established only on the basis of a detailed study of the distribution of fracture systems in the layers located above and below the productive ones. It is of interest to predict the direction of the most brittle cracks based on data on the distribution of zones of intensive absorption of drilling mud in carbonate formations that are above and below productive deposits. Today, we can assume that direct links have been established between tectonics and the structure of the modern relief.

There is a great potential to increase the flow rate of horizontal wells if the horizontal well is carried out directionally, so that their hole intersects vertical cracks or weakened zones crossing the massif in rocks. The opening of vertical cracks will multiply the area of oil filtration into the well, the greatest effect can be achieved by wiring horizontal wells along large cracks. The wiring of horizontal wells abroad is most often economical when developing depleted fall sites due to the intersection of a number of vertical faults with one hole. In the practice of drilling horizontal wells, the effect of increasing their flow rate due to the opening of vertical cracks is not (yet) used, although for most rather depleted deposits, it would be possible to predict the development of fracturing systems of tectonic and natural origin based on the analysis of structural features of structures and a number of various indirect signs noted during drilling and production wells. Based on the above, it is possible to develop recommendations for determining the direction of horizontal wells that can be used in many oil areas. So far, the largest number of horizontal wells is carried out in oil areas where oil fields are located at a late stage of operation. Productive layers on them are located under the thickness that have received a forecast assessment of their oil and gas potential.

The choice of the drilling angle and drilling system depends on the goals set by the drilling team and the complexity of the rocks, as well as on the drilling conditions that may occur during the work.

The horizontal hole in the productive horizon allows for a smoother extraction of oil from the reservoir and reduces the tendency and formation of depressions characteristic of vertical holes along which the underlying water or gas from the gas-bearing part above the oil reservoir zone moves intensively to the well. With such phenomena, the life of the well is sharply shortened, an unprocessed part of the reserves remains, and compaction of the field development grid is required. Slowing down these processes with horizontal wells makes it possible to develop oil-bearing sections of the reservoir with a much smaller thickness than with vertical shafts. In reservoirs where the vertical permeability is significantly greater than the horizontal one, the hole running through the reservoir multiplies the flow of oil into the well. In fractured and heterogeneous reservoirs, the hole, resembling the formation, meets a large number of areas with increased permeability and porosity. Thanks to horizontal shafts carried out from early drilled wells, it is possible to extract oil remaining in certain sections of the reservoir after prolonged operation.

The success of well wiring is largely determined by the preparation for its implementation (planning work before it begins) and operational planning to optimize decision-making in the drilling process.

Exceptional attention is paid to drilling technology, including the quality of drilling mud, drilling regime, and issues of reservoir placement. In the presence of data on productive formations, it is necessary to choose the most economical technology, which is determined by the target task that the mining company sets for horizontal drilling, the properties of the formation and drilling conditions during the work. The technology is largely determined by the radius of curvature in the transition zone from the vertical direction of the barrel to the horizontal.

In fact, the drilling of horizontal sections turned into continuous tool detachments and descents with a lead-up to the bottom-hole of the bit and a short, up to 20-30 seconds of time, drilling, after which the tool separation followed again.

- bit 215.9 millimeters (calibrator 215.9 millimeters);
- electric drill E164-8R: 3 with mechanism of curvature (MC) CE1 64,
- isolation monitoring device (IMD), drill collar (DC)146 millimeters - 75 meters;
- drill pipes with the inner end (DPIE) 127x10 “E, L” -300-375 meters;
- drill pipes with the outer end (DPOE) 140 millimeters.

was changed to the following:

- bit 215.9 millimeters (calibrator 212 millimeters);
- electric drill E164-8R: 3 IMD;
- drill pipes with the inner end (DPIE) 127x10 “E, L” -300-375 meters;
- drill collar 146 millimeters -75 meters;
- drill pipes DPOE 140 millimeters.

In fact, the drill collars were presented in a part of the hole with an angle of less than 60 degrees, in the “shoe" of the column. Further drilling was carried out with the rotation of the columns by the rotor at low speeds, for which the layout was removed a telemetry system, a flimsy housing that could withstand high torsion torques. After changing the layout, the cases of the tool hanging when bringing it to the face immediately stopped. To create an axial load on the bit, a much smaller load from the surface was required, which is clearly reflected in the cartogram. The penetration per bit also increased significantly from 16-18 meters to 28-22 meters per crushing, which is shown on the cartogram. The rearrangement of the drill collar made it possible to significantly reduce stiffness in the interval of intense curvature, which, along with turning the tool, made it possible to reduce hanging and realize the axial load at the bottom most fully, and immediately affected an increase in penetration on the bit and a slight decrease in the durability of the bits, since they began to work with large axial loads. Moreover, the output of the layout of the bottom-hole assembly (BHA) from the interval of intense curvature into the horizontal part of the hole is not the reason for the decrease in hanging, as clearly evidenced by the drilling of the well, where the last 3 hollows in the horizontal hole section were made by an electric drill. The cartograms of the hydraulic weight indicator indicate that tool freezes took place before the end of drilling.

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Issue Article

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ANALYSIS OF THE CHOICE OF A ROCK-DESTROYING TOOL FOR DIRECTIONAL DRILLING BASED ON THE EXPERIENCE OF FIELDS IN THE WESTERN PART OF TURKMENISTAN

Abstract: *the article reviews the analysis and provides recommendations, as well as instructions for the correct choice of rock-breaking tools for directional and horizontal wells in the Western part of the oil and gas fields of Turkmenistan for the purpose of trouble-free wiring and to increase mechanical speed during construction.*

To analyze the choice and mode of operation of rock-breaking tools, materials were used for working out previously drilled wells, with geological characteristics of deposits and physical and mechanical properties of rocks, stratigraphy (lithological section), and data on the durability of bits and mechanical speed obtained from the results of working out bits.

This paper presents a detailed analysis of the created load on the bit and considers the effects of transverse loads on the bit, the difficulties of drilling directional wells, their specific causes. There are also recommendations for choosing the mode of drilling drill bits and operating instructions for different types of rock-breaking tools.

This work can be used to perform the assigned tasks in the construction of oil and gas wells with complex geological characteristics.

Key words: *bit, vibration, crack, sludge, torque, load, cutting element, downhole motor, layers, shoe, support.*
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Introduction

As the set of curvature, tilt angles and deflection distance increases, the torque and braking of the column often significantly limits the weight transferred to the bit. When such a pattern is observed, the penetration rate is greatly reduced and may even lead to a limitation of the drilling program if the load on the bit becomes insufficient to overcome the strength of the rocks.

The right choice of bits is key to improving drilling speeds in low-load conditions. Bits with fixed incisors usually require less loads to continue drilling than roller bits.

The usual characteristics of roller bits that are successfully drilled at low loads are high displacements of the rollers and a low number of teeth. Bits with fixed cutters with a low-density cutting structure with large protrusions of cutting elements. It can be used to increase the load on a single cutting element, which will cause a greater cutting depth. Sufficiently low loads of 900-4540 kg give quite acceptable penetration speeds. High rotation speeds from the downhole motor, which are usually used in the corner set and lateral sections, help to compensate for the effect of reducing the load on the bits [1, 2].

Some manufacturers of volumetric downhole engines believe that it is necessary to have very low

rotational speeds of about 80 rpm, others - as high speeds as possible up to 2100 rpm. However, in the practice of drilling horizontal wells, the speed of downhole motors averages between 150-200 rpm.

Since many horizontal wells are aimed at formations with vertical cracks, dynamic loads should be considered.

Dynamic loads can be caused by cavities, voids, broken rocks, cracks and changes in rock types.

Each of these factors, individually or in combination, make it difficult to maintain the same conditions in the bottom-hole.

The result of such loads is vibrations, jumps, uneven loads on supports and cutting structures, which leads to unpredictable drilling speeds and a reduction in the operating time of the bit.

Plain bearings, compared to rolling bearings, are usually better suited to shock load conditions due to better load distribution.

Cutting structures in the form of steel (milled) teeth are more resistant to breakage and chipping due to alternating dynamic loads and are recommended if the rocks are not too hard or abrasive. In other conditions, preference is given to bits with inserts of tungsten carbide, (TCI), having a small displacement of the rollers, a small overhang and a large number of teeth. Bits with fixed cutters with high density and small overhang of cutting elements more effectively resist breakdowns.

Usually shock absorbers do not work in horizontal wells, because they cannot be effectively placed on the drill string.

With the determination of the placement of the downhole motor, the curves of the translators, measuring and other tools, the shock absorbers have to be placed in relatively inefficient places.

Therefore, shockproof tools practically do not represent a way to reduce dynamic loads during horizontal drilling. [3, 4, 5]

Hydraulic drilling parameters for horizontal wells are selected as well as for vertical ones. The big difference between horizontal wells is due to the accumulation of sludge on the underside of the well.

These conditions worsen the wear of the external surface of the bit and the seals of the supports of the roller bits. The lifetime of the sealed bit supports will also be affected by less efficient cooling of the bit in the horizontal hole.

The accumulation of sludge around the bit can be reduced by increasing the turbulence of the flow and choosing a bit design and flushing scheme that promote cross-flows. The cross flow is obtained with an asymmetric arrangement of the nozzles in the form of double nozzles and their absence on the roller bit.

Turbulence is achieved by more efficient mixing, which can be facilitated by increasing the paws to the outer diameter of the rollers, by using attached cutting structures of the PDC and intensive circulation [6, 7]. The shoes of the bit paws cannot be used if they are not linked to the correct operation of the downhole layout.

With an increase in the angle of inclination of the well from 0 to 45 °, the minimum velocity of the slurry removal solution increases rapidly. This speed may exceed the required speed for a vertical well by 2-3 times. Using reverse expansion to clean the borehole, when sludge accumulates on the underside, it is often possible to increase the problems associated with the wear of the outer surface of the bit [8, 9, 10].

Anti-wear shoes on the paws of the bit and the hardening of its outer surface helps to protect the paws of the roller bits.

In bits with fixed incisors, diamond inserts on the bevels of the calibration part will protect the diameter of the bit during its reverse movement.

Controllability, which is defined as the ease with which a change in the course or direction of a well is carried out, has reached a new level with the advent of methods for drilling horizontal wells with medium, small and ultra-small radius of curvature [11, 12].

In the past, the development of bits for conventional drilling included properties that limited the lateral departure of the bits during drilling.

New developments give properties to bits that not only do not allow, but on the contrary enhance lateral care, controllability.

The calibration shoes of the bits with fixed incisors were dramatically redesigned. The PDC and TSP cutters were placed along their length of the calibrating part of the bit, which was reduced in length, and the downhole surface of the bit was leveled, which led to an increase in the ability of the bits to lateral cutting.

If necessary, the density of diamonds on the calibration part can be increased to obtain additional bit life when necessary.

By reducing the full length of the bit, its controllability can be increased proportionally. The reduction of the neck of a fixed bit is one of the methods of reducing the shoulder of the protrusion. This, in turn, allows the controlled system to drill with a smaller radius (create a large set of angles) at a given bending angle of the downhole layout [13, 14, 15].

Shorter bit necks allow you to increase the ability of downhole layouts to gain an angle by placing the stabilizers closer directly to the downhole surface of the bit.

A neck of ordinary length, therefore, reduces the set of curvature, which, in turn, increases the radius of curvature of the horizontal well [16, 17, 18].

The bending angle of the downhole system can be reduced if it is not desirable to increase the rate of curvature set. Reducing the bending angle of the layout will reduce the displacement of the bit, thereby reducing the force of the dynamic load on the calibration part of the bit.

Being subjected to lateral loading, the bit turns near the point of adhesion to the well wall. This forces

the well to follow a path determined by the magnitude and direction of the lateral load, as well as the direction of rotation of the bit.

Thus, a bit rotating clockwise with cutting elements pressed against the bottom wall of the well will tend to drill down and to the right. With hourly rotation and compression of the bit to the upper wall of the well, the trajectory will go up and to the left. This trend is called the departure of the bit.

The neutralization of care depends on the type of bits used. Usually, the behavior of roller bits is more predictable than bits with fixed incisors. The main reason is that fixed bits have more changes in the location of the incisors, the downhole surface, in the length and shape of the calibration part [19, 20].

The development of a plan to achieve the desired trajectory of the well should be based on the available information on the care of the bits and the layout of the bottom in this drilling environment. After the start of the well, corrections can be made to compensate for undesirable deviations.

The torque depends on the interaction of the calibrating and downhole cutting elements with the rock and is primarily a function of the aggressiveness of the cutting structure and the load on the bits.

In comparison with the roller bits, the PDC bits exhibit greater instability of torque with fluctuations in the load on the bit. This is especially evident when drilling in conditions peculiar to the penetration of formations with vertical cracks [21, 22].

The torque changes are especially amplified when using PDC bits with aggressive cutting structures or when working with high-torque low-speed downhole motors.

In practice, changes in torque are a well-established phenomenon, there are also laboratory data, however, there is no complete understanding of torque fluctuations.

However, sufficient experience and laboratory data indicate that bits with fixed incisors work much more roughly than roller bits in similar conditions. This is the result of the alignment of the torque on the bit with the torque of the drill string. Therefore, increased torque changes lead to large changes in the orientation of the downhole surface.

Therefore, depending on the formations, it may be more difficult to maintain the orientation of the downhole surface of the bit when drilling with aggressive bits with fixed incisors. That is why roller bits are preferred in the areas of the angle set.

To reduce torque fluctuations, it is advisable to use PDC bits with smaller protrusions of the cutters and a higher angle of reverse inclination of the cutter.

As in the case of any downhole equipment, the service life of the bit can be predicted only on the basis of experience and knowledge of the design features of the bit in question. The choice of a bit should be made in order to increase the probability of successful drilling of the next part of the well.

Although increases in lateral loads are observed when the angle is set, the sections of the curvature set are usually shorter in length than the service life of the bit. Therefore, unplanned descents and ascents are not always associated with the service life of the bit.

The service life of a bit in a horizontal bore is usually the same as in a vertical well under similar conditions in terms of the bit load and rotation speeds. However, this also assumes the ability of the bit to keep its diameter.

It was found that in the final section of the angle set in the well, rapid wear of the diameter and supports reduced the service life of the roller bits with sliding supports. The short service life of the bits was determined by the high content of fine sludge in the solution, high speeds of the downhole engine and large lateral loads [23, 24].

To increase the service life of the bits in wells where it is difficult to maintain the diameter of the bit, there are various solutions.

Smaller displacements of the rollers or designs of the calibration part with more wear-resistant inserts or with reinforcing materials can be used in the roller bits. The paws of the bits can be protected as described above.

Bits with fixed incisors can use individually or in combination an increased length of the calibration part, increased diamond density, an elongated PDC contact area on the calibration part and TSP materials.

Since the heart of the roller bits is the reference layout, it must be kept in mind, first of all, when analyzing the service life of the bits. Reliability analysis leads to the conclusion that, although the cost of drilling decreases with increasing service life of the bits, the possible savings decrease when the risk of failure of the support exceeds the calculated probability of failure-free operation.

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Issue Article

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NUMERICAL SOLUTION OF THE HOMOGENEOUS DIRICHLET PROBLEM FOR THE HELMHOLTZ EQUATION USING MATLAB

Abstract: *In this paper, we describe the numerical solution of the homogeneous Dirichlet problem for the Helmholtz equation. It shows what difficulties arose and how they were solved. This may be useful for researchers solving similar problems.*

Key words: *the Dirichlet problem, the Helmholtz operator, numerical methods, MATLAB, FDM, FEM.*

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Introduction

The homogeneous Dirichlet problem for the Helmholtz equation is considered in the description of many physical phenomena. In particular, the gain coefficient averaged over the cross section of the active element and the output power of the He-Ne laser radiation are expressed through the solution of the corresponding problem. These issues are considered in detail in a series of articles [1-14]. In [1], a method was proposed for finding an approximate solution of the Dirichlet problem for the Helmholtz equation (1)-(2):

$$\Delta f + \lambda^2 f = 0 \qquad (1)$$

$$f\big|_{\partial\Omega} = 0 \qquad (2)$$

where $\Omega \subset \mathbb{R}^2$- bounded simply connected domain with boundary $\partial\Omega$. This method has been tested for domains Ω that admit an analytical solution (circle, rectangle and ellipse - respectively, in cylindrical, Cartesian and elliptical coordinates), and then, using this method, the value of the quantity E (see formula (3) below) was studied for various regions Ω. The value of E, commonly referred to as the average-to-peak ratio, is defined as follows. Let f be the solution of the homogeneous Dirichlet problem (1)-(2) corresponding to the first (minimal) eigenvalue of the Laplace operator λ_{min}, then:

$$E = \frac{1}{|\Omega| f_{max}} \int_{\Omega} f(S) dS \qquad (3)$$

where $|\Omega|$ is the Lebesgue measure of the domain Ω, $f_{max} := \max_{\Omega} f$. The search for the optimal cross-sectional shape of the He-Ne laser in terms of gain is reduced to the search for the region Ω, for which the value of E is maximum. Finding such a simply connected region is still an unsolved problem, the best estimates for the value of E are obtained in [15-16].

It was decided to compare the method proposed in [1] with the methods of finite differences (FDM) and finite elements (FEM) widely used in numerical solutions of the Helmholtz equation.

Numerical calculations

To be sure what comparison is reliable same computing environment (MATLAB) were used, programs for suggested method and FDM were

written by authors and for FEM already existing library Partial Differential Equation Toolbox [17] was used.

Let us describe what difficulties we had in solving problem (1)-(2) using the FDM and FEM methods.

The first issue is common to both FEM and FDM. Since the equation is homogeneous and the boundary conditions are zero, the systems of equations formulated in both methods become homogeneous, which leads to the difficulty of obtaining an exact numerical solution.

After studying the available materials, no conventionally accepted solution to this problem was found. Despite the logical progression of the steps, which arise from the theoretical description of the method, a qualitative practical implementation has yet to be discovered.

Therefore, we proposed our own solution, and later it was discovered that when using this solution, the calculation results converge within an acceptable margin of error with theoretical calculations and other methods.

The essence of the solution lies in introducing a function $g(x, y) = f(x, y) + a$, where ' is an arbitrary constant. By substituting $g(x, y)$ instead of $f(x, y)$ into the equation (1), we obtain the same equation for g, but with a right-hand side of the form $\lambda^2 h^2 a$, where h is the distance between nodes, and with border conditions equal to a.

Let's provide the derivation of the of the resulting equation. From (1) in the Cartesian coordinate system

$$\frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial y^2} + \lambda^2 f = 0$$

Let's approximate second-order derivatives.

$$\frac{f(x-h,y) - 2f(x,y) + f(x+h,y)}{h^2} + \frac{f(x,y-h) - 2f(x,y) + f(x,y+h)}{h^2} + \lambda^2 f(x,y) = 0$$

From here we get:

$$f(x-h,y) + f(x+h,y) + f(x,y-h) + f(x,y+h) + \lambda^2 h^2 f(x,y) - 4f(x,y) = 0$$

Because

$$g(x,y) = f(x,y) + a$$
$$f(x,y) = g(x,y) - a$$

then we get:

$$g(x-h,y) - a + g(x+h,y) - a + g(x,y-h) - a + g(x,y+h) - a - 4g(x,y) + 4a + \lambda^2 h^2 g(x,y) - \lambda^2 h^2 a = 0$$

And finally we obtain equations for g:

$$g(x-h,y) + g(x+h,y) + g(x,y-h) + g(x,y+h) + (\lambda^2 h^2 - 4)g(x,y) = \lambda^2 h^2 a \qquad (4)$$

The second problem pertains solely to the finite difference method. The issue arises due to the presence of second-order derivatives with respect to both variables in the equation, which prevents the traditional layer-by-layer computation of the entire calculation domain based on initial conditions using a "sweep" method typically employed in many cases of this method's application. To circumvent this, all nodes within the calculation domain are linearly numbered layer by layer. For instance, if a node has the number 'x', the node directly above it will have the number 'x+s', where 's' is the layer width; the node below it will have the number 'x-s', and the nodes to the left and right will be 'x-1' and 'x+1', respectively.

For each node, an equation (4) is formulated. To achieve this, a sparse matrix of size $N \cdot N$ is created, where N is the number of nodes in the calculation domain. Each row of the matrix contains coefficients of the equation corresponding to the node with the respective number. The columns represent the values of the function at each node (considered as variables).

Nodes outside the calculation domain are assigned a value of a in the column corresponding to the node number. Then, the matrix equation $AX=B$ is solved, where A is the aforementioned matrix, X is the vector of function values at the nodes within the calculation domain, and B is the vector of right-hand side values of the equations (for nodes inside the domain, this is $\lambda^2 h^2 a$, where h is the distance between nodes; for nodes outside the domain, this is a).

To determine whether a node lies within the shape or not, its coordinates are checked against the boundary equation. The built-in MATLAB function is employed to solve this equation.

Let’s explain the difference between common and our cases by images.

On the Figure 1 the initial calculation domain is depicted, with green nodes representing nodes where the function's values are defined by initial conditions.

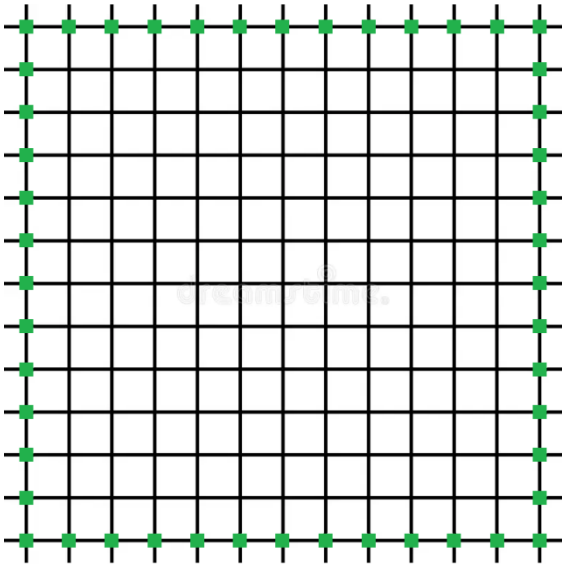

Fig. 1. Beginning state

Figure 2 depicts the initial step of the sweep. Blue nodes are the ones from which calculations are made, while the red node is the one being calculated (notice that all blue nodes are pre-determined).

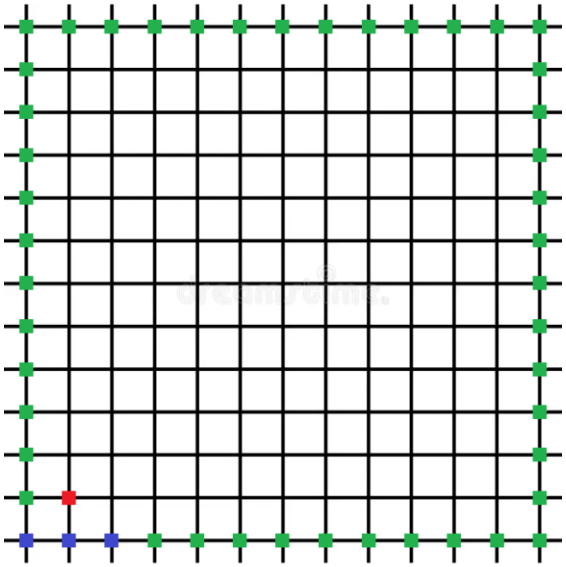

Fig. 2. Sweep

In Figure 3, the moment is shown when the sweep has already computed two layers. The orange nodes represent the nodes that have been calculated.

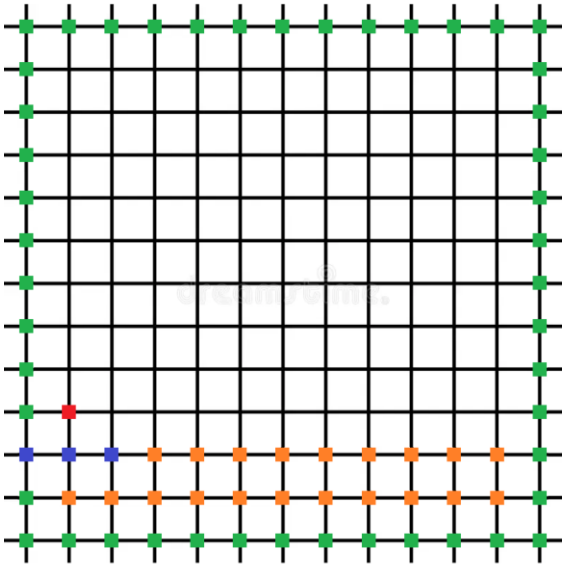

Fig. 3. Sweep 2.

Figure 4 illustrates our scenario (as evident, not all blue nodes are known).

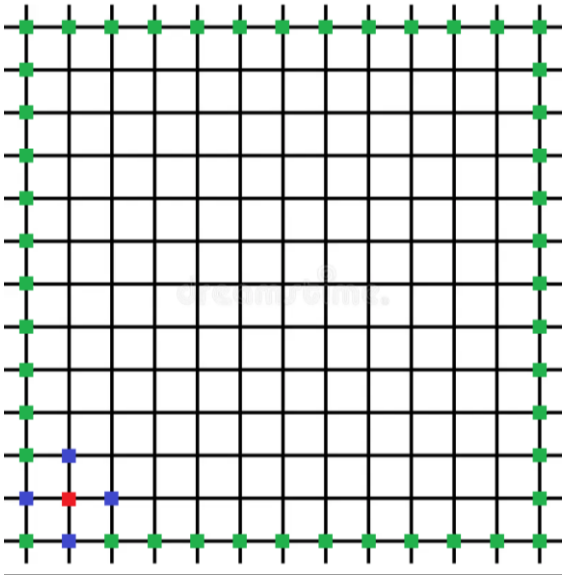

Fig 4. Our case

Conclusion

Calculations were carried out both by the method proposed in [1] and by the methods of FDM and FEM - for different domains Ω and a different number of calculation nodes. The calculation results will be published later. According to the results of the calculations, it can be seen that the method proposed in [1] shows approximately the same fairly high accuracy as the FDM method, and with the same number of nodes, the accuracy of these methods is higher than that of the FEM. With the same number of calculation nodes, the method proposed in [1] is faster than FDM and FEM. Currently, research is being carried out to find the optimal shape of the region Ω, which gives the maximum value of E from equality (3).

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Issue Article

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INTEGRATING THE TELEGRAM MESSENGER INTO THE MOODLE LEARNING MANAGEMENT PLATFORM

Abstract: *The service for integrating a Telegram bot with a learning management system based on LMS Moodle is described. The developed solution allows users to find answers to frequently asked questions and get information about deadlines for answering assignments and tests from the LMS moodle course calendar directly in the Telegram messenger.*

Key words: *integration, PHP, Telegram, Moodle, bot, Laravel.*

Language: *English*

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Introduction

This work continues the series of articles [1-3], describing the development of the IT infrastructure of SPbPU according to the Digital University model and on the way to the third generation university [4].

In the electronic educational environment of universities, various LMS systems are used to train students in electronic courses, the most popular of which are EDX and Moodle. Currently, SPbPU uses Moodle [5] installed on the traditional LAMP/LEMP infrastructure (Linux, Apache/Nginx, MySQL, PHP/Perl/Python) [6]. The architecture of distance learning portals is distributed. There is a portal for general disciplines (taught by several areas of study - for example, physics, mathematics), portals of institutes for special disciplines (taught by one or two areas of study), a server for olympiads, etc. As a rule, for each discipline for each teacher for each type of classes (lecture, practical exercises, laboratory), each semester creates its own course in the corresponding LMS. Using Telegram [7] as a convenient tool for accessing information about e-courses helps to improve the user experience and reduce the time spent searching for the necessary information.

Adding Telegram as an additional communication channel will increase the accessibility of learning, as many students already actively use Telegram in their daily lives. This will allow them to receive important information and communicate with the educational platform with minimum effort and maximum comfort. The advantages of such a bot are that users can quickly get answers to frequently asked questions, necessary materials and deadline dates without leaving the Telegram application.

Existing problems and their solution

Let's consider what problems the integration of the Telegram messenger into the Moodle learning management platform can solve.

Problem 1. The problem of students failing to meet deadlines for assignments in Moodle, due to the fact that it is difficult for them to follow them due to the large number of portals and courses. This can have a serious impact on the effectiveness of the educational process.

Modern learners are often faced with a huge amount of information and responsibilities. In modern educational institutions and organizations providing online learning, students are provided with access to various courses and portals on the Moodle platform. Each of these courses may have their own due dates, deadlines, and requirements.

Because of this variety of information and commitments, students may find it difficult to effectively manage their time and priorities. They may inadvertently miss or forget assignment deadlines as they constantly need to switch between different courses and portals to keep track of updates and deadlines.

The result of this problem can be a deterioration in the academic performance of students, stress and anxiety due to unfulfilled obligations, as well as general disorganization in the educational process.

To solve this problem, integrating the Telegram messenger into the Moodle learning management platform can represent an effective solution. Through Telegram, students can receive information about the nearest deadlines, notifications from the course (see Fig. 1). This will allow them to be more organized in their studies, keep track of deadlines and properly distribute time between different tasks and courses.

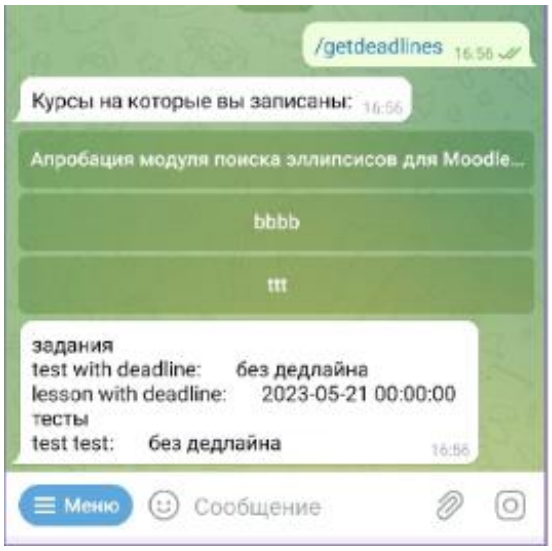

Fig. 1. Telegram interface, deadline request.

Such communication through a platform that students actively use in everyday communication (Telegram) can significantly improve communication and help students cope with the problem of missing deadlines due to information fragmentation.

Problem 2. The problem of frequently asked questions related to courses in Moodle can have a significant impact on the effectiveness of the educational process, both for students and teachers. This problem manifests itself in the fact that the same questions on courses arise from different students, and this can lead to a number of negative consequences.

Repetitive workload for educators - when educators constantly receive the same questions from different students, this can take a significant amount of time and energy. As a result, teachers spend more effort on repetitive explanations, which can reduce their effectiveness in other duties.

Students are wasting time - students asking the same questions are also wasting their time waiting for an answer or looking for the information they need. This can reduce their motivation and learning productivity.

Decreased quality of feedback - repetitive questions can lead educators to focus more on providing general answers instead of addressing the individual needs of each student. This can negatively affect the quality of the feedback and support that students receive.

To solve this problem, the Moodle platform can implement various measures, such as:

- Creating a plugin that adds the username field to the user information section for authorization in Telegram, using the Moodle REST API functionality extension. With its help, the Telegram user and the Moodle user are identified.

- Create a FAQ section where educators can provide detailed answers to the most frequently asked questions. Where there is also an implemented generated link, by clicking on which you can log in to the Telegram bot.

- Creation of a Telegram bot that will provide students with the opportunity to receive quick answers to the most frequent requests (see Fig. 2). This bot can be customized based on the FAQ section of the course and provide links to resources to help students find more information.

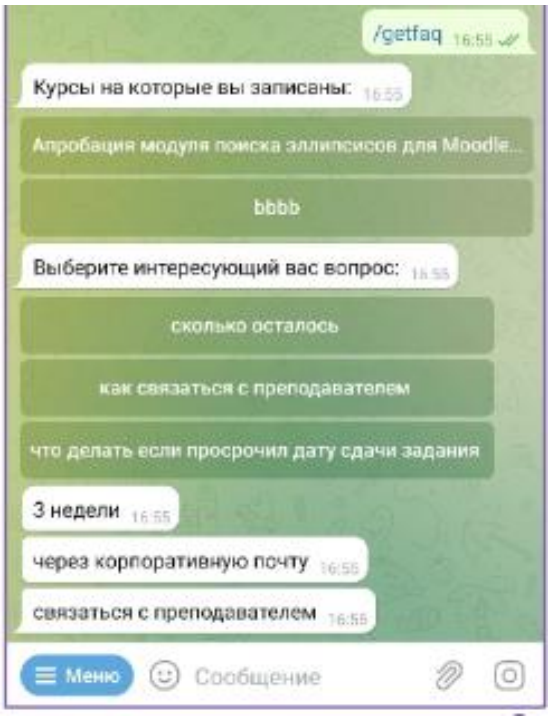

Fig. 2. Telegram interface, FAQ request.

System description

We decided to develop a Telegram bot in PHP [8]. Writing a Telegram bot in PHP has several advantages:

1. Widespread: PHP is one of the most popular programming languages for web development. It has a large developer community, extensive documentation, and many ready-made libraries and frameworks. This makes the development and support of the Telegram bot in PHP more accessible and convenient.

2. Integration with existing systems: many web applications and platforms, including Moodle, often use PHP in their development. Writing a Telegram bot in PHP makes it easy to integrate it with existing systems and interact with them through APIs or other mechanisms.

As a framework, we chose Laravel [9] due to the following reasons:

1. MVC architecture: Laravel is based on the MVC (Model-View-Controller) design pattern, which makes it easy to separate business logic, presentation, and data management.

2. Routing: Laravel provides handy tools for defining application routes. You can define routes for various HTTP requests and associate them with the appropriate controllers and actions.

We also used the Telegram Bot SDK for Laravel [10]. Some features and capabilities of the Telegram Bot SDK for Laravel include:

1. Handling incoming messages: The SDK provides a mechanism for handling incoming messages from bot users. You can define handlers for different types of messages (text messages, images, audio, etc.) and react accordingly.

Database interaction: Telegram Bot SDK integrates with Laravel's database functionality, allowing you to store and retrieve data related to the bot and users.

Fig. 3 shows the application diagram and Fig. 4 shows the administration panel. In essence, the application is a microservice and interacts with Moodle API and Telegaram API.

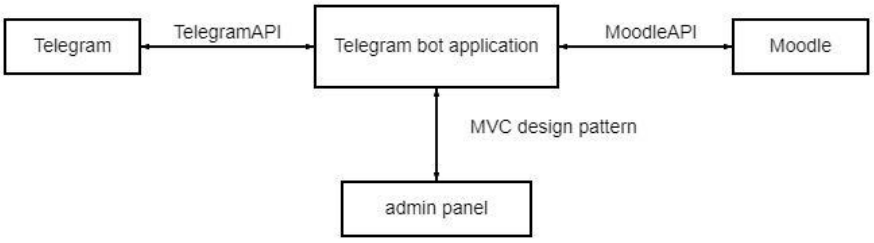

Fig. 3. Application schema.

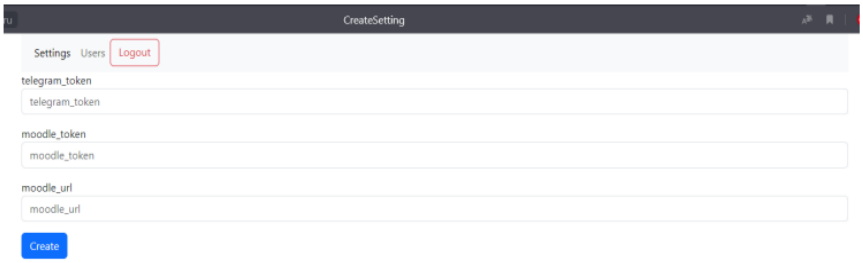

Fig. 4. Administration panel.

Telegram Bot SDK allows you to create multiple bots that can be configured to work with individual Moodle portals. Also, with the help of a single database of authorized users, you do not need to re-authorize to work with another online course, which makes it easier to use.

Conclusion

As a result of the development of the bot, users received a convenient tool that allows them to receive answers to frequently asked questions and information about deadline dates in a convenient form. Thanks to this, users can effectively organize their training, complete tasks on time and not miss important deadlines. Thus, the bot significantly improves the experience and quality of learning for users of the Moodle platform. The developed bot also provides opportunities for further improvement and functionality expansion. For example, we plan to introduce additional features such as new content notifications or interaction with other learning-related tools.

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Issue Article

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COMPARATIVE ANALYSES OF BUILDING VOCABULARY IN ENGLISH AND UZBEK LANGUAGES

Abstract: *This article covers the figurative use of construction words in English and Uzbek languages. Their meanings are shown in both languages and devoted to consideration of representation of the category of form in the conceptual picture of the world of English and Uzbek speakers through metaphorization.*

Key words: *categorizes, shape, object systematizes, line, structures, column, construction.*

Language: *English*

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Introduction

At the present stage of linguo-cognitive research, interest in the multidimensional phenomenon of metaphor in language, speech and thinking of the native speaker is not extinguished. Today, there is no doubt that the consideration of metaphor has shifted from its narrowly stylistic understanding as a model means of language designed to "beautify" speech to the cognitive aspect of its functioning. The results of the numerous studies carried out in this field of linguistics demonstrate conclusively the fact that the metaphor, in particular the concept. It is a conceptual operation that structures, categorizes, systematizes and conceptualizes objective reality in the mind of the native speaker and predetermines his behavior and world perception, as it reflects stereotypes of thinking and stereotypes of perception of the surrounding reality. Comparative study of the patterns of metaphorical representation of objective reality gives the opportunity to reveal both universal and differential, nationally specific features of cognitive consciousness of speakers of different languages, and lacunarity of metaphorical representation of concepts.

Methodology

Lexus is a semantic field of construction vocabulary. The category of form is one of the categories of reality, the concept of which is formed in man first. Objects of different shape and configuration, of different structural organization, the spatial judgment about which is formed in the consciousness of the person, surround it in all spheres of its existence. By understanding the surrounding reality, human consciousness, comparing fragments of reality on different features, classifies them into separate groups, categories, classes, subclasses, categories. There are certain established and fixed standards applicable to the evaluation of the external appearance of the subject. Nevertheless, the human consciousness, which is inclined to anthropocentricity and anthropometrics, provides new images and its standards in order to bring the abstract concept of the form of an object closer to a quite tangible, real, close to man sphere.

Results

The results of the comparative study conducted in the material of English and Uzbek languages show that the construction vocabulary is one of the frequency and productive prototype patterns of the form of objects, objects, entities. It should be noted that in all such cases the analogy is based on perceptual similarity. One example of a productive metaphorical reinterpretation of construction vocabulary in order to characterize the shape of an object is the development of metaphorical meaning in

nouns columns and column in the concept spheres of the languages in question. Thus, the same metaphorical significance is observed in the following examples of rethinking people, objects, located or moving behind each other with an extended line: column of demonstrators; tank column; tractor column; a line of moving people or vehicles: a column of refugees. Similar similarity of development of metaphorical meaning of considered nouns is traced in the following examples: column - the same as a column: newspaper column, column of numbers; one of several vertical blocks of print into which a page of a newspaper or magazine is divided: I didn't have time to read the whole article - just the first column; any vertical block of words or numbers: Add the column of figures and divide the sum by three.

In the conceptual sphere of the Uzbek language, a rather productive prototype standard of form is a noun pole, the separate portable values of which coincide with the metaphorical values of the above noun column, as well as the synonym pillar: the column is a mass of something moving, volatile, rising directly up: a column of smoke, a column of fire, a column of insects, dust stands by the column.

For comparison let's give the similar metaphorical meaning of the noun column -something with a tall narrow shape: A column of smoke rose from the chimney; a column of smoke, a column of steam and ash. It should be noted that the synonymous noun pillar A similar metaphorical value is developing: pillar - something that is tall and thin: a pillar of rock, a pillar of smoke.

In addition, the concept of the English language is characterized by the use of the noun pillar for metaphorical representation of the underlying idea as a building pillar: pillar - an important idea, principle or belief, which is not traceable in the concept of the Uzbek language. In the concept spheres of both languages considered a fairly productive source met aphorizing in the sphere of categorization of objects of reality on the basis of FORM are nouns wall and wall, which develop similar metaphorical values: A wall is a solid mass of something that forms a barrier, a veil: a wall of trees, a wall fog, rain, wall of fire, wall of the people, wall of the people, and also in battle, fist fight: A close, closed group of people: to go into battle with the wall, to stand with the wall, to stand with the wall. A similar development of the metaphorical meanings of the noun wall can be seen in the conceptual sphere of the English language: wall - mass of people or things formed in such a way that you cannot: get through or past them: The demonstrators formed a solid wall to stop the police from getting past them; a large, powerful, usually fast moving mass of something: After the rains, the houses were washed away by a wall of mud/water. However, there is also a separate metaphorical meaning of the noun wall - a large number of things that form an upright structure like a wall: a wall of books/boxes.

The similarity of the metaphorical representation of the category of form is observed in the conceptual spheres of the compared languages with the metaphorical use of the following lexical units: arch – to form the shape of an arch; vault – the inner upper part of something resembling such an overlap; dome - an object shaped like the top half of a ball; a dome is a semicircular top of something, the top of something in the form of a hemisphere, an object in the form of a hemisphere: a parachute dome; a maze is a complex, intricate arrangement, combination something: a maze of streets, a maze of thoughts; labyrinth – a system or process that has a lot of very complicated details.

Figurative association on the external basis underlies the rethinking of a number of lexical units of the conceptual sphere of the Uzbek language, metaphorical correspondence to which we have not found in the conceptual sphere of the English language: tower – a pile of objects in the form of such a structure; floor – a number of objects located horizontally on the same level; canopy – a protruding, overhanging part of something some; a corridor is a narrow, long space connecting something, a passage, a ladder – about something located by ledges, with parts protruding one above the other: the rows are arranged by a ladder , multi-stage – consisting of prefabricated steps, nodes, carried out in several stages. This list can be continued, including all the objects of the real world, which in the mind of a native speaker of the Uzbek language are metaphorically reinterpreted by means of construction vocabulary.

The development of a similar metaphorical meaning is observed in the functioning of the nouns brick and brick in English and Uzbek. The concept sphere of a native English speaker is characterized by a metaphorical reinterpretation of the brick lexeme to represent the shape of objects: a bar of soap, tea, a loaf of bread, which can be traced in the concept sphere of a native Uzbek speaker: a brick is a very thick book, a manuscript; a product in the form of such a bar: peat in bricks.

It should be noted that a number of the listed objects serve as a standard not only in naive, but also in scientific categorization, in particular when nominating anatomical objects: the vestibule in the ear labyrinth, the nasal septum, the labyrinth – the inner ear of vertebrates and humans, the palate – the heavy upper part inside the mouth, In the wall of the uterus/stomach, the arch is a raised curve on the lower part of the legs.

The representation of the form category in real reality is inextricably linked with the structure of the object. In the metaphorical nomination, which is based on the similarity of the shape of the object and the prototype standard, the structural features of the characterized objects and phenomena are also reinterpreted. The metaphorical reinterpretation of structural features testifies to the potential of the construction vocabulary in the nomination of abstract

concepts. The building and the process of its construction become the basis for more complex analogies, which are based not so much on the visual perception of the shape of the object, as they are created in the human mind. Such a structural feature of a building as a foundation in both considered conceptual spheres, by functional analogy, is reinterpreted as a base, a support, the basis of something, including abstract concepts: the foundation of knowledge, the scientific foundation; the foundation is the most basic part of what the rest of which develops.

Accordingly, to lay the foundation of something is to lay the beginning of something; to lay the foundations – to carefully plan and prepare something that will be needed in the future to achieve an aim; foundation-stone – the basic ideas, principles, facts etc that something depends on or develops from. The widespread use of the nouns foundation and foundation may indicate the generalization of its meaning: "the foundation of a building is the foundation of something."

The analogy with the construction of a building allows us to visualize important structural elements of abstract concepts as a building material: brick is an essential element of something; building block is one of the basic parts that something is made from and cannot exist without; cement is something binding, binding, uniting someone, anything; cement – something that helps to make an idea stronger.

Conclusion

The above examples indicate that this metaphorical reinterpretation is universal for both conceptual paintings under consideration. Thus, the above examples indicate the high productivity of the construction vocabulary in the representation of the form and structure of a large number of objects of the material and ideal worlds. In our opinion, this is explained by the desire of human consciousness to give the form and structure of cognizable objects and entities familiar recognizable outlines.

The conceptual sphere of building construction is close to a person, since a dwelling, a building in its generalized sense, is a primary necessity for the well-being of an individual. Its orderly internal organization serves as a prototype of categorization and systematization of objective reality. The commonality of world perception and categorization of objects of the surrounding reality in the conceptual world pictures of native English and Uzbek speakers is obviously explained by the commonality of physical and mental organization, the similarity of the world perception of native speakers of the languages in question, the possible interpenetration and mutual influence of languages caused by external contacts. The revealed inconsistency and lacunarity of the metaphorical perception of a number of concepts indicate the nationally determined specificity of the metaphorical perception of a certain number of objects of the material and ideal worlds.

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Issue Article

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STATE REGULATION OF STRUCTURAL CHANGES IN THE ECONOMY OF UZBEKISTAN

Abstract: *at the current stage of socio-economic transformations in the economy of Uzbekistan, the relevance of improving the structure of the national economy. This is due to the fact that the economy acts as an independent factor, not only directly affects economic growth, but also determines the nature of economic development. The future of a country in a globalized world is determined by which industries dominate the structure of the economy, what resources and factors are used in production, what role a person plays in economic relations, the stability of the role in the world community, the impact on economic growth, and the improvement of the standard and quality of life of the population.*

Key words: *governmental support, budget resources, institutional factors, market mechanisms, transformation.*

Language: *English*

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Introduction

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In recent years, the economy of Uzbekistan has been undergoing deep structural transformations aimed at liberalizing foreign trade, tax and financial policies, supporting entrepreneurship and guaranteeing the inviolability of private property. At the new stage of reforms based on the wide implementation of market mechanisms, increasing the effectiveness of work to reduce the role of the state and increasing the participation of the private sector in the economy, the introduction of an effective economic management mechanism aimed at achieving the final result is required.

The solution to this problem requires ensuring consistency in the activities of ministries and departments involved in structural reforms, the introduction of a modern and inclusive institutional system that ensures the overcoming of certain problems, in particular:

- delay in the process of ensuring compliance between macroeconomic stability, economic growth goals and structural changes, the introduction of an effective system and mechanisms for regulating the economy;
- specific approaches and principles of socio-economic development of the regions are not fully formed, and the relationship between regional and sectoral development of the economy is not ensured;
- have not developed a unified industrial policy and strategy based on increasing labor productivity in industries that are fundamental drivers of the country's industry development, specific mechanisms and tools for strengthening the competitiveness of the industry.[1]

In order to determine the priority directions of reforms aimed at further improving the well-being of the people, transformation of sectors of the economy,

accelerated development of entrepreneurship, unconditional provision of human rights and interests, the formation of an active civil society in subsequent years on the basis of the principle "In the name of honor and dignity of man" with a deep analysis of the complex world processes and the results of the country's development stages passed, the Decree of the President of the Republic of Uzbekistan "On the Development Strategy of New Uzbekistan for 2022-2026" was adopted. The development strategy of New Uzbekistan for 2022-2026 set an ambitious task - to increase the volume of gross domestic product per capita in the next five years by 1.6 times due to ensuring consistently high growth rates in the sectors of the economy with the its size by 2030 up to 4 thousand US dollars per capita and create the prerequisites for the country to enter category of "upper middle income states" (Goal 21 of the Development Strategy).[2]

Uzbekistan, which in 2026 will celebrate the 35th anniversary of its independence, has set goals for 2026 and adopted a Development Strategy for 2022-2026, based on its 30-year experience as of 2022. Undoubtedly, this strategy represents a powerful road map for achieving the goals set in the process of building a New Uzbekistan, carried out under the visionary leadership of Mr. Shavkat Mirziyoyev, who became president in 2016.

Presidential Decree No. 60 of 28.01.2022 "On the Development Strategy of New Uzbekistan for 2022-2026" laid the foundation for the further development of the country, in particular providing for:

- radically increasing the role of the private sector in the economy, supporting entrepreneurship, improving investment, creating a healthy competitive environment;
- reducing the tax burden on business and providing financial resources based on the conditions, characteristics and capabilities of the regions;
- the development and implementation of measures to ensure macroeconomic stability and contain inflation rates;
- the creation of sustainable production and food security systems with the introduction of agricultural, resource-saving and smart technologies;
- expansion of trade, economic and investment cooperation with partner countries, promotion of competitive products to foreign markets, ensuring interconnectedness through the development of transport and logistics systems.

The main goal of the New Uzbekistan Development Strategy for 2022-2026:

1. Building a humane state by elevating the part and dignity of the person and further developing a free civil society.

2. The transformation of the principles of justice and the rule of law and the fundamental and essential condition for the development of the country.

3. Accelerated development of the national economy and ensuring high growth rates.

4. Pursuing a fair social policy, developing human capital.

5. Ensuring spiritual development and raising this area to a new level.

6. Approach to global problems based on national interests.

7. Strengthening the country's security and defense potential, conducting an open, pragmatic and active foreign policy.

As the whole world assesses, New Uzbekistan, which has accelerated its integration into the international community under the leadership of Mr. Mirziyoyev and has come to the fore with its peace-loving rhetoric, seeks to crown the advantages of its balanced foreign policy in the context of the goals for 2026. At the heart of these goals is the creation of a strong and stable state and ensuring a prosperous future for the people of the country. Therefore, the administration of Tashkent is determined to successfully spend the period of the "Third Renaissance."[3]

The 2022-2026 development strategy, which was billed as a reflection of this strong will, emerged from comprehensive population surveys conducted to identify people's needs. Thus, it can be argued that the people of Uzbekistan personally outlined the set course for the future of the country.

The strategic document provides for attracting foreign investment to Uzbekistan in order to support small and medium-sized businesses, create jobs to eliminate unemployment problems, combat monopolization, accelerate privatization processes to adapt to a free market economy and, ultimately, increase the standard of living of the population due to lower inflation.

In this sense, Uzbekistan has already achieved significant economic success since Mirziyoyev became president. Inflation, which amounted to 18.8% in December 2017, decreased to 10% in December 2021. Thus, over the past three years, Tashkent has achieved significant economic success. Of course, this situation is a concrete result of the decisive steps taken under the leadership of Mirziyoyev. Now, as a result of the policy, the goal has been set to reduce inflation to 5% by December 2023.

To achieve the goals set in this direction in the Development Strategy for 2022-2026, the leadership of Tashkent plans to support the chemical industry, the pharmaceutical sector, energy projects, work on the transition to renewable energy sources, as well as such industries as furniture production and tourism. In addition, digitalization and the transition to a digital economy are among the issues to which the Tashkent administration attaches great importance. Because Uzbekistan does not accept remaining outside the era of technology.[4]

On the other hand, one of Uzbekistan's goals is to be a self-sufficient country and ensure "food security." In this context, the Tashkent administration is preparing to create serious incentives and support for agriculture and animal husbandry.

To this end, it is envisaged to continue the implementation of industrial policies aimed at ensuring the stability of the national economy, an increase in the share of industry in gross domestic product and an increase in the volume of industrial production by 1.4 times, further liberalization of leading industries and economies, liberalization of the energy resources and natural gas market, widespread private investment in this area, the introduction of social consumption standards in order to protect vulnerable segments of the population.[5]

As a result of all these initiatives, Uzbekistan expects an increase in its gross domestic product (GDP) by 1.6 times. That would mean the national per capita income in the country would reach $4,000. [4] Therefore, if Uzbekistan achieves its development goals, the country's annual GDP growth rate will be 6.5%.

Seeking to become one of the leading players in the global economy in line with its goals until 2026, Uzbekistan also wants to be admitted to the World Trade Organization (WTO). In this direction, the leadership of Tashkent also supports policies pursued to achieve the country's economic goals through political reforms. Indeed, having managed to make his country one of the respected states of the world and focusing on new breakthroughs, Mr. Mirziyoyev, in accordance with the spirit of the Third Renaissance, takes an approach that makes the rule of law a top priority and takes transparency and justice as the main principle in the management of the state. In this regard, Uzbekistan clearly declares that it will continue the processes of political and legal reforms in accordance with the goals of 2026.

Experience gained from the negative situations caused by the corona virus pandemic and climate change indicates the need to choose more sustainable approaches to ensure economic growth, in particular, the formation of an effective organization for the implementation of strategic goals on a "green" economy. In this regard, on December 2, 2022, the Decree of the President of the Republic of Uzbekistan approved the Program for the country's transition to a "green" economy and ensuring "green" growth until 2030. The program defines priority areas for ensuring "green" economic growth in the Republic of Uzbekistan, including:[6]

- sustainable and efficient use of natural resources;
- strengthening the resilience of the national economy to natural disasters and climate change;
- ensuring green and low-carbon development of the national economy, in particular industry;
- innovation and effective green investments;
- development of sustainable and inclusive green urbanization;
- support of the population and their places of residence, most susceptible to strong influence during the transition to a "green" economy.

It is envisaged that the effective implementation of the tasks in these areas is carried out according to the following priorities: capacity-building and human capital development in the framework of "green" growth; creation of a favorable political environment, effective institutions for the transition to a green economy; Increased external and internal green funding flows. In accordance with the Concept of transition to a "green" economy and ensuring energy saving in the industries approved by this decree, measures are envisaged to improve competitiveness, financial stability, energy and environmental security of the economy of the Republic, as well as improve the standard of living of the population and the quality of services provided on the basis of capacity expansion, modernization, technological development of energy saving and rational use of fuel energy resources, increasing energy efficiency.[7]

In order to maintain fiscal stability, the government plans to introduce additional budget rules setting a limit on the annual budget deficit. Given the government's commitment to limit the budget deficit to 3% of GDP in the coming years, Uzbekistan remains at low risk of a debt crisis.

In turn, the Central Bank raised the main rate in mid-March 2022 from 14 to 17% in order to consolidate expectations and contain pressure on the exchange rate. This policy is aimed at curbing price pressures and gradually reducing inflation. However, the transfer of the impact of economic policy is constrained by a low level of financial mediation, a high degree of dollarization and the implementation of lending programs at preferential rates.[8]

The pandemic has slowed down the process of privatization and reform of the energy sector. However, progress has been made in other areas, in particular in agriculture and in improving corporate governance. The continued liberalization of cotton and wheat prices, the easing of the requirements for sowing areas for crops contributed to the diversification and expansion of agricultural production. In recent years, large-scale work has been carried out in the Republic to reduce state participation in the economy. At the same time, about 50% of the country's GDP and a fifth of the volume of foreign trade is still created by state enterprises, which provide more than half of the state budget revenues when hiring less than 10% of the employed population.[9]

By the Decree of the Cabinet of Ministers of March 29, 2021 No. 166, the Strategy for Management and Reform of Enterprises with the Participation of the State and its Implementation Targets in 2021-2025 were approved. The number of

enterprises with state participation will be reduced by 75%, and shares of at least 20 enterprises will be offered on primary and secondary placement.

The main goal of the ongoing transformations is to transform large enterprises into internationally recognized companies with the placement of part of the shares on the international stock exchange (IPO). These measures are carried out in accordance with the Decree of the President of RUz No. UP-6096 of October 27, 2020 "On Measures for the Accelerated Reform of Enterprises with the Participation of the State and the Privatization of State Assets." This regulatory act provides for the transformation of 32 large state enterprises in the field of fuel energy, mining, transport, telecommunications and the chemical industry, as well as the sale of 556 state assets.[10]

As a result of the transformation of state-owned enterprises and companies, the following results have been achieved:

- developed plans to improve financial stability and operational efficiency for 21 state-owned companies based on the recommendations of international consultants;
- developed development strategies for 21 state-owned companies for the long term;
- credit ratings
- received from international agencies for 6 state-owned companies;
- Eurobonds issued on the international stock market totaling $1 billion. (Uzavtomotors $700 million and Uzavtomotors $300 million).

In accordance with Presidential Decree No. UP-101 of April 9, 2022 "On the next reforms to create conditions for stable economic growth by improving the business environment and the development of the private sector," the main directions for increasing the role of the private sector in ensuring economic growth of the Republic are determined:

- liberalization of the market for goods and services, in which public participation remains, creating conditions for the promotion of the private sector in these areas;
- acceleration of transformation and privatization of enterprises and commercial banks with the participation of the state, stimulation of the increase in qualitatively new, in particular based on the principles of environmental, social and corporate governance (ESG), investments and highly efficient production technologies by reducing the share of inefficient enterprises in the economy;
- giving impetus to the development of different segments of the financial market through further liberalization of the de tender market and capital market;
- attracting foreign investors to geological exploration, production and processing processes in order to provide industries with a guaranteed raw material base;
- development of the energy resources, transport, communications market and creation of conditions for attracting private investment in these areas.

According to IMF forecasts, Uzbekistan's economic growth is expected to slow in 2022. Experts predict an increase in the current account deficit to about 9.5% of GDP. The decline in remittances will be partially offset by lower imports and higher commodity export revenues. This year, it is expected that increased inflation will remain at 12% due to spikes in world food and fuel prices.

According to the results of the IMF mission held in November 2022, forecasts on the development of the Uzbek economy have changed significantly. Contrary to expectations at the beginning of the year, remittances, including those of migrant workers, grew more than 2 times, which, combined with continued fiscal support and sustained trade, contributed to economic activity and growth in Uzbekistan. As a result, according to forecasts, in 2022, the economy of Uzbekistan will grow by almost 6%. Inflation has risen and taken on a broader footing, reflecting global price increases, particularly on food and energy. Due to decisive and timely actions of the Central Bank, it is expected that by the end of the year it will be possible to keep inflation at about 12% 1.[11]

A slowdown in the global economy is forecast in 2023, however, despite this, inflation may become more sustainable. As a result, despite the expected continuation of relatively active domestic demand, in 2023, according to forecasts, economic growth in Uzbekistan will slow down somewhat and will be slightly less than 5%. Inflation is expected to remain at an increased level (according to the country's Central Bank, by the end of 2022, Uzbekistan's GDP growth is expected within the forecast corridor of 5.2-5.8% (the previous forecast was 5 − 5.5%). In 2023, the economy is predicted to slow down - 4.5-5%, in 2024 - 5-6% and in 2025 - within 6-6.5%).[12]

In order to improve the situation, IMF experts advise the Government of Uzbekistan to take the following directions of economic policy and the necessary measures for the development of the economy:

- monetary policy should remain firmly focused on reducing inflation. It is necessary to further reduce concessional lending programs and replace them with subsidizing interest rates for critical economic activities;
- fiscal policy should be aimed at supporting efforts to reduce inflation. Work should continue to expand the tax base by eliminating benefits and improving compliance with tax laws;
- continued privatization of state-owned enterprises and state-owned banks. Further improvement of corporate governance and increased

transparency in state-owned enterprises and state-owned banks should play a key role;

- increasing competition and creating a level playing field for business. This requires the further opening of domestic markets to private firms and the removal of privileges for state-owned enterprises, as well as the passage of a new competition law and ensuring the independence and sufficient powers of the antimonopoly committee;
- expansion of digitalization of public services, including tax and customs administration. It is proposed to improve the management system by strengthening the requirements for beneficial property, in particular, in large construction and infrastructure projects, in order to avoid opposition from stakeholders;
- improvement of the work of the markets of factors of production, in particular, the labor market, land, energy, water and financial markets, in order to increase their productivity. Land reform, including in agriculture, should be accelerated to ensure the protection of land rights and the possibility of its sale. Electricity and water rates are proposed to be gradually raised to cost recovery levels and then to market levels to improve efficiency and attract further investment, free up budgetary resources for more pressing needs, and facilitate a transition to a greener economy. Tariff increases must be accompanied by adequate support for vulnerable households.
- strengthening of trade integration and regional cooperation. Despite the fact that the current geopolitical situation creates serious problems, it also creates opportunities for attracting business. Accelerating WTO accession negotiations and expanding cooperation with neighboring countries, including to improve existing and create new transport routes, will increase Uzbekistan's investment attractiveness.

In accordance with the Presidential Decree of October 30, 2020 No. UP-6098, Uzbekistan introduced measures to reduce the shadow economy and support business, which will be in effect from January 1, 2021, including:

- until January 1, 2022, the income of small businesses in the field of catering received from individuals using bank cards and contactless payments will not be included in the total income in order to mandatory transition to the payment of generally established taxes;

- construction organizations are allowed to hire employees on an urgent basis without concluding a cash payment agreement, the volume of which should not exceed 10 percent of the total wage fund for the reporting period (excluding the amount of social tax).

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Issue Article

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THE USE OF PREDATORY TICKS-PHYTOSEIDS IN THE PROTECTION OF APPLE TREES FROM TICKS-PHYTOPHAGES

Abstract: *The proposed method does not require large production facilities and expensive equipment. For breeding ticks, any room with racks for storing containers is suitable. It is necessary to ensure that the optimal air temperature is 25 ° -28 ° C, and humidity is 80-90%. According to her, predatory mites were bred in the laboratory on spider mites of beans. The propagated predatory mites are collected together with the leaves and placed in a Petri dish. Later it was abandoned for cucumbers in greenhouses in the ratio of 1:20; 1:30 and 1:50. During the control, the reproduction of both representatives is monitored. They can be quickly and easily distinguished by color. Current studies were described in documents conducted on Phytoseiulus persimilis Ath.- red fruit mite in the process of use in various proportions (1:20; 1:30 and 1:50) (predator: prey), methods for determining the ratio of pests and entomophages and its biological effectiveness. Studies have been conducted to establish biological efficacy.*

Key words: *predatory tick, air temperature, additional light, Phytoseiulus persimilis.*

Language: *Russian*

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ПРИМЕНЕНИЕ ХИЩНЫХ КЛЕЩЕЙ-ФИТОСЕИД В ЗАЩИТЕ ЯБЛОНИ ОТ КЛЕЩЕЙ-ФИТОФАГОВ

Аннотация: *Предлагаемый способ не требует больших производственных помещений и дорогостоящего оборудования. Для разведения клещей подходит любое помещение со стеллажами для хранения ёмкостей. Необходимо обеспечить, чтобы оптимальная температура воздуха составляла 25°-28°С, а влажность - 80-90%. По её словам, хищные клещи разводились в лабораторных условиях на паутинных клещах фасоли. Размножившиеся хищные клещи собираются вместе с листьями и помещают в чашку Петри. Позже была заброшена на огурцы в теплицах в соотношении 1:20; 1:30 и 1:50. Во время контроля отслеживаются размножение обоих представителей. Их можно быстро и легко отличить по цвету. Текущие исследования были описаны в документах, проведенных на Phytoseiulus persimilis Ath.- красный плодовый клещ в процессе использования в различных пропорциях (1:20; 1:30 и 1:50) (хищник: жертва), методы определения соотношения вредителей и энтомофагов и его биологической эффективности. Были проведены исследования для установления биологической эффективности.*

Ключевые слова: *хищный клещ, температура воздуха, дополнительный свет, Phytoseiulus persimilis.*

Введение

Хищных клещей привлекают укроп, горчица, фацелия и другие нектарные растения. Они откладывают яйца на усиках и черенках листьев. На огурце основную часть яиц откладывают на усиках листьев. Яйца яйцевидные, молочного цвета, размером 0, 14х0, 19 мм. Эмбриональное развитие яйцеклетки длится от 1,0 до 6,6 дней в зависимости от температуры.

Для ambliseyus kupayişn первое, что нужно сделать, это поместить мучного клеща (Acarus arris) в пшеничные отруби, а затем предстоит их

размножение. Разведение мучного клеща и хищного клеща происходит в различных изолированных комнатах. Предлагаемый способ не требует больших производственных помещений и дорогостоящего оборудования. Для разведения клещей подходит любое помещение со стеллажами для хранения ёмкостей. Необходимо обеспечить, чтобы оптимальная температура воздуха составляла 25-28°C, а влажность - 80-90%. Мы расскажем вам, как сохранить необходимую влажность в ёмкостях в следующей главе. При совокуплении клеща дополнительный свет не требуется.

В теплицах против вредителей клещи выпускаются каждые 7 дней. На каждое растение необходимо разместить по 60-70 хищных клещей. В качестве профилактической меры развития паутинного клеща в теплицах необходимо оставить на каждом квадратном метре по 60-70 штук. Рекомендуется повторить процедуру во второй раз через неделю. По степени вредоносности паутинного клеща рекомендуется использовать хищных клещей в соотношении 1:10 и 1:20. Согласно исследованиям, проведенным в 2007 году, (Ташпулатова. 2019) хищные клещи используются для борьбы с паутинным клещом.

По её словам, хищные клещи разводились в лабораторных условиях на паутинных клещах фасоли. Размножившиеся хищные клещи собираются вместе с листьями и помещают в чашку Петри. Позже была заброшена на огурцы в теплицах в соотношении 1:20; 1:30 и 1:50. Во время контроля отслеживаются размножение обоих представителей. Их можно быстро и легко отличить по цвету.

В течение одного поколения взрослого клеща-хищника уничтожает 500-800 яиц паутинного клеща или 50-60 яиц личинки и взрослой особи паутинного клеща.

Текущие исследования были описаны в документах, проведенных на Phytoseiulus persimilis Ath.- красный плодовый клещ в процессе использования в различных пропорциях (1:20; 1:30 и 1:50) (хищник: жертва), методы определения соотношения вредителей и энтомофагов и его биологической эффективности. Были проведены исследования для установления биологической эффективности. Для него, прежде всего, было взято среднее количество вредителей на листе, и в том же количестве были выпущены хищные клещи. Хищные клещи разводились в лабораториях с помощью мучных клещей. В этом случае клещей разбрасывают вокруг корня дерева или развешивают на деревьях в специальных бумажных или тканевых полосках. Полученные результаты показаны на рисунке 69.

Таблица 1. Влияние постоянной температуры воздуха на амблисейусов (день) (лабораторные эксперименты, 2019)

Фаза развития	**Температура °C**				
	15°	15°C	25°C	30°C	35°C
Яйцо	6,6°C	2,4°C	1,9°C	1,2°C	1,0°C
Личинка	2,2°C	1,2°C	0,9°C	0,4°C	0,5°C
Протонимфа	8,0°C	3,2°C	1,7°C	1,1°C	1,1°C
Дейтонимфа	6,2°C	2,4°C	1,4°C	1,5°C	1,5°C
Яйцо-имаго	23,1°C	9,2°C	6,0°C	4,2°C	4,1°C

Наблюдения были проверены на 3-й день, 7-й день и 14-й день, биологическая эффективность phytoseyulius perimilis против красного яблочного клеща была значительно выше во всех трех вариантах. В экспериментах по первому варианту этот показатель составлял 58,2% на 3-й день, 71,4% на 7-й день, 85,7% на 14-й.

Соотношение энтомофага к донору составляет 1:30% по сравнению с вредителем на 3-й день при использовании в норме 41,2% . На 7-й день было обнаружено 59,0%, а на 14-й - 68,4% биологической эффективности.

В последнем варианте, при использовании в соотношении 1:50, эффективность незначительно снизилась и мутагенно достигла 32,6% на 3-й день, 51,4% на 7-й день и 64,3% на 14-й. При этом количество хищных клещей в природе снова увеличилось, резко сократив количество вредных клещей.

Из этих исследований видно, что биологическая эффективность хищных клещей растет с каждым днем. Следовательно, высокой эффективности можно достичь, если отказаться от клещей в соотношении 1:20, сокращая период развития вредных клещей на деревьях.

В нашей стране садоводство и выращивание продуктов обладают большим потенциалом за счет климатических условий и большому количеству солнечных дней. Но в тоже время борьба с вредителями остается большой проблемой.

Сейчас метод химической борьбы является основным методом борьбы с уменьшением численности вредителей. Растущий спрос на качественные, не содержащие химикатов

продукты на международном рынке, борьба с вредителями выполняют такие задачи, как изучение современных биологических методов, их использование и внедрение.

Очищающие микробиологические средства. В последние годы мероприятия, проводимые микробиологическими средствами для использования вредных организмов, были эффективными. Этот метод не несет опасности окружающей среде и животным. Есть возможность использовать эти инструменты в любой период развития растения.

За последние три года мы провели исследования по использованию безвредных средств для защиты окружающей среды и здоровья человека для борьбы с вредителями. В условиях нашей страны встречаются несколько доминирующих вредителей, и применение против них эффективных паразитических энтомофагов эффективно во всех отношениях. Резкое окукливание некоторых вредителей можно объяснить тем, что они уменьшаются до энтомофагов. Они уменьшают количество урожая, нанося большой ущерб листьям и плодам в садоводстве. В природе борьба со скрыто живущими вредителями очень сложна, и с ними можно бороться только с помощью энтомофагов.

Из эффективных паразитических энтомофагов листоверток считаются Apanteles ater (Braconidae), Tranosema rostralis, Campoletis latrator, Lissonota complicator (Ichneumonidae). Itaplectis alternans, I. maculator (Ichneumonidae) - это паразитические энтомофаги их куколок. Кроме того, побеги повреждаются личинками, в том числе Apanteles praepotens (Braconidae), Phobocampe tempestiva (Ichneumonidae).

Исследования были проведены в 2016-2019 годах, и над листовертками провели исследования по объединению микроорганизмов с паразитическими энтомофагами в природе и анализу их эффективности. В данном случае исследования проводились на основе биологических средств, выращенных в лабораториях Центра биологической химии ТашГАУ. Полевые эксперименты проводились в интенсивных и 4-летних местных садах Ташкентской области Куйичирчикского района ПТЗ "Мустакиллик". Сорт яблони "Голден дельтпес" высажен по схеме М9 4х3. Эксперимент проводился в данных вариантах. Использовали препарат на основе Bacillus thuriengiensis (Бета Про, к) из микробиологических агентов, согласно трихограмме и энтомофагов в природе в период плодоношения. 0,32 кг/га, лепидозид 100 н.к. 1,2 кг/га, и контроль проводили с помощью энтомофагов в природе без никакого средства на 30 фруктовых деревьях на площади 3 га в каждом варианте.

Трихограмма была оставлена на яйцах листоверток в дозе 2 г на гектар с трихокартами вокруг деревьев. В норме по нагрузке микробиологический препарат составляет 500 л на гектар. Раствор был переведен на деревья по принципу двукратной обработки. Экспериментальные наблюдения проводились на 3, 5 и 7 сутки при уменьшении количества вредителей.

Их видовой состав и фенологические календари были проведены на основе сбора образцов из поколений развития. Формула Аббата была использована для демонстрации эффективности биологических способов борьбы на листовёртках.

Представители семейства паразитов Apanteles, Campoletis, Lissonota закрепились на побегах листоверток в малом возрасте и вышли, когда на деревьях начали распускаться почки. Развитие личинок паразита в почках продолжалось до цветения плодовых деревьев. В этом случае из эффективных паразитов листоверток, таких как Tranosema rostralis, Phobocampe tempestiva начали повреждать личинки после полного оцветения. Личинки-паразиты начали вылезать из тела донора, когда яблоки зацвели и окукливаться. В этот период подошел к концу первый период использования микробиологического средства.

Было замечено, что купола листвянок, которые стали куполообразными через 10-12 дней после того, как яблоня зацвела, были повреждены паразитами представителей семейства Итоплектис. Сезонные циклы полета паразитов семейств Apanteles и Campoletis занимали 5-7 дней от цветения яблок до конца цветения, в то время как представители семейства Lissonota проводили 11-12 дней от цветения яблок, 11-24 дня от цветения яблок в семействах Tranosema и Phobocampe, а также itoplectis семья закончилась через 25-35 дней после использование микробиологического инструмента и его результаты представлены в таблице, из которой следует, что количество листоверток от двух применений уменьшилось, а смертность личинок пошла на 7-й день и достигла 87,5 -86,7% (таблица 2).

Таблица 2. Биологическая эффективность микробиологических препаратов в интенсивном садоводстве против листоверток (Ташкентская область, Куйичирчикский район, 2016-2019 гг.)

№	Варианты	Норма препарата	Среднее количество вредителей на 30 деревьях				Биологическая эффективность по дням, %		
			После применения препарата по дням	Количесиво вредителей до применения препарата					
				3	5	7	3	5	7
1	Бета ПРО	0,3	146	107,2	88,7	76,8	64,8	84,7	87.5
2	Лепидоцид	0,5	101,2	102,4	135,6	96,4	61,1	78.7	86,7
3	Контроль (без применений)	-	112,5	115,9	126,4	137,1	-	-	-

Бета Pro. р. до применения количество почек составляло 146 в среднем на 30 деревьях, что уменьшило количество листоверток от применения препарата. После применения биологическая эффективность снизилась на 7-й день и составила 56,8%. И при следующем использовании их количество резко уменьшилось.

Бета-про из микробиологических препаратов. п., лепидацид 100 п.п. при использовании первого и второго, воздействие на энтомофагов, пораженные вредителями, было минимальным. В этом цветение яблони показало, что в период почкования перед цветением Апантелес, Камполетис, Лиссонота негативно влияли на образы представителей семейства. При этом было отмечено уничтожение имаго и уменьшение их численности по отношению к вредителям.

В период полета эффективного паразита Tranosema rostralis одна часть сохранилась. Когда был использован препарат после цветения яблок, представители семейства Jtoplectis начали отмирать, а также паразиты из куколок вредителей. В то же время начали погибать имаго паразитов Apanteles, Campoletis, Tranosema Ham. Но куколки представителей семейства Лиссонота и Траносема не сохранились. Для первого поколения паразитов яблони, использовали препараты паразитических семейств Лиссонота. Такие виды, как Tranosema, Phobocampe и Jtoplectis, теперь могут уничтожить имаго.

В заключение можно сказать, что в мелковозрастных представителях листоверток из семейств паразитов Apanteles, Campoletis, Lissonota была пронаблюдена зимовка. Паразит Tranosema rostralis показал, что высокоэффективен при снижении количества личинок листоверток в саду. Одним из эффективных паразитов был Phobocampe tempestiva Hamorab. 86,7-87,5% эффективности может быть достигнуто при применении препарата на основе микробиологического препарата Bacillus thuriengiensis против листоверток в саду. Также было замечено, что паразиты негативно влияют на представителей семейства Apanteles, Campoletis, Lissonota.

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PHILOSOPHICAL ISSUES OF IMPROVING AESTHETIC EDUCATION BASED ON CLUSTER APPROACH TO ART

Abstract: *In this article, all the means of aesthetic education are educational activities that serve to develop the aesthetic attitude of a person to reality, and it has its own impressiveness and expressive power, without which the scope of human knowledge cannot be created. Also, it is shown that the development of the human ability to think artistically is an important task of the means of aesthetic education.*

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Introduction

In the middle of the 20th century, which is known in history as the "atomic age" and "the age of the conquest of the universe", it was customary for the public to view art as a "useless, entertaining activity, a domestic sphere". Even, some representatives of the field of exact and natural science began to put forward the opinion that "human well-being and development do not need art anymore." This situation created the need to present a new vision and a new approach to "protecting" and "improving" art by explaining, explaining, and teaching the essence of art to representatives of the social and humanitarian sciences.

Methodology

As a result, at the end of the 20th century and the beginning of the 21st century, a new direction in the field of modern art - the cluster approach to art - appeared.The cluster approach to art is a new direction of art studies, which by the end of the 20th century became the center of wide discussion among philosophers and art critics, and was evaluated as an important intellectual reality in art theory, art philosophy, and aesthetics. During its time, the "British Journal of Aesthetics" informed the general public that new views and opinions are emerging in the science of aesthetics by revealing clusters of art theory to the public. Art theory clusters were put forward by the Scottish philosopher Beris Gott. This theory was a new direction that was opposed to comments aimed at defining the essence of art in a specific definition, limiting the scope of research and the object of study. B. Goth's theory originated from the teaching of the American philosopher Morris Waits, the founder of the non-essentialism trend that emerged in the middle of the 20th century. In particular, M. Waits, in his article "The Role of Theory in Aesthetics", worries that defining art leads to limiting its essence. He says that since artistic forms of art are constantly moving, changing and renewing, it cannot be defined by a fixed and unchanging concept, on the contrary, art is an open and free concept for all that does not fit into any mold. In 2000, B. Goth further activated this position of M. Weitz and put forward a new "cluster theory" in his research entitled "Art as a cluster concept". Usually, the cluster approach is used to clarify the "complex situations" of the "extraordinarily complex" situations that arise in modern sciences (astronomy, psychology, sociology, ethics). However, in this and other situations, it is necessary to determine which symbol, slogan or call to action is being discussed. B. Goth's theory of cluster approach to art, in turn, represents its methodological essence. In other words, B. Got divided the cluster approach to art into two parts - a) general approach; b)

allocates to a private approach. In this regard, the "general" approach refers to the discussion, information, information and general comments on the criticism of clustering. "Private" approach includes specific and targeted criteria of discussion, information, information, messages into the cluster understanding of art. B. Goth explores these possibilities of art and shows the following 10 criteria:

1) includes positive aesthetic qualities;
2) reflects feelings;
3) attracts intellectually;
4) a very complex field in terms of form;
5) has the ability to cover diversity;
6) shows personal imagination;
7) has artistic image experience;
8) creative at a high skill level;
9) belongs to a certain artistic direction;
10) the content of creating a work of art can be acquired.

It should be noted that the cluster approach is more visible outside of the philosophy of art because it is important for clarifying the complex processes in various fields of modern science and when it is difficult to fully reveal the phenomenon of space and time. Art is also not without its chaotic aspects that elude philosophical analysis. However, indifference to the research of the feelings that are born under the influence of the real content and concrete essence of art, if allowed to deviate, leads to uncertain conclusions. Because the judgments about emotions based on concrete and digital technologies do not accurately reflect the content of art and the essence of artistic works, on the contrary, subjective emotional states are satisfied with simple observation instead of being free from superficial subjectivity. This subjectivity is not fully reflected in feelings, but takes a leading place; This is the main reason why people often become victims of emotional experiences. However, when art is studied under the influence of such uncertainty and meaninglessness, the main focus is preoccupied with trivial subjective aspects, and the result is that art becomes not only boring, but unpleasant. In fact, the approach to the philosophical essence of art only from the "interest-utilitarian" point of view is not very correct. Such views are the result of knowingly or unknowingly interpreting that the social, spiritual, educational importance and "usefulness" of art is closely related to science, education and training. A conscious and rational compromise with art prevents a person from becoming aesthetically perfect. In addition, art as a research object of aesthetics directly or indirectly participates in educational processes. The reason is that a person whose feelings have not yet been formed and whose taste has not been developed is powerless in the face of existing life difficulties and worries, and as a result, he falls under the influence of foreign ideas. Art always accompanies a person so that such negative situations do not appear. True art is a spiritual phenomenon that encourages a person to overcome and fight against various harmful consequences.

Results

Art is the most important, basic and effective means of aesthetic education. In this regard, philosopher-art critic Tilab Mahmudov says that "art becomes a utilitarian-aesthetic entity of society. The essence of art and its power of movement serve to open up human potential in all aspects - both physical and spiritual. - is the truth. Philosophical analysis of life affects the formation and development of art in general, and new and modern art types in particular. In particular, a new aesthetic outlook on life, literature, and art changes a person's attitude to reality. In fact, historically, the relationship between aesthetics and art theory has always been contradictory. If we look at it from an aesthetic point of view, views on this matter can be divided into two directions. The first is the analysis of the philosophical-emotional evaluation of the aesthetic subject; the second is an analysis of the philosophy of art in relation to the aesthetic object. However, I. Kant and H. Hegel, the representatives of these two trends, did not come to the final conclusion about the rational relationship between the subject and the object. It is known that art does not directly copy existence, but rather expresses it through artistic images. Accordingly, a work of art encourages a person not to be limited only by the beauties of reality, but also to consciously observe and evaluate the existing beauties. This is how the art of painting reveals beauty to us. In this regard, Rozi Choriev's paintings such as "Childhood Memories", "Contemporaries" series of portraits, "Fergana Valley" are a vivid expression of our opinion. Therefore, Uzbek pop star Botir Zakirov said that his paintings "can be called songs." "In his picture called "Cradle", the mother sitting on the red carpet is leaning on the cradle, the national pattern of the carpet, the ancient Uzbek cradle, the bright color of the mother's dress, the long braid of hair thrown behind her - all this reminds of the Uzbek folk song - "Black Hair".

The artist's painting "Pomegranate Ripe" also gives the impression of a youthful song full of wonder and joy. From the analysis of views on the philosophical essence of art, it can be understood that art is a constant companion of a person, it forms and educates the most beautiful and noble qualities in a person. The history of mankind shows that the relationship between man and art has been resolved in various ways. In particular, at the present time, art plays a very important role in the aesthetic culture and spiritual world of a fully matured person. ... True works of art, intellectual sophistication or artistry and shallowness of content must be advanced and perceived by the educator. Otherwise, the complex processes of modern art development can be misinterpreted.The issue of the cluster approach to art

has become a tradition, especially among European philosophers. In particular, the Russian researcher A.E. Radeev examines the cluster approach to art mainly from two perspectives. That is, a) historicity (adequately with the ideas of B. Goth); b) studies the theoretical (the question of the relationship of the cluster approach to art and aesthetics). It is known that art does not directly copy existence, but rather expresses it through artistic images. Accordingly, a work of art encourages a person not to be limited only by the beauties of reality, but also to consciously observe and evaluate the existing beauties.

Conclusion

This is how the art of painting reveals beauty to us. In this regard, Rozi Choriev's paintings such as "Childhood Memories", "Contemporaries" series of portraits, "Fergana Valley" are a vivid expression of our opinion. Therefore, Uzbek pop star Botir Zakirov said that his paintings "can be called songs." "In his painting called "Cradle", the mother sitting on the red carpet is leaning on the cradle, the national pattern of the carpet, the ancient Uzbek cradle, the bright color of the mother's dress, the long braid of hair thrown behind her - all this reminds of the Uzbek folk song - "Black Hair". The artist's painting "Pomegranate Ripe" also gives the impression of a youthful song full of wonder and joy.

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