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## Assessment of the Governance of Arctic Cities in the Resilience Context \*

**Aleksandr N. Pilyasov**<sup>1,2✉</sup>, Dr. Sci. (Geogr.), Professor

**Varvara A. Molodtsova**<sup>3</sup>, Junior research fellow

<sup>1</sup> Institute of Regional Consulting, Nakhimovskiy pr., 32, Moscow, 117218, Russia

<sup>2</sup> Lomonosov Moscow State University, Leninskie gory, 1, GSP-1, Moscow, 119991, Russia

<sup>3</sup> National Research University Higher School of Economics, Pokrovskiy bulvar, 11, Moscow, 109028, Russia

<sup>1,2</sup> pilyasov@mail.ru ✉, ORCID: <https://orcid.org/0000-0003-2249-9351>

<sup>3</sup> vmolodtsova@hse.ru, ORCID: <https://orcid.org/0000-0001-8226-4824>

**Abstract.** The aim (research question) of the paper is to theoretically comprehend and empirically generalize the phenomenon of governance of Russia's Arctic cities in the context of their resilience (resistance to shocks and crises). The main tasks to be solved are: 1) searching for specific indicators to characterize the administrative and managerial system of a sample of Arctic cities; 2) distinguishing the types (groups) of Arctic cities according to the selected indicators of administrative and management system; 3) characterizing the local government structure of the three Arctic cities in the context of the previously conducted typology of Arctic cities according to the parameters of administrative and management system. The main results of the work are: 1) determination of the range of indicators (six) for assessing the quality of management of the 29 largest Arctic cities in terms of strengthening their resilience: these are indicators of openness to the outside world (“basicness” of the city); governance efficiency, degree of independence of decisions of city authorities; 2) identification of five clusters of cities with similar properties of the administrative and managerial subsystem: compact high-quality management, “low-cost” municipal management, “strong average” cities, significant reserves for improving management efficiency, case-anomaly; 3) institutional and geographic factors, acting together, determine the appearance of the administrative and managerial subsystem of the Arctic city. Among geographical factors, it is not latitude but longitude that is the location of the city in the European or Asian Arctic that is of primary importance; 4) For Arctic cities, where frequent natural and social force majeure demands a super-operational response to external threats, the model of power with a strong mayor is in most cases preferable to the “consensus” model of collective leadership with a weak mayor; 5) the ideal administrative and management system of the city, which implements the imperatives of basicness/openness, efficiency and autonomy to the maximum extent, and guarantees the city resilience, should have nature-like properties of self-organization, plasticity, flexibility, mobility and diversity. Their strengthening is provided by rejection of unification, including the ultimate consideration of specific features of a particular type and exploitation phase of the main natural asset nearest to the city.

**Keywords:** *Arctic city resilience, administrative and managerial subsystem, Arctic city management quality assessment, BES-model («basicity»-efficiency-self-sufficiency), environmentally compatible technologies and practices*

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### **Introduction**

Among the five main urban subsystems that affect the resilience of the Arctic city, identified in the work of N. Zamyatina and co-authors [1], administrative and managerial one is of particular interest. Firstly, there are practically no special works on the peculiarities of managing Arctic cities either in Russia or in the world. This topic is dominated by works of a very wide profile: for example, the state administration of the Arctic zone as a whole, the Arctic “megaproject” [2] or work related to international cooperation in the Arctic and management of its problems through new structures created for the global Arctic in the 1990s and 2000s (Arctic Council, Conference of Parliamentarians of the Arctic Region, University of the Arctic, etc.) [3].

In Russia, the topic of managing Arctic cities is adjoined by the topic of “reloading” of single-industry cities [4–6], without a clear specification of a specific natural zone, and they, as a legacy of the industrial era, are found everywhere, both in the temperate zone of the main Russian settlement and in the North zone, and in the Arctic zone. Foreign literature develops the topics of urban management (and co-management) in general, and a significant pool of literature (dozens of works) in this direction has been accumulated in recent decades [7]. However, due to the significant specifics of the cities of the Russian Arctic, the conclusions from these works are difficult to apply. For our study, the efforts of colleagues to describe management under force majeure in the interests of ensuring the viability of socio-economic systems are of relevance [8]. But these works do not have a geographical (latitudinal) reference.

There are works on the factors and assessment of resilience of the world's Arctic cities that have appeared in recent years, which use, among others, the indicators that can be related to the administrative and management system of the city [9]. However, in this case, which is closest to our topic, the administrative and management system of the city is not distinguished separately, it is just that in the general pool of attracted indicators of urban sustainability assessment, there are those that can be conditionally attributed to the management system.

Secondly, in our practical work on the preparation of strategies for the socio-economic development of the Arctic and northern cities, we have always analyzed the state of the local government system, the quality and efficiency of local authorities (city self-government bodies). But previously, it has not been possible to summarize this accumulated experience in the form of a separate work, in the form of an analysis of the activities of the administrative and management system of the Arctic city in the framework of the resilience paradigm. Such an effort therefore seems timely, urgent and relevant.

Here, for example, is only a short list of questions that need to be addressed scientifically: What exactly are the particularities of governance in an Arctic city compared to a non-Arctic city of comparable size? Is and how is the management of an Arctic city changed during the transition from the state to the corporate model of Russian Arctic development? Do management issues differ in the coastal and "land" expanding Arctic cities?

Thirdly, in the last decade, a new idea of Arctic urbanization has been maturing as a holistic and specific phenomenon that requires a separate study [10–12]. Therefore, it seems relevant not only to isolate the Arctic cities into a separate production, but also to study the phenomenon of Arctic management, the activities of the urban administrative and management subsystem, taking into account the significant diversity of situations within the Arctic itself. This is also a theme we have focused on in this paper.

The purpose (research question) of the work is to theoretically comprehend and empirically generalize the phenomenon of managing Russian Arctic cities in the context of ensuring their resilience (resistance to shocks and crises). This goal determined the solution of three tasks: 1) search for specific indicators to characterize the administrative and management system of a sample of Arctic cities; 2) isolation of types (groups) of cities in the Arctic according to selected indicators of the administrative and management system; 3) characterization of the structure of local government of the three cities of the Arctic in the context of the previously conducted typology in terms of the parameters of the administrative and management system.

The information basis for this work was provided by municipal statistics, strategies for socio-economic development of Arctic and Northern cities that we have developed, and the work of colleagues on the resilience and sustainability of the world's Arctic cities and the forms (methods) of its measurement.

### ***Methodology and research methods***

The peculiarity of studying the administrative and managerial system of an Arctic city is that this research is always ideological. The fact is that, depending on the ideological framework in which the research question is posed, it sounds completely different.

In the logic of liberal and market administrative and management system, it remains to “adjust” the urban development that the market could not regulate; in other words, the object of local administrative regulation is formed on the residual principle, as one of many others, one might even say, closing. On the other hand, the administrative and managerial block is central in the logic of state dirigisme, active influence on the course of socio-economic processes and the entire dynamics of urban resilience, all others depend on it, and it sets the goal-setting for the work of the rest — socio-cultural, economic specialization and life support, even natural and ecological blocks.

Our approach is that it is the central unit of the entire urban system, which significantly affects the overall resilience and its dynamics. The argument for this approach was our entire experience of interaction with the authorities of the Arctic cities, where the extent to which the city will survive the challenges of radical economic reform and the deep economic crisis in Russia in the 1990s and early 2000s depended on the skills and competence of the particular government and the assembled team of local officials. It was this living experience, familiarity with specific management practices of survival that convinced us that in such bifurcation situations, the man-

agement factor, the quality of the administrative and management system can decisively influence the choice of a new one — depressive-crisis or successful, upward — trajectory of city development.

In this work, we understand the management of Arctic cities as a process that is the result of the activities of the administrative and management system, which includes structures (departments, committees, administrations, offices) of the city municipal government and various authorized structures in the form of municipal unitary enterprises, autonomous non-profit organizations, agencies, non-profit partnerships, etc. Over time, the size and content of this system can both expand enormously, which was characteristic of the Soviet era of total nationalization, and shrink, which was typical for 1990s radical market reforms in Russia, in the Russian North and in the Arctic. Now, we are witnessing a slow expansion of this system from the extremely compressed state of the 2000s.

The target function of the process of managing Arctic cities (activities of the administrative and management system) is to strengthen the resilience (anti-crisis stability) of the city. In the Arctic, every (even a relatively large) city faces the threat of non-existence, i.e. transformation into a shift settlement. The amplitude of constant and typical for the city pulsations can, at some catastrophic moment, lead to standstill of year-round life and transition to seasonal type of existence. So, the activity of the administrative and managerial system of the city must be assessed by whether it expands the horizon of the city's existence, or, conversely, narrows it to the extreme, to the point of turning into a shift camp. This question is directly related to the specificity of the Arctic city. Its viability is unambiguously determined by specificity.

The realities of the 1990s crisis showed that if the local authority fought desperately to strengthen the specificity of the city, to emphasize and reinforce it, to protect the uniqueness and separateness of the city and its unique functions, it managed to save and conserve the city for the future. If it surrendered to the "mainland" standard of unification and devalued (exchanged it for the promises of a great shift future) its specificity, then the city became doomed to radical depopulation, lowering of status, and, in the limit, closure. Therefore, the smart management of the Arctic city is a full-fledged accounting and strengthening of its specifics and differences from the mainland counterpart. It works directly to ensure its resilience.

But the question arises: in what ways is the Arctic city's specificity and uniqueness being strengthened? These are, for example, new basic functions for the surrounding area or the whole country or even the whole world. Thus, Reykjavik is desperately fighting to become not only an air but also a maritime hub between the US and Europe. This is the acquisition of new competencies and the radical strengthening of local human capital, including through the development of local scientific and educational structures. So, for example, the University of Alaska invited the Nobel laureate in economics to radically increase its specificity and its home city — Anchorage. This is the strengthening of local specifics, including through new unique material assets. For example, the city of Gubkinskiy gained an advantage due to the construction of a swimming pool with a

unique 50-meter walkway (all neighboring cities have swimming pools, but with a 25-meter walkway).

Here we are talking about the man-made strengthening of the specificity of the Arctic cities through the activities of the administrative and management system. But the Arctic cities already have an important special feature compared with the “mainland” cities. What is this specificity?

Arctic cities, much more than cities in the temperate zone, tend to have a structure-forming organization, which is a “support” for others, cementing the urban system into integrity. In one city, it is a city-forming economic enterprise, in another one — it is an educational structure, in a third one — it is a structure-forming airport or military unit, etc. The internal system of an Arctic city always needs to be “physically” based on something, just to exist. This is its internal feature (the forms of its manifestation from city to city can be diverse).

The external feature is that the Arctic city itself plays the role of a support base for the surrounding territory in most cases. It is not the Christaller’s central place of social services, for which there is simply no population around, but the supporting production base from which production is carried out, including rotational activities for the surrounding resource industries.

Another feature of the Arctic city: even if it is not directly engaged in resource extraction, its vitality, dynamics of development are directly connected with the dynamics of extraction of neighboring natural resources. The life cycle of resource development determines population fluctuations and migration to and from the city, and many other socio-economic processes.

These super-significant external interactions, on which the very life of the Arctic city depends, denote its extremely open character, open to the outside world. In this sense, it is a miniature of a global city. It is greatly aided here by waterways, both sea and river routes, which many cities of the Arctic use to “communicate” with their patronized external environment.

One could say that there is a paradox here: the resilience of the Arctic city is an internal phenomenon but it depends crucially on the external interactions of the city. The administrative and management system has an overriding responsibility to link, integrate the inner city and the effectiveness of its external interactions, on which the very future existence of the Arctic city depends.

The management of Arctic cities, in order to be successful in strengthening their resilience, must be smart in terms of emphasizing and strengthening their specificity, adaptable to rapidly changing natural and economic conditions (for example, climate change in recent decades) and work to increase the reserves of internal systems (intelligence, energy, food, etc.). Only management, which does not deplete, but increases the supply of urban reserves, is effective.

### ***Main results***

#### ***1. Selection of indicators for assessing the quality of management of Arctic cities to strengthen their resilience***

The task was to compare the largest cities of the Russian Arctic (29) in the “management” block, which, along with other blocks, is designed to strengthen the resilience of Arctic cities in response to natural and social challenges and disasters. As part of the overall concept of Arctic city resilience, governance is designed to a) strengthen its openness to the outside world and the success of its basic functions for the surrounding area, flexibility and innovation; b) effectively (rationally, economically) mobilize key assets and multiply them; and c) strengthen the financial, economic and administrative autonomy of the city. The set of indicators that is able to characterize these three most important vectors of sustainable management (we call it the “**BES model**” — basic economy, effective management, self-sufficiency) differs from standard and well-known indicators of municipal management efficiency.

About two tens of indicators of municipal statistics, which are being developed for urban districts and characterize the parameters “basicness/innovativeness” (B); management effectiveness (E) and self-sufficiency (“control of the city of its own destiny”) (S), were preliminarily calibrated:

*B5 (basicness/innovativeness/openness to the outside world):*

- employment in the basic sector, oriented to external markets — through the average number of employees of organizations by actual types of economic activity;
- share of shipments of own production in the basic sector of the city's economy — through the indicators of shipments of organizations by actual types of economic activity;
- number of municipal services provided by local governments, municipal institutions in electronic form (the degree of implementation of digital technologies);
- level of education (per 1000 people aged 15 and over, indicating the level of education);
- cost of contracts (per year) for the purchase of high-tech and innovative products.

*E9 (management efficiency, including the main assets of the city):*

- budget expenses of the municipality for the maintenance of employees of local governments per one inhabitant of the municipality;
- surplus (+), deficit (-) of the budget of the municipality (local budget), actually executed;
- number of municipal officials per 1000 residents of the city — through the number of employees of local self-government bodies at the end of the reporting year;
- share of fixed assets of organizations of municipal ownership that are in bankruptcy in the fixed assets of organizations of municipal ownership (at the end of the year, at full book value);
- volume of construction not completed within the established time frame, carried out at the expense of the budget of the urban district (municipal district);
- share of the area of land plots that are objects of land taxation in the total area of the city district (municipal district);
- share of apartment buildings located on the land plots with the state cadastral registration;

- number of municipal services provided by local self-government bodies, municipal institutions;
- total area of dilapidated residential premises and emergency residential buildings.

*S3 (self-sufficiency):*

- administrative status (expert score);
- share of own revenues of the local budget (with the exception of gratuitous receipts, receipts of tax revenues under additional standards of deductions and income from paid services provided by municipal budgetary institutions) in the total volume of revenues of the budget of the municipality;
- investments in the fixed capital of organizations of municipal ownership (without funds for shared construction of organizations of municipal ownership);
- investments in fixed capital at the expense of the budget of the municipality.

As a result of repeated testing of indicators for multicollinearity, reliability/political motivation, monotony/provision of geographical differences across Arctic cities, only six indicators were left in the final set, the rest were excluded. The main criterion for their capacity: each provides a significant amount of information in the distribution of values across a sample of cities, while not duplicating the other five left indicators, that is, it actually carries new information about the work of the administrative and management system of the city.

The *first* indicator reflects our five-point assessment of the strength of the administrative status of the city (how far this city extends its influence on the surrounding territory — based on the hypothesis that it is critical for the viability of a typical Arctic base city to have influence on the external space). The high administrative status of the city indicates significant independence in making decisions about its development (regional center, district center, single-industry town — the center of the urban district, port-district center, etc.). It is clear that a mere city within an urban district has a weaker status than the center of an urban district. The question of who has the “greater” status in terms of independence in making decisions on their economic fate — the center of a city district or the center of a municipal district — was determined individually for a particular city, taking into account the values of other indicators.

Not only the official status of the city (regional, district, center of an urban district) was taken into account, but also its informal influence on the surrounding territory as an outpost development base typical of an Arctic city. Therefore, in a number of cases in our expert assessment, the actual score turned out to be higher or lower than the formal administrative status of the city.

The *second* indicator of the share of own revenues in the city budget (average for 2017–2019) gives a concise description of the degree of independence of decisions made in matters of local development: how much are they provided with their own financial resources? To what extent does the city control its own destiny? The ability to have their own sources of budget revenues is critical for sparse cities in the Russian Arctic and relatively more important than for cities in

the main settlement zone. This is because their own financial and budgetary capacity allows them to mobilize resources promptly in times of crisis and disaster, even before the arrival of federal assistance.

The *third* indicator of the share of apartment buildings located on land plots with state cadastral registration (as a percentage) reflects the diligence of local authorities in establishing local control and registration. Unfortunately, other (and more reliable) indicators in this area, such as the number of days to take a decision on approval of a land plot for residential construction, are not currently being developed. Therefore, our search was extremely narrowed and forced us to use those indicators that are developed annually for all cities in the Arctic.

The *fourth* indicator of municipal budget expenditure on the maintenance of local government staff per resident of the municipality (average for 2017–2019, in rubles) reflects the resource intensity of local government as a whole. It is assumed that there is a certain average norm for sustainable management, because both the maximum and minimum values characterize the presence of problems within the city management system (irrationality, overstaffing or vice versa, extreme, up to a shortage of competent specialists, tightness).

The *fifth* indicator of the number of people employed in the public administration and military security, social security per 1000 population (average 2017–2019) reflects the size of the governance sector in relation to the overall size of the city. It is important to find inherent optimum, based on the features of economic and geographical position, sectoral structure, basic functions, etc. There is no one general optimal solution here: what suits one city, definitely does not suit another. But on average, “corporate” single-industry cities have a lower value of this indicator than the cities of “white-collar”, budgetary services and non-manufacturing commercial services.

The *sixth* indicator of budget expenditures per inhabitant (average for 2017–2019, rubles) reflects the amount of financial resources of the authorities for a quick response to crises. This is not the size of the city’s economy and this is not the volume of the city budget, it is precisely the resource equipment of the authorities, which is important for crisis situations, what can be quickly mobilized.

The resulting indicators differ significantly from the initial pool of indicators, which originally guided our work on assessing the administrative and management system of Arctic cities. However, there is a conviction that they economically grasp the basic information about the management of Arctic cities, which can be obtained by means of municipal statistics. At the same time, of course, they must be supplemented by materials from in-depth field surveys of the real situation in the cities of the Arctic, which are laborious, costly, and do not provide continuous, but only selective observation. But only a combination of continuous statistical observation methods with selective sociological (anthropological) studies allows obtaining the most reliable results. However, in the context of the pandemic, we did not have the opportunity to organize expeditionary surveys in key cities, so we have to rely on municipal statistics when conducting a typology (classification)

of Arctic cities according to the criterion of the work of the administrative and management system.

## 2. Clustering of Arctic cities according to selected management indicators

The selected indicators, which are considered by us the most informative in terms of the characteristics of the administrative and management system, did not have reliable values for some cities in the Arctic from our sample (there were gaps in the data for years). In this case, it was necessary to use indicators for administrative cells of a higher rank (for example, municipal districts). The initial table “cities–indicators”, which was used for subsequent cluster analysis in order to identify the main groups (types) of cities according to the characteristics of the management system, is given below (Table 1).

Table 1

Initial table for clustering (classification) of Arctic cities

City	Administrative status <sup>2</sup>	Share of own tax and non-tax revenues in total budget revenues, average for 2017-2019, %	The share of apartment buildings located on land plots, with state cadastral registration, average for 2017-2019, %	Average budget expenditures per person for 2017-2019, thousand rubles	Number of people employed in the O sector (OKVED2) per 1000 people, average for 2017-2019, people	Budget expenditures of the municipality for the maintenance of employees of local governments per one inhabitant of the municipality, average for 2017-2019, rub.
Apatity	3	41.7	100	40.6	20	1793
Arkhangelsk	5	51.8	62	25.7	42	1672
Bilibino	3	15.3 <sup>3</sup>	n/d <sup>4</sup>	19.8	78	15395
Vorkuta	3	26.4	90	50.5	33	1928
Gubkinskiy	3	53.7	100	152.3	33	10763
Dudinka	3	37.5	37	40.5	71	7657
Zapolyarnyy	1	67.2	90	15.9	62	n/d
Inta	3	20.3	100	64.5	38	3815
Kandalaksha	3	47.9	99	79.9	40	n/d
Kirovsk	3	51.2	100	68.9	18	2483
Kovdor	3	46.8	47	55.0	16	2868
Kola	3	28.6	56	240.0	234	n/d
Kostomuksha	3	50.9	70	29.8	24	1589
Labytnangi	3	14.5	96	201.8	53	14040
Leshukonskoe	1	10.6	93	65.8	43	8695
Monchegorsk	3	44.1	100	47.1	17	2108
Muravlenko	3	15.4	100	156.2	30	11952
Murmansk	5	59.7	21	47.1	50	2292
Nadym	2	44.3	100	13.6	32	8932
Naryan-Mar	4	67.2	99	36.6	80	7762
Novodvinsk	3	37.9	100	26.2	18	2180

<sup>2</sup> 1 - urban settlement, city; 2- urban settlement, the center of the district; 3 - the center of the urban district, municipal district, municipal district; 4 - the center of the autonomous region; 5 - regional center.

<sup>3</sup> Italics indicate cases where, due to the lack of data for the city, data for a larger administrative unit (for example, a municipal district) was used.

<sup>4</sup> n/d - no data.

Novyy Urengoy	3	39.0	100	109.5	30	4963
Norilsk	3	43.3	100	101.2	25	3811
Noyabrsk	3	30.3	100	109.1	23	5976
Olenegorsk	3	40.7	97	46.4	43	2321
Onega	1	43.4	96	4.3	27	1678
Polyarnye Zori	3	44.8	95	58.4	27	3192
Revda	1	32.0	100	12.4	101	n/d
Salekhard	4	25.4	100	154.9	132	11179
Severodvinsk	3	53.9	100	37.2	33	1721
Segezha	3	47.9	66	25.9	51	998
Tarko-Sale	2	29.6	99	15.5	45	11699
Usinsk	3	48.5	54	73.2	25	4762

Clustering was carried out using the Grouping Analysis tool in the ArcGIS program. This tool clusters points into groups, minimizing the variance within groups for each of the variables taken as the basis for clustering, while the spatial position is not taken into account. Additional important criteria were the evenness of distribution of settlement points in clusters and the absence of a predominant influence of one of the variables, the clustering bases, with little involvement of other variables.

The clustering of the six variables revealed a decisive influence of the administrative status indicator. Therefore, in the final version, clustering was based on five variables, which allowed the initial population of Arctic cities to be divided into clusters of comparable size, within which each variable was characterized by minimal variance.

The result was five groups of cities with similar properties of the administrative and management system, primarily in three priority areas — “basicness”, “efficiency”, “self-sufficiency” (BES-model). The first group of *compact quality management* includes seven cities: Gubkinskiy, Kandalaksha, Kirovsk, Naryan-Mar, Novyy Urengoy, Norilsk, Severodvinsk, which are distinguished by effective municipal management with an average staff of managers themselves, and significant budgetary opportunities. From the position of implementing the BES model, this is the best situation in the interests of ensuring the viability of the city: in most of these cities, in addition to budgetary ones, there are also significant corporate resources capable of emergency mobilization in force majeure situations; the administrative staff is not bloated, and, as our expeditionary surveys have shown, it has a significant layer of old-timers, experienced municipal employees who know the city system well and are able to adequately assess its potential for adaptation to crises and disasters that are not unexpected for them precisely in the strength of long experience of living and working in the city.

The second group of “*low-cost municipal government*” includes 11 cities: Arkhangelsk, Murmansk, Dudinka, Zapolyarniy, Kovdor, Olenegorsk, Onega, Revda, Usinsk, Kostomuksha, Segezha. The situation here, in terms of implementation of BES-model priorities, is relatively favorable — there are experienced managers, but the available budgetary resources are not used to strengthen the administrative and management system as the core of the city’s overall resilience; a high share of own income, while the costs of municipal management per one inhabitant of the city is the minimum among all groups.

The third group of “*strong average*” includes nine cities: Apatity, Vorkuta, Monchegorsk, Nadym, Novodvinsk, Noyabrsk, Polyarnye Zori, Tarko-Sale, Inta. Here we have average values for all indicators. It can be regarded as the fact that the administrative and management system of the city has a certain resource to ensure the city’s resilience in times of crisis, but it is not prohibitive.

The fourth group of *significant reserves for improving management efficiency* includes five settlements: Muravlenko, Kola, Labytnangi, Salekhard, Leshukonskoe. With their own revenues being low, the expenditures on residents and managers are maximal here, and the share of managerial personnel of municipalities is large (partly due to the lack of other areas of employment). None of the priorities of the BES-model is fulfilled by the management system.

The fifth group includes the only city-*anomaly* — Bilibino. Here, the maximum costs for the maintenance of managers in terms of a resident, while the budget costs per resident are minimal, the share of managers is average. Taking into account the depth of the forthcoming restructuring of the local economy in view of the closure of the Bilibino nuclear power plant and depletion of the nearby deposits, which have been exploited for many decades, the city’s potential for resilience is extremely weakened, as evidenced by the fact that all urban systems (and the fact of the maximum population outflow) are functioning. Without exaggeration, this is the most problematic case in our entire sample of Arctic cities.

Having received this result, it was interesting to evaluate the role of factors of geographical location, geographic latitude and longitude in the costs of municipal government. We already have an idea of the enormous and overriding factor of the administrative status of the city. We know what the typologies of cities are by the criterion of governance, if this “overhanging” factor is removed. Does geography have any bearing on the internal differences in the operation of the administrative system between the cities of the Arctic? Or is everything determined by institutions, by administrative status?

It turned out that geography is as important as institutions. But it is not the breadth of zonality, as we have expected, that creates a regular rhythm in the parameters of the governance system (Fig. 1).

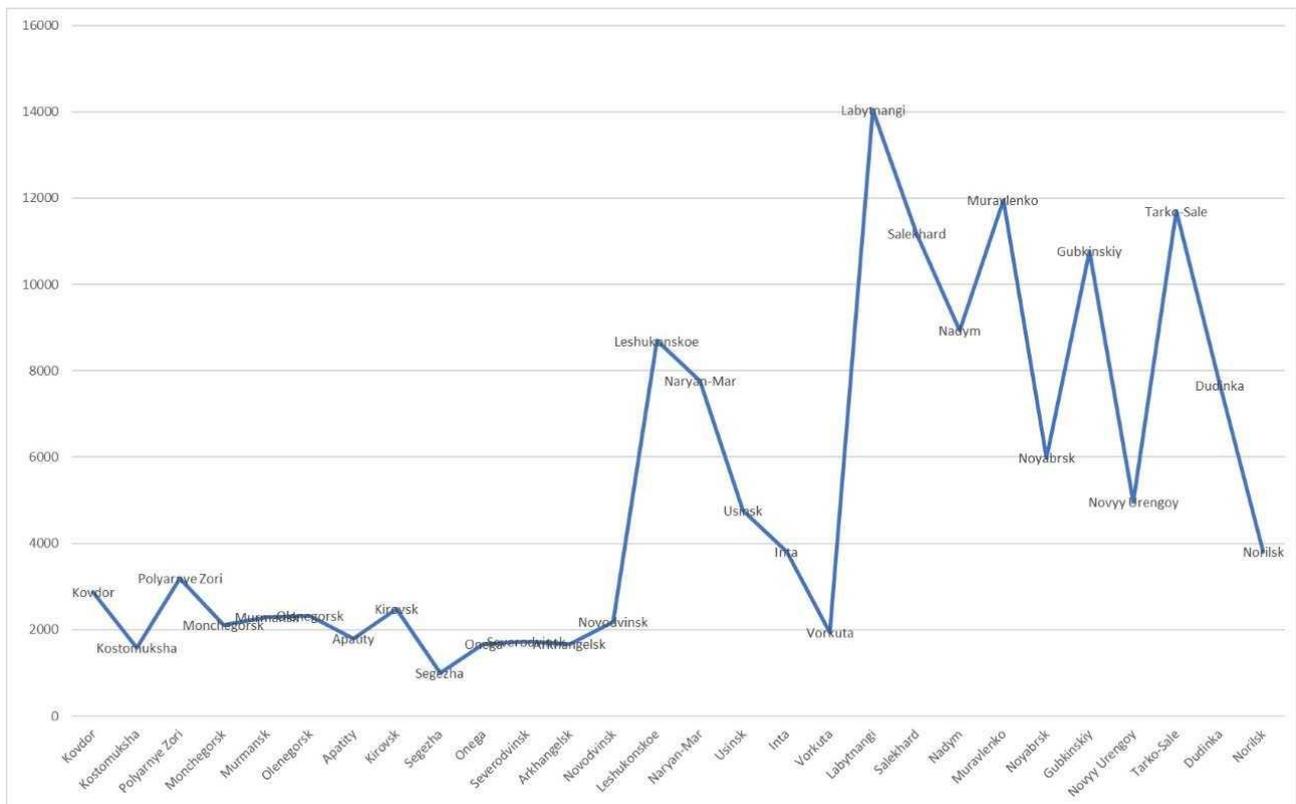


Fig. 1. Lack of dependence between geographical latitude of the city and its costs of municipal administration (the action of institutional factors prevails). The horizontal axis is degrees of northern latitude; the vertical axis is per capita budgetary expenditures on local government in rubles.

Longitude matters, that is, the location of the city in the European or Asian Arctic (Fig. 2). The graph clearly shows the trend of rising costs of municipal administration as the Arctic city “shifts” from the west of Russia to the east. This fact is not surprising in itself, but it is usually forgotten when cities within the Arctic zone are compared. In our study, the significance of longitude is as fundamental to the evaluation of the administrative system of the city as it is to the administrative status of the city. In the literal sense, institutional and geographical factors that have a powerful effect on the appearance of the city’s administrative and management system go hand in hand.

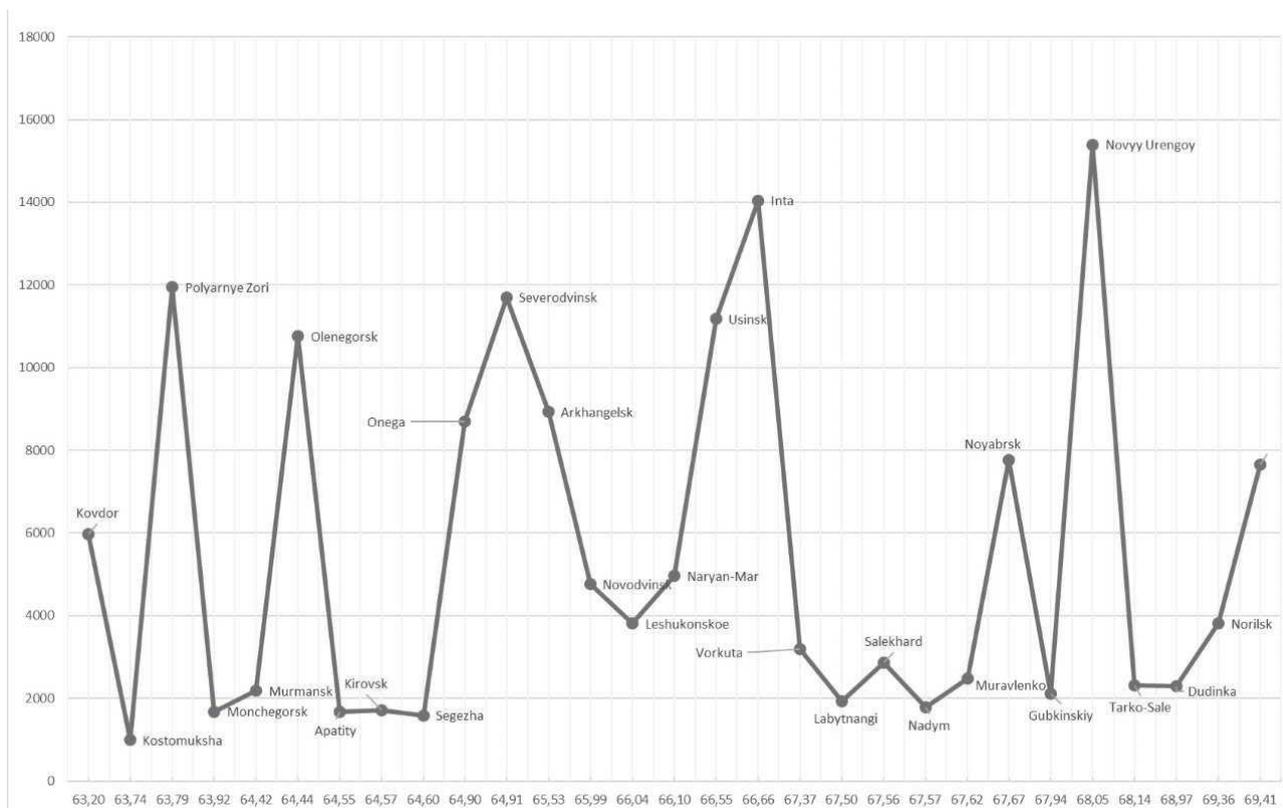


Fig. 2. Does the cost of managing Arctic cities depend on longitude? The horizontal axis is degrees eastern longitude; the vertical axis is per capita budgetary expenditures on local government in rubles.

### ***3. Is the structure of local government linked to a particular type of Arctic city in terms of the quality of the administrative and management system?***

The administrative and managerial system of an Arctic city should be characterized not only from the outside, by the tools of municipal statistics, but also from the inside, as a result of an analysis of the structure of local government, the positions of its main units (departments and divisions), their functionality, staffing, etc. Work on the strategies for the cities of Gubkinskiy, Noyabrsk and Muravlenko gave us a unique opportunity to supplement the completed typology of Arctic cities in terms of statistical parameters of the quality of municipal government, understanding the organizational structure of city management.

Cluster typology, based on selected, information-intensive indicators of municipal statistics, made it possible to classify the initial sample of Arctic cities into five groups according to the properties of the administrative and management system. The question arises, is there a relationship between the internal organizational structure of local government and a specific type of administrative and management system of the city, in other words, does the organizational structure of power affect the fulfillment of three imperative requirements for the administrative and management system of the Arctic city: to ensure basicness, efficiency, self-sufficiency (BES - model)? To answer this question, we mobilized our experience in preparing socio-economic development strategies for the cities of Gubkinskiy, Noyabrsk and Muravlenko, which are in the first, third and fourth groups of our classification according to administrative and management systems.

What characterized the internal structure of the administration of the city of Gubkinskiy during the period of our preparation of the Strategy for the socio-economic development of the city in the early 1910s? This type of structure can be conditionally called “political”, since the administration is headed by a popularly elected head (“strong” mayor), in contrast to the “technical” structure of local governments, in which the head, elected by people or among the deputies, heads only the representative body of the municipal entity (“weak” mayor who does not manage budget funds directly, but does so through the decisions of the representative body and the contracted head of administration).

For Arctic cities, where frequent natural and social force majeure makes it imperative to respond to external threats with extreme urgency, the strong mayor model is in most cases preferable to the “consensus” model of collective governance with a weak mayor. It is no coincidence that most cities of the first, most successful type of government, belong to the model of personalized leadership, with a strong mayor (Fig. 3).

Being the highest-ranking local politician, the head of the municipality of the city of Gubkinskiy is not only responsible for the performance of the administration, but is also responsible to the population that elected him for the implementation of the election promises and programs, forms the city development policy and presents it for public discussion. Clarity, distinctness, simplicity of the structure of local government and the powers of each structural element, which we clearly felt in the process of working on the Gubkinskiy City Strategy, is undoubtedly the strength of this model of city government with its reliance on a strong, charismatic mayor. This structure is able to implement all three of the most important priorities for the management of the Arctic city: B — to increase its basic functions for the surrounding territory of resource industries, openness and innovation; E — to ensure the effective management of the main city assets; S — to protect under all circumstances the important political, financial and economic self-sufficiency of the city. These are the most important conditions for the resilience (resistance to crises and disasters) of the entire urban system.

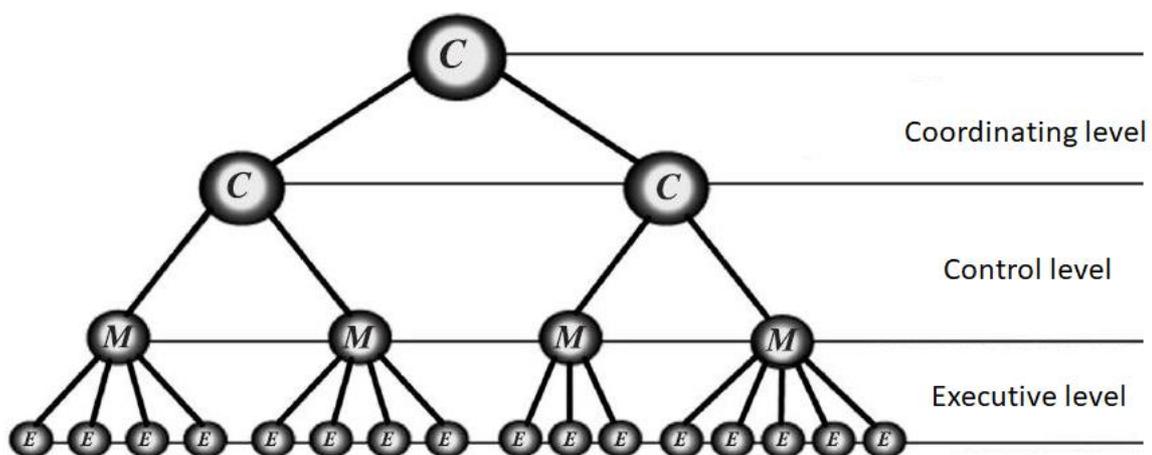


Fig. 3. Multi-level management system [13], implemented in the structure of the local government of the city of Gubkinskiy.

The disadvantage of this model is its excessively personalized nature: the change of the head, as a rule, entails both a change in the structure itself and the top management personnel. This happened, for example, with the departure of the veteran mayor of Gubkinsky V.L. Lebedevich.

In general, if we compare this (“political”) type of municipal government structure, it usually turns out to be more expensive than the “technical” type, in which the head of the city is appointed by contract. In our classification, these are cities included in the second and third types.

The third type is the city of Noyabrsk, for which we also developed the Strategy for social and economic development. In terms of local government structure, it was a complete opposite of Gubkinskiy in the sense that it had a constantly changing corps of local government managers and a technical type of municipal government structure (“city manager”).

Therefore, only one of the priorities of our management triad “basicity/innovation-efficiency-self-sufficiency” was implemented in the city, simply “automatically”: we are talking about the political and economic independence of Noyabrsk due to the headquarters status (“Noyabrskneftegaz”), as well as a smart decision of the first city planners to separate the new city from the much larger Surgut, giving it to the Yamalo-Nenets Autonomous Okrug, and not the Khanty-Mansiysk AO (Noyabrsk is located on the border between the okrugs). Over the past decades, the city has not acquired any new basic functions. In terms of efficiency, none of the municipal government teams has managed to establish accountable, compact and effective management of local development, as evidenced by the weak position of Noyabrsk in entrepreneurship development, despite all external favorable prerequisites, against the backdrop of cities of comparable development in the Arctic and North.

Frequent changes in local government teams have meant that the city has failed to create an effective and necessary partnership between the government and civil society structures in order to address key urban issues. This is why we have identified the task of consolidating the efforts of the authorities, business, and the public in the city as very important for the dynamic development of the city in the Noyabrsk strategy.

We discovered even more problems within the city’s management system when working on the Muravlenko city strategy, which belongs to the fourth, least effective type of administrative and management system. Here it was not possible to fully implement any of the priorities of the BES model: there are no new basic functions or activities, the inefficiency of the management system is proved by numerous statistical parameters, lack of independence is fixed by the subordinate status of the city-forming enterprise — a division of Noyabrskneftegaz.

For a small town like Muravlenko, the administrative structure looks rather complicated from a functional point of view. It is an intermediate option between the “technical” (in terms of the method of formation) and the “political” administration (in terms of the institution of deputies, assistants to the head of administration, the “image” department of information and public relations). In the functional blocks of the administration structure, there is a great mismatch: for example, absolutely different issues of the current maintenance of the city infrastructure are brought together in one direction; urban development; public safety. In terms of staffing, the same type of administration

bodies had serious differences in the number of employees: for example, organizational management (41 people) and legal department (9 people)<sup>5</sup>. There is an imbalance in the distribution of functions and financial resources within the structure of the city administration. There is also a certain duplication of functions: financial planning is simultaneously handled by the Department of finance, the financial and economic department of the Department of social protection of the population.

The transition to a more compact, clear and distinct structure of the administration of the city of Muravlenko city administration will improve the position of the city on the type of administrative and management system in terms of formal indicators of its performance. We are talking about 1) the formation of self-sufficient blocks of development (economic and territorial) within the structure; the current content of the urban economy; social issues; ensuring municipal activities; 2) ensuring comparability in terms of the scope of powers and financial resources included in the blocks of one to three departments; 3) ensuring the comparability of the powers and financial resources of the departments included in the departments; 4) consolidation of the functions of information, technical and organizational support of different departments within the same department of organizational, legal and technical support.

There is a correspondence between the place of the city in terms of the quality of the management system in formal indicators, and the internal state of its municipal management “economy”: the leader Gubkinskiy, by formal indicators of the quality of the administrative and management system, turned out to be the most distinct, clear, although quite costly, managerial “vertical”. On the other hand, Muravlenko, which is included in the most problematic type of Arctic cities in terms of the quality of the administrative and management system (except for the city of Bilibino), in the 2010s had an irrationally cumbersome structure of local government, with multiple duplication of functions and asymmetry between human resources and the volume of tasks assigned to management or department.

### *Discussion*

We evaluated the existing administrative and management system of dozens of the largest Arctic cities in Russia according to the available quantitative criteria and qualitative features. But the question arises: what should be the “ideal” administrative and management system that implements the three indicated imperatives “basicity/innovation – efficiency – self-sufficiency” to the maximum extent, guarantees the city’s vitality, resistance to natural and social crises and disasters?

It seems that the answer to this question lies in the mainstream of the ideas of sociobiology by Edward Wilson [14] and the ideas of rationality of nature-compatible solutions, which are very close to his worldview<sup>6</sup>. How can nature-like solutions that carry the features of the proper-

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<sup>5</sup> The data on the staffing table of the Administration of the city of Muravlenko in 2011.

<sup>6</sup> The banner of environmentally compatible solutions has been raised in recent years by Corresponding Member of the Russian Academy of Sciences M.V. Kovalchuk in numerous journalistic articles and media appearances. Our differ-

ties of biological systems (self-organization, plasticity, flexibility, diversity, mobility, etc.) implement the three main priorities of the management system of the Arctic city: basicity/innovation, efficiency, self-sufficiency?

The first property in modern conditions is provided by mobile, focused on a certain (and often short) time period, solutions that are based on new technological capabilities of artificial intelligence (digital transformation of management — an electronic city/a digital twin of the city's management system, etc.). The most important challenge is to overcome the corporate tightness of many single-industry towns in the Arctic and enter the global and national networks of partner cities in order to join the accumulated best practices of urban management in extreme conditions of cold discomfort and peripheries <sup>7</sup>.

The second requirement for the effectiveness of the management system in the Arctic conditions is provided by nature-compatible solutions, i.e. the maximum adaptation of the management process to the specific stage of the life cycle of the development of the dominant (anchor) natural resource. The modern unification of management systems and decisions is simply unacceptable for the Arctic cities, which all, even the largest ones, depend on the process of exploitation of mineral and fuel-energy resources.

On the contrary, the management system of such a city should be very resource-“colored” — adaptive to a particular type of resource and the phase of the life cycle of exploitation of a resource field (the town management system at the “oil fountain” phase, when financial possibilities and migration turnover go off the average value is one thing; town management at the dying-out phase, when we speak about controlled contraction or anti-crisis stabilization of the whole town system is quite another).

The ideal environmentally compatible (and therefore the most effective) solution in these conditions is the management of the city as if it did not depend on the exploitation of non-renewable and depleted natural resources, but on biological resources that are constantly renewed (for example, fish, forest, water). This means the necessity to reserve all types of city assets — financial (technically easy to do due to their mobility, but legally very difficult, due to limitations of the Budget code to accumulate insurance reserves in local budgets); material (but these basic funds of municipal enterprises should be constantly renewable, so that the technology does not become obsolete), human resources (the pool of available talents should not be depleted, land resources. Let us dwell on the latter in more detail.

The most important paradox of the Arctic city development is the fact that, being located inside the Arctic desert (there is no one else to present the demand for land plots), the city faces enormous difficulties in expanding its city limits, that is, in adding new lands. These prohibitions

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ence from his position is only one: we believe that for fragile and turbulent Arctic systems, the effectiveness of environmentally compatible solutions is much higher than for other latitudinal zones.

<sup>7</sup> These two terms were proposed by Ph.D. T.E. Dmitrieva.

and restrictions apply both to large cities with a population of over one million and to small Arctic cities.

But, unlike a large millionaire city, land resources are the few that an Arctic city has around in abundance (“few people – a lot of land”). Therefore, it is wrong to legally limit its spatial growth. On the contrary, land assets are the few that can be relatively easily reserved for the future by creating a kind of stabilization fund when force majeure occurs in the form of buildings collapsing from melting permafrost, the need to move some production and residential buildings for other reasons, the deployment of smart technology parks and special economic zones. The Arctic city should have too much land. This is its insurance.

On the other hand, advocating this artificial redundancy of the territory and the generosity of drawing the city limits, it is necessary to ensure rational use of the land plots included in the inventory. Therefore, all modern indicators of municipal statistics in terms of their involvement and turnover<sup>8</sup> (and there are about ten of them) are extremely significant for the Arctic city. The use of land reserves, as well as financial resources, can become a safety cushion for the city during periods of force majeure. Managing an Arctic city is a real art of mobilizing reserves of all kinds and constantly taking care of their increment.

The priority of the city’s independence in terms of environmentally compatible solutions means “soft” management, which combines difficultly compatible things: on the one hand, strong responsible and personalized leadership; on the other hand, co-management, that is, divided leadership between the mayor and the city administration, the city administration, civil society structures represented by active residents and city businesses.

Environmental compatibility means “automatism” of managerial decisions that do not depend in a decisive way on the personality of only the first person. But it would also be wrong to reduce the governance of the city to a consensual, collective co-management, especially for the Arctic, because of the need to respond quickly to emerging challenges. The city must have a “face”, and it must be personified, not collective.

This means that a difficult and fluid balance must be struck between the authoritarianism of the mayor’s personality and the democracy of collective co-management. In the Arctic city, this managerial harmony is facilitated, on the one hand, by its small size (the effect of the “direct perception pyramid” works [15], when people know each other and at least once a year meet with every other inhabitant); on the other hand, it is extremely difficult due to the usual shortage of

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<sup>8</sup> Availability in the urban district of the approved general plan of the urban district; area of land provided for construction - total; the area of land plots provided for housing construction, individual housing construction; the share of the area of land plots that are objects of taxation by land tax in the total area of the territory of the urban district; the share of apartment buildings located on land plots in respect of which state cadastral registration has been carried out; the share of land plots that are in municipal ownership, as well as state ownership of which is not delimited; the area of land plots provided for the construction of housing construction facilities, in respect of which, from the date of the decision to allocate a land plot or the signing of the protocol on the result of bidding (tenders, auctions), permission for commissioning has not been received within three years, etc.

human resources and the very strong distorting influence of the super-actors of local development represented by large resource corporations.

### *Conclusions*

1. An important factor in ensuring the resilience of the Arctic city to the challenges of external crises and disasters is the work of the administrative and management system, which, depending on the ideology of the researcher, occupies a central, core place in the entire urban system (state dirigisme) or a place along with other systems — sociocultural, life support, industrial and economic, etc. (market liberalism). The activity of the administrative and management system of the city must be assessed by whether it expands the horizon of the city's existence or narrows to the point of turning it into a shift camp. Realities of the 1990s clearly demonstrated that these outcomes directly depend on the degree of specificity of the Arctic city, which is not only given by God, but is largely determined by the efforts of local authorities. Smart management, effective work of the administrative and management system strengthen the original specificity of the Arctic city.

2. Our initial hypothesis was that in order to work effectively for resilience, the management system of an Arctic city should work on three priorities: the basic nature (innovation, openness) of the city's economy, management efficiency, independence of political decisions of the city government. As a result of preliminary selection, out of almost two dozen indicators of municipal statistics, which characterize the work of the city's management system from different angles, six indicators were eventually left. The first reflects a five-point assessment of the strength of the city's administrative status. The high administrative status indicates a considerable degree of autonomy in making decisions about its development. The second one is the share of own revenues in the city budget (average for 2017–2019) that characterizes the degree of independence of decisions made in matters of local development. The third indicator of the share of multi-apartment buildings located on land plots with state cadastral registration (in percent) reflects the promptness of local authorities in establishing local control and accounting. The fourth indicator of municipal budget expenditures for the maintenance of employees of local governments per one inhabitant of the municipality (average for 2017–2019, in rubles) demonstrates the resource intensity of local government. The fifth indicator of the number of people employed in the sector "Public administration and ensuring military security; social security per 1000 people" (average for 2017–2019) shows the size of the governance sector in relation to the overall size of the city. The sixth indicator of budget expenditures per inhabitant (average for 2017–2019, rubles) reflects the amount of financial resources of the authorities for a quick response to crises.

3. The use of the described indicators in the cluster analysis of 29 largest cities in the Russian Arctic made it possible to identify five groups of cities with comparable properties of the administrative and management system: 1) compact quality management — Gubkinskiy, Kandalaksha, Kirovsk, Naryan-Mar, Novyy Urengoy, Norilsk, Severodvinsk: effective municipal govern-

ment with an average amount of managers. This is the best situation in terms of implementing the BES ideals of “basicness/innovativeness-efficacy-self-sufficiency” in the interests of urban sustainability; 2) “low-cost municipal government” — Arkhangelsk, Murmansk, Dudinka, Zapolyarnyy, Kovdor, Olenegorsk, Onega, Revda, Usinsk, Kostomuksha, Segezha. There are experienced managerial staff here, but the available budgetary resources are not used to strengthen the administrative and management system: the cost of municipal administration per citizen is the lowest among all groups; 3) “strong middles” — Apatity, Vorkuta, Monchegorsk, Nadym, Novodvinsk, Noyabrsk, Polyarnye Zori, Tarko-Sale, Inta. The administrative and managerial system of the city has a certain resource to ensure the viability of the city in times of crisis, but it is not outrageous; 4) the necessity to increase management efficiency — Muravlenko, Kola, Labytnangi, Salekhard, Leshukonskoe. The management system does not fulfill any of the priorities of the BES model here; 5) the city-anomaly Bilibino is the most problematic case in the entire sample, the potential for resilience is extremely weakened.

4. More detailed analysis of internal structure of management of three cities in the sample — Gubkinskiy (first type), Noyabrsk (third type), Muravlenko (fourth type) allowed to make several preliminary conclusions: a) the “political” structure of local government with an elected mayor to fulfill the priorities of the BES-model and ensuring the viability of the city are preferable to the “technical” structure with a city manager due to the special requirements for prompt response to force majeure, which are constantly heard for Arctic cities; b) the frequent change of teams of local authorities near the Arctic city reduces the efficiency of its management system and makes collective co-management difficult; c) cumbersomeness, inconsistency, duplication of functions, imbalance in the volume of functions and resources of the local government structure do not allow realizing the potential of the administrative and management system in ensuring the viability of the city (Muravlenko’s case).

5. An ideal Arctic city management system would necessarily include environmentally compatible technologies and practices. The priority of economic basicity/innovativeness/openness is ensured by mobile, time-bound solutions and the decoupling of Arctic mono-cities. The priority of management efficiency is ensured by the maximum adaptation of the administrative and management system of a specific stage of the life cycle of mining the dominant (anchor) natural resource. Effective management of an Arctic city is a true art of mobilizing reserves (material, land, financial, human) of all kinds and constantly taking care of their increment. An Arctic city should have an excessive amount of land: this is the little that it can relatively easily reserve for the future. However, advocating the artificial redundancy of the territory and the generosity of the city limits, local authorities need to achieve the rational use of the land plots involved in the accounting. The priority of the political independence of the city in terms of environmentally compatible solutions means achieving a difficult and fluid balance between the authoritarianism of the mayor’s personality (responsible and personified leadership) and the democracy of collective co-

management — a divided leadership between the mayor and the city administration, the city duma, structures of civil society represented by active residents and urban businesses.

## References

1. Zamyatina N.Yu., Medvedkov A.A., Polyachenko A.E., Shamalo I.A. Zhiznestoykost' arkticheskikh gorodov: analiz podkhodov [Resilience of Arctic Cities: An Analysis of the Approaches]. *Vestnik Sankt-Peterburgskogo universiteta. Nauki o Zemle* [Vestnik of Saint Petersburg University. Earth Sciences], 2020, vol. 65, no. 3, pp. 481–505. DOI: 10.21638/spbu07.2020.305
2. Leksin V.N., Porfiryev B.N. *Gosudarstvennoe upravlenie razvitiem Arkticheskoy zony Rossiyskoy Federatsii: zadachi, problemy, resheniya* [State Management of the Development of the Arctic Zone of the Russian Federation: Tasks, Problems, Solutions]. Moscow, Nauchnyy konsultant Publ., 2016, 192 p. (In Russ.)
3. Rowe E.W. *Arctic Governance. Power in Cross-Border Cooperation*. Manchester University Press, 2018, 164 p.
4. *Monogoroda. Perezagruzka. Poisk novykh modeley funktsionirovaniya monogorodov Rossii v izmenivshikhsya ekonomicheskikh usloviyakh* [Monocities. Reboot. Search for New Models of Functioning of Single-Industry Towns in Russia in the Changed Economic Conditions]. Moscow, Bazovyy element Publ., 53 p. (In Russ.)
5. Uskova T.V., logman L.G., Tkachuk S.N., Nesterov A.N., Litvinova N.Yu. *Monogorod: upravlenie razvitiem* [Monocity: Development Management]. Vologda, ISERT RAS Publ., 2012, 220 p. (In Russ.)
6. Zamyatina N.Yu., Pilyasov A.N. *Innovatsionnyy poisk v monopofil'nykh gorodakh. Blokirovki razvitiya, novaya promyshlennaya politika i plan deystviy* [Innovative Search in Single-Industry Cities. Development Locks, New Industrial Policy and Action Plan]. Moscow, URSS Publ., 2015, 216 p. (In Russ.)
7. Pierre J. Models of Urban Governance: The Institutional Dimension of Urban Politics. *Urban Affairs Review*, 1999, vol. 34, iss. 6, pp. 372–396. DOI: 10.1177/10780879922183988
8. Bakema M.M., Parra C., McCann Ph. Governance in Extreme Contexts — Disasters and Resilience in New Zealand, Chile and the Netherlands. *Extended abstract ERSA Conference 2017, Groningen, The Netherlands. Social Progress for Resilient Regions. Special Session: Regional Resilience in the face of Natural Disasters and Climate Change*, 5 p.
9. Suter L., Orttung R. *Building an Arctic Urban Sustainability Index. A Reference to Aid in the Selection of Indicators*. Washington DC, 2016, 44 p.
10. Zamyatina N.Yu., Goncharov R.V. Arkticheskaya urbanizatsiya: fenomen i sravnitel'nyy analiz [Arctic Urbanization: A Phenomenon and a Comparative Analysis]. *Vestnik Moskovskogo universiteta. Seriya 5: Geografiya* [Moscow University Bulletin. Series 5, Geography], 2020, no. 4, pp. 69–82. (In Russ.)
11. Hansen K.G., Rasmussen R.O., Weber R. *Proceedings from the First International Conference on Urbanisation in the Arctic. 28–30 August 2012. Ilimmarfik, Nuuk, Greenland. Nordregio Working Paper*. Stockholm, Nordregio, 2013, vol. 6, 218 p.
12. Dybbroe S., Dahl J., Muller-Wille L. Dynamics of Arctic Urbanization. *Acta Borealia*, 2010, vol. 27 (2), pp. 120–124.
13. Popovich A.Yu., Tsygichko V.N. Problema sinteza ierarkhicheskikh struktur upravleniya [The Problem of Synthesis of Hierarchical Control Structures]. *Trudy ISA RAN* [Proceedings of the ISA RAS], 2009, vol. 41, pp. 233–246. (In Russ.)
14. Wilson E.O. *Sociobiology: The New Synthesis, Twenty-Fifth Anniversary Edition*. Belknap Press, Imprint of Harvard University Press, 2020, 720 p.
15. Zimin B.N. *Razmeshchenie Proizvodstva v Rynochnoy Srede* [Placement of Production in a Market Environment]. Moscow, Al'fa-M Publ., 2003, 176 p. (In Russ.)

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