Management peculiarities of integration development in the agricultural sector

T G Krasnova¹, A N Dulesov²,³, A K Pozdnyakov¹ and A S Vilgelm¹

¹Department of Management, Khakas State University N.F. Katanova, 90 Lenina str, Abakan, 655017, Russia
²Khakas Technical Institute, Siberian Federal University, 27 Shchetinkina str, Abakan, 655017, Russia
³E-mail: babyshkag@mail.ru

Abstract. The search for the most effective forms of functioning of agriculture is the actual direction in modern methods of management of regional economics. The article deals with the development of regional agro-industrial complex as a system, functioning at the expense of integration processes occurring at the level of agricultural sphere of activity. The issues of integration in agriculture are considered from the point of view of forming the stability of balanced regional economy. A distinctive point of our paper is the application of the process approach which allow construct models of farm land use on the example of the Republic of Khakassia. Also we consider realization mechanism of agro-industrial integrative development model by means of various management methods. The choice of the direction of integrative development of agriculture in the regions is justified by the fact that integration ties arising at all levels of agro-industrial complexes (providing, producing, processing) contribute to active formation of sustainable local agricultural markets.

1. Introduction and theoretical basis

The agro-industrial complex (AIC) is of particular importance in the economy of many regions. Its role lies not only in the fact that it provides food to the population, but also in the development of rural areas - employment of the population, which is a particularly acute problem in regions with agricultural specialization [1].

Ensuring the food security of the country, the agricultural sector acquires special strategic importance. Processing of agricultural products takes a special place in the structure of agriculture.

In terms of AIC activity, we can distinguish three main spheres of activity: the first - providing the basic means of production; production and technological production of chemical means of protection and fertilizers [2, 3].

The second sphere of activity includes those enterprises that produce agricultural products. And the third sphere is procurement and processing.

Agricultural activity in the regions is developing at a stable pace, but there are no shifts in agricultural processing. If we evaluate the available resources, the processing industry should be located in an accessible area to agricultural resources, which will ensure the arrival of quality raw materials.

The processes of agroindustrial integration in Russia began with the formation of agroindustrial combines for the production and processing of agricultural products [4]. The inevitability of integration
processes in the agricultural sector is associated with the need for balanced, dynamically developing agricultural production.

In Russia, the issues of sustainability and balance of the national economy have their own specifics and are associated with certain limitations: the lack of a program of interaction between economic entities; the lack of a unified database on the relationship between the branches of production [5, 6].

Many scientists (A. Granberg, K. Losev, V. Parfenov, E. Shopkhoev) determine the following stages of sustainable development for Russian regions [7, 8, 9, 10]:

- bridging the gap in the nature of structural changes and the need for integration ties;
- taking advantage of the integration interactions of regional industries;
- active development of local markets with well-developed inter-regional relations.

The agricultural sector needs well-built integration interactions. At the same time, the main goal of AIC development is to improve the welfare of the population in rural areas [11]. In the food AIC, meat, grain and dairy subcomplexes, which employ about 85% of the workers, account for 75% [12].

Ensuring the sustainable development of the agroindustrial sector becomes possible with expanding reproduction of agricultural raw materials. The balance is determined by the rational ratio within three spheres of agroindustrial sector: providing, production and procurement-and-processing.

Since most of the issues are decided by the owner, especially on the choice of the type of products produced, the results do not always meet their expectations. Consequently, it is necessary to coordinate the efforts of agricultural producers not only in the issues of manufactured products, its processing, but also in the search for markets.

The advanced experience of countries with a high level of AIC development shows that the integration processes are not successful without a sufficient technical base [5]. The impact of technical and technological lag in agricultural processing on the volume of output leads to a decrease in the growth rate of agricultural production [13].

Based on the above, we can conclude about the need for a balanced development of the agricultural sector through integration processes that contribute to the balance and proportionality of the sphere of activity of the AIC [14].

Integration processes enhance specialization in the branches of regional economy. Due to integration interactions there can be formed a single agro-industrial space, focused on specific consumers.

2. Results and conclusions

The Republic of Khakassia is Siberian region with significant potential of agricultural production. Even in the Russian rankings the republic has sufficient weight in wool production (15th place), sheep population (16th place), cattle and goat population (38th place) [15].

Agriculture as a backbone industry in the republic's economy has accumulated a certain potential for development over the past six years (table 1).

Table 1. Agricultural output dynamics in the case of the Republic of Khakassia, mln. roubles [15].

| Indicators | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|------------|------|------|------|------|------|------|
| **Agricultural output, included:** | | | | | | |
| | 11381.8 | 12216.6 | 13896.4 | 14870.4 | 14395.7 | 13966 |
| | 3035.1 | 3040.6 | 3889.3 | 3445.4 | 3744.1 | 5055.4 |
| | 8346.7 | 9176 | 10097.1 | 11424.9 | 10651.7 | 8910.6 |
| **Cattle breeding** | | | | | | |
| | 107.3 | 113.8 | 107.0 | 96.8 | 97.0 |
| **Growth rate of agricultural output, included:** | | | | | | |
| | | | | | | |
| **Crop production** | | | | | | |
| | 100.2 | 127.9 | 88.6 | 108.7 | 135.0 |
| **Cattle breeding** | | | | | | |
| | 109.9 | 110.0 | 113.1 | 93.2 | 83.7 |

*Note: Source – author's calculations based on data from Federal State Statistics Service [16].
A stable growth is observed in crop production (average growth rate - 112.1%), in livestock breeding there is a trend to lower production rates over the last two years (average growth rate - 102%).

Opportunities for the agricultural sector are largely determined by the chosen direction in achieving a sustainable, balanced state of this industry, which creates a solid foundation for the well-being of each region of the country.

The development of any industry is based on the principles of self-regulation and self-development, manifested in the ability to generate new levels of development [17]. And the new levels appear at the expense of the accumulated potential of the previous level, acquiring other properties different from the previous level. Self-realization mechanism of agro-industrial development potential is characterized by integration changes at the regional and external levels.

The success of agricultural production does not manifest itself quickly, it requires quite large investments in all areas of activity: crop, livestock, processing production. Agriculture, to a greater extent than other branches of production, is influenced by natural factors, which creates additional obstacles to the continuous development of the entire AIC.

The regional level of agricultural structure consists of different subsystems, forming a balanced mechanism of continuous reproduction.

The territory of the Republic of Khakassia has its own limitations for the development of agriculture due to natural and climatic factors, so the development of this area is only about 30% of the Russian level, and the republic ranks 67th by agricultural output [18].

Nevertheless, the Republic of Khakassia can provide its population with meat, potatoes, vegetables and other products. It balanced financial result is 92 million rubles (2019), which is 0.6% of the total balanced financial result. The amount of losses of agricultural organizations for the base period (2019) was 36 million rubles. It should be noted that this is not the highest value in the sectoral context, but it is due to the share of agriculture in the structure of regional GDP [19]. More attention in the issues of sustainable development of the agricultural sector is paid to farming, since these organizational structures are the most effective form of management.

The dynamics of sown areas in the Republic of Khakassia reflects a fairly stable situation since 2011 (figure 1).

![Figure 1. Dynamics of sown areas of agricultural crops in the Republic of Khakassia [20].](image)

In order to assess the changes taking place in the agricultural sphere of activity regression models reflecting the level of land use in the Republic of Khakassia were built. The following territorial units were singled out for the effectiveness of the study: towns, municipal districts, the northern area, the southern area and the central area. Republic consist of five towns (Abaza, Abakan, Sayanogorsk, Sorsk, Chernogorsk), and eight municipal districts (Altaiisky, Askizskiy, Beiskiy, Bogradskiy, Ordzhonikidzevskiy, Tashtypskiy, Ust-Abakanskiy and Shirinskii). The northern, southern and central areas were chosen based on the territorial location of the districts.
The northern part of the territory has great potential in agricultural activities, also in tourism and industrial production. The central part of the Republic of Khakassia represents the most developed and populated part of the territory with sufficiently developed transport infrastructure and agricultural land.

The southern part of the territory also has the potential of industrial and agricultural development. Its advantageous distinction is its significant forest reserves.

The general indicators on the districts of the Republic of Khakassia characterize areas from the point of view of their potential (table 2).

| Area      | Territory | Population | Density of total sowing area, % | Density of industry per sq. km, roubles |
|-----------|-----------|------------|---------------------------------|---------------------------------------|
| Whole     | 61900     | 100.0      | 536.90                          | 100.0                                 |
| towns     | 336.18    | 0.54       | 348.488                         | 65.0                                  |
| municipal districts | 61523.67 | 99.46     | 187.112                         | 35.0                                  |
| NA        | 17943.42  | 30.0       | 50953                           | 9.5                                   |
| SA        | 24862.3   | 40.20      | 107789                          | 20.1                                  |
| CA        | 19057.13  | 30.8       | 378108                          | 70.4                                  |

Note: Source – author’s calculations based on data from Federal State Statistics Service [20].

The northern and central districts account for almost 30% each of the territory of the republic. The most densely populated is the central area (70.4%). Density of industry is the highest in the central area of the republic (2.239.8 roubles per sq. km), and the density of agricultural lands is practically the same in the northern area (0.43) and the southern area (0.42). Such differentiation of indicators predetermines the specialization of individual districts of the republic.

The correlation analysis (table 3) was carried out to estimate the forecasted changes of farm land use size, which showed the nature of the dependence of the results of the agricultural sector (y) of farm land size in the Republic of Khakassia (the average error was 2.57%). The obtained models are suitable for forecasting (table 3).

| Areas | Specification | R², % | OA, % | 2018 | 2022 | 2023 | 2024 | 2025 |
|-------|---------------|-------|-------|------|------|------|------|------|
| Whole | y = 1124.09e + 0.0639x | 80.34 | 9.64  | 110882.6 | 111165.1 | 113768.1 | 118654.3 | 119351.5 |
| NA    | y = 14.85x² + 73.39x + 207 | 76.18 | 6.36  | 385451.1 | 38965.4 | 40085.6 | 40280.0 | 40344.6 |
| SA    | y = 797.67e + 0.070x | 84.55 | 8.07  | 18288.7 | 18399.1 | 18958 | 19007 | 19715.6 |
| CA    | y = 18.61x² + 56.42x + 501 | 86.9 | 7.23  | 53242.9 | 55904.1 | 56321 | 56846 | 57236 |

Note: There is division of the Republic of Khakassia territory into North (NA), Southern (SA) and Central (CA) areas was made without regard to towns and their satellite urban areas in this table.

Consequently, in the integration processes at regional level it is necessary to use the potential of land use and actively develop integration ties in the field of agricultural activity.

The implementation of the model of integrative development of agriculture in the region is based on the existing agriculture resources, but with the use of tools and levers of influence on the processes of relationships formation [21]. The mechanism for implementing the model of integration development includes various management methods (figure 2).
Figure 2. Integration mechanism of management development of the agricultural sector in the region: P - planning function (indicative plan, regional agricultural development program, roadmaps, models of changes in response to controlling influence); O - organization function of integration interactions (identification of potential interactions, logistics of development of integration relations); K - control functions.

The issues of integrative development of the agricultural sector in the region are becoming the key issues in most regions. At the same time the mechanism of integration development, actively introduced in the AIC, will promote transition of agriculture to more effective management methods.

Growth rate forecast of farm land use, made taking into account the intraregional integration ties laid down in agricultural development model, shows the prospects for industry development. Provided integration mechanism of management development is comprehensive in terms of coverage of all controlling influences and controlled objects, which provides growth agricultural output as a significant result.

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