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Strategic Development and Use of Agro-Food Sector's Potential in Rural Areas

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***Abstract*—Strategic planning for the development and use of the potential of agro-food sector in rural areas helps to identify agricultural activities for specific rural municipalities as sources of growth and create a brand for the municipalities. Agribusiness occupies an important place in the economy of Bashkortostan. Among the most important tasks of development are ensuring food security, manufacturing high quality and competitive products, increasing the sales of local products in domestic and foreign markets and significantly increasing the income of agricultural entities. Ensuring decent living and working conditions for the rural population is equally as important. Increasing the competitiveness of agricultural products should be achieved through technical and technological modernization of production, introduction of digital technologies and creation of favourable economic conditions for innovation and investment in agribusiness.**

Keywords—strategy, development, rural areas, agro-food sector, economic efficiency, forecast, potential.

I. Introduction

Today, strategic planning can become the basis for ensuring the competitiveness in development of various territorial systems, including rural areas. Unlike classical methods, strategic planning produces a futuristic map that visualizes the economic space and makes the considerations of alternative ways and means of achieving the desired result possible.

II. Methods

The methodological basis of the study comprises of objective economic laws, patterns, fundamental principles developed by leading Russian and foreign scientists on the issues of strategic planning and management. In this research, a systematic approach for scientific rationale and development of practical recommendations in the process of strategic planning of rural development was used.

The research results were identified and their novelty and significance assessed using scenario methods, which is based on the formulation of agribusiness development scenarios and covers all possible options in fulfilling the internal potential and impact of external conditions. As part of the implementation of the scenario method, the following development scenarios are proposed – extensive, intensive, extensive-intensive.

The extensive scenario creates opportunities for increasing the economic well-being of rural areas, since it increases production resources, but at the same time limits the possibilities for a qualitative improvement in the economy. This scenario does not provide for a significant change in the qualitative aspects of production and provides for certain limited measures of state support.

Intensive scenario is the main form of expanded reproduction. It is implemented by improving the management system on the basis of scientific and technological progress in order to increase crop yields per unit area, increase labour productivity and reduce costs per unit of production. The intensive scenario for agribusiness development involves substantial state support.

The extensive-intensive scenario provides comprehensive regional economy development of rural areas. Production volumes and other target parameters are determined by combining quantitative parameters of the extensive scenario and qualitative parameters of the intensive development scenario, that is carried out with significant government support.

III. Literature review

Economists have developed two adaptive strategies for Russian agribusiness development which are implemented in various short-term and long-term basis [1]. Recommendations on the national scientific and technical policy for three main sectors of the Russian agribusiness industry are proposed: crop production, animal husbandry and food industry. A number of measures are also proposed to reduce institutional barriers to increase investment attractiveness of the industry [2]. Using agriculture and food sectors as case study, methodologies are proposed which take into account the similarities between scientific and strategic documents, as well as the overlap between them over a certain period of time, and thus exploring the links between science and strategy [3]. A strategy structure has been formulated based on three objectives: to predict the future of the food system; harmonise the most important drivers of change affecting food security; reach consensus on the forecast for the period until 2030 [4].

Forecasting methodology for the development of the region's agro-food system has challenges such as accounting

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for the interconnections of all elements, the need for a comprehensive study on the characteristics of agricultural production, systematic accounting of its intellectual, innovative, social and other features [5]. An analysis of scientific research allows us to conclude that the problem of choosing a forecasting methodology, especially the long-term one, is still far from being solved. It is difficult to use methods of processing large amount of datawhich characterize the development of agriculture. In this regard, research and scenario method formulations for predicting the development of agriculture in the regions possess critical scientific theoretical significance and applied application [6].

The underdevelopment of the organizational mechanisms for strategic planning of the development of individual municipalities negatively affected the functioning of the rural areas. The absence of clearly formulated strategic programs for the socio-economic development of rural areas of many regions strengthens the polarization among municipalities within the dichotomy «city – periphery (rural area)» and widens the gap in living standards between the urban and rural population of the region. Assessment of the socio-economic situation in rural areas of the region shows the imbalance of the social life and the growth of social tension [7].

IV. Practical significance

The use of strategic development mechanisms will enable local authorities to assess the potential and reserves of agro-food sector of the territoriestaking into account unique features, shape the future image of rural areas and develop practical measures in achieving this. As far as image is concerned, thanks to the development strategy and a calculated future, rural areas will improve, which, in turn, will directly affect their investment attractiveness [8].

V. Results

One of the main approaches in developing a strategy for sustainableagribusiness development is a differentiated approach to the implementation of various policy measures [9].

This approach is due to the heterogeneity of rural areas and, therefore, the inequality of the initial development conditions, due to: the existence of demographic, economic and social problems that are area specific; environmental and climatic features; specialization of agricultural producers of various territories in products effective for them; differences in the resource base (environmental, economic and administrative) [10].

Due to aforementioned factors, during territorial agribusiness development, it is necessary to pay special attention to agro-climatic zoning, which takes into account the differences in environmental conditions and is the scientific and production basis for the placement of various agricultural objects, agricultural production systems in the republic, hydraulic land reclamation, variety testing, etc. [11].

Plant cultivation is a leading sector in the agricultural industry. The main objectives of economic entities engaged in agriculture as a whole, are making profits, fulfilling contractual obligations and meeting the population's food needs [12].

Cereal production is the main crop production in the Pre-Ural steppe and the region's southern forest steppe. Its production today reaches up to 3.8 million tons. Among cereals and legumes, wheat occupies the largest area (44.9%), mainly spring wheat. In 2018, the sown area of wheat amounted to 786.3 thousand ha, including spring wheat – 594.5 thousand ha. The sown areas of winter wheat in recent years have tended to expand – by 2.1 times, but in general, the sowing of winter crops decreased by 22.7%.

In 2018, the region in question was the 14th place in the country by the total grain production criterion, or 2.7% and the 3rd place in the Volga Federal District (14.3%).

When formulating an agribusiness development strategy, it is necessary to apply measures that justify options of effective functioning of rural areas of the republic for the long term.

We, hereby, make a forecast for the gross production of the main agricultural crops constituting the agro-food sector for 2019 – 2030 period. Forecasts based on these parameters are based on the assumption of an increase in gross yield with constant seasonal dynamics. The actual gross yield for the previous year for the parameters under consideration are adjusted annually.

To predict the parameters of sown areas of agricultural crops until 2030, we use the «Forecast» function in Excel and the obtained values are shown in Table 1.

TABLE I. Forecast values of sown area of agricultural crops, thousand ha

Parameter	Years			
	2019	*2020*	*2025*	*2030*
Grain crops	1757.8	1990.6	2254.6	2384.2
Sugar beets	52.3	69.9	72.4	84.6
Sunflower	247.1	266.2	286.7	297.2

The forecast values of crop production in 2019 – 2030 is calculated using the following formula:

$$ВП = a + b * S_k \quad (1)$$

where ВП is theforecast values of crop production;

a and b –are the coefficients characterizing the relationship between the studied variables;

Sk – forecast values of sown areas of crops in the k-th forecast period.

coefficients *a* and *b* are calculated using the formulas:

$$b = \frac{\sum_{i=1}^{n} S_i * ВП_i - n * \overline{S * ВП}}{\sum_{i=1}^{n} S_i^2 - n * \overline{S}^2} \quad (2)$$

$$a = \overline{ВП} - b * \overline{S} \quad (3)$$

where n is the number of measured values;

$\overline{ВП}$ – the average value of crop production;

$\overline{S}$ – the average sown area of crops.

coefficients *a* and *b* are calculated as:

b grain crops = (60187305.9 + 67548209.6 + 53528216.1)) – 181161870.4) / (9529509.0 – 9527641.2) = (181263731.5 – 181161870.4) / 1867.8 = 101861.1 / 1867.8 = 54.5;

b sugar beets = (689864,0 + 839520,0+ 656052,0)) – 2181267.7) / (7484.5 – 7460.1) = (2185436.0 – 2181267.7) / 24.4 = 4168.3 / 24.4 = 170.6;

b oil crops = (478149.6 + 642100.2 + 730062.1)) – 1844134.7) / (151038,5 – 150796,9) = (1850311,9 – 1844134.7) / 241.6 = 6177.2 / 241.6 = 25.6;

a grain crops = 33885.5 – 54.5 * 1782.1 = -63304.0;

a sugar beets = 14580.7 – 170.6 * 49.9 = 6071.2;

a oil crops = 2741.8 – 25.6 * 224.2 = -2990.1

The correlation coefficients indicate strong relationship between the considered parametersand the accuracy of the forecast:

$$r = \frac{\sum_{i=1}^{n} S_i * BII_i - n * \overline{S * BII}}{\sqrt{(\sum_{i=1}^{n} S_i^2 - n * \overline{S^2}) * (\sum_{i=1}^{n} BII_i^2 - n * \overline{BII^2})}} \quad (4)$$

Here is the calculation of the correlation coefficient and its level:

$$r_{\text{grain crops}} = \frac{(181263731.5 - 181161870.4)}{\sqrt{(9529509.0 - 9527641.2) * (3471494203.8 - 3444674553.7)}} = \frac{101861.1}{223813.9} = 0.46;$$

$$r_{\text{sugar beets}} = \frac{(2185436.0 - 2181267.7)}{\sqrt{(7484.5 - 7460.1) * (640631044.0 - 637787521.3)}} = \frac{4168.3}{8334.1} = 0.50;$$

$$r_{\text{oil crops}} = \frac{(1850311.9 - 1844134.7)}{\sqrt{(151038.5 - 150796.9) * (23044865.2 - 22552401.7)}} = \frac{6177.2}{10908.2} = 0.57.$$

The obtained correlation coefficients indicate strong relationship between the considered parameters.

The forecast values of grain production for the 2019 – 2030 period, calculated using formula 1, are:

$ВП_{2019}$ = -63304.0 + 54.5 * 1757.8 = 32560.2thousand centners;

$ВП_{2020}$ = -63304.0 + 54.5 * 1990.6 = 45256.3thousand centners;

$ВП_{2025}$ = -63304.0 + 54.5 * 2254.6 = 59654.0thousand centners;

$ВП_{2030}$ = -63304.0 + 54.5 * 2384.2 = 66721.9thousand centners.

Based on the obtained data, we present a zoned model, which suggests the possibility of developing the crop production industry according to extensive, intensive, and extensive-intensive scenarios.

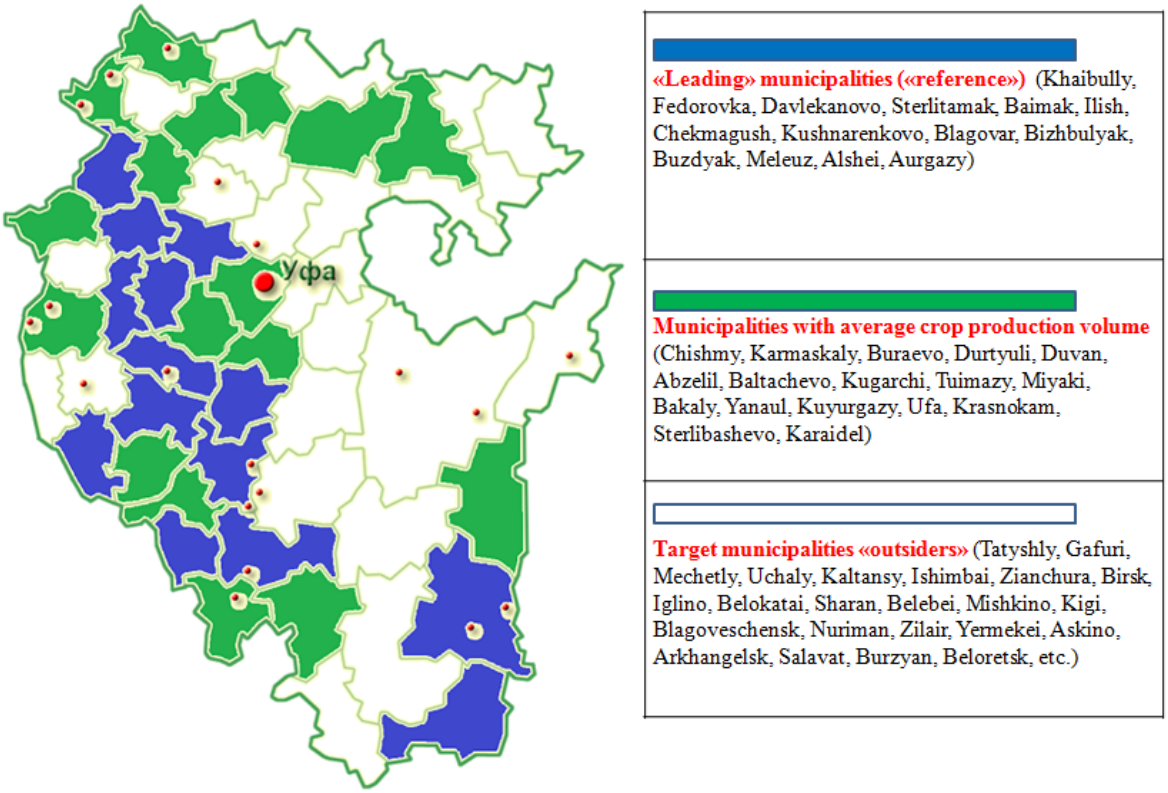

Fig. 1. Territorial model in the implementation of the strategic directions of the municipalities for the development of grain production.

The importance of the grain market is indicated by its leading role in providing food resources, the presence of inter-sectoral relations [13]. According to the calculations carried out under the scenario of extensive and intensive development in terms of grain production, significant results were obtained in all farm categories in the Republic of Bashkortostan:

- for the middle-term perspective (2018 – 2025): 5.97 million tonnes for the Bashkortostan Republic, including subregions: western – 2.1 million tons, northwestern – 0.5 million tons, northeastern – 0.3 million t, northern – 0.1 million tons, Ural – 0.7 million tons, central – 0.7 million tons, southern – 1.5 million tons;
- for the long-term perspective (2018 – 2030): 6.67 million tons for the Bashkortostan Republic, including subregions: western – 2.4 million tons, northwestern –

0.6 million tons, northeastern – 0.3 million tons, northern – 0.1 million tons, Ural – 0.7 million tons, central – 0.8 million tons, southern – 1.7 million tons.

Agriculture in the Republic of Bashkortostan is core in the growth of interregional and international competitiveness of the republic in the production of sugar beet. The republic is the northernmost region in sugar beet production. Depending on the year, the volume of production of sugar beet crops is 1241.7 thousand tons (2014) – 1590.0 thousand tons (2017). This is about 3.5% of production in Russia (11th place among the regions), in the Volga Federal District – 21.2% (3rd place in 2018). Sugar beet production is concentrated in the Pre-Ural steppe and the southern forest steppe of the republic. The cost of sugar beet crops is relatively high compared to other beet-growing regions, although profitability in the republic is more than 45%. The competitiveness of sugar produced from local raw materials in the republic is low compared to imported raw materials and white sugar (from Ukraine, Cuba, etc.).

$ВП_{2019}$ = 6071.2 + 170.6 * 52.3 = 14995.9 thousand centners;

$ВП_{2020}$ = 6071.2 + 170.6 * 69.9 = 17999.2 thousand centners;

$ВП_{2025}$ = 6071.2 + 170.6 * 72.4 = 18425.8 thousand centners;

$ВП_{2030}$ = 6071.2 + 170.6 * 84.6 = 20507.7 thousand centners.

It can be seen that a sequential increase in the gross yield of sugar beets in the Republic of Bashkortostan to 16.6 million centners is predicted [14, p. 298].

According to the calculations based on the extensive-intensive development scenario, the following results were obtained in terms of sugar beet production volumes in all categories of farms in the Republic of Bashkortostan:

- for the middle-term perspective (2018 – 2025): 1.8 million tons for the whole Bashkortostan Republic, including subregions: western – 1.0 million tons, central – 0.4 million tons, southern – 0.5 million tons;
- for the long-term perspective (2018 – 2030): 2.1 million tons for the whole Bashkortostan Republic, including subregions: western – 1.1 million tons, central – 0.4 million tons, southern – 0.5 million tons.

Territorial model of the participation priority in the implementation of the strategic directions of the Republic of Bashkortostan's municipalities in the development of sugar beet production is presented in Figure 2

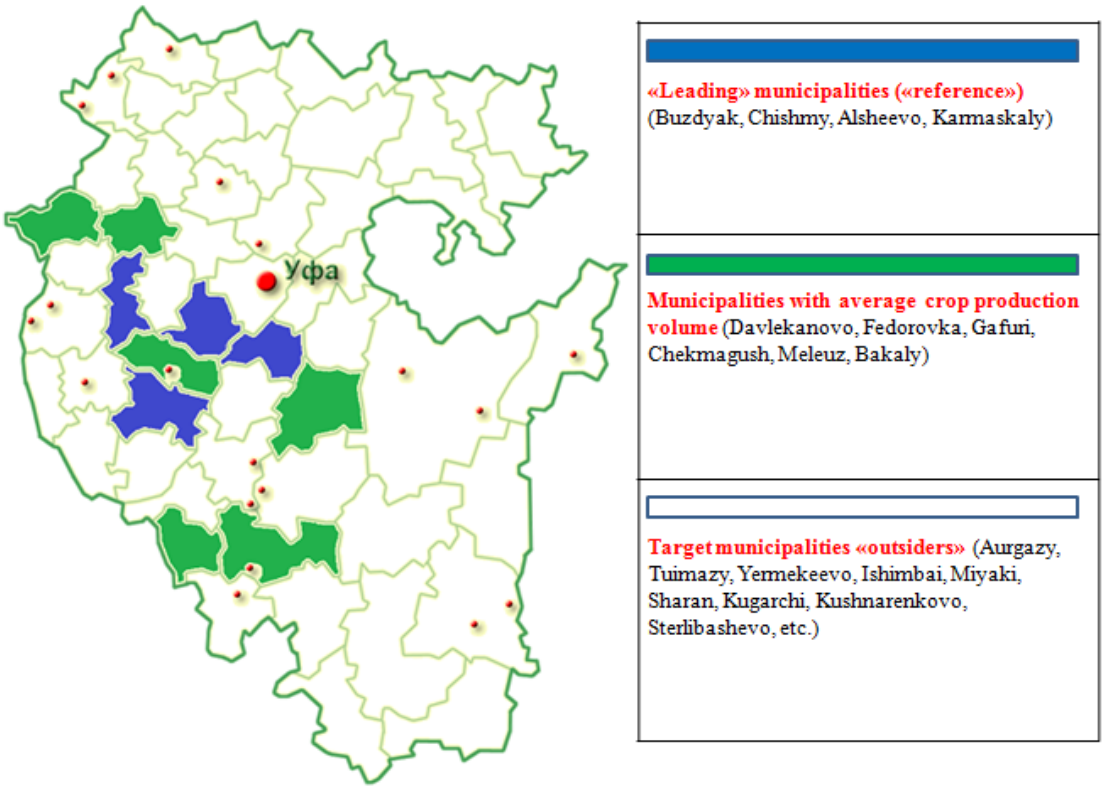

Fig. 2. Territorial model in the implementation of the strategic directions of the municipalities for the development of sug-ar beet production.

Sunflower seeds in the Republic of Bashkortostan are produced for the production of vegetable oil. The production volumes of sunflower seeds in recent years has increased sharply (by 75.1%) and amounted to 324.4 thousand tons in 2018. In 2018, the Republic produced 2.5% of the total sunflower production in Russia (15th place), 6.9% of the production volume of the Volga Federal District (5th place). Sunflower seed production is concentrated in the Pre-Ural steppe and in the Southern forest steppe and, in part, in the Trans-Ural steppe. Due to high selling price, the production of sunflower seeds is cost-effective. Its production on the territory of the Pre-Ural steppe withstands competition from productions in Orenburg region, and other neighbouring northern regions.

Farms in the republic expanded sunflower plantations from 210.7 thousand ha (2014) to 225.3 thousand ha (2018). The expansion is due to the high economic efficiency of seed

production of this crop. The main areas of these seeds are located in the Pre-Ural steppe and their specific gravity reaches 10%, which negatively affects soil fertility. In 2018, plantations of the crop occupy 7.6% of the total sown area and 60.0% of the sown area of industrial crops in the republic.

In recent years, a significant place in the agro-food sector has been occupied by trade in oilseeds and vegetable oil, the forecast values of the gross production are:

$ВП_{2019}$ = -2990.1 + 25.6 * 247.1 = 3327.3 thousand centners;

$ВП_{2020}$ = -2990.1 + 25.6 * 266.2 = 3815.6 thousand centners;

$ВП_{2025}$ = -2990.1 + 25.6 * 286.7 = 4339.7 thousand centners;

$ВП_{2030}$ = -2990.1 + 25.6 * 297.2 = 4608.1 thousand centners.

According to the extensive-intensive scenario, the gross yield of oilseeds is projected to increase up to 4.9 million centners.

According to the calculations of the extensive-intensive development scenario, the following were the forecast values of sunflower production in all farm categories in the Republic of Bashkortostan :

- for the middle-term perspective (2018 – 2025): 433.7 thousand tons for the whole Bashkortostan Republic, including subregions: western – 155.8 thousand tons, Ural – 14.0 thousand tons, central – 30.6 thousand tons, southern – 233.7 thousand tons;

- for the long-term perspective (2018 – 2030): 460.8 thousand tons for the whole Bashkortostan Republic, including subregions: western – 164.6 thousand tons, Ural – 14.1 thousand tons, central – 32.2 thousand tons, southern – 249.8 thousand tons.

The territorial model of the participation priority in the implementation of strategic directions of the municipalities of the Republic of Bashkortostan in the development of oilseed production is presented in Figure 3.

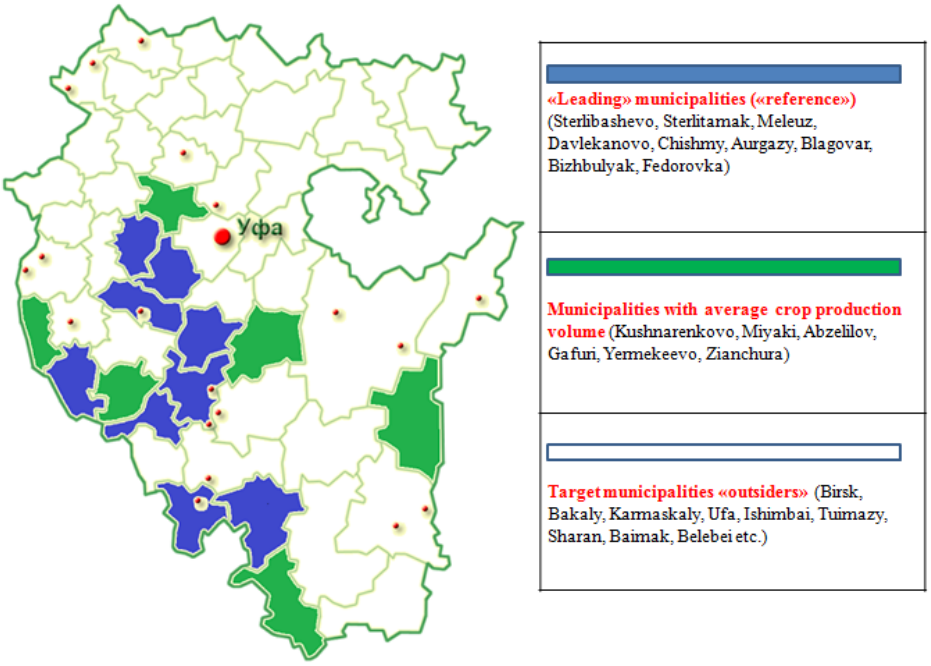

Fig. 3. Territorial model in the implementation of the strategic directions of the municipalities for the development of oilseed production.

The strategic development of the agro-food sector determines the priority areas in agribusiness and state regulation mechanisms. This makes it possible to comprehensively tackle the development of the industry, which in future will contribute to improved efficiency in the region's agricultural output [15].

The strategic priority for agribusiness development is the effective functioning of the agricultural sector and providing the population with a wide range of high-quality food products in accordance with the recommended standards.

When developing regulatory measures for the agribusiness sector, it is necessary to take into account factors that have a significant impact on the formation and development of this sector. At the current stage of the region's socio-economic development, their systematization takes into account the following threshold of effects: macro- and microeconomic, regional [16].

Regional factors are crucial for the formation and development of agriculture in the region that are closely related to both macroeconomics and microeconomics factors.

VI. Conclusion

The formulated scientific provisions will improve municipal authorities' quality of planning and forecasting activities. The results of the study have practical importance in the preparation and adjustment of programs for the strategic development of rural municipalities of the Republic of Bashkortostan. The presented territorial model of the participation priority in the implementation of strategic directions for the development of production of grain crops, sugar beets and oilseeds makes it possible to develop the crop

production industry according to extensive, intensive and extensive-intensive scenarios [17].

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