The development level and economic efficiency of vegetable production in the Krasnoyarsk region

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Abstract. The problem of increasing the development level of vegetable subcomplex is considered in the presented work. The conducted research testifies to reduction of manufacture volumes in vegetable production and, as a consequence, dissatisfaction of the population demand. Particular attention should be paid to the fact that by category of farms the greatest reduction is observed in the sector of personal subsidiary production, although it is the main supplier of vegetable products. In order to change this situation, it is proposed to create a wholesale and distribution center on a cooperative basis. Its formation will not only create conditions for the effective supply of vegetable products to the population of the region, but will enable the organization of a favorable social environment in rural areas.

1. Introduction
Vegetable growing is one of the priority sectors in agriculture. Vegetables occupy an important place in the food, being an important component of the human diet. However, at present, the industry does not meet the need of the country's population for vegetable products. In 2018, the actual consumption of vegetables in Russia amounted to 105.6 kg per person per year, and in the Krasnoyarsk region 99.7 kg with a scientifically based nutrition norm of 120 - 140 kg. The lack of security in the local market with high-quality vegetable products of local production makes it possible to fill it with products from CIS countries almost without hindrance. At the same time, imported vegetable products occupy more than 15% of the Russian consumer basket. The main source of population supply with vegetable products in Russia is open-ground vegetable growing (up to 95%) [1]. The process of providing vegetable products depends on the efficiency of vegetable production in farms of all categories and directions for further development of the vegetable industry.

The efficiency of vegetable production is studied by both local and foreign scientists. According to A. Ursu «... economic efficiency plays an important role in making informed decisions at the level of farms, being one of the main criteria for assessing the level of economic activity and development prospects» [2].

In their scientific work, such authors as Dubovitsky A. A., Klimentova E. A. note that «improving the efficiency of vegetable production has been and is of great importance for the entire national economy and for each enterprise, which is due to many factors. First, the growth of production in conditions of limited resources contributes to a more complete satisfaction of the food population needs. Secondly, with the efficient use of labor and material resources, production costs are reduced, which affects the level of retail food prices. Thirdly, the increase in production efficiency ensures the
growth of enterprises incomes, more funds are allocated for the economic and social development of labor groups» [3].

2. Research methods
In modern conditions of vegetable growing branch development the situation with providing the population of the Krasnoyarsk region with vegetables differs in the instability. This is due to such reasons as reduction in production volumes, insufficient receipt of vegetable products from other regions in Russia and CIS countries, unreasonably high losses of products at all stages from cultivation to receipt to consumers, disproportions in the development of vegetable subcomplex industries, weak development of market infrastructure, etc. [4].

The level of production and consumption of vegetables in the Krasnoyarsk region is evidenced by the data presented in figure 1. The actual level of vegetable consumption in the Krasnoyarsk region per person in 2018 amounted to 99.7 kg, a decrease of 6.8% compared to 2014, but the average annual demand for vegetables was satisfied by 71%.

![Figure 1](image)

**Figure 1.** Average per person level of vegetables production and consumption in the Krasnoyarsk region, kg.

Along with changes in the amount of consumption, there are noticeable changes in the production of vegetables in the Krasnoyarsk region. During the period under review from 2014 to 2018, there was a reduction in the area of vegetable crops by 2.65 thousand hectares or almost 30%, which affected the decrease in the gross harvest of vegetables by 24.4%, despite an increase in the yield of vegetable crops by 7.3% or 17.8 c per 1 ha (table 1).

**Table 1.** Dynamics of the main indicators in vegetable production by categories of farms in the Krasnoyarsk region.

| Indicators                                      | Years                      |
|------------------------------------------------|----------------------------|
|                                                | 2014 | 2015 | 2016 | 2017 | 2018 |
| 1. Cultivated area - total, thousand hectares  | 8.90 | 8.90 | 9.27 | 6.0  | 6.25 |
| including agricultural organizations          | 0.8 | 0.73 | 0.79 | 0.70 | 0.65 |
| peasant (farmer) organizations                | 0.3 | 0.43 | 0.78 | 0.74 | 0.89 |
| personal subsidiary farms                      | 7.8 | 7.74 | 7.7  | 4.57 | 4.71 |
| 2. Produced (grown) vegetables - total,        | 217.2| 225.0| 238.8| 146.67| 164.24|
| thousand tons                                  |     |      |      |      |      |
| including agricultural organizations          | 13.94| 17.10| 21.73| 15.24| 15.56|
| peasant (farmer) organizations                | 5.0 | 8.97 | 18.26| 13.8 | 20.2 |
Table 1. Yield of vegetables, C per 1 ha.

| Category                             | 2018   | 2019   | 2020   | 2021   | 2022   | 2023   |
|--------------------------------------|--------|--------|--------|--------|--------|--------|
| personal subsidiary farms            | 198.3  | 199.0  | 198.8  | 117.6  | 128.5  |        |
| including agricultural organizations | 241.7  | 249.9  | 253.3  | 261.7  | 259.5  |        |
| peasant (farmer) organizations       | 150.5  | 202.8  | 223.8  | 199.4  | 206.9  |        |
| personal subsidiary farms            | 253.5  | 257.0  | 258.3  | 257.4  | 272.6  |        |

Nevertheless, the Krasnoyarsk region ranks the 1st place (8th in Russia) among the subjects of the Siberian Federal district in terms of vegetable production. Production of open-ground vegetables in 2018 for all categories of farms is 99.7 % of the total vegetables production, and in agricultural organizations 96.8 %. The leaders in the production of vegetables in farms of all categories are Berezovsky and Emelyanovsky districts. The main regions producing vegetable products are shown in figure 2.

Figure 2. The main areas of the Krasnoyarsk region for the production of vegetables in farms of all categories, thousand tons.

During the study period, there is a decrease in the area of vegetable crops in agricultural organizations and personal subsidiary farms of the population by 18.7 % and 39.6 %, respectively, and in peasant farmer) organizations there is an increase in the cultivated area by almost 3 times. But, despite this change, the increase in the gross harvest of vegetables is due to an increase in the yield of vegetable crops by 41.2 % or 84.5 kg / ha.

In the agricultural organizations of the region during the study period, the tendency to reduce the cultivated area under vegetable crops remained. In 2018, compared to 2014, the decrease was 18.75 %, but the gross harvest of vegetables fluctuates, due to an increase in the yield of vegetable crops compared to 2014 by 11.9 %. Reduction of cultivated area under vegetable crops at agricultural enterprises is explained by difficulties of their cultivation and especially realization. There is also a lack of money for the purchase of expensive seeds, fertilizers, energy and agricultural machinery.

A significant structural component of vegetable production is the personal subsidiary farms (PSF) of the population, in which 75.4 % of all cultivated areas and about 78.2% of the gross vegetables harvest is concentrated in 2018. The high share of PSF in total production is due to the unsatisfactory needs of the population in vegetable products. In 2018, the cultivated area of vegetables in private farms decreased by 146 hectares to the level of 2017, and by 3090 hectares to the level of 2014 the production of vegetables in this category of farms in 2018 decreased by almost 70 thousand tons to the level of 2002, despite a yield increase of 7.5 %.

In order to increase the production of vegetables in the region, agricultural organizations engaged in their production are provided with state support in the form of:
• compensation of cost part in original and elite seeds of vegetable crops, including F1 hybrids, included in the state register of breeding achievements approved for use in the territory of the Russian Federation;
• provision of unrelated support in the production field of open and closed ground vegetables in spring greenhouses (an increased rate is paid for 1 hectare sown with vegetable crops);
• compensation of a expenses part for construction of vegetable growing objects used for production and (or) storage of vegetables.

3. Results
The efficiency of vegetable growing largely depends on natural, technological, organizational and economic factors of production. Technical factors are more widely used in agricultural organizations, which have the necessary resources to a greater extent than other categories of farms producing vegetable products. Economic efficiency indicators of vegetables open-ground production in the agricultural enterprises we will present in table 2.

Table 2. Economic efficiency of vegetables open-ground production in the agricultural enterprises of the Krasnoyarsk region.

| Indicators                                         | 2014     | 2015     | 2016     | 2017     | 2018     |
|---------------------------------------------------|----------|----------|----------|----------|----------|
| Cultivated area, ha                               | 775      | 730      | 787      | 696      | 654      |
| Yield, c per 1 ha                                 | 150,5    | 202,8    | 223,8    | 199,4    | 206,9    |
| Gross production, tons                            | 11663,7  | 14804,4  | 17613,1  | 13878,2  | 13531,3  |
| Sold vegetables, tons                             | 8214,9   | 8662,2   | 8875,9   | 8527     | 6607     |
| The level of marketability, %                      | 70,4     | 58,5     | 50,4     | 61,4     | 48,8     |
| Vegetable production costs, thousand rubles       | 810863,9 | 824309,0 | 841728,1 | 774960,9 | 735694,6 |
| Production cost of 1 c of vegetables, rub.        | 6952     | 5568     | 4779     | 5584     | 5437     |
| Revenue from sales of vegetables, thousand rubles | 756181,5 | 858943,8 | 750901,1 | 746112,5 | 488984,1 |
| Total cost of sold vegetables, thousand rubles    | 568881,8 | 609385,8 | 561755,7 | 505565,8 | 401309,2 |
| Implementation the cost of 1 c of vegetables, rub.| 6925     | 7035     | 6329     | 5929     | 6074     |
| Average selling price of 1 c of vegetables, rub.  | 9205     | 9916     | 8460     | 8750     | 7401     |
| Result from the sale of vegetables, thousand rubles | 187299,7 | 249558,0 | 189145,4 | 240546,7 | 87674,9  |
| Profit from the sale of 1 c of vegetables, rub.   | 2280     | 2881     | 2131     | 2821     | 1327     |
| Level of profitability, %                         | 32,92    | 41,0     | 33,7     | 47,6     | 21,8     |

The production efficiency of open-ground vegetables in agricultural organizations of the region for the period from 2014 to 2018 is characterized by an increase in yield by 37.5 %, a decrease in the level of marketability, due to a decrease in the gross harvest and a decrease in the sale price of 1 kg of vegetables. Despite the decrease in the production cost of 1c of products, there is a decrease in profits from sales, as a consequence of the decrease in the price of products sales in agricultural organizations due to the deterioration of product quality during its storage. At the same time in 2018 a positive result was obtained from the sale of vegetables in the amount of 87 million rubles, which is lower than in 2014 by almost 100 million rubles.
Now in vegetable growing of the Krasnoyarsk region it is necessary to pay attention to development of market infrastructure, especially, to creation of the effective distribution mechanism for agricultural production in all categories of farms. To solve the sales problem of vegetable products, and on this basis lead to an increase in its production, it is possible by creating wholesale and distribution centers (WDC), whose tasks are the completion and processing, packaging, transportation and trade of agricultural products, the provision of veterinary certification services, phytosanitary control.

The effectiveness of the wholesale and distribution center depends on the scheme of relationships formed between the project organizers. When forming WDC in the form of a consumer cooperative, the largest share of participation in its organization and activities belongs to the members of the cooperative-small businesses and its functioning should reflect and implement their pressing interests [5].

4. Conclusion

Having analyzed the current situation of the vegetable growing industry in the Krasnoyarsk region, we note that the main volume of vegetables in the region is produced in agricultural organizations – in 2018 year 78.2 % of the total gross harvest of vegetable products. The area of planting vegetables in farms of all categories decreased by 39.8 %, as a result of its reduction in agricultural organizations and personal subsidiary farms, but nevertheless there is a tendency to increase the area under vegetable crops in peasant (farmer) farms.

Due to the reduction in sales of vegetables in 2018, there is a decrease in revenue by 267 million rubles compared to 2012. At the same time, during the period under review, the highest average selling price of 1 c of vegetables was in 2015, equal to 991.6 rubles. As a result of the decline in profits from sales of products in the industry in 2018, the level of profitability amounted to 21.8 %, which is lower than in 2012 by 11.8 %.

In order to ensure favorable conditions for the sale of vegetable products grown in all categories of agricultural farms in the region, to facilitate access to markets and processing of products, it is necessary to form and develop sales cooperation in the form of consumer cooperatives to collect vegetables from personal subsidiary farms in the form of wholesale and distribution centers. Their creation is an important and necessary stage in channels reorganization of agricultural production distribution that will allow adjusting active economic interaction of subjects in the agrarian market [6].

It is also of great socio-economic importance, as private farming is a source of livelihood for many rural families. In this regard, the purchase of perishable agricultural products such as vegetables from the population is particularly important in replenishing the family budget of rural families.

The formation of distribution structure in the vegetable subcomplex in the form of a wholesale and distribution center, built on the basis of cooperative relations is an important question, which allows to solve the economic satisfy problem for the demand of the population in vegetable production, and social basis for sustainable development of rural areas.

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