

Human and Social Potential of Neo-Industrial Development of the Arctic: Sociological Analysis, Modeling, and Regulation



Valerii Vasil'evich

MARKIN

Federal Sociological Research Center, Russian Academy of Sciences
Moscow, Russian Federation, 24/35, Krzhizhanovsky Street, office 5, 117218
E-mail: markin@isras.ru



Anatolii Nikolaevich

SILIN

Tyumen Industrial University
Tyumen, Russian Federation, 38, Volodarsky Street, 625000
E-mail: sm-2004@rambler.ru

Abstract. The present article is a continuation of the previously published paper [6] and it reviews the methodology, conceptual approaches to sociological analysis, modelling, monitoring and management of human and social potential of neo-industrial development of the Russian Arctic. The successful implementation of this task and the preparation and adoption of efficient management decisions require reliable analytical and diagnostic information about the social situation in this macro-region and opportunities for supplying the planned investment projects with human resources. The aim of the study is to create a sociological ground that will help obtain necessary sociological information in the preparation and adoption of administrative decisions of government agencies in the monitoring mode and regulate social processes in the Arctic region more efficiently. With the help of the methodology of socio-

For citation: Markin V.V., Silin A.N. Human and social potential of neo-industrial development of the Arctic: sociological analysis, modeling, and regulation. *Economic and Social Changes: Facts, Trends, Forecast*, 2017, vol. 10, no. 6, pp. 75–88. DOI: 10.15838/esc/2017.6.54.5

spatial and socio-territorial identification and with the use of social simulation we carry out our own analysis of the current status and trends of human potential (quantitative and qualitative characteristics of human resources, their health and level of professional training) and social potential (social ties, trust, involvement in the regional community). It is a fundamentally new methodological approach and it has been proposed and implemented for the first time based on the materials of the Arctic region (the Yamal Peninsula) crucial for Russia. Neither domestic nor foreign sociologists have conducted such work before. The application of the social simulation methodology in a sociological study of human and social potential of the Far North, its reproduction and intensification for the purpose of neo-industrial development and social development in the empirical aspect was implemented by analyzing the statistics, mass surveys, interviews of target (reference) groups, and expert assessments. In the framework of this methodology we should particularly note an agent-based approach which along with system dynamics modeling helps identify the subject and, with some degree of formalization, to represent the subject-to-subject relations of main participants of the neo-industrial frontier and align them for monitoring and regulation. The article presents a preliminary design of the model. The model and sociological ground thus formed contains sociological information about the subjects of a new development of the North concerning the direct target (forecast) property: characterization of important constituents (components) of human and social potential of the Arctic frontier, in particular the set of direct and indirect indicators of the quantity and quality of people who have expressed a desire and intention to live and (or) work in the Arctic; their educational and professional competences; their physical, mental and social health, etc. In the general framework of social capital we highlight the indicators of social identity and social trust. The materials of a sociological research that we put forward allow us to offer the authorities and management reliable analytical and diagnostic information about actual and potential participants of neo-industrial development of the Yamal frontier. We also outline the following prospective directions of further research and development: to create an information-analytical system based on BIG DATA and DATA MINING, to map the layout of the information received, the new technologies of dialogue interaction between representatives of different social groups and institutions involved in the processes of development, etc.

Key words: Arctic, development, social and human potential, modeling, sociological research.

Introduction

In the previous article [6] we considered socio-spatial transformations of the territory of the Yamal Peninsula. The aim of the present publication is to put forward a research project, which can help build a model-sociological ground for assessing the most important components of human and social potential of the Arctic frontier with the use of an agent-based approach; we are referring to the plans for the upcoming neo-industrial development of the Arctic.

This has become possible mainly due to fundamental research carried out by V.L. Makarov and A.R. Bakhtizin [5], and by M.K. Gorshkov and V.A. Ilyin [8]. Some ideas on socio-economic issues in the development of the Russian North, proposed by N.Yu. Zamyatina [2], A.N. Pilyasov [7], A.A. Shabunova [10] and several other domestic and foreign scientists [11, 19, 21, 22] are also of considerable interest. It is especially important, because conceptual approaches of the national industrial policy in the framework

of neo-industrial development [1] have been clearly delineated in the Russian practical and academic discourse. Unfortunately, in general we have to admit that little attention is paid to scientific sociological and interdisciplinary support for an upcoming development of the Arctic [14].

We understand neo-industrial development of the Arctic region as the process of creating a territorial-industrial complex of a new type in extreme climatic conditions; this complex is based on a set of associated productions and logistics that have high technical and technological level (fifth and sixth technological orders), require skilled labor and scientific and technological support of production processes.

The formation and functioning of such a complex must be environmentally friendly; it needs to have all the necessary means to neutralize threats and risks of violation of natural balance of the territory [13, 16].

The lives of people, servicing this complex must be quite comfortable, and the area should have the necessary social infrastructure for permanent residence of the staff with families and for temporary residence of rotational workers. These circumstances are especially important for a region with extreme climatic conditions. It is also crucial to take into account the interests of indigenous peoples (indigenous ethnic groups who lead a traditional way of life connected with reindeer herding, fishing, gathering, hunting, and other crafts [4].

We have chosen Yamalo-Nenets Autonomous Okrug (YaNAO) as the main object of study of the Russian Arctic; the Okrug occupies one fifth of its territory and is the central and most significant link for the economy. YaNAO

is also called the energy heart of Russia: oil, gas and products of their processing are shipped from here to 21 European countries. Currently, on the basis of the South Tambeyskoye gas field, the company Yamal LNG, the main shareholders of which are Nova TEK (Russia), Total (France) and CNPS (China), finishes the construction of a plant to produce liquefied natural gas; the capacity of the plant is 16.5 million tons. The company also finishes the construction of a port to ship the products by sea.

When speaking about the Yamal frontier, we mean that in the scientific literature, the term “frontier” is used in two senses: as the border of developed areas, the front boundary or the whole area of new development, the border region. For instance, in the U.S., the term was officially used to denote the line bounding the area with a population density of less than two people per square mile [9]. In Russia, frontier is more often viewed not only as a border, but also as the whole area with special social conditions, public administration and social control, as the territory with dynamic and unstable equilibrium, where the informal norms in some cases are much more important than the official ones. The residents of Yamal call the rest of the country “Earth” [6].

The region under consideration – Yamalo-Nenets Autonomous Okrug – has all the features of a frontier: its population density currently stands at less than one inhabitant per square km. We agree with the viewpoint, according to which the modern concept of frontier is also characterized by the phenomenon of Arctic urbanization – a zone, where new technologies and institutions are developed. From the classical theory of the American frontier (as a very natural

development of the territory) there are parallels to the prospects of development of basic settlements of the Russian Arctic as potential centers of innovation in architecture, life support technology, institutional arrangement of communities with a large proportion of migrants and those who have been residing here for a long time, including the indigenous peoples of the North [2; 7].

Methodology and methods

Our study was constructed in the framework of a general paradigm of socio-spatial and socio-territorial identification in a transforming society [8]. We have chosen social simulation methodology in order to analyze human and social capital in different territorial units of the Arctic region. The methodology is used in solving semistructured problems by formalizing the concepts on the basis of qualitative and quantitative information about the selected fragment of social reality and participants of the relevant processes in the design of agent-based models [5; 23].

We have set a goal to form a model-sociological ground (for neoindustrial exploration of the Arctic), for which we have collected statistical and sociological data and analyzed them, which enabled us to characterize the main social groups that are agents of neo-industrial development in the region in the aspect of human and social potential necessary and sufficient for life in new conditions. We proceeded from the idea that each of the components of this potential is characterized by a specific set of quantitative and qualitative indicators previously used for system dynamic simulation modeling [12]. We can say that the human potential of the Arctic zone is a set of certain human characteristics that help forecast their future possibilities of

life in the Far North and participate in the new reproduction of this zone [17, 18].

The human potential of the Arctic frontier has the following basic features of people who live and (or) work in the Arctic:

- demographic characteristics of the quantity and quality of certain population groups who link their plans with the region, including the standard of living and quality of life;
- their professional competences, including education and training;
- their physical, mental and social health.

State and sectoral statistics also use these items to a certain extent, and they can be found in relevant statistics collections, but most of the necessary information requires that special sociological research be conducted like mass surveys of the northerners belonging to different social groups (long-term residents, including representatives of indigenous peoples of the North – indigenous ethnic groups; settlers – people who have lived in the Arctic region for less than three years; rotational workers who came here to work from other regions), in-depth interviews of experts, content analysis of the media, including social networks; analysis of accounting statements of oil and gas companies and other organizations [15, 20]. Moreover, it is necessary to carry out a sociological analysis of social potential of exploration, which emphasizes issues of social identity, and social trust.

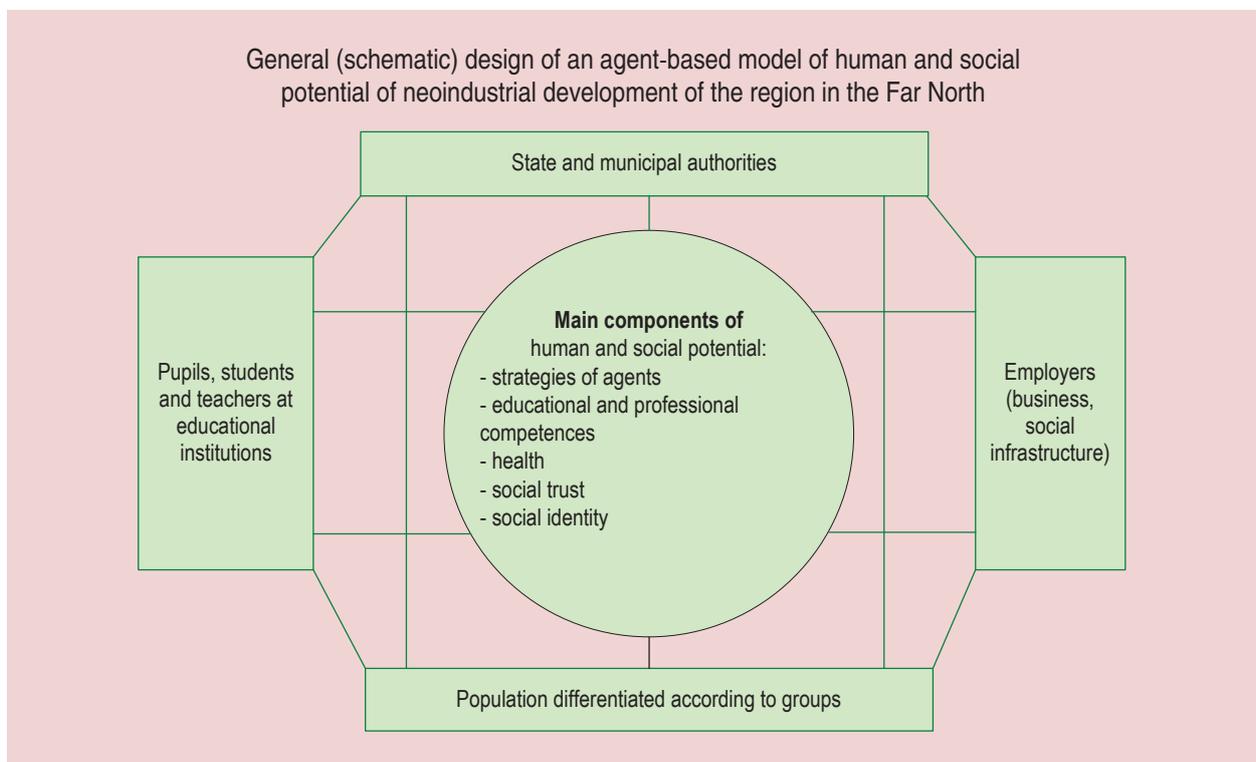
In the context of the data of the population censuses of 2002 and 2010 and current statistics materials of 2010–2015 relating to YaNAO, we have analyzed the results of several sociological surveys, including the one performed in 2015 jointly with the Arctic Research Center (town of Salekhard, V.A. Kibenko et al.); the survey

covered 2,285 respondents 18 years of age and older, who reside in the region; in the administrative center of YaNAO – the city of Salekhard (p=414, r±2.9%); in the gas “capital” – the city of Novy Urengoy (p=531, r±4.3%); in the oil production center – the city of Noyabrsk (p=517, r±3.1%) and other settlements of YaNAO, including the areas of compact residence of indigenous ethnic groups. The quota sample represented the gender and age of respondents. The overall sampling error for the district as a whole did not exceed r±2%. The materials of this main survey (hereinafter – SS main) have been compared with the results of other population surveys of different social groups of northerners (hereinafter – SS gr.), for example, such as long-term residents (in 2010, p=1013, r±2.7%; in 2015, p=1115, r±2.5%); representatives of indigenous ethnic groups (in 2010, p=596, r±2.9%; in 2015, p=603, r±2.7%); newcomers in the Northern region who have lived here for less than three years (in

2010, p=496, r±2.8%; in 2015, p=513, r±3%); rotational workers who came from other regions (in 2010, p=615, r±2.9%; in 2015, p=722, r±2.6%).

In the framework of a survey of gender differences in the health of northerners in 2010, men older than 18 and residing in the town of Nadym (p=510, r±2.3%), town of Muravlenko (p=418, r±3.1%), settlement of Tarko-Sale (p=205, r±3.3%), settlement of Tazovsky (p=231, r±4.1%) were surveyed, and another survey according to the same methodology was carried out in 2015 (hereinafter – SS health).

To assess the situation in the sphere of personnel training for the North in 2014–2016, the surveys of 195 representatives of major employers (oil companies), teachers (560 people) and students (670) of Yamal branches of Tyumen universities were conducted with the use of a quota-territorial sample (hereinafter – SS education).



Results

Developments of agent-based social models that have recently become well-known help combine system dynamic simulation with this new form of social engineering, formalize and “revive” social expectations, intentions, behavior strategies of certain population groups that are most important in addressing social issues (in this case – the development of the circumpolar region in a neo-industrial discourse) [5, 23].

The main agents in the context of human and social potentials are selected as follows:

- population groups differentiated by gender and age, by period of residence in the region (particularly – representatives of indigenous peoples of the North – indigenous ethnic groups, and rotational workers);
- pupils, students and teachers of educational institutions located in the region;
- employers – representatives of the enterprises of key profiles for the development and institutions of social infrastructure;
- state and municipal authorities (*Figure*).

Human potential of the Yamal frontier

We consider human potential in this context not just as a general definition describing the physical and spiritual strength of individuals and communities that promote the reproduction of society, but as actual abilities of people and groups that are in-demand and necessary in dealing with specific tasks in the new development of the Arctic region. First and foremost, they are the following interlinked characteristics: socio-demographic characteristics of the quantity and quality of people who want to live and (or) work in the Arctic; their professional competence; their physical, mental and social health, measured with the help of sociological scales.

Total population of YaNAO is about 540 thousand people, of which 61.7% are Russian, 9.9% are Ukrainian, 8% are representatives of the peoples of the Volga region (Tatar, Bashkir, Chuvash), 6% are representatives of the North Caucasus and Transcaucasia, and 9% are indigenous peoples of the North (the most numerous of them are Nenets and Khanty). About 17 thousand people lead a nomadic life.

In the past years, about 45 thousand migrants come to YaNAO, and about the same number of them leave; i.e. there is a renewal of about 10% of the population in the Okrug.

In addition, there is an increasing number of people who live on the move and commute long distances throughout their entire life. Today, one in four people working in YaNAO is a rotational worker who came here from another region of Russia or the CIS.

The development of new neo-industrial Arctic territories has been launched and is now accelerating. The Bovanenkovo, Novoportovskoye and Tambeyskoye centers of oil and gas production on the Yamal Peninsula, Kamennomyssky oil and gas area in the Gulf of Ob, etc., major infrastructure facilities and communications, the multi-functional sea port of Sabetta, LNG plants, etc. are being developed. It means that the need for professionally trained personnel increases significantly.

At the same time, almost three quarters (73.2%) of respondents residing in YaNAO intend to leave the territory of the district now or in the future (*Tab. 1*). In addition, more than half of parents participating in the survey (57.2%) do not want their children to live and work in the Far North when they grow up. All this, of course, heightens the importance of exploring opportunities of retaining necessary

permanent employees in the region and using interregional work on a rotational basis more efficiently [19, 20].

Speaking about human potential, the authors mean primarily the number and quality of people who are involved in the development of the Arctic region and who intend to continue living and (or) working there, the set of their professional and cultural competencies, and the ability to live permanently in the North or work there on a rotational basis provided by their good health status.

All of the identified intentions (life strategies) require further monitoring with a detailed characterization of the qualities of their bearers. Special attention is drawn to a group of agents who chose the “marginal” strategy “I want to live here for a little while and then I plan to leave”. It has the largest proportion in the modal value of distribution of agents, and from the point of view of neo-industrial development of the region it needs to clarify motivational attitudes in the dilemma “to stay or to leave”, and the prospects of retaining the necessary personnel on site, especially young and middle-aged people who have already adapted to the conditions of the Far North.

One of the important drivers of intensification of human potential in the region is vocational and educational training of specialists who are going to work in new conditions.

Training of skilled workers is carried out mainly by companies themselves at educational and training centers; highly qualified specialists for the oil and gas industry in Russia are trained in four universities: Industrial University of Tyumen (previously known as Tyumen State Oil and Gas University), Gubkin Russian State University of Oil and Gas, Ufa State Petroleum Technological University and Ukhta State Technical University. Most of the engineers in the Yamal region are graduates from the Industrial University of Tyumen, which is the largest research and educational holding that includes not only educational institutions of different levels, but also scientific research institutes, a design institute, facilities for pilot production of high-tech products and high-tech services. Workers for the North are also trained there.

In the target (reference) groups we studied the quality of training at different universities, and also how students, teachers, and representatives of employer companies assess key aspects of educational process.

The information was obtained in 2014–2016 with the help of a questionnaire survey of 670 undergraduate students, 560 professors and 195 managers representing oil and gas companies with the use of quota-territorial sample (SS education). Some results of the survey are given in *Tab. 2*.

Table 1. Desired places where residents of different age plan to live (percentage of respondents)

Intended place of residence	Respondents' age, years			
	18-24	25-39	40-54	55 and over
1. I want to live here for the rest of my life	31.3	27.1	22.4	31.1
2. I want to live here for a little while and then I plan to leave	57.0	62.5	65.4	51.1
3. I want to leave as soon as the opportunity presents itself.	11.8	10.4	12.2	17.7

Source: data of SS main as of 2015 (in collaboration with the Arctic Research Center, V.A. Kibenko), n=2,285 respondents.

Table 2. Evaluation of the quality of training of professionals for the development of oil and gas resources of the Arctic region in Russian institutions (percentage of those surveyed in each group)

Assessment	Students	Teachers	Employers
I think it is sufficiently high	47.4	59.4	22.5
I think it is satisfactory	36.9	25.4	35.0
It requires radical change	3.1	13.2	39.1
I am not sure	12.6	2.0	3.4
Total	100.0	100.0	100.0

We note a significant difference in the rating of the main agents of the components of our model: the teachers' assessments are clearly too high, and the assessments made by representatives of specialized companies are obviously more realistic. The identified imbalances require detailed explanation and further sociological monitoring with direct participation (dialogue) of main agents.

In the course of the survey specific proposals to change the structure and content of educational process were received. In addition, according to a significant number of respondents, the current interaction of universities with the regional community is implemented insufficiently. Meanwhile, a regional university that cooperates effectively with government, business, and civil society should be the main integrator of innovative neo-industrial development of the Arctic region, coordinator in the formation of new partnership

structures (business incubators, technology parks, etc.), testing ground for innovative technology and business processes, and ultimately one of the key actors (stakeholders) in sustainable socio-economic development of the Arctic.

The importance of the health component of those who participate in the development of the Arctic is confirmed by the data of medical statistics and the results of conducted mass surveys of the northerners.

For instance, the causes of mortality in the working age population of Yamalo-Nenets Autonomous Okrug are as follows: diseases of the circulatory system (21.2 cases per 10 thousand people), accidents, poisoning, and injuries (12.8 cases per 10 thousand people). The low-quality alcohol poisoning, drug overdose, suicide, and homicide account for nearly half of the causes of death. Nevertheless, self-reported health is quite high, especially in men (*Tab. 3*).

Table 3. Self-reported health in male residents of Yamalo-Nenets Autonomous Okrug (percentage of respondents SS health)

Self-reported health	2010	2015
I feel good	40	38
I fall ill sometimes	36	35
I fall ill often	10	12
I am chronically ill	8	8
I am a disabled person	3	2
I cannot say for sure	3	5
Total	100	100

However, these data indicate an emerging trend of deterioration in self-rated health in those who came to the North. The reasons for this are the climatic, socio-psychological, environmental (anthropogenic) and other factors and their interaction.

For example, with the combination of geomagnetic field disturbances and gravity anomalies, there is a dramatic increase in the number of cases of exacerbations of cardiovascular diseases, mainly hypertensive crisis, myocardial infarction, and errors of operators.

Northern natural conditions that affect the health of the people who came here from other regions are quite diverse and are still not studied profoundly. It is not only low temperature, but also the lack of daylight leading to seasonal depression and insomnia, high wind speed, atmospheric pressure, specifics of water and nutrition, etc.

Moreover, rotational work makes all of these multiple effects on the human body not continuous, but fractional in their nature. Regular long-distance commuting that implies crossing multiple time zones, changes in the climate and social conditions – all these factors do not allow an individual to establish stable relations with their external environment, so the life on the move, when rotational workers “live in the South and work in the North”, is accompanied by chronic tension of regulatory and adaptation systems of the human body.

In the course of the surveys of northerners we found out how satisfied they are with medical care in general and with its individual aspects. The indicators turned out worse than the national average ones that had been identified earlier by major sociological centers [10, 13].

Despite the sufficiently low level of people’s satisfaction with existing healthcare system, the government reduces healthcare expenditures and the number of medical organizations. Thus, in recent years their number on the territory of Yamalo-Nenets Autonomous Okrug has decreased by half (there were 48 hospitals and 78 out-patient healthcare facilities in 2000; in 2015, their number was 23 and 36, respectively). Besides, the change in subordination of local medical institutions (from the municipal to the district governance) is assessed negatively by the population.

Social potential in the discourse of the agent-based model for development of the circumpolar region

In this study, we consider social potential as a set of connections and relationships between people and social groups in relation to the type and place of their life in the aspects of social identification and satisfaction with these relationships from the standpoint of the current status and prospects.

As part of immediate preparation for the use of the methodology of social simulation based on a representative mass survey (2,285 respondents) in 2015, we investigated various combinations of regional identity, including the identity of the residents of Yamalo-Nenets Autonomous Okrug in the discourse of agent-based relations. Whom do people living in the Arctic region identify themselves with? It turns out that the priority is given to national and state identity – 43.4% of respondents consider themselves primarily as “Russian”; ethnic identity ranks second, with 16.6% (including “Russian” and “Slav” – 12.3%), followed by regional identity (“northerner” – 11.5%, “resident of Yamal” – 9.8%), and finally, local identity – 5.1% of respondents (“resident of

Salekhard”, “resident of Novy Urengoy”, etc.). It has been found that people born in the Tyumen Oblast, felt the sense of regional identity stronger, and the feeling of state and ethnic identity is stronger in those who came from other regions.

It has been found that sufficiently strong social connections between individuals and social groups can be formed only on the basis of trust at all levels of social relationships [3]. Trust is the confidence in the honesty

and sincerity of others or the state and non-governmental institutions, the media, etc. It is one of the foundations of social cohesion, which largely determines the dynamics of development of the social situation in the Arctic region under consideration.

Sociological studies documented a decrease in the level of trust in different levels of social interaction, and in representatives of different groups of agents. Thus, surveys conducted on representative samples in Salekhard, Novy

Table 4. Dynamics of changes in the level of social trust of Yamal residents (percentage of respondents SS gr. 2010 and 2015)

Object of trust	2010			2015		
	Level of trust					
	I trust	I don't trust	I am not sure	I trust	I don't trust	I am not sure
Regional government	29.6	39.0	31.4	27.0	40.5	32.5
Municipal authorities	27.5	28.7	43.8	25.8	31.2	43.0
Political parties and figures	19.0	34.9	46.1	15.3	28.2	56.5
Mass media	25.5	40.1	34.4	25.4	29.3	45.3
Religious denominations	35.5	38.9	25.6	35.4	40.0	24.6
Social environment (neighbors, colleagues)	32.8	41.4	25.8	24.0	43.6	32.4

Table 5. Trust of inhabitants of Yamalo-Nenets Autonomous Okrug in the authorities (percentage of respondents SS gr. 2010 and 2015)

Social groups of Yamal residents	Level of trust					
	2010			2015		
	I trust	I don't trust	I am not sure	I trust	I don't trust	I am not sure
Long-term residents (living in the North over five years)	24.8	26.3	48.9	24.1	42.2	33.7
including representatives of indigenous ethnic groups	18.3	31.4	50.3	18.1	32.6	49.3
Newcomers (living in the North for less than three years)	28.1	33.3	38.6	26.1	35.7	38.2
Rotational workers whose permanent place of residence is in other regions of Russia and the CIS	31.2	41.4	27.4	28.2	28.9	42.9

Urengoy, the rotational settlement of Yamburg and the settlement of Yar-Sale show that the representatives of some selected groups trust others less: aboriginal people representing a Northern ethnic group do not trust others, especially outsider visitors; those who live in the North all the time (for more than five years) have a more negative attitude toward rotational workers from other regions, etc. (*Tab. 4, 5*).

Analysis of the data suggests the presence of a very sustainable trend in the low level of trust of the agents representatives of residents toward the agents authorities and other official institutions. At the same time, it is noteworthy that there is quite a sharp decline in the trust in the immediate social environment (neighbors, colleagues, etc.).

Obviously, in the further explication of this multi-agent model, we should select this group as a relatively independent agent and take it into account in tracing the social potential, especially because it can be assumed that the solution to the dilemma “whether to leave or to stay” depends on this agent-agent link.

However, the attitude toward the authorities was and still remains the fundamental basis of the relationship of trust. This attitude is highly differentiated across different groups of the population, especially on the basis of how long the people have lived in the region.

According to the survey, the greatest level of social discontent, pessimism and distrust of the authorities is typical of the representatives of indigenous ethnic groups (Nenets, Khanty and Selkup) who believe that “everyone tries to deceive them”. They are often afraid to answer frankly, hence the largest proportion of those who chose the answer “I am not sure” (about half of the respondents).

As for the rotational workers who arrived to work in the North from other regions of Russia and the CIS, they are more optimistic than the long-term residents of Yamal.

At the same time, in all the categories of respondents there turned out to be a high proportion of those who are “not sure”, which is, obviously, an expression of distrust. It turned out that a critical attitude toward the authorities and distrust of them correlate with the increase in age and in the level of education.

Distrust of the authorities and political leaders is aggravating in connection with the increasing income differentiation and the inequality in income distribution. So, in recent years, the total incomes of the wealthiest 10% exceed in 29 times this indicator for the poorest 10%.

It was revealed that among the newcomers and rotational workers from other regions of Russia there are opposite trends in the dynamics of social trust in the immediate environment. A lot of romantics come to work in the North believing that can find a more free and pure social space there; they believe that in the North there are no traditional mechanisms of social control based on kinship and neighborhood relationships (except for the cases when the whole clan moves to the North), and you can find secured independence in this region, etc. However, not everyone can get used to the new norms of “personal” responsibility for their words and deeds, and they are sometimes excluded from relevant reference groups, become disappointed and even angry.

Thus, social potential of the regional community is largely determined by the reliability of social relations based on the trust in social and governmental institutions, as well as in the immediate environment. Not less important is social inclusion in local and

regional community (or, conversely, exclusion from it), the identity of inhabitants of the Arctic region, which further reinforces the need for research on human and social potential with the help of agent-based models.

Conclusion

The application of social simulation methodology in a sociological study of human and social potential in the region of the Far North, its reproduction and intensification for the purpose of neo-industrial and social development has shown the prospects of this trend in theoretical-methodological and practical terms.

In the framework of this methodology, the agent-based approach is especially relevant; along with system dynamics modeling it helps identify and represent subject-to-subject relations of participants of the main neo-industrial frontier and build them for the purposes of monitoring and regulation.

Thus, the contours of a model-sociological regional ground have been formed, in which human and social potentials were represented in the set of direct and indirect characteristics of the number and quality of people who have expressed a desire and who actually intend to live and (or) work in the Arctic; their professional competencies; their physical, mental and social health, etc., all this is of major importance for neo-industrial development of

the Far North.

The sociological research conducted by the authors in cities, towns, national and rotational settlements of the Arctic frontier helped obtain reliable analytical and diagnostic information on the main characteristics of social (trust in the social environment and government, involvement in the regional community) and human potentials (quantity and quality of potential participants) in neo-industrial development of the Yamal frontier.

Further work in this direction can be carried out in the field of geographic information (mapping) explication of these models and in an interactive mode of sociological monitoring with the use of computer technology that includes communication and interaction (social networks) between the agents representatives of various groups in the development of the region and its social development, the expansion of this circle with the help of experts-consultants, representatives of government, business, nongovernmental organizations, the media, and residents themselves acting as informants who are directly involved in the preparation and evaluation of management decisions. In the diagnostic and design perspective, these arrays can be combined in an information-analytical system on the basis of BIG DATA and DATA MINING.

References

1. Gulin K.A., Ermolov A.P. Natsional'naya promyshlennaya politika Rossii v ramkakh neoindustrial'nogo vektora razvitiya: kontseptual'nye podkhody [National industrial policy of Russia in the framework of neo-industrial vector of development: conceptual approaches]. *Ekonomicheskie i sotsial'nye peremeny: fakty, tendentsii, prognoz* [Economic and Social Changes: Facts, Trends, Forecast], 2015, no. 6, pp. 58–77. (In Russian).
2. Zamyatina N.Yu. Arkticheskaya urbanizatsiya kak frontir [Arctic urbanization as a frontier]. *Nauchnyi vestnik YaNAO. Obdoriya: istoriya, kul'tura, sovremennost'* [Scientific Herald of Yamalo-Nenets Autonomous Okrug. Obdoriya: history, culture, modernity], 2016, no. 3 (92), pp. 114–120. (In Russian).

3. Kozyreva P.M. *Doverie i ego resursy v sovremennoi Rossii* [Trust and its resources in modern Russia]. Moscow: IS RAN, 2011. 172 p. (In Russian).
4. Kokis K.A. K voprosu o formirovanii arkticheskoi politiki RF [Revisiting the issue of formation of Arctic policy of the Russian Federation]. *Arktika i Sever* [The Arctic and the North], 2015, no. 19, pp. 81–95. (In Russian).
5. Makarov V.L., Bakhtizin A.R. *Sotsial'noe modelirovanie – novyi komp'yuternyi proryv (agentno-orientirovannye modeli)* [Social simulation – a new computer breakthrough (agent-based models)]. Moscow: Ekonomika, 2013. 295 p. (In Russian).
6. Markin V.V., Silin A.N. Tsirkumpolyarnyi region v konturakh sotsial'no-prostranstvennoi transformatsii territorii (na primere Yamala) [Circumpolar region amid socio-spatial transformation of a territory (Case Study of Yamal)]. *Ekonomicheskie i sotsial'nye peremeny: fakty, tendentsii, prognoz* [Economic and Social Changes: Facts, Trends, Forecast], 2016, no. 6 (48), pp. 28–52. DOI: 10.15838/esc/2016.6.48.2. (In Russian).
7. Pilyasov A.N. Goroda-bazy Arkticheskogo frontira [Base towns of the Arctic frontier]. *Voprosy geografii. № 141. Problemy regional'nogo razvitiya Rossii* [Issues of geography. No. 141. Problems of regional development of Russia]. Moscow: Kodeks, 2016. Pp. 503–529. (In Russian).
8. Rossiiskoe obshchestvo: transformatsii v regional'nom diskurse (itogi 20-letnikh izmerenii: monografiya [Russian society: transformation in the regional discourse (the results of 20 years of measurements: a monograph)]. Team of authors under the scientific supervision of M.K. Gorshkov and V.A. Ilyin. Vologda: ISERT RAN, 2015. Pp. 93–120. (In Russian).
9. Turner F. *Frontir v amerikanskoi istorii* [The Frontier in American History]. Moscow: Ves' mir, 2009. 304 p. (In Russian).
10. Shabunova A.A., Kalachikova O.N., Leonidova G.V., Smoleva E.O. Eksklyuziya kak kriterii vydeleniya sotsial'no uyazvimykh grupp naseleniya [Exclusion as a criterion for selecting socially vulnerable population groups]. *Ekonomicheskie i sotsial'nye peremeny: fakty, tendentsii, prognoz* [Economic and Social Changes: Facts, Trends, Forecast], 2016, no. 2, pp. 29–47. (In Russian).
11. *Arctic design group*. Available at: <http://arcticdesigngroup.org/ARCTIC-DESIGN-GROUP>. (Accessed 03.12.2016).
12. Barbakov O.M., Kiselyov V.G. Methodology of carrying out social experiments in virtual space. *Tyumen State University Herald*, 2012, no. 8. (In Russian).
13. Belonozhko M.L., Silin A.N. Russian North: Change of Social Situation. *Middle – East Journal of Scientific Research*, 2013, no. 16 (2), pp. 150–155.
14. Hill F., Caddy C. *The Siberian Curse: How Communist Planners Left Russia Out in the Cold*. Washington, D.C.: Brookings Institution Press, 2003. 240 p.
15. Larchenko L.V., Kolesnikov R.A., Tumanova G.P., Kibenko V.F. Economic Problems of Exploring Hydrocarbons in Russian Northern Provinces in the Context of International Interests. *International Journal of Energy Economics and Policy*, 2016, no. 6 (3), pp. 529–536.
16. *National Security Presidential Directive on Arctic Region Policy, The White House, 2009, 9 January*. Accessed: <https://www.fas.org/irp/offdocs/hspd/hspd-66.htm>.
17. *New Mobilities and Social Changes in Russia's Arctic Regions*. Ed. by M. Laruelle. Routledge: London and New York, 2017. 216 p.
18. Paasi A. Place and Region: Regional worlds and worlds. *Progress in Human Geography*, 2002, no. 6, pp. 802–811.
19. Saxinger G., Ofner E., Shakirova E. Jch bin bereit. Die nachste Generation mobile Fachkrafte in der russischen Erdgas – and Erdolindustrie. *Austrian Studies in Social Anthropology*, 2014, no. 2, pp. 1–24.
20. Silin A.N. Long distance Commuting in Oil and Gas production Industry in the North western Siberia: Sociological Analysis of Change. *Mediterranean Journal of Social Sciences*, 2015, no. 3, vol. 6, pp. 109–206.

21. Stammler F., Forbes D. Oil and gas development in the Russian Arctic: West Siberia and Timan-Pechora. *IWGIA Newsletter Indigenous Affairs < Arctic Oil and Gas Development*, 2006, no. 2-3/06, pp. 48–50.
22. *The Arctic Research and Policy Act of 1984, Public Law 101-609*. Available at: [http:// www.whitehouse.gov](http://www.whitehouse.gov)
23. Trajkovski G., Collins S.G. (Eds.) *Handbook of Research on Agent-Based Societies: Social and Cultural Interactions*. New York, NY: Information Science Reference Hershey, 2009. 412 p.

Information about the Authors

Valerii Vasil'evich Markin – Doctor of Sociology, Professor, Chief Research Associate, Federal Sociological Research Center, Russian Academy of Sciences (24/35, Krzhizhanovsky Street, office 5, 117218, Moscow, Russian Federation; e-mail: markin@isras.ru)

Anatolii Nikolaevich Silin – Doctor of Sociology, Professor, Honored Scholar of the Russian Federation, Chief Research Associate, Tyumen Industrial University (38, Volodarsky Street, 625000, Tyumen, Russian Federation; e-mail: sm-2004@rambler.ru)

Received June 5, 2017.