The role of agricultural sector in the socio-economic development of the Arctic zone of the Russian Federation

L V Voronina¹, M G Yurkevich²

¹Northern (Arctic) Federal University named after M.V. Lomonosov, Arkhangelsk, Russia
²Institute of Biology of the Karelian Research Centre of the Russian Academy of Sciences, Petrozavodsk, Russia

voronina_ljudmila@rambler.ru, svirinka@mail.ru

Abstract. The article is devoted the agricultural sector role in the socio-economic development of the Arctic zone of the Russian Federation. Nowadays the agricultural sector is the one of the main parts of public authorities’ policy. The scope of the study is the regions fully or partially attributed to the Arctic zone of the Russian Federation according to the Presidential Decree. The results of the study show the significantly lower contribution of the agricultural sector to the socio-economic development of the Arctic regions for all indicators considered than the average level in Russia. An exception is the indicator “The turnover of agricultural enterprise in the total regional turnover”, the high value of which is achieved only thanks to the Murmansk region. Agriculture and forestry, hunting, fishing and fish farming sector play the important role of in the development of the local economy of the following old-developed regions: the Murmansk region, the Arkhangelsk region, as well as the Republic of Karelia, and the outsider the Yamalo-Nenets Autonomous Okrug. Fixed assets of agricultural enterprises have a high degree of equipment depreciation in the Arctic regions of the Russian Federation and should be repaired. The share of food and agricultural products in the value of imports in the Arctic zone is less than the national average. The results obtained can be applied in the development and updating the strategic documents in the agricultural sector to increase its significance in the socio-economic development of the Arctic zone of the Russian Federation.

1. Introduction
Since the beginning of the 20th century attention of state authorities has been focused on the integrated development of the Arctic zone of the Russian Federation and the effective development of natural resources on its territory. According to the new edition of the Presidential Decree “On the Basics of State Policy of the Russian Federation in the Arctic for the period until 2035”, one of the main tasks for economic development of the Arctic zone is to stimulate local production of agricultural raw materials and food. The document also reflects the policy in relation to the native population of the North, Siberia and the Far East (hereinafter - the indigenous peoples), more than 50% of which live in the Arctic territories of Russia [1]. In particular, it is noted that it is necessary to protect their original habitat and preserve and develop traditional sectors of the economy, handicrafts and crafts, contributing to an increase in the level of employment of indigenous peoples [2]. The development of the agricultural sector of the economy in the Arctic territories can help to achieve the national goals such as strengthening food and environmental security, preserving local commercial activities and increasing the level of employment, especially of the rural population.
On the one hand, all regions of the Arctic zone are characterized by low population density, which means the availability of vast areas for the development of crop production and animal husbandry, as well as water resources for fish farming and fishing. The regions of the European Arctic differ from Asian part of the Arctic by the availability of resources for forestry and hunting resources. On the other hand, the Arctic territories of Russia are characterized by harsh natural climatic conditions, which greatly complicate the development of the agricultural sector in this area.

Also, from the beginning of the 1990s, there has been a tendency to depopulate the regions of the Arctic zone of the Russian Federation due to the high negative net migration rate. The main reasons for high immigration are increased unemployment and lower incomes because of the closure of production [3].

In connection with all of the above, for the effective development of the agricultural sector in the territory of the Russian Arctic is depend on financial support by government. A preliminary analysis of the agricultural sector and its role in the socio-economic development of the Arctic entities are made in this study in order to develop effective tools and mechanisms of state policy and its application in the fields of agriculture and forestry, hunting, fishing and fish farming.

2. Theoretical framework
A large number of studies cover the issues of contribution of the agricultural sector to the development of territories. The development of agriculture in the Northern and Arctic regions is reported in the papers of scientists from the Komi Science Center of the Ural Branch of the Russian Academy of Sciences, such as Ivanov V.A. [4], Ivanova E.V. [5], Lazhentsev V.N. [6], Zhukov N.I., Shcherbakova A.S. [7, 8], Dmitrieva T.E., [9], Terentyev V.V. [10] and others. Nikitenko M.E. and Trofimova I.B. [11] considered agriculture development in terms of the food security and commercialization products of traditional activities made by indigenous peoples in the Arctic zone of the Russian Federation. Sibileva E. V., Mikhailova M. M., Vasilieva O.G., Vinokurova T.E. and Ushnitsky O.A. focus on the features of the agricultural sector in the economy of the Republic of Sakha (Yakutia) [12].

Analysis of existing studies shows that most of research cover only one side or direction the in analysis of the role the agricultural sector and its importance in economic development in a certain region or in the entire of the Arctic. This research is aimed at studying the role and significance of the agricultural sector in various directions of socio-economic development of the Arctic zone of the Russian Federation.

3. Research methods
The research purpose is to assess the role of the agricultural sector in the socio-economic development of the Arctic zone of the Russian Federation at the present.

The scope of research is the regions, fully or partially attributed to the Arctic zone of the Russian Federation according to the Presidential Decree [13]. The study is based on secondary data obtained from the Federal State Statistics Service. The research methods are content analysis, comparative analysis, statistical data analysis and graphical modeling.

The methodology for assessing the agricultural sector in the socio-economic development of the regions of the Arctic zone of the Russian Federation consists of the following steps. The first stage includes a comparative analysis of the scientific literature in order to determine the contribution of agriculture, forestry, hunting, fishing and fish farming to the socio-economic development of the Arctic regions.

The second stage consists of selecting a set of indicators reflecting the role of the agricultural sector in the socio-economic development of the Arctic zone of the Russian Federation. The main criteria for selecting the indicators were the possibility to quantify them and the existence of statistical data for the observed regions.

At the next stage, a database was formed for the beginning of 2019 for nine regions of the Russian Arctic and Russia to describe the socio-economic condition as a whole, as well as for of agriculture and forestry, hunting, fishing and fish farming sectors.
The fourth stage of the study is devoted to the calculation of indicators that reflected the role of the agricultural sector in the competitiveness of the Arctic regions, employment and foreign trade. Lastly, comparative analysis of indicators and interpretation of the results were carried out to draw the conclusions about the significance and role of the agricultural sector in the socio-economic development of the Arctic zone of the Russian Federation.

4. Results and discussion

All Arctic regions can be classified depending on the suitability of climatic conditions for the development of the agricultural sector in the territory. Thus, according to the Bioclimatic Index of Severity of Climatic Regime (hereinafter BISCR), the Arkhangelsk region, the Republic of Komi, the Republic of Karelia and the Krasnoyarsk Territory (BISCR over 5 points) are the regions with the mildest natural climatic conditions [14]. The region with the most harsh natural climatic conditions in the Arctic zone are three Autonomous Okrugs (the Chukotka, the Yamalo-Nenets and the Nenets), as well as northern part of the Siberian Arctic (the Republic of Sakha (Yakutia)), where the BISCR are less than 5 points. Crop production and forestry predominate on the territory of the regions of the first group, whereas the spheres of agricultural sector such as livestock and mainly reindeer husbandry are highly developed in the regions of the second group. Moreover, the share of indigenous peoples in population is high for northern regions and most of indigenous peoples are employed in such agricultural spheres as crop production, animal husbandry, hunting, fishing and fish farming. The greatest number of them live in territory of the Yamalo-Nenets Autonomous Okrug and the Republic of Sakha (Yakutia).

The results of the study of role of the agricultural sector in the socio-economic development of the Arctic regions of the Russian Federation are presented in table 1.

Table 1 shows the share of the agriculture at Gross value added across the Arctic which is less on 0.8 % than average in Russia. Less than 1% of agriculture and forestry, hunting, fishing and fish farming are presented in the sectoral structure of Gross value added of the Nenets Autonomous Okrug and the Yamalo-Nenets Autonomous Okrug in 2018 year. The share of agricultural sector at Gross Value Added is higher than the average in Russia only in three old-developed Arctic areas: the Murmansk region (13.0%), the Yarchuk region (5.4%) and the Republic of Karelia (5.6%).

Furthermore, these three regions are leaders in terms of the share of Fixed Capital Investments, turnover of enterprise and fixed assets value at the agricultural sector of the regional economy. Thus, the share of Fixed Capital Investments by agriculture in the total regional investments among all the entire Arctic zone exceeds the average in Russia and means 9.5% for the Arkhangelsk region, 6% for the Murmansk region, and 4.3% for the Republic of Karelia. In another Arctic regions of Russia this indicator is less than 1.5% and equals zero in all Arctic Autonomous Okrugs. The average value of the share of Fixed Capital Investments by agriculture for the Arctic is lower than for the country by more than 3 times in the beginning of 2019 year.

The most effective policy for agriculture and forestry, hunting, fishing and fish farming was being pursued the Murmansk region in 2018 year. In this region the share of the turnover of agricultural enterprise in the total regional turnover was 23.2% and exceeded more than 10 times the average in Russia. The share of turnover for another Arctic regions of the Russian Federation does not exceed 1.5%, with the exception of the Arkhangelsk region, the Republic of Karelia and the Nenets Autonomous Okrug, where average value of the indicator is 1.7% for the country.

| The share of agricultural sector at Gross value | The share of Fixed Capital Investments by agriculture in the turnover of agricultural enterprise in the total | The share of fixed assets value by agriculture at total regional | The share of employed in the agricultural sector at |
|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|--------------------------------------------------|

3
The average meaning of indicator “the share of fixed assets value by agriculture at total regional fixed assets value” in the Arctic zone (1.1%) is almost 3 times lower than the national average due to the higher depreciation. For this indicator all studied Arctic regions, except of the Murmansk region, have less than the average in Russia. Especially, the Yamalo-Nenets Autonomous Okrug, the Nenets Autonomous Okrug and the Republic of Komi have the lowest share of fixed assets value at agriculture (0.1%, 0.4%, 0.7% and 0.6%), because of the high impact of resource-extracting sectors in the economy.

Near 4.9% of population are employed in the agricultural sector in the Arctic regions. It is almost 1.5 times lower than the average in Russia. The highest share of employed in the agricultural sector (over 7%) are in the Siberian regions such as the Krasnoyarsk Territory and the Republic of Sakha (Yakutia). It explains by farm popularity and well-developed small forms of entrepreneurship on this area.

Regarding financial component of agricultural sector in the Arctic zone, the share of unprofitable organizations is high (Figure 1). According Figure 1, the indicator is higher than 40% in all Autonomous Okrugs of Arctic zone where on oil and gas production is main economic activity.

At the beginning of 2019 year the Murmansk region and the Republic of Komi have the lowest share of unprofitable enterprises in the agricultural sector: 12.8% and 20% that is less than the average Russian level.

|                          | added in region, % | total regional investments, % | regional turnover, % | fixed assets value, % | population in region, % |
|--------------------------|--------------------|-------------------------------|----------------------|-----------------------|-------------------------|
| The Republic of Karelia   | 5.6                | 4.3                           | 5.1                  | 3.0                   | 4.9                     |
| The Republic of Komi      | 1.7                | 1.2                           | 0.6                  | 0.6                   | 5.0                     |
| The Arkhangelsk region    | 5.4                | 9.5                           | 6.7                  | 2.9                   | 5.0                     |
| The Nenets Autonomous Okrug | 0.7              | 0.2                           | 1.9                  | 0.4                   | 4.9                     |
| The Murmansk region       | 13.0               | 6.0                           | 23.2                 | 3.4                   | 3.1                     |
| The Yamalo-Nenets Autonomous Okrug | 0.1     | 0.0                           | 0.0                  | 0.1                   | 1.5                     |
| The Krasnoyarsk Territory | 2.5                | 1.5                           | 1.3                  | 2.6                   | 7.5                     |
| The Republic of Sakha (Yakutia) | 1.8        | 0.3                           | 0.2                  | 1.2                   | 7.1                     |
| The Chukotka Autonomous Okrug | 3.0        | 0.5                           | 0.7                  | 0.7                   | 5.0                     |
| The Arctic zone of Russia | 3.8                | 1.2                           | 1.8                  | 1.1                   | 4.9                     |
| The Russian Federation    | 4.6                | 3.6                           | 1.7                  | 3.1                   | 7.1                     |
The rural economy plays significant role in the international trade of most Arctic regions (Figure 2). The exceptions are the Nenets Autonomous Okrug and the Yamalo-Nenets Autonomous Okrug because they are depended on oil & gas production. The agricultural sector plays inconsiderable role in the international trade for the Republic of Komi. Only 0.2% of food and agricultural products are imported. The agriculture sector contributed to the international trade only in the Murmansk region at the beginning of 2019 year.

**Figure 2.** The role of rural economy in the international trade of the Arctic regions, %
The Murmansk Region and the Chukotka Autonomous Okrug differ among all Arctic regions because the share of food and agricultural products in the exports is higher by 3.3 and 3 times than the national average level. A high amount of indigenous peoples are involved in traditional economic activity in these part of the Arctic. In 2018 local products from specific economical activity such as reindeer husbandry and fish farming (the Murmansk region) were actively exported. All Arctic regions have small share of food and agricultural products in the imports, except the Murmansk region, compare with average share for Russia.

In the Republic of Karelia and the Arkhangelsk region the contribution of the agricultural sector to the international trade is less than the national average by 2 and 3 times in 2018. For these two old-developed regions of the European Arctic import is over export.

In remote regions of the Siberian Arctic the share of import does not exceed 5% for the Republic of Sakha (Yakutia) and 2% for the Krasnoyarsk Territory, and the share of exports is less than 1% for both districts.

5. Conclusion
Based on the results of the study, the following conclusions are made. All indicators, except of the share of the turnover of agricultural enterprise in the total regional turnover, shows that the agricultural sector contributes less to the socio-economic development of the Arctic zone than in entire Russia. The Arctic zone has the high value of indicator “The share of the turnover of agricultural enterprise in the total regional turnover” only thanks to the Murmansk region.

The agriculture and forestry, hunting, fishing and fish farming in region’s economy are important for the old-developed regions of the European North: the Murmansk region, the Arkhangelsk region and the Republic of Karelia. An outsider area is the oil and gas region - the Yamalo-Nenets Autonomous Okrug, where almost all indicators are close to zero. The Arctic Autonomous Okrugs have the lowest meaning of all indicators and inconsiderable contribution of the agricultural sector to their economy in reason of harsh natural climatic conditions and natural based economy.

Fixed assets have high level of depreciation in the Arctic zone and should be repaired. It leads to increasing investments to economy.

The structure of the the international trade turnover for the Arctic agricultural goods is significantly different from the entire Russia. Thus, share of food and agricultural products in the imports is less in the Arctic regions than average share. Moreover, agricultural products are not imported at all in Autonomous Okrugs. The largest contribution to the international trade is made by the regions of the European Arctic where economy are diversified by sources of income. The examples are the Murmansk region and the Republic of Karelia, the borders of which are close to Scandinavian countries.

The research results can be applied in the preparation and updating of strategic planning documents for agricultural sector and increasing its role in the socio-economic development of the Arctic regions in Russia.

Acknowledgments
The authors wish to thank the Russian Foundation for Basic Research for financial support: № 19-29-05174-mk «Agricultural and economic efficiency of application of artificially improved soils on the basis of waste of pulp and paper industry».

References
[1] The list of indigenous peoples of the North, Siberia and the Far East of the Russian Federation: Decree of the Government of the Russian Federation of 04.17.2006 №. 536-r (ed. 12.26.2011) Consultant Plus
[2] On the Fundamentals of the state policy of the Russian Federation in the Arctic for the period until 2035: Decree of the President of the Russian Federation dated 05.03.2020 164 Official Internet portal of legal information Available from: http://www.pravo.gov.ru, 05.03.2020 [Accessed 27th February 2020]
[3] Shelomentsev A G, Voronina L V, Ukhanova A V, Smirenikova E V 2018 Paradox of population migration in the Russian Arctic: factors and barriers Management of Economic Systems: an scientific electronic journal 11 41

[4] Ivanov V A 2019 Methodological and practical aspects of strategic management of sustainable development of the agrarian sector of the northern region Corporate governance and innovative economic development of the North: Bulletin of the Research Center of Corporate Law, Management and Venture Capital of Syktyvkar State University 1 16-33

[5] Ivanov V A, Ivanova E V 2017 The formation and development of an innovation system of agrarian sector of the Northern region: evidence from the Komi Republic Regional Economics: Theory and Practice 1 142-155

[6] Ivanov V A, Lazhentsev V N 2015 The agricultural sector of economy of the Arctic territories of Russia (case study of the Komi Republic) Proceedings of the Komi Science Centre of the Ural Division of the Russian Academy of Sciences 3 132-140

[7] Zhukov N I, Shcherbakova (Ponomareva) A S 2019 The development of organic farming in the conditions of the North and the Arctic (on the example of the Republic of Komi) Corporate governance and innovative economic development of the North: Bulletin of the Research Center of Corporate Law, Management and Venture Capital of Syktyvkar State University 1 34-45

[8] Shcherbakova (Ponomareva) A S 2018 Ranking assessment of the quality of soils of agricultural lands (on the example of the Republic of Komi) Sever i rynok: formirovanie èkonomičeskogo porâdka 5(61) 120-131

[9] Dmitrieva T E, Shcherbakova A S 2017 Social aspects of the effectiveness of the agricultural sector of the rural economy of the northern region Russia in XXI century: global challenges and prospects of development Materials of the sixth International Forum 471-479

[10] Terentyev V V 2013 Staffing for the modernization of agriculture in the northern and Arctic territories (case study of the Komi Republic) Economic and Social Changes: Facts, Trends, Forecast 4 151-165

[11] Nikitenko M E, Trofimova I B 2016 Food security in the Arctic territories of the Russian Federation Society: Politics, Economics, Law 9 33-37

[12] Sibileva E V, Mikhailova M M , Vasilieva O G, Vinokurova T E, Ushnitsky O A 2013 Features of the agricultural sector of the economy of the Republic of Sakha (Yakutia) Current Trends in Economics and Management: A New Vision 23 253-257

[13] On the land territories of the Arctic zone of the Russian Federation: Decree of the President of the Russian Federation № 296 from 02 of May 2014 year (ed. or 05.03.2020) Meeting of the legislation of the Russian Federation 18 (part. II) p 2136

[14] Martynov A S, Artyukhov V V, Vinogradov V G 1997 Electronic atlas-monograph on the socio-economic geography of Russia Russia as a system Available from: http://www.sci.aha.ru/RUS/wadb2.html [Accessed 27 February 2020]