Agro-Industrial Clusters in the Russian Economy as a Logical Stage of Integration in the Digital Economy

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Abstract— **The global trend in recent years is the consideration as the main determinant of the competitiveness of national economies NBIC - the synthesis of nano-bio-information technology and cognitive science. Therefore, the issues of digitalization of the agro-industrial complex in the Russian economy are a logical continuation of the national economic policy along the trajectory: modernization - innovations - informatization - digital economy. The importance of the AIC in the digital economy is determined by a number of factors. First, it is an industry where goods are manufactured that satisfy the primary needs of consumers at the micro level, and the country's economic security at the macro level is ensured. Secondly, it is an industry in which complex transformation processes take place, including trends in the integration of economic actors. The authors consider agro-industrial clusters as a logical stage of integration in the overall digitalization of the economic system. The formation of the digital economy in the short term may become one of the breakthrough directions of the country's development and the interaction of economic entities of the agroindustrial complex in the digital economy should be based on the achievements of scientific and technological progress, the use of information technologies, and the formation of a common information space within agro-industrial clusters. The development of "intelligent" agriculture has the greatest chances in the organizational and economic models of agro-industrial clusters, which include not only forms of interaction between economic entities, but also internal mechanisms of interaction with innovative institutions and technological platforms**

Keywords— *agro-industrial clusters, digital economy, competitiveness of the economy*

1. INTRODUCTION

In the current economic context, the introduction of innovations plays a key role in the process of production, and digital technologies are becoming an integral part of all the sectors and spheres of economy. The idea of digital economy is supported and developed by scientists, politicians, public figures and governments of many countries, because it helps to raise efficiency of production, science, education, public sector activities. The modern interpretation of the notion "digital economy" takes into account application of digital technologies in all the branches and spheres of activity. Given this, formation of digital economy should become one of the breakthrough courses of Russia's development in the coming years.

Along with that, against the background of a negative geopolitical situation, falling prices for energy resources, development and stimulation of Russian production becomes more and more significant for sustainable economic development of Russian economy. Due to depletion of traditional sources for development, at the present time, development of the agro-industrial complex is especially important, and higher efficiency of its functioning and continuous introduction of up-to-date research and development is its important component.

The authors suggest considering agro-industrial clusters as an effective form of economic entities interaction, allowing to enhance food security of Russian economy, improve investment prospects of the branch, as well as to use the achievements of scientific and technological advance and modern digital technologies with the aim of forming the common information space within the cluster.

2. SCIENTIFIC BASES OF THE RESEARCH

Theoretical and methodological approaches are based on studying the works by foreign and Russian researchers and analysts, including the methodology of an institutional approach and cluster analysis. Development of the general cluster approach in economics was influenced significantly by the theory of regional development by J. Thünen, W. Launhardt, A. Weber, A. Lösch, the theory of regional specialization by A. Smith, D. Ricardo, E. Heckscher and B. Ohlin etc. A. Marshall's contribution to creating the theoretical basis of the cluster theory is widely recognized, who studied peculiarities of geographical regionalization and concentration of production [1].

Nowadays, separate aspects of the cluster theory are the research subject of an Economics Nobel Laureate, P. Krugman. The publications on the cluster theory by Granberg A.G., Kleiner G.B., Miroliubov T.V. etc. can be distinguished in Russia. The given issues should not be considered brand new for the agrarian sphere of national economy, either. In Russia, as early as in 1920, B.S. Yastremsky studied clusters from the point of view of a statistical approach using the example of economy management in the agrarian sphere of the

economy in his work "Relationship between the elements of peasant economy in 1917 and 1919" [2].

In different years, Knipovich B.N., Chaianov A.V., Kondratyev N.D., Skvortsov A.I., Chelintsev A.N. etc. contributed to developing the theory and methodology of basic principles of regionalization and specialization (and, basically, the main principles of clusters formation) in the agrarian sphere of Russian economy [3]. The subject of clusters in their current interpretation became the subject matter of analysis in the papers by a number of Russian academic economists. The publications by Ableev A.M., Demichev V.V., Frolova O.A. [4], Gryadov S.I. etc., were devoted to different aspects of agro-industrial clusters development. The monograph by researchers of the All-Russian Institute of Agrarian Problems and Informatics named after A.A. Nikonov is devoted to current aspects of placement and specialization of agro-industrial production [5]. Thus, it can be said that the issues of clustering the agro-industrial complex were studied indirectly alongside with the origin and development of the cluster theory on the whole.

3. TASK SETTING AND METHODS

While writing the article, the authors applied such methods of research as an abstract-logical one, analysis and synthesis, economics and statistics analysis, methods of formal logic and formal modeling. Research papers by Russian and foreign researchers, materials of the Federal State Statistics Service of the RF, Ministry of Agriculture of the RF, normative legal documents of the state administrative bodies, including the Program "Digital Economy of the Russian Federation", "State Program for Development of Agriculture and Regulation of Agricultural Commodity Markets for 2013-2020" etc. served as the information basis for the research. Considering the fact that formation of agro-industrial clusters is quite new to the Russian business practice, the authors used empirical material of the first successful practices of the cluster approach in the system of the agro-industrial complex, analyzing the advantages and potential opportunities of a model of cluster development in an innovative line.

4. THEORETICAL PART

The task of developing digital economy was set by the RF President V.V. Putin in the Address to the Federal Assembly on December 1, 2016, with the aim of improving the efficiency of economic branches, and, correspondingly, the country's competitiveness and living standards by means of using digital technologies. According to the Address, in 2017, the Program "Digital Economy of the Russian Federation" was elaborated, that involves the development of:

the markets and branches of economy where interaction of certain entities is carried out (suppliers, consumers of goods, works and services);

the frameworks and techniques where competencies are formed for developing markets and branches of economy;

the environment for developing frameworks and techniques and efficient interaction of market participants and economic branches that covers regulatory control, information infrastructure, personnel and information security.

The program is focused on the fact that effective development of markets and branches in digital economy is possible only if there are developed frameworks, technologies, institutional and infrastructural environments.

Successful experience of the countries that have taken the path of intensive innovative development, is indicative of active use of a cluster model of organizing economy. Those agro-industrial clusters are becoming more and more timely that are aimed at creating such territorial associations where the goods most effective for the given territories will be produced, ensuring investment inflow and food security. Clusters are dynamic structures because they have a high degree of activity and adaptability in the first place, their formation speeds up processes in particular branches and steps up competition in the global market.

In the context of the general policy of import substitution and stimulation of small and medium business development, the cluster strategy in the Russian AIC gains ground, since it makes it possible to: first of all, create a new long-term paradigm of agro-industrial complex development on its basis; secondly, have a positive impact on development and investment attractiveness of regions; thirdly, ensure food security for the country.

The interaction of economic entities of agro-industrial clusters under the conditions of digital economy should be based on the current achievements of scientific and technological progress, use of information technologies, formation of common information space within the cluster.

When studying the issues of forming digital economy, it is necessary to pay attention to the degree of integration of branches into digital economy, their adaptability and readiness for innovative and digital transformations.

Thus, the following courses of forming digital economy on the basis of automation can be considered within agro-industrial clusters: engineering and manufacturing processes; system of management at all levels, work places, logistics, relationship of the AIC entities with partners, consumers, investors and public authorities.

It should be noted that economic entities included in the AIC have a different degree of readiness for activities in the context of digital economy. Thus, only 5-10% of enterprises are classified as enterprises with a high degree of readiness. The enterprises capable of such adaptation may include medium and large agricultural enterprises having material, financial and labor resources for using modern information technologies. Such agricultural organizations amounted to at least 70-80% of their total number in the last five years [6]. At the same time, there are enterprises not capable of independent adaptation. As a rule, they include small farming and other enterprises of the population. They need substantial assistance in adapting to digital economy: from teaching computer skills to purchasing digital equipment.

It should be pointed out that the specific character of interaction of economic entities of the AIC is associated with technological peculiarities of production, its length and

dependence on climate and environmental conditions, territorial dispersion, limited transportability and perishable properties of many types of products.

The interaction is carried out in the form of cooperation and integration: in horizontal line – within the branch, in vertical line – technological interaction of different branches; when selling or purchasing goods, rendering services; consulting commodity producers, training of personnel etc. All the listed interactions are based on information and communication interactions, that cover all scopes of activity, serving as information interactions between agricultural organizations, producers of means of production for agriculture, enterprises for processing and marketing agricultural raw materials in order to provide them with the necessary information, playing a major role in managerial decisions and promoting innovative development of the agro-industrial complex.

Information and communication relations between the AIC entities should be formed in the common information space of the agro-industrial cluster. In the authors' opinion, it is the efficient cluster policy in the Russian AIC that can raise innovative and digital adaptation of all the groups of agricultural entities by means of solving the following priority tasks.

Firstly, when conducting a cluster policy, development of a competitive market is regarded as of paramount importance. In this respect, state initiatives in the cluster policy are directed at supporting strong and creative companies in the first place and creating a productive environment in which, in their turn, weaker and more under-developed firms would be able to increase their competitiveness.

Secondly, the cluster policy pays key attention to analyzing local markets and companies on the basis of not the inherited factors of production, but the created ones in the first place. A microeconomic approach in the cluster policy allows taking into account the peculiarities of development and competitive advantages at the level of local territories and elaborate effective targeted programs of accelerating development and raising competitiveness of companies.

Thirdly, operating cluster policy is based on organizing interaction between state institutions, business and academic institutions with the aim of coordinating efforts on increasing the innovativeness of production, which promotes higher effectiveness in work.

Fourthly, implementation of the cluster policy is directed at stimulating development, increasing innovative potential and involvement in digital economy of small and medium enterprises in the first place [7].

5. RESULTS

The most obvious features of agro-industrial clusters can now be observed at the meso-level of certain regions. For instance, the agro-industrial cluster in the Tomsk Region is now considered one of the most "mature" ones, that combines integration of certain types of agricultural specialization with introduction of advanced digital technologies. The agro-industrial clusters in the Novgorod, Kemerovo, Tula and other

regions are emerging. The cluster model in the Tomsk Region is considered by the state institutions of the region as a variant of enhanced capabilities for integrating different types of agricultural activities and different business forms. Thus, within the framework of the concept of the innovative territorial center "INO Tomsk", a cluster of renewable natural resources was formed which included 38 economic entities in 2015. And a dairy cluster is being formed within the framework of the strategy of social-economic development of the region: in particular, an agreement was signed between the Tomsk Region Administration and a Chinese-Russian company in the sphere of developing the agro-industrial complex, including the investor's intentions to establish large livestock breeding dairy complexes for the period till 2030. The peculiarities of the model of forming clusters in the given region include the attempts to create in practice a local system of interactions: state institutions (regional authorities) – business (small and medium forms of business) – scientific institutions (universities and research institutes) [8].

A similar model of interaction and cooperation of three institutional sectors – science, business and authorities is described in scientific literature as a "triple helix model", which plays a major role in forming mature clusters and achieving innovative effects in them.

A territorial agro-industrial cluster "Biocomplex" is created in the Omsk Region, where the main activities are focused on three-fourfold increase in value of grain by means of diversifying production and processing of grain. Today, there are 20 cluster participants, and the number of incoming economic entities within the cluster is planned to increase up to 110 by 2020, proceeding from the potential opportunities of the region in the given sphere of activity. In this regard, the tasks are set of increasing the share of innovative products with a maximum number of processing stages, involving small business in modern high-technology business-processes, introducing non-waste technologies and recycling, solving ecological tasks and problems, creating new high-productive work places and modern infrastructure within the cluster, commercializing research and development and increasing investment inflow in the region.

It makes sense to propose an organizational-structural model on the basis of developing the system of contractual relationship in vertical direction as a synergetic effect from combining small and medium business with large agricultural holdings: between large agricultural holdings as growth points, small and medium business. In horizontal direction: development of cooperative activities and improvement of the existing cooperation variants can ensure the effect of "coupling" and survival in the field of economic activities of small and medium business [9].

6. CONCLUSIONS

Based on the results of the research, we can draw the following generalizing conclusions:

1. interaction of economic entities of the AIC in the context of digital economy with the aim of improving production efficiency and sales of products should be based on

the current achievements of scientific and technological advance, use of information technologies, formation of the common information space within agro-industrial clusters;

2. agro-industrial clusters can be considered as an effective form of interaction between economic entities of the AIC, based on the cooperation between production companies, educational and scientific organizations, public authorities; between small, medium and large enterprises; between already existing companies and the infrastructure stimulating emergence of new enterprises within the cluster;

3. development of innovative agro-industrial clusters in the context of digital economy is largely determined by the effectiveness of the government cluster policy, capable of raising digital adaptation of all the groups of agricultural entities.

References

[1] Marshall A. Principles of political economy. In 3 volumes. Vol. 1. – M.: Progress, 1983. – 416 p.

[2] Yastremsky B.S. Relationship between the elements of peasant economy in 1917 and 1919 // "Vestnik Statistiki", 1920, pp. 19-21 (Cited from B. Duran, P. Odell. Cluster analysis. M.: Statistica 1977.)

[3] Maksimova T.P. Forming agro-industrial clusters in the economy of the RF: theoretical bases and potential opportunities\\ Russian Journal of Entrepreneurship - 2015, volume 16 №18, September – pp. 2935-2947

[4] Frolova O.A. Agro-industrial clusters: Russian model\\Vestnik NGIEI (Bulletin of NGIEI), 2011, №2, volume 1, pp.129-136.

[5] Goncharov V.D., Khoruzhiy V.I., Koteev S.V. Placement and specialization of agro-industrial production in Russia. M.: VIAPI- 2015

[6] Agro-industrial complex of Russia in 2016//Moscow: Ministry of Agriculture of the RF, 2017.

[7] Ustiuzhanina E.V. et al. Development benchmarks of Russian economy//M.: KNORUS, 2018.

[8] Maksimova T.P., Bondarenko N.E. Development of inter-firm cooperation in the Russian agro-industrial complex: Theory and practice // Espacios. 2017. Vol. 38. № 33. P. 15.

[9] Maksimova T.P., Bondarenko N.E., Zhdanova O.A. Transformation of farms in the agrarian economy of the Russian Federation in modern conditions // Academy of Strategic Management Journal. 2017. Vol.16. Special Issue № 2. P.3.