Features of Risk Management in Agriculture Organizations of an Industrial Region

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Abstract. Agricultural organizations are at great risk. The level of risk faced by agricultural organizations depends on regional circumstances. The most acute situation is observed in industrial regions, especially those that specialize in the mining industry. In this article the concepts of agricultural risk are considered, the features of agricultural risks of producers in industrial regions are studied. On the example of the Kemerovo region, the possibilities of reducing risks by agricultural organizations of the industrial region are investigated.

1. Introduction
In modern market conditions any organization is at risk from its activities. Different risks are typical for organizations of various fields of activity. The success and stability of agricultural organizations is largely dependent on the existing risk management system. A feature of agricultural production is its high dependence on external risks caused by weather conditions and the global food market conjuncture.

Agricultural risks depend on the regional characteristics of the territory. A very acute situation is characteristic of industrial regions. In such regions, as a rule, in addition to natural risks, agricultural organizations are faced with the high environmental and financial risks faced. However, the problem of at least partial self-sufficiency in food remains a challenge for such regions; therefore, the relevance of the study is justified by the need to manage risks in agriculture of industrial regions in order to minimize their causes and possible losses.

2. Methods
This article discusses the theoretical features of agricultural risks in industrial regions. An assessment of the risk management features of agricultural organizations of an industrial region is given on the example of the Kemerovo region.

The object of the research is agricultural risks. The subject of the research is risk management in agricultural organizations of an industrial region. Object of observation Kemerovo region is an industrial region specializing in mining and having a number of protracted problems in the development of agriculture.
Monographic and economic-statistical methods of research are used in the article. The features of the development of agriculture of the industrial region were examined by analyzing the dynamics of socio-economic indicators, the regulatory framework and expert assessments.

3. Research

3.1. Concept of the agriculture risks of industrial regions

Agricultural risks associated with the death of crops, planting of perennial plantations and farm animals are the most common risks of agricultural organizations in the production sphere. The main sources of risk are winter crop freezing, flooding, hail, drought, fire, lightning, a storm, a hurricane, animal accidents, animal death from diseases and etc. Weather risks are specific risks inherent in agricultural production. These risks pose the greatest danger to agriculture.

Many of the Russian regions are located in the zone of risky farming, which causes high risks in the agriculture of such regions. In such regions agriculture, excluding state subsidies, is unprofitable. The main cause of these losses is drought.

The relevance of the study is justified by the need to manage risks in agriculture of industrial regions in order to minimize their causes and possible losses.

Agricultural risks of industrial regions have a number of features that are associated with the specifics of agricultural development in such regions. The specificity of agriculture in industrial regions is due to several reasons:

1. Low share of agriculture in gross regional product, adverse environmental conditions and unfavorable demographic situation. Under such conditions, agricultural products produced in them cannot compete with products imported or imported from agricultural regions, since such regions do not have the necessary conditions, and agricultural regions provide themselves with a break due to economies of scale.

2. The desire for full food independence of industrial regions can negatively affect them economy, because agriculture in such regions is less cost effective compared to basic industries. The economies of adjacent agrarian regions, acting as food suppliers, may also suffer in such a situation.

3. The regional agrarian policy of industrial regions should take into account environmental and demographic factors.

4. The decision about stimulating agricultural production should be based on the observance of a number of public interests. Industrial regions have a number of competitive advantages in the context of the food embargo and the policy of import substitution of agricultural products. There is generally a fairly favorable investment climate in industrial regions, high production and scientific potential, which allow the development of high-tech, technologically complex industries that create a product with high added value.

Thus, industrial regions can have technological and investment growth points for agricultural development. At the same time, various risks of agricultural development in industrial regions are great. The situation is especially acute for regions specializing in mining, since they have high environmental and personnel risks of agricultural development.

The environmental risks of agricultural production in the mining regions are primarily associated with environmental changes under the influence of mining. Soil and water samples often do not comply. At the same time, environmental risks negatively affect such subject as the state, producer, and consumer. The problem of the state is that the producing regions are not always able to ensure the production of high-quality agricultural products. It creates a threat to the region’s food self-sufficiency. Manufacturers face the risk of not complying with the requirements of supervisory services and get a penalty. Consumers may face limited access to high quality local agricultural products.

The personnel risk of agricultural development in industrial regions is associated with a shortage of qualified specialists. The wages of industrial workers can be several times higher than the wages of
farmers. An insignificant share of the rural population and the outflow of the able-bodied population from rural areas reduces the personnel potential of agriculture in industrial regions.

The Kemerovo region is one of the typical industrial regions of the Russian Federation. The region is located in the risky farming zone, there are sharp temperature fluctuations during the calendar year, which explains the high cost of production and high risks.

In order to briefly characterize the agricultural industry of the Kemerovo region, a SWOT analysis matrix has been compiled (Table 1).

| Table 1. SWOT analysis matrix agriculture of the Kemerovo region. |
|---------------------------------------------------------------|
| **Strengths**                                                   | **Weaknesses**                                      |
| 1. Availability of production facilities                      | 1. Slow modernization of fixed assets              |
| 2. Significant scientific potential in the field of agriculture| 2. Low capacity utilization                        |
| 3. High market capacity                                        | 3. The existence of difficulties in ensuring the sale of livestock products |
| 4. The presence of trade relations within the region           | 4. The low level of development of transport and logistics, specialized and social infrastructure of the countryside |
|                                                               | 5. The unfavorable state of the region’s ecology   |
|                                                               | 6. The shortage of areas suitable for agriculture due to the industrial specialization of the region |
| **Opportunities**                                              | **Threats**                                         |
| 1. Growth in demand for high-quality agricultural products    | 1. Growth in producer prices of agricultural products |
| 2. Development and promotion of regional brands               | 2. Interregional competition with producers of the nearest agricultural regions |
| 3. Significant state support for agribusiness                 | 3. Unstable exchange rate of the national currency |
|                                                               | 4. Difficult access of small and medium enterprises to credit resources |

Kemerovo region is surrounded by such mountain systems as the Kuznetsk Alatau, Mountain Shoria and Salair Ridge. Mountains create a closed geographical system, isolated from adjacent regions. Most of the industrial emissions into the atmosphere are deposited in the Kuznetsk Basin and on the mountain slopes facing it due to the reflecting action of the mountain ranges. Emissions into the atmosphere are transported over considerable distances, polluting surface water and soil. The proportion of non-compliant hygiene standards in terms of physico-chemical indicators of samples in certain areas of the region is more than 5%. There are territories include Novokuznetsk, Leninsk-Kuznetsk, Prokopyevsky, Tsulsky, Tyazhinsky, Chebulinsky municipal districts. On average, the indicator in the region reaches 9%.

The human development potential in the Kemerovo region is reduced, due to the low share of the rural population (less than 15%) and low average wages in agriculture. The average salary of agricultural workers is almost 40% lower than the average salary of industrial workers.

Thus, agricultural producers of the Kemerovo region face natural, environmental and personnel risks in their activities.
3.2. Agricultural risk management methods of an industrial region

In general, the main methods of risk management include risk control, risk retention and risk transfer. Risk control is aimed at reducing the probability of the damage and extent of the damage. Risk retention includes insurance, risk transfer, self-insurance, creation of reserves and funds.

Insurance is one of the most popular risk management methods for agricultural organizations in the Russian Federation.

Federal Law of 25.07.2011 N 260 “About state support in the field of agricultural insurance and on amendments to the Federal Law “About the development of agriculture” was adopted in 2011. The adoption of this law is the development and improvement of the agricultural insurance system. The list of insured events was expanded, insurance of farm animals was introduced.

Since January 1, 2016 there is a single all-Russian association—the National Association of Agricultural Insurers (NAAI) in the market of agricultural insurance with state support. Insurance companies, who are members of NAAI do not have the right to enter into contracts of insurance with state support. The most important activity of the Association of agricultural insurers engaged in agricultural insurance with state support is the formation of the compensation fund and the implementation of compensation payments. The compensation Fund protects the interests of insured farmers in case of bankruptcy of the insurer.

According to the data of 2018, the volume of the agricultural risks insurance market in Russia amounted to 3.7 billion rubles. Agricultural risk insurance is mainly concentrated in agricultural regions. More than 50% of the agricultural risk insurance market falls on insurance with state support.

But in industrial regions agricultural insurance is poorly developed. Regional programs of state support for agriculture in industrial regions often do not contain measures for the development of agricultural insurance with state support.

For example, the state program of the Kemerovo region includes measures to manage risks in crop production, but such measures and indicators are not provided for livestock breeding.

Moreover, the size of the agricultural insurance market in the Kemerovo region is insignificant. According to the NAAI, the agricultural insurance market in the region can be characterized as a market without significant state support (Fig. 1).

![Map of the Kemerovo region](image)

**Figure 1.** Agricultural insurance in the subjects of the Russian Federation.

Insurance with state support currently has many problems, such as high insurance premiums inaccessible to farmers, delayed subsidies, fraud, distrust of insurance companies. Therefore it is
advisable to use other methods of risk management to minimize the likelihood of risk along with the improvement of agricultural insurance.

It should be noted that in the Kemerovo region traditionally there is a low profitability of agricultural production. On the one hand, agricultural producers need a risk management system in conditions of high risks and low profitability of the industry.

On the other hand, the lack of financial resources does not allow the development of an expensive risk management system. Currently, there is a problem of low profitability in the agricultural industry. This does not allow agricultural organizations to form a sufficient financial reserve from their own profit. Data on the profitability of agriculture are presented in table 2.

### Table 2. Profitability indicators of agricultural production in the Kemerovo region, %.

| indicator                  | 2013 | 2014 | 2015 | 2016 | 2017 |
|---------------------------|------|------|------|------|------|
| Product profitability by  |      |      |      |      |      |
| "Agriculture, hunting and |      |      |      |      |      |
| forestry"                 |      |      |      |      |      |
| Crop Product Profitability| -2.62| 4.92 | 4.22 | -3.1 | 5    |
| Profitability of livestock| 0.59 | 10.69| 8.57 | 3.39 | 5    |

In conditions of low state support and a limited budget, agricultural organizations of the Kemerovo region are forced to seek their own approach to risk management.

In our opinion, the below opportunities can be used to reduce the risks of agricultural organizations in industrial regions:

1. Diversification of activities. For example, in the Kemerovo region, many large livestock organizations have their own feed base, which provides feed production not only for the organization itself, but also for sale. This solution allows to minimize financial losses when one of the areas of business shows a decline. Most large agricultural organizations have a milk-grain specialization.

2. Using the vertical integration mechanisms. In modern conditions, a business model is competitive if agriculture is a separate part of the business, rather than its central core. An example of a successful agricultural business in an industrial region is the SDS Agro in the Kemerovo region. The company is part of the SDS holding company. High financial results of other activities allow the company to conduct such technological areas of business as pedigree cattle breeding and the embryonic technologies development. These business lines are less exposed to natural and environmental risks. The company also manages to reduce costs by producing modern fertilizer and animal feed inside holding company enterprises. Cost reduction allows you to create financial reserves.

3. The development of subsidized insurance costs. In the Kemerovo region, there are opportunities to subsidize insurance costs for agricultural producers. However, the practice is not widespread. Often, agricultural insurance is not available to manufacturers due to high insurance premiums.

4. Using the possibilities of subsidizing high-tech areas of agricultural production. The legislation of the Kemerovo region provides for subsidizing the cost of the purchase of breeding material for cattle.

Reserves to increase crop yields can be created through a mechanism for subsidizing elite seed crops. The use of frost-resistant crops in the activities of agricultural organizations reduces the natural risk.

5. The formation of value added chains. Organizations that not only produce agricultural products but also process them further have the opportunity to reduce risks not only by diversifying activities, but also by reducing natural risks at the final stage of production. In the Kemerovo region, there are programs to subsidize the industrial processing of agricultural products.
4. Discussion and conclusion
So, the development of agriculture in the industrial region is difficult, due to the low efficiency of the industry, adverse environmental conditions, low share of the rural population. Agriculture in such regions is subject to increased natural, environmental, and personnel risks.

Despite this, industrial regions are often not able to provide a sufficient number of jobs, their industry negatively affects the environmental situation in the region, so agricultural development seems to be a promising direction for economic development.

A study of the characteristics of reducing the risks of agricultural producers in the Kemerovo region showed that agricultural insurance with state support is underdeveloped. Mechanisms for subsidizing costs, diversification, vertical integration help agricultural organizations in the Kemerovo region reduce risks.

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