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## ECONOMIC AND MATHEMATICAL ECOMODEL OF A GEOGRAPHICAL EXPEDITION

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## ECONOMIC AND MATHEMATICAL ECOMODEL OF A GEOGRAPHICAL EXPEDITION

**Annotation:** The article discusses the concepts related to expeditionary activities. The periods of formation, territories and expiary research spaces. The forms and directions of its implementation in modern conditions are revealed. It is shown that an increase in the level and definition of the effect of the expedition company depends on the accepted model of the geographical expedition. When determining the cumulative impact on the cost of the forwarding company, the following are used different models and modeling methods with financial and environmental dependencies. Transition to the digital economy in public administration, economic and social sectors by 2030, it increases the requirements for the mathematical and modeling apparatus of scientific research on the effectiveness of the use of allocated budget funds.

**Keywords:** Economy Period Ecomodel Expedition Geography Value Added Ecology Method

Definition of Expedition derives from word (Expedition), which has in English many senses. This is expedition, this is expedient action, this is quick termination of action, this is speed (velocity), this is an organizing form of the enterprise or company, this is determined means of the management actions and etc. Below it is touched by studies some ecological, economic and mathematical and modeling aspects of geographical expedition with assessment on historical data.

According to the ITU, the word "expedition" has Latin roots and means "dispatch, parcel", i.e. 1) a military operation, usually associated with the transportation of troops by sea; 2) travel for scientific purposes; 3) post office offices, periodicals and various institutions for sending correspondence, parcels, etc.

The word expedition (Latin *expeditio* – campaign) can also mean: the department of an institution that accepts, sends or distributes shipments and correspondence; services for the delivery of goods and goods by various modes of transport; the name of the department for the acceptance of primary documentation in government agencies; sending a group of people on a long hike, traveling to a specific place with a special scientific or military purpose, assignment: military action in overseas territories in a remote area; sending troops to carry out an operation in a remote area; scientific territorial research by sending scientists to carry out research on the ground; movement of a group of climbers or rescue of mountain tourists by climbers, etc.; the name of the company (brand) specializing in the production and sale of original gifts.

The history of expeditionary exploration of the Earth and geographical discoveries is divided into several periods covering various geographical areas and historical epochs. But, as can be seen from the materials below, they had in common that travel, trips, hikes, expeditions, sailing, flying, climbing, trade contacts, tourism, movement, migration contributed to the enrichment of various types of knowledge and ideas about the Earth and its regions, territories, fixed in a variety of forms. The modern era is characterized by the presence of communication networks, the Internet, television, satellites, unmanned vehicles for various environments, allows virtual travel, makes it possible to travel and explore without resorting to real movement in space, to survey and study the Earth and its territories using artificially created virtual reality, which affects the conclusions and thinking of researchers.

One of the earliest periods was the Phoenician exploration of the Mediterranean in 1500-300 BC. There is practically no documentary evidence of the routes of the Phoenicians, but they reached the shores of Britain. According to some researchers, the Phoenicians could have sailed to Central America, but no reliable evidence of this has been found. According to ancient sources, the founder of Carthage, Dido, was of Phoenician origin from Asia Minor. The Carthaginians continued to explore the Mediterranean and neighboring territories, in particular Gannan (500 BC E.) explored the west coast of Africa. An ancient Greek researcher from Massalia (modern Marseille) Pytheas (c. 380 - c. 310 BC) was the first to circumnavigate Britain, explore Germany, and, according to him, reach the legendary land of Thule.

In ancient Greece, Xenophon drew attention to the importance of goods and money for the economy. Plato emphasized the need for foreign trade for the existence of the state, Aristotle created the doctrine of interest as a way to create wealth, accumulate the owner's capital, and develop trade and agriculture. His "Chremastics" was the science of increasing wealth, capital, and trade exchange.

In ancient Rome, the basis of the economy and production was expansion, the development of new lands and inhabited territories. The concept of expansion comes from the Latin word *expansio*, which means expansion, and is used to characterize the economic policies of companies, monopolies, and countries aimed at spreading

and expanding their spheres of influence in order to gain access to new or profitable markets for their goods, make investments, open access to the raw materials of territories, minerals, and bioresources. Cato the Elder (234-149 BC B.C.) introduced the concept of effective activity, work, linking the cost of it with the resulting final cost of goods and other factors. Marcus Terentius Varro (116-27 BC) combined the territorial organization of the economy with geographical aspects of efficiency, and Lucius Junius Moderatus Columella (1st century AD) drew attention to territorial factors, to obtaining greater profits and income through more efficient activities. The word "effect" comes from the Latin word effectus, which originally meant execution, action, and later – the result of an action or a consequence of what is happening due to certain causes, i.e. it had an assumed or established function of causality. The concept of efficiency also implies a functional assessment of the comparison of the result obtained with the required costs in the form of a ratio, difference, etc. Efficiency has various forms – for example, statistical or real, virtual or approved (program, plan), digital or fuzzy sets, dynamic or static, general or private efficiency, etc.

In Asia, the Chinese were engaged in the exploration of new lands, which in the II century BC. e. bypassed most of the eastern hemisphere. A Han Dynasty diplomat from 139 BC, Zhang Qian traveled West, trying to form an alliance with the Yuezhi against the Xiongnu steppe people. Despite the failure of the main task, Zhang Qian discovered the remnants of Alexander the Great's empire for Chinese civilization. Upon his return to China, Zhang Qian reported on his visit to Bactria and the cities of Ferghana and Sogdiana, and described the lands located to the west. In 1328-1333 . Chinese traveler Wang Dayuan made two voyages to the Indian Ocean, reaching Ceylon and India. In 1334-1339 he visited Africa. Later, the traveler and naval commander Zheng He made seven trips to Arabia, India, East Africa, Indonesia and Thailand. The Pacific region has been explored and developed by Polynesians for several thousand years. Moving from island to island on invented canoes, they reached New Zealand by 1280. The Vikings, moving along rivers and seas, explored the western part of the northern hemisphere in the period from 800 to 1040. Eric the Red (950-1003) from Iceland founded a settlement in Greenland, and his son, Leif Erikson, is considered the first European to land in North America. The development and development of fishing, marine and animal industries by the pioneers of Russia in those days in the northern territories made it possible to significantly replenish the state treasury and gain new knowledge in the geographical description of lands.f geographical expedition with assessment on historical data.

At the same time, it is completely silent that during the first caravan trip to Syria, Muhammad, where he was singled out from all the captains by the monk Bahira, was only 12 years old, and the meaning of what the Christian monk said to the head of the caravan and the boy's uncle Abu Talib was not to take the future prophet on future trips and to protect him from possible harm to him. And on the second trip to Syria with the caravan of his future wife Ha-didji bint Huweilid in 595, he was responsible for the success of this trade enterprise and provided a large profit to his mistress and future wife. Apparently, he did not have time to conduct religious conversations then. The Arab biographers of Muhammad do not talk about other allegedly "numerous" trips with caravans to Syria. For a more thorough study of these issues, in our opinion, we should first turn to the facts from the biography of the Prophet of Islam Muhammad. Arab sources provide evidence that neither the contents of the Koran nor the Sunnah of the Prophet Muhammad were strongly influenced by Judaism or Christianity.

It is a reliable and universally recognized fact that Muhammad did not know how to read and write ... The Koran says about it: "You have not read any Scripture before and have not copied it with your right hand" (29:48). Accordingly, Muhammad could not know the contents of the Bible from written sources. In addition, it is hardly possible to assume such a wide spread of Jewish and Christian religious literature in the VII at the beginning of the century, not only in Mecca and Yasrib (Medina), but also in Arabia as a whole. Written monuments were a very rare phenomenon for the culture of the central part of the Arabian Peninsula at that time, and manuscripts of religious content in Arabic or written in Arabic script could not exist due to the fact that a single language and its writing of the Arabs had not yet been formed by the beginning of the 7th century. Thus, it is hardly possible to assume that Muhammad and his companions could read the Bible or other religious writings. As noted above, both Christianity and Judaism have spread to the periphery of the Arabian Peninsula, in the south and north. Muhammad, with the exception of two short trips with caravans to Syria in 582 and in 595, lived his entire life until the beginning of the discovery in 610 in the heart of the desert of Arabia, the city of Mecca... (Zhamashev A., Talasbayev E. Al-Farabi Kazakh National University. Kazakhstan, Almaty, 2022).

In the Middle Ages, states encouraged foreign trade so that the most necessary goods would arrive with the trips of sailors and merchants to overseas, far or near countries. Theologians supported the ideas of foreign trade, justifying its godliness, only illegal trade was prohibited. Loans were used to develop trade and acquire property on the side, from which taxes and interest were collected. The economic teaching of Thomas Aquinas interpreted the acquisition and accumulation of property as a normal phenomenon, and the granting of a loan for its acquisition as quite legitimate, similarly, the collection of interest was considered as a reflection of its effective use through a measure of profit from the acquired property. But when the loan money was not used to purchase new or old useful property, then charging interest was considered illegal, unprofitable, and incorrect (Thomas Aquinas "The Sum of theology").

In the era of Great Geographical Discoveries, the period from the XV to the XVII century, Europeans discovered new lands and sea routes to Africa, America, Asia and Oceania. Among the significant researchers of this time: Athanasius Nikitin, who traveled to Persia, India and Turkey, and reflected the uniqueness of the state policy of the countries of those times in the field of financial and trade relations, existing trading systems in his book "Walking across three Seas"; Bartolomeu Dias, the first European to reach the Cape of Good Hope; Christopher Columbus, who discovered America in 1492 and carried out three more expeditions in 1493-1496, 1498-1500, 1502-1504 to the shores of fabulous India for spices and perfumes, as a result of which America was originally called the West Indies; Vasco da Gama, who circumnavigated Africa and sailed to India during his expeditionary voyages in 1497-1498; Vasco Nunez de Balboa, the first to reach the Pacific coast of America; Fernand Magellan and Juan Sebastian Elcano, who made the first circumnavigation of the world in 1519-1521; Jacques Cartier, who made the first map of Canada; Francisco de Orellana, the discoverer of the Amazon; Willem Janszoon, who was the first to reach the shores of Australia; and Abel Tasman, who discovered the island of Tasmania and New Zealand. Expeditions and geographical discoveries made it possible to publish the first printed Geographical Atlas. From the 15th to the 18th centuries, the Russian Pomors had superiority and even dominance in the knowledge of the Northern Ocean. And the Norwegian lands in the North represented a sparsely populated territory, but the end of the 19th century came and the situation changed to the opposite, famous travelers, geographers and explorers, polar explorers and explorers of the North and oceans were born. The reason for the success was the solution of complex tasks related to landscaping, development of companies, infrastructure and transport networks and hubs, and the transformation of territories into a sustainably developed economic region.

During the reforms of Peter the Great, the economic ideas of mercantilism turned out to be the most developed in Russia, which were very suitable for the trade policy of the time when money was considered the most important element of national wealth. To obtain them, the export of capital from Russia was limited, magistrates, commercial colleges, chambers of commerce and stock exchanges were created. Significant amounts of financial resources were invested in foreign trade, ports and a merchant fleet were built at the expense of the state budget, and shipbuilding was developing. The state actively supported the merchants in foreign trade operations. Numerous sales offices were established in different countries of the world. Expeditions were planned to India, Madagascar, the Arctic and Pacific coasts, America, Kamchatka and other regions. An active financial policy was pursued in the field of trade in order to send the surplus abroad. However, the effect of the ongoing reform and the planned expeditionary research of new markets and territories was not fully achieved due to the cessation of transformations and the country's economy entering a state of stagnation. But the Academy of Sciences was established, celebrating its 300th anniversary today, and subsequently launched extensive expeditionary and geographical research. Many northern seas, bays, straits, islands, and capes are named after Russian explorers, such as Vitus Bereng, Semyon Dezhnev, Krasheninnikov, Anton Chekhov, Andrei Popov, Admirals Makarov and Ushakov, and others. Russia also contributed to the discovery of Antarctica by the Russian naval expedition led by Thaddeus Bellingshausen and Mikhail Lazarev in 1820. The memory of her expeditions to the shores of Madagascar (island of Nusi Be), Corfu, Italy, Sicily, Mauritius, and North America is still preserved by the locals. The idea of expeditions from Russia to China by sea (NSR) was expressed back in 1525 by Ambassador Dmitry Gerasimov, simultaneously with the publication of one of the first Maps of Muscovy based on historical data.



6 In March 1918, the Russian Academy of Sciences decided to cooperate with the authorities in the field of natural resources research as part of the task of reorganizing industry and reviving the country's economy. In 1920, the old government of Northern Russia, headed by Miller, sailed from Arkhangelsk to England on an icebreaker. However, as part of the development of new regions of the country, expeditions on the Chelyuskin icebreaker along the Northern Sea Route continued, although the icebreaker sank in February 1934, compressed by ice in the Chukchi Sea. But 103 members of the expedition continued their research in difficult conditions, and the government sent ships and planes to the emergency area (pilots M. Vodopyanov, I. Doronin, I. Kamanin, S. Levanovsky, A. Lyapidevsky, V. Molokov, M. Slepnev received the title of heroes for saving Chelyuskin residents) and other funds. In 1934-1937, crews consisting of V. Chkalov, A. Belyakov, A. Baydukov, M. Gromov, A. Yumashev, S. Danilin, V. Grizodubova, M. Raskova, P. Osipenko, and others. They made numerous flights over the North and the Arctic and were presented with awards.

In 1938, polar explorers I. Papanin, E. Krenkel, E. Fedorov, P. Shirshov landed at the North Pole on M. Vodopyanov's plane and conducted scientific research in the Arctic for 274 days, also receiving the title of heroes for them.

4 In the 1950s, scientists made a significant contribution to the study of the Arctic and Antarctica, as well as the regions of the North. According to the program of the International Geophysical Year, the Mirny, Lazarev, Vostok, and other scientific stations were created. The exploration of the North Pole area was continued. Arctic research was carried out by 4 Arctic stations "North Pole" on drifting ice floes.

12 In Siberia, in the 1960s, a new scientific center was established – the Siberian Branch of the Academy of Sciences near Novosibirsk with more than 20 research institutes. The Academy of Sciences was given the role of the main coordinating center for the organization of theoretical research in the field of natural and social sciences, the coordination of academic, branch and university scientific research.

Modern research is conducted not only with the help of ground-based expeditions, but also with the involvement of aircraft and spacecraft, often using robotic means. The boundaries of research have expanded beyond Earth and include expeditions involving humans or automated stations into outer space, to neighboring planets and other astronomical objects. Huge opportunities have been opened up as a result of spacecraft expeditions beyond the Earth's atmosphere. With the help of heavy Proton satellites, it is possible to measure the spectra of cosmic rays, the behavior of photons and other particles when they affect the Earth's atmosphere, to study the energy activity of the Sun, the northern lights and the effects on climate and weather.

3 The use of computer technology makes it possible to more accurately process the research results obtained by space expeditions. In 2025, the media published the results of research on expeditions to Mars, Earth and the Moon in terms of agricultural development, climate and ecology. The economic estimates of the forwarding costs and the required time using a neural network and business are given (KP. 22-29.01.2025). Promising areas of research today are scientific research in the Arctic. They are needed to obtain accurate results of climate and environmental monitoring of the Arctic seas, the global climate, the natural diversity of the oceans, the development of world science and technology, and mapping of underwater areas of the seas (RG, 29.1.2025).

2 The relevance of effective management of the research field is growing from year to year, requiring continuous refinement of patterns of obtaining economic returns from the research and development sector. Scientists today are considering the mutual impact of development and financing in various countries of the world, on the one hand, and the state of relative per capita volumes of their economies, on the other. A range of indicators is used, including patent activity, research and development costs, the number of researchers and the number of publications in the publications included in the Scopus database, by subject area relative to the population of countries. It has been established that the closest relationship between the level of GDP at purchasing power parity per capita and indicators of scientific activity occurs for the total number of publications and for publications in the subject area related to economic disciplines. In particular, a formula for linear multiple regression of the interdependence of indicators of scientific and inventive activity of the countries of the world and the level of their economies was obtained. The formula includes per capita figures for the number of economic publications and research expenditures. Ensuring high spending on research and development is of paramount importance for modern economic growth. The overall high level of publication

3 activity, with a special focus on the development of research in the economic subject area, is considered important. Comprehensive ecological and archaeological expeditions today cover not only the Northwestern Federal District, but also many territories of the North and the Russian Arctic. They provide detailed information about events thousands of years and centuries ago and about events that took place millions of years ago.

In the Quaternary period, the natural evolution of vegetation cover was broken by the anthropogenic factor. According to the recent archaeological data, the first inhabitants appeared the European North-East more earlier, i.e. in the Middle Pleistocene, or in the Late Paleolithic Age 70,000 years ago (Guslitzer & Kanivets, 1965; History of the Komi ASSR, 1978; Podoplelov, 1985; Archaeology of the Komi Republic, 1997; Historical-Cultural Atlas, 1998).

The sites of primitives dating back to the beginning of the last (the Valday stage) glaciation are registered in the Pechora basin. The area became permanently inhabited since the Mesolithic and Early Neolithic (VIII – IV thousand years B.C.). Till 1st millennium A.D., the tribes living in the European North-East were mainly engaged in hunting, fishing, and gathering. These occupations did not lead to considerable transformation of ecosystems. Although science has established the disappearance of the woolly mammoth 4 thousand years ago.

4 On the whole, the analysis of available literature reveals that in the European North-East of Russia remote from the federal centre of the country, human press upon the environment became prominent in the 19th and 20th centuries. In the recent decades the mineral deposits (coal, oil and gas, gold) are intensively explored.

The Rusanov company and the White Sea Company were largest timber industrial companies at that times that felled timber in the Komi Region for export. In 1870 year N.I. Rusanov, a merchant from St.Petersburg, made a 18-years-long contract for logging 100,000 trees in the forestries of Yarensk and Udora and further rafting them to the town of Mezen (Tsivunina, 1951; Studies on History, 1955; Forests and Forest Industry, 1961; Bondarenko, 1979, 1986; Chuprov & Zabortseva, 1998).

The supplements to the contract that came into force in 1873 y. allowed to sell and float to Archangelsk town additional 25,000 logs. The State allotted to Rusanov 863,931.9 hectares of forest for logging. It was difficult to control and register timber felling on such a vast territory. The lumbermen hired by Rusanov felled the best wood even outside the allotted land and floated beams without registering them at the forestry authorities. Often cut trees were left to decay on the cutting area. In spite of the revealed deviations, in 1889 Rusanov prolonged the contract and continued logging at the same areas.

23 Since the end of the 19th century his agents came to the Ust-Sysolsk District. The White Sea Company organized logging in state woods in the Vychegda basin. In 1859-1885 y. the Company owned the saltern in Seregovo and 1,000 hectares of wood ascribed to the saltern. The Company supplied the saltern with planks and firewood and therefore lumbered the adjacent woods. Trade houses appeared at the end of the 19th century in Archangelsk, Mezen and Pinega towns. The trade houses were mainly organized by Russian merchants and rich peasants. Half of those capitalistic associations were business families (Bros. Volodins, Bros. Ruzhnikovs etc.).

Simultaneously, the afflux of foreign capital in Russia got stronger. The Swedish merchant A. Linbeck and trade house "Ulsen, Stampe and Co." Purchased the right for lumbering in the Pechora basin. Local merchants acted as agents and contractors of certain firms. Later some of them (A. Zaboev, A. Kuzbozhev, V. Oplesnin, A. and P. Shakhovs etc.) organized timber works of their own, but their contribution was negligible. The trade houses included industry as well: they initiated as commercial agreements between capitalists, but later involved felling and flitching (Bondarenko, 1979, 1986).

Joint stock companies as a new form of capitalistic associations evolved owing to extended timber felling and concentration of production and capital in timber industry of the North. Newly formed joint ventures, both Russian (Sokol, Nord, Baltic Trade Joint Venture, A. Ruzhnikov etc.), foreign (Pechora, Joint Stock Lumbering in North Russia, Timber Trade Society, Alcius and Co), or shared-stock (Archangelsk Saw-Mill Association, Stella Polare, Surkov and Shergold etc.).

Political reliability and economic independence of founders were the main criteria for licensing the joint-stock company (Bondarenko, 1986). Often the foreigners contributing finance to timber industry of the North, naturalized in Russia. Foreign capital played a secondary role in joint-stock companies credited by Russian banks. The number of joint-stock companies felling timber in the Komi gradually increased: 5 in 1905 y. and 12 in 1914 y. (total 30 associations) (Chuprov & Zabortseva, 1998). In 1906 year Russian and foreign merchants

(Surkov and Shergold community, joint-stock company Nord, trade house Ulsen, Stampe and Co.) – altogether 17 firms – united into the Union of Archangelsk Timber Merchants. Formally the Union declared promotion of timber industry and trade in the Northern region. In fact, it defended the interests of owners of saw-mills. With foundation of this syndicate, timber traders could purchase public forests on more higher profitable conditions. Timber floated by the Pechora was twice cheaper than timber floated by the North Dvina or the Volga. Besides, the monopolists bought the Pechora woodlands with the minimal extra charge, if with one at all. The forest was exported abroad, mainly to the markets of London. Timber felling reduced during the World War I owing to shortage of manpower, difficulties of transporting timber from the White Sea ports and forced expulsion of foreign merchants from Russia (Chuprov & Zabortseva, 1998).

From 1700 year upto beginning of 20th century near 2 thousands wooden vessels were built at the European North of the Russia. They were used for export of wood abroad without paying customs duties and tariffs and for other aims. In 1870 y. merchant N.I. Rusanov had concluded agreement with Treasury on cutting of ship-building and other wood on Mezen and Vashka for 18 years. Cuttings were also done by Ruzhnikovs, Ganneman, Petz, Steward, Ulsen, Stampe, Linbeck, Amosov, Surkov and Shergold. In Pechora basin cutting of wood had been done for Archangelsk port, fish branch and needs of the population for the whole century. Wood was departed by means of rivers and seas at northern traces in countries of the Europe and the Russia (Komi Affil., 1961).

In an article in the *Republika Gazette* (March 14, 2024), the Russian Geographical Society published information about the routes of three captains collected in the footsteps of lost Arctic expeditions in the early 20th century. There is an assumption that earlier than Vilkitsky, in the same year 1913, the missing expedition of the famous Arctic explorer Vladimir Alexandrovich Rusanov could have reached Severnaya Zemlya. Her tracks on the way to the archipelago were discovered in 1934. The last finds, presumably also related to the Rusanov expedition, were found in 1947 on the northeastern coast of Bolshevik Island, in Akhmatova Bay. The story of the discovery of the finds became the basis for Veniamin Kaverin's adventure novel "Two Captains", and the surname of the main character of the work, who discovered the Northern Land before Vilkitsky, Tatarinov, is an obvious artistic flip of the surname Rusanov. The unsuccessful organization of three geographical expeditions posed the problem of reasonably providing them with working capital and the resources and scientific materials necessary for expedition activities.

At first, the discovered new land of the archipelago was named the word "Taiwan" after the first syllables of the names of the expedition icebreakers "Taimyr" and "Vaigach". However, the archipelago was officially named the Land of Emperor Nicholas II in honor of the then reigning Russian Emperor Nicholas II on January 10 (23), 1914, when Order No. 14 of the Minister of the Navy was announced. Veniamin Kaverin's novel "Two Captains" says that Katya's father Ivan Tatarinov discovered Severnaya Zemlya six months before Vilkitsky, a fact that did not become known due to the missing letter of discovery.

In Grigory Adamov's novel "The Exile of Vladyka" (1946), the action also takes place on Severnaya Zemlya, on the island of the October Revolution in the Shokalsky Strait, where the underwater village of Cape Olovyan and mine No. 6 are located. In the memoirs of the head of the expedition to Severnaya Zemlya 1930-1932. George Ushakov's "On an Untrodden land" contains a description of the expedition events. Almost the entire country participated in supplying the polar expeditions of the 1930s with equipment and food. Armenia, for example, sent barrels of cognac for polar explorers and explorers of the North. It was used in the Arctic Circle for warming purposes. A circular letter from Arkhangelsk province emphasized that when exporting timber by sea, the government pursued a policy of increased supply of food and goods – bread, oats, tea, vegetable oil, cereals, and manufactures. Thus, when there was a shortage of capital, the labor and natural resources of the North became the main factors. Information about many subsequent northern and Arctic expeditions is contained in the Land Use Report/ Vegetation Analysis & Ecosystem Processes (2004).

In 2024, the 90th anniversary of the famous Arctic expedition on the Chelyuskin ship under the leadership of the famous polar researcher academician O.Y. Schmidt was celebrated, which, despite its legendary air rescue finale near the shores of Chukotka and Wrangel Island, Alaska in 1934-1935, made it possible to collect numerous information and scientific materials that made it possible to organize regular navigation in the future along the entire route of the Northern Sea Route (NSR). Today, the country has more than 60 powerful



icebreakers that allow year-round navigation and scientific expeditions to the North Pole through the ice at any time of the year. There are only 2 such powerful icebreakers in the United States. The country's icebreaking fleet is currently able to support ski, environmental and sports expeditions to the North Pole, Arctic islands and archipelagos, which have become quite frequent, especially recently, during the intensive development of Arctic tourism. At the Russian Vostok station in Antarctica in 2025. New buildings were put into operation to study the continental ice sheet and the climate of the planet, replacing the old scientific facilities that had existed since the mid-1950s. In the interests of global development in the North and in the Arctic, FSAU Scientific Research Institute Center for Environmental Industrial Policy and JSC Marine Arctic Geological Exploration Expedition are currently working, summarizing the scientific results of the 300-year work of the Russian Academy of Sciences in this field of research.

In the 1980s and 1990s, planned methods of supplying and delivering products to organizations under limits were developed as a matter of priority in the implementation of external relations. The efficient use of allocated working capital was economically stimulated. Scheduled deliveries to organizations developing external relations were subject to economic benefits in accordance with the regulation "On the procedure for forming government orders for 1989 and 1990." The management of allocated working capital for the purposes of external relations of organizations was carried out in two ways: according to static standards, based on comparisons of standards with actual values; according to the maximum-minimum system, when minimum and maximum levels are set for each required element or resource when calculating the limits of working capital for assessing the financial situation.

For all types of working capital immobilization, deadlines were set, the causes of tension with supplies and resources, responsible and ongoing measures to save or release allocated funds, and to calculate time indicators. The time of the actual funds on the way (in days) was determined by the formula by dividing the available balance of funds and material assets on the way by their one-day expenditure according to the cost estimates. Formulas of arithmetic or geometric progressions were used to obtain individual totals. The resulting time indicator was usually adjusted to take into account transport and other conditions. Budgetary funds and bank loans were also widely used as sources of financing.

On December 1, 2006, the Duma of the Taimyr (Dolgano-Nenets) Autonomous Okrug adopted a resolution proposing to return the former name of the Severnaya Zemlya archipelago to the Land of Emperor Nicholas II, as well as rename Maly Taimyr Island to Tsarevich Alexei Island, October Revolution Island to St. Alexandra Island, Bolshevik Island to St. Olga Island, Komsomolets — to St. Mary's Island, Pioneer Island — to St. Tatiana's Island, Domashny Island — to St. Anastasia's Island, which increased the interest of the Russian Geographical Society in the northern odysseys.

Regional media published reports on northern expeditions in the Laptev Sea, on the Novosibirsk Islands, Sannikov expeditions, the search for Sannikov Land 60-80 miles from the islands, 2 islands beyond the Novosibirsk Islands. On March 14, 2024, a large article "Routes of the Three Captains" (Georgy Sedov, Georgy Brusilov, Vladimir Rusanov) was also published. Based on the materials of V. Kaverin, the Russian Geographical Society presented information and held an exhibition of the Museum of the Arctic and Antarctic (Non-accidental accidents: in the footsteps of lost expeditions) in the Department of Nature of the National Museum of the Republic of Kazakhstan (Syktyvkar, 03/14/2024). Many theatrical productions were created based on their motives, for example, the Sevastopol Waltz, a romantic story of love, loyalty, friendship and sea brotherhood (Opera and Ballet Theater of the Republic of Kazakhstan, March 20, 2024). A message was received from the Ural Branch of the Russian Academy of Sciences about the conference "The Russian Arctic: New Meanings and Values" (10/17/2022) during the celebration of 311-The anniversary of M.V. Lomonosov (Arkhangelsk, 2022), on the Lavery readings (Arkhangelsk, 2023) (Science of the Urals, No. 22-23). It is also interesting to hear a message from the Russian Geographical Society regarding Arctic research and activities of the Russian Geographical Society (Sevastopol, 03/5/2023). In addition, according to the approved plan and the state task for 2024, fundamental scientific research was carried out at the ISEiEPS of the KSC Ural Branch of the Russian Academy of Sciences on the following topics: "Human resources of the northern regions of Russia: development potential or limitation of economic growth", "The real sector of the economy of the northern regions of Russia: problems and prospects", "Digital bioeconomics of the Northern region: approaches and directions of

formation", "Development of a methodology for creating a backbone transport network of the European and Ural North of Russia", "Scientific foundations of energy transition research at the regional level", in addition, the Institute staff carried out regional, applied and other scientific research, conducted research funded by the Russian Science Foundation. Modern territorial research is the main method of obtaining primary geographical materials used in geographical research. Territorial surveys are conducted by expeditionary and stationary methods and are accompanied by mapping. People who carry out territorial research are called researchers. They can be either scientists, or travelers, merchants, or military, but they make up a description of new territories in the course of fulfilling their main practical tasks. For example, Artur Chilingarov, an academician of the Russian Academy of Sciences, who previously headed the Russian Geographical Society, was an outstanding polar explorer who received the country's highest award, the Golden Star, and the title of hero twice. In modern Russia, only three more have been awarded the same award: two near-space researchers and one atmospheric researcher, a pilot by profession. The Republic of Kazakhstan has its own researchers who have visited Franz Josef Land, the North Pole (2023), the territories of Chile and Argentina (Punto Arenos; Union Glacier, etc.), which are the starting points for exploring the South Pole of the Earth - the territories of Antarctica, discovered by the expeditions of M. Lazarev, F. Bellingshausen, R. Amudsen and others. R. Scott in the 19th and 20th centuries.; on the mountain peaks of the North Caucasus (Elbrus, Kazbek, etc.), Tibet (Everest), the Circumpolar Urals (Narod), Africa (Kilimanjaro), Antarctica (the highest point (4892 m) of the Vinson massif). The aim of the regional researchers is to tell the world about the Republic of Kazakhstan, its sporting achievements (including in mountaineering, skiing and water sports, tourism and travel), touching on the history of geographical discoveries, ecology, awareness of the heroic deeds of previous polar expeditions (O. Olshanskaya in the literary note "Conquerors of Antarctica", 2025).

In 2023-2025, expeditions under sail, boat expeditions on oars and alone were seen in the Arctic and Antarctic Seas by the media. Fyodor Konyukhov, a member of the Russian Geographical Society, has made numerous sailing and rowing expeditions in northern and Arctic waters, on a yacht in the waters of the Atlantic, Indian and Pacific Oceans, near Antarctica and between Australia, Latin America and South Africa. Hiking on nomads, Varangian ships, rooks, tugs or sailing ships along the rivers and lakes of the North is becoming widespread. Earlier, an expedition by Dmitry Shparo and others took place under the auspices of the Geographical Society. to the North Pole in 1979 (May 31) from Henrietta Island on skis – about 1,500 km (77 days). This was reported by the regional newspaper (Republic, dated 05/30/2024). The Russian Geographical Society published a story about the routes of the pioneers of the Russian Far East ("Pioneers of the Far East"). Information about the expeditions was posted on the Internet in 2024. The media also reported on a balloon expedition near the NSR highway from the Kola Peninsula to the airport in Khatanga (03/26/2023). Materials about the expeditions of polar explorers are also available in the archives of the KSC Ural Branch of the Russian Academy of Sciences. The green light of ecotourism is visible today on the route Dyatlov Pass – Manpupuner Plateau (Ministry of Natural Resources and Environment of the Republic of Kazakhstan and the International Autonomous Non-commercial Association "Northern Urals", 2023-2024). There are also trips from Komi and Arkhangelsk, from Murmansk to the Svalbard archipelago, Solovki, Rybachy Peninsula, Vaigach and Novaya Zemlya, Franz Josef Land, including for environmental purposes. Information about the expeditions of the Komi Branch of the Russian Geographical Society to the basins of the northern Ukhta and Sula rivers was reviewed at the Syktyvkar Geographical Seminar of the Komi Republican Branch of the NGO "Russian Geographical Society" at the Komi Republican Academy of Public Administration and Management in December 2024. During the meeting, regional researchers of the North and tour operators assessed the tourist expedition season of the Komi Republic in 2024 in the Republic of Komi. In the IB Ural Branch of the Russian Academy of Sciences (2023), during expeditionary research (2017-2023) and scientific experiments (2020), it was revealed that logging by harvesters and forvaders affected the environment of the northern region, relationships with business companies, carbon deposition in the North in forest ecosystems, and forest lease by companies affected rare species of flora and fauna, routes of movement, places and territories of habitat. In the Ministry of Construction of the Republic of Komi, regarding the roads of Pechora, it was noted in the materials for the session of the Komi State Council that the passage of 1 large truck is equal in terms of the impact on nature and roads to the passage of 5,000 passenger cars. The Republic was counting on government assistance to compensate for the effects, to provide

3 higher incomes for northerners and polar explorers, to receive comfortable housing under the program for the  
3 resettlement of part of the population from the Far North and equivalent areas, and to finance environmental  
programs of the Ministry of Natural Resources and Environment of the Republic of Kazakhstan within the  
specified time frame and in sufficient volume. PSU believes that "a promising approach to the spatial  
development of the studied regions is the ecosystem model of territorial development, in which the unit of analysis  
is the territorial ecosystem." RAS advisers drew attention to the North Arctic forms of economic and life  
management, the integrated use of natural resources, taking into account the urgent need to increase Russia's  
3 technological self-sufficiency, and the creation of bridgeheads for the development of Arctic resources (The  
25 portal of the Great Russian Encyclopedia, 2024 <https://bigenc.ru/c/severnyi-ekonomicheskii-raion-3f55a1> ).  
3 Rosatom State Corporation believes that 160 high-ice-class vessels will be required to operate on the Northern  
Sea Route (NSR) by 2030. There are 30 units operating at the NSR today, 33 units are under construction, and 97  
units need to be built. For expeditions to the NSR, ships are built and repaired by PJSC NOVATEK, PJSC NK  
Rosneft, PJSC Gazprom Neft, JSC GTLK, NOREBO Holding, the Non-profit Partnership Northwest Fishing  
Consortium (NWRC), and foreign companies from South Korea, Japan, and Norway. 2 thousand of them are  
employed in fishing and marine management activities in the country: 320 units in the Northern Basin, 1,420  
units in the Far Eastern Basin. (Kola Scientific Research Center of the Russian Academy of Sciences, 2024).

4 In 1935, the country joined the Svalbard Treaty and received the right to extract Arctic resources. In  
3 2024, Russia owned 4 villages in Western Svalbard (Grumant): Barentsburg with the mine, Pyramid, Grumant  
with the Colsbey mine, the Bohemian Tundra site. For the first time, a unique symbiosis of cultures and places on  
this part of the Arctic map was noted. Once a month, a ship with food and manufactured goods sailed to  
Barentsburg. The West Svalbard Current of the Norwegian Current passes near the islands, which is a branch of  
the Gulf Stream, which significantly affects the climate of Northern Europe and the Arctic. There are search  
works, geographical and historical, ecological studies on Archipelago. Today, in Russia, in the Republic of  
Kazakhstan, in Syktyvkar, and elsewhere in the country, a new view of the Arctic is being formed in the field of  
education and administrative management of the Ministry of Defense through understanding the heroic past of  
the Arctic, the northern regions of the country and its foreign neighbors, lessons for the future, taking into  
account the facts of caring for the nature of the Arctic, its preservation and development in the scientific  
paradigm of generational change, which, however, is not supported by all modern researchers and thinkers.  
Within its framework, young people are encouraged to take a more active part in new Arctic projects, to study the  
lessons of the Arctic and to understand its historical significance and to form a memory of the country's heroic  
past in the development of the Arctic and adjacent islands, territories and regions.

3 To determine the effect of an expedition company in modern scientific literature, the economic category  
2 "capital" is used, which is now beginning to be applied to a wide range of company assets that can bring  
2 economic benefits over a long period of time. Researchers usually identify human, intellectual, social, network,  
and other types of capital. This makes it important to develop new approaches to the assessment of various types  
of capital used in expeditions, taking into account their complementary specificity. Within the framework of  
scientific publications, the task was set to propose a new approach to assessing the company's network,  
environmental, resource and other capital.

2 Existing methods of estimating the value of a company are usually based on summing up the values of  
2 individual types of capital. However, the additive approach does not take into account the complementary nature  
of different types of capital. The researchers propose using a multiplicative approach based on a modified Cobb–  
Douglas function that takes into account the available property and network capital, as well as the economic  
efficiency of the company. The conclusions of the scientific conference state that based on the analysis of the  
sustainability of the capitals created as a result of the activities of ecosystem actors, it was first of all revealed  
16 that the higher the level of capital use, the lower the entropy and the higher the stability of the territory (Luzinsky  
Readings-2024).

2 This approach takes into account the complementarity of different types of capital and their cumulative  
2 impact on the cost of the forwarding company. According to the available data, this approach makes it possible to  
compare the network capital of different companies and identify the factors influencing its accumulation. An  
important task is to model and optimize the ways and timing of the operation of the production assets used, and



improve methods for assessing business sustainability, taking into account emerging challenges. As Prof. Agarkov S., the world is entering an era of unlimited communication, when the focus of the competition for geo-economic leadership is not on natural resources as such, but on the ability to manage their flows in a multidimensional communication space, ... its leaders will be countries that have no restrictions on the movement of resources. Based on the application of the ecosystem approach, which involves taking into account the triad of humanitarian, technological and environmental symbioses, the system of state support is being optimized through the targeted linking of package measures to a specific ecosystem (industrial, entrepreneurial, innovative, etc.) and an alternative ecosystem organizational and economic model of development and the sustainability of actors' capitals is being created (Luzin Readings – 2024: section – Technological development and natural capital).

The development of technology and automation of production and research processes often lead to a decrease in the specific volume of labor employed in them. For a single-product dynamic model of replacement of production assets, which takes into account the inertial properties of the funds being introduced, the case of a reduction in the volume of labor resources was investigated under the condition of growth and attraction of capital investments. The Central Research Institute of the Russian Academy of Sciences has obtained a solution that makes it possible to determine the optimal strategy for withdrawing obsolete funds and introducing new, more advanced ones in the event of a decrease in labor resources. The principle of differential optimization was used as an optimization criterion, and the development of modeling tools for their distribution was taken into account.

The Central Research Institute of the Russian Academy of Sciences also presented a model for the dissemination of network innovations based on physical approaches and describing the stages of accelerating and decelerating growth. It uses a diffusion model to describe exponential growth, and an electrical model to describe logarithmic growth. The correspondence of the physical parameters to their economic counterparts is noted: the size of the company, the characteristics of the speed of information exchange between companies, the willingness of companies to innovate, the influence of companies on each other and the breakthrough level of innovation.

And in the Republic of Komi, about 0.5 billion rubles of budget funds were raised in 2020 for the implementation of measures within the framework of rural development programs, and in 2023 – already 0.7 billion rubles, however, in 2024 the deficit of municipal budgets will amount to almost 0.5 billion rubles, although 2.5 billion rubles were previously planned (mass media, dated 12/24/2024).

Today, the economic efficiency of investments is often determined by the difference between cash receipts and expenses in a given area of activity. The commercial activity of a research company is expressed through an increase in funds in the form of net discounted income, which is defined as discounted net income accumulated over the accounting period, calculated by summing net income over the years multiplied by the discount factor, or discounted profit growth over the years minus the outflow of funds. It is customary to call effective research works that ensure the non-negativity of net discounted income.

The relationship between the size of the budget deficit and the rate of inflation is considered in many works of economists. For example, A. Pigou, in his concept of welfare, believed that the welfare of society depends primarily on the production and distribution of national income and its real size. This followed from the ideas of A. Smith and D. Ricardo. However, if the social welfare is changing significantly, then there are two approaches to improvement: the first is to evenly distribute the available real incomes in society, the second is to increase the amount of utility in the distribution due to the cost-effective allocation and use of economic resources, when the costs of labor, capital and land remain the same. Achieving well-being without government regulation and market control then becomes difficult. Therefore, in order to satisfy the public interest, the Government strives for a more active economic policy to create or achieve well-being in general. The results are covered in reports, publications of reports and other scientific publications.

**Conclusions:** The analysis and study of geographical expedition materials using the ecomodel can be complemented by the organization and practical functioning of created expedition research data banks, using modeling methods for processing, using and analyzing expedition databases and data banks on them, with the development of DBMS (database management system), transformation and research of data banks on current, prospective, and completed geographical expeditions.

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