

Formation of competitive AIC in conditions of mining region sustainable development (on the example of Kuzbass)

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Abstract. This article considers the particular features of the development of the agro-industrial complex (AIC) in the conditions of mining regions. The Kuzbass (Kemerovo region) has been chosen as the object of analysis. A conceptual approach to the food security of the industrial region is presented, in the framework of which the main goals and objectives, principles and directions of development of the agricultural sector of industrial regions are shown. The article systematizes the results of previous studies of the authors related to the conditions and development factors of the AIC of the Kemerovo region. It has been established that the Kemerovo region as an industrial region is characterized by specific features of the AIC development which have evolved under the influence of climate, the available natural resources and the results of local economic activity. The current state of the Kuzbass agro-industry suggests that the region cannot ensure high competitiveness in the main types of agricultural products and their processed products. In the current economic conditions, introduction of deep processing of agricultural products on an innovative basis, production of functional products, integration and cooperation of producers, and improvement of production technologies may become the promising areas for the development of the agro-industrial complex of the Kemerovo region. The development of these areas will make it possible to produce agricultural products and food products with higher added value, and therefore, to increase the competitiveness of the agricultural sector in the region.

1 Introduction

Sustainable development of mining regions implies the positive structural shift linking expanding processing sectors of economy with environmental problems long-term solving [1, 2]. It suggests relocating investments from coal mining to environmentally friendly industries, including agriculture [3].

A significant differentiation of natural and economic conditions in different regions of Russia determines the existence of regional features in various sectors of the Russian economy. The agro-industrial complex is characterized by significant regional imbalances that are primarily due to the high dependence of the distribution of agricultural enterprises as the main component of the agro-industry on the climatic and environmental conditions of specific territories.

The researchers are actively exploring issues of regional development and the functioning of the agro-industrial complex [5-9].

In industrial regions, unfavorable conditions for the development of agriculture are often observed. This is most typical of regions with developed extractive industries, in which a significant part of the territories is occupied by industrial enterprises and is not suitable for agriculture, and the ecological situation is very unfavorable.

The specific character of industrial regions in the development of their agribusiness and food supply was reflected in the works of G. Rachana, A. Joshi [8], V. Mazloev, M. Ozerova [9].

However, in order to provide the population of industrial regions with food, especially essentials, in such regions, agriculture should be developed taking into account their regional specific features. At the same time, it is important that the agribusiness of industrial regions could be competitive, because otherwise the enterprises of the complex will not be able to function in the long term without large-scale state support.

The relevance of the study is also due to the high importance of the agro-industrial complex for the sustainable development of industrial regions [10-11].

2 Research methodology

The object of observation of this study is the Kemerovo region. The conditions and factors of the AIC functioning in the industrial region are considered. The fundamental factors of increasing the competitiveness of agribusiness in the industrial region are detailed. In relation to the Kemerovo region, the promising areas for the development of the agro-industrial complex are determined taking into account the studied conditions and factors.

The article uses monographic, abstract logical, economic and statistical methods.

The empirical base of the study is represented by publications of scientists considering various aspects of food supply in the region, as well as by official statistics.

3 Results and discussion

A number of specific conditions affect the development of the agro-industrial complex of the Kemerovo region. The fundamental ones are natural climatic. The region is located in the temperate zone of the northern hemisphere. The climate of the Kemerovo Region is greatly influenced by the contrast of the relief structure, heterogeneity of the underlying surface and vegetation cover. The continental climate of the region, the high annual amplitude of temperature fluctuations, the unevenness in the amount of precipitation have a negative impact on agriculture. It should be noted separately that a high concentration of minerals is observed in the region. The main mineral is coal. In addition, in the region there are deposits of ore and non-metallic minerals. All this predetermined the development of industrial production in the region.

According to the Federal State Statistics Service, in the gross regional product (hereinafter - GRP) of the Kemerovo region, the share of industry in the period from 2000 to 2017 is in the range of 45-47% and tends to increase, while the share of agriculture is in the range of 3.6-5.7%, and there is a tendency to its decline. Such dynamics confirms that

the economy of the industrial region is poorly diversified. It is worth noting that industrial regions are characterized by lower profitability of agricultural products as compared to the basic industries. In the Kemerovo region, the profitability of agricultural products in 2016 amounted to 3.3% compared to 16.4% profitability of extractive industries products.

The current environmental situation in the region reduces the possibility of producing quality products. In such conditions, the main task of developing the agribusiness of the industrial region is to maintain and develop the intensive agriculture and to expand production of deeply processed agricultural products on an innovative basis [11-12].

At the regional level, it is important to consider the environmental aspect of agricultural development [13-14]. For industrial regions, it takes on special significance.

Despite the fact that industry has an adverse effect on the environment, a high concentration of industrial production has led to the formation of a developed infrastructure in the region.

The human resources available in the region may become a possible growth point. Specialists for agriculture and the processing industry are trained at two universities in the region — the Kemerovo State Agricultural Academy and the Kemerovo State University, as well as in the Kemerovo Agricultural College.

The functioning of research centers and laboratories on the basis of regional universities specializing in the training of specialists for the agricultural sector suggests that the region has the scientific potential to develop areas and tools that will enable it to realize the growth factors in the competitiveness of the agricultural sector.

The priority development of industry in the region and the conditions considered in which the agro-industrial complex operates determine the existence of specific features of the regional agro-industrial complex.

According to the authors, the growth of food security of the population of the industrial region due to the development of competitiveness of agricultural products should become one of the most important goals of the regional agrarian policy at the present stage. At the same time, it is extremely important to rely on the principles of maintaining the unity of the market of agricultural products, raw materials and food and the priority of increasing the competitiveness of agricultural products.

Based on the goal, tasks and promising directions are set for the development of the agro-industrial complex of the industrial region (Figure 1).

Thus, since the competitiveness factor of the agricultural sector plays a high role, price and non-price factors of the competitiveness of the agricultural sector in industrial regions should be considered.

Speaking about the price competitiveness of the AIC agricultural products of industrial regions, it is worthwhile to understand that agricultural regions have a price advantage due to the existence of economies of scale. Large production volumes allow agricultural regions to reduce unit costs for agricultural production, so industrial regions should look for opportunities to build up non-price competitive advantages.

The advantages of industrial regions can be created due to high indicators of the efficiency and intensity of agriculture, as well as due to the technical and technological advantage over agricultural regions, which can be created through the investment of industrial enterprises in the development of agriculture and state support.

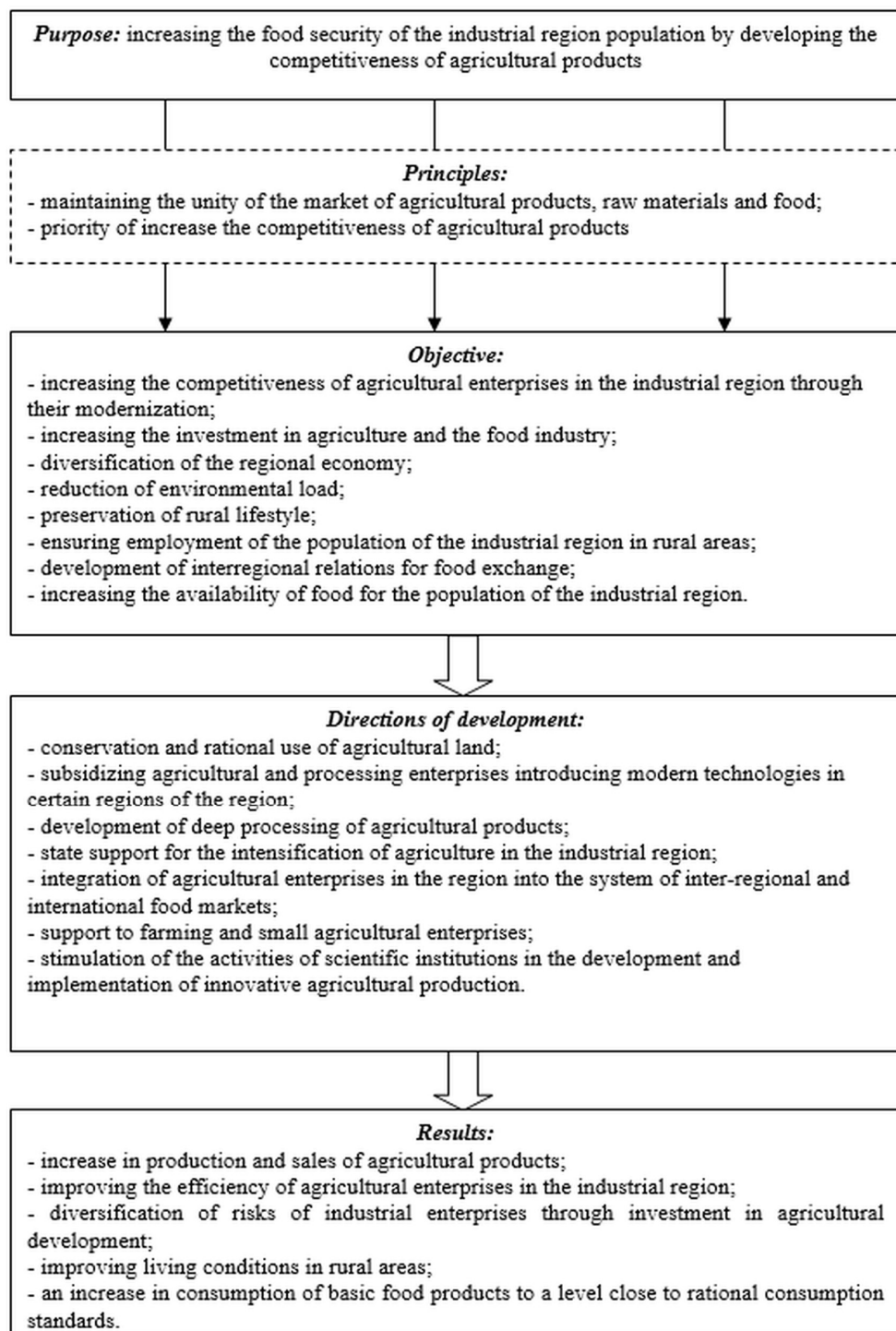


Fig. 1. A conceptual approach to the functioning and development of agribusiness in the industrial region.

Table 1 shows the indicators of intensity and efficiency of the agricultural production of the Kemerovo region examined by the authors.

Table 1. Indicators of production intensity and efficiency.

| Indicators | 2000 | 2005 | 2010 | 2015 | 2016 | 2017 |
|---|-------------|-------------|-------------|-------------|-------------|-------------|
| Milk per 1 cow, t. | 2693 | 3297 | 3886 | 4126 | 4168 | 4289 |
| Yield of bovine offspring per 100 cows per year, heads | 82 | 79 | 71 | 75.78 | 79 | 73 |
| Yield of live calves per 100 cows and heifers | n/a | n/a | n/a | 88.3 | 87.2 | 86.3 |
| Yield of pig offspring per 100 sows per year, heads | 891 | n/a | 2120 | 2687.07 | 3529 | 2932 |
| The average egg production of laying hens in agricultural organizations per year, pcs | 210 | 314 | 315 | 314.4 | 311 | 327 |
| Yield of grain and leguminous crops in farms of all categories, dt / ha | 14.6 | 15.0 | 17.3 | 17.1 | 15.6 | 18.2 |
| Yield of potato in farms of all categories, dt / ha | 134.5 | 104.9 | 145.7 | 143.3 | 152.1 | 158.7 |

In general, there is an increase in indicators of the effectiveness and intensity of agriculture in the Kemerovo region. However, yield indicators can be characterized as quite low compared to neighboring agricultural regions.

Table 2 shows the indicators of technical endowment of the development of agribusiness in the Kemerovo region.

Table 2. Indicators of technical endowment of the AIC development in the Kemerovo region.

| Indicators | 2000 | 2005 | 2010 | 2015 | 2016 | 2017 |
|--|-------------|-------------|-------------|-------------|-------------|-------------|
| Seeding (planting) of the respective crops per one combine harvester, ha | 273 | 340 | 494 | 476 | 504 | 515 |
| Seeding (planting) of the respective crops per one potato harvester, ha | 21 | 37 | 76 | 100 | 107 | 114 |
| Number of tractors per 1000 ha of arable land | 6.4 | 4.2 | 3.2 | 2.3 | 2.1 | 2 |
| Arable land load per tractor | 158 | 240 | 311 | 428 | 464 | 468 |
| Tractor replacement coefficient, % | 1.3 | 2.3 | 1.9 | 1.9 | 1.5 | 3.1 |
| Harvester-thresher replacement coefficient, % | 2.7 | 8.5 | 1.7 | 1.8 | 4.1 | 2.2 |
| Potato harvester replacement coefficient, % | 3.8 | 2.6 | 2.0 | 2.2 | n/a | 9.3 |

In the Kemerovo region in 2000-2017, an increase in the load on equipment is observed. The cultivated area per harvester increased significantly, and the arable load on the tractor almost tripled. At the same time, the growth in the replacement rate of agricultural machinery is a positive aspect of technical endowment of the development of the agro-industrial complex of the Kemerovo region.

According to the authors, the investment and personnel potential of industrial organizations should be aimed at optimization of the agro-industrial complex performance.

The conditions and factors of the AIC development and functioning in the Kemerovo region are shown in Figure 2.

Thus, the current orientation of the functioning of the agricultural sector in the Kemerovo region indicates the presence of specific conditions, and the state of price and non-price factors confirms the need to develop areas and tools that will increase the competitiveness of the AIC in the industrial region and produce products with high added value.

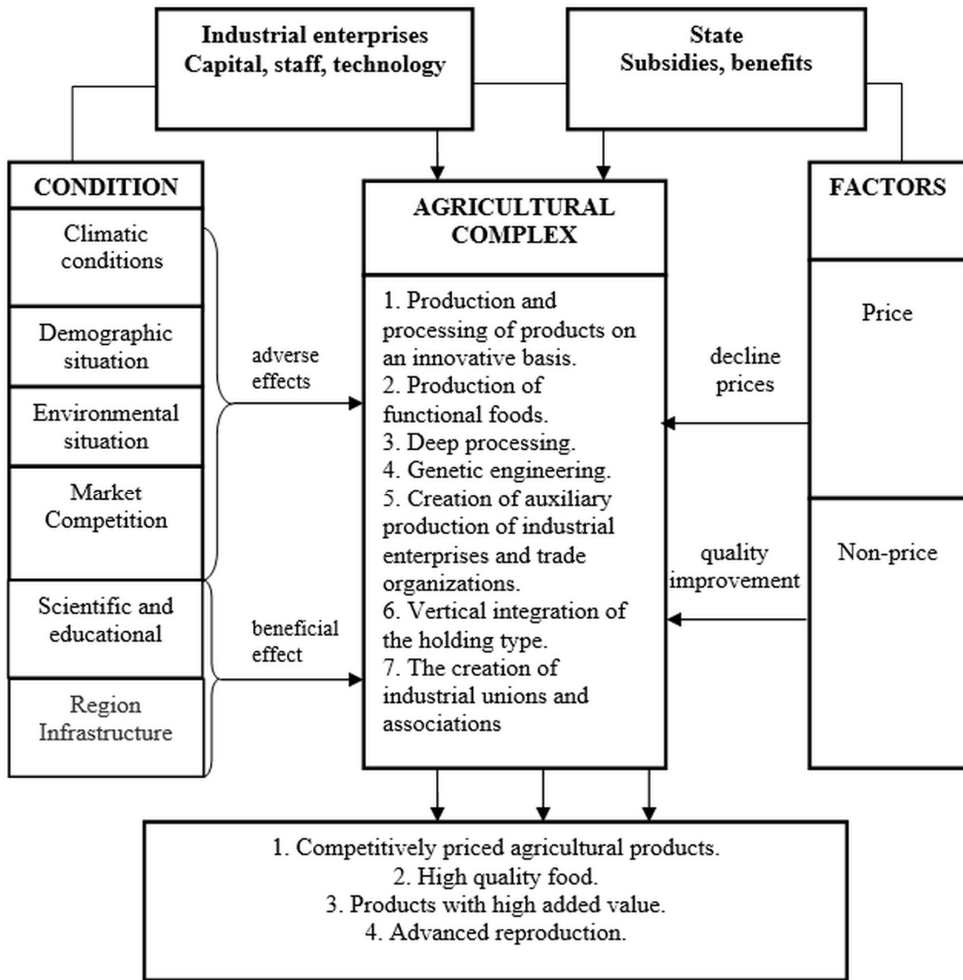


Fig. 2. Conditions and factors of development and functioning of the AIC of the Kemerovo region [15-16].

4 Conclusion

Since the development of agribusiness in industrial regions is influenced by various conditions, the impact of most of which is unfavorable, it is important for all participants in the food supply system of such regions to overcome them by creating growth points for the regional AIC on the basis of prices decrease and improvement of agricultural products quality.

The development of AIC in industrial regions is a task of state importance, as it allows us to solve the issue of food supply to the population.

Industrial enterprises interested in diversifying activities, creating subsidiary farms and having the potential to create high-quality food products and products with high added value can attribute to increasing the competitiveness of the agribusiness in such regions.

Industrial enterprises have the opportunity to create such growth factors. Despite the fact that in industrial regions the efficiency of the agro-industrial complex is significantly lower than that of the basic industries, industrial enterprises are interested in diversifying

their own risks and creating subsidiary farms. In addition, the human potential and the ability to create products with high added value through integration and cooperation, participation in industry unions will make it possible to achieve a positive social and economic result and to maintain the rural territories of the industrial region.

Of the conditions reviewed in the article, the current infrastructure and the human resources available are positive for the Kemerovo region. Natural, climatic, environmental and demographic conditions, as well as competition in the food market adversely affect the development of the AIC.

The study suggests that today there is a need to develop and justify the promising areas for increasing the competitiveness of the agro-industrial complex in industrial regions, in particular, the Kemerovo region. The results obtained are of interest for other regions with a dominant share of extractive industries in GRP.

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