Prospects for the development of agricultural cooperation (on the example of rural environmental enterprises)

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Abstract. Based on the analysis of the activities of the ancestral estates of Russia over the past ten years, and in particular of rural enterprises of ecological orientation of the Belgorod region over the past three years, we propose to implement in the practice of managing the collective of an agricultural cooperative of farms of ecological orientation the principles of the leading theoretician in the field of agricultural economics and management - A. V. Chayanov. The principles of organization and management developed by A.V. Chayanov, organically inherent in peasant farms that do not use hired labor and are based solely on family labor, correspond to the characteristic features of modern eco-farms in Russia and other countries and can be fully applied to their economic system. In the course of the study, in several stages, during 2018-2020, we conducted surveys of experts, in the capacity of which were the settlers of the ancestral estates of the Belgorod region. The objectives of the expert method were: to determine the degree of influence of the implementation of Chayanov's principles on the main indicators of the economic dynamics of family estates, to establish the leading principles that have a cardinal impact on economic trends.

1. Introduction

It has long established itself as one of the most optimal systems for the distribution of human, financial and natural capital, an economic cluster that has a dynamically developing nature both by year and by various industries and territories of the Russian Federation - it can and should become the most important regional project in the field of development of ecological agricultural enterprises. This kind of project is proposed by us in the form of an innovative ecological cluster, the basis of which should be agricultural production cooperatives, uniting family estates and other eco-oriented farms [2, 7].

At the same time, it is noteworthy that neither in the matrix of cluster initiatives of the Russian Federation as of May 1, 2018, given in the article by prof. Moskovkin V.M. "Development of analytical tools within the framework of the regional cluster benchmarking system", nor in the matrix of cluster initiatives as of February 4, 2020, among 119 Russian clusters there are not even those that are functionally close to the proposed cluster [13].

The proposed project will become reliable ways to increase labor productivity in ecological agricultural production, and in general in the agro-industrial complex of the regions [1, 3, 8].

Eco-farms can form the basis for critical regional projects to prevent and combat future pandemics. Indeed, as noted in the article by Manuilov M.B. "The impact of pollution formed in urbanized areas on the ecological and epidemiological situation ", possible ways of household infection of urban residents with viruses include: 1) contact of people with contaminated water of recreational facilities;
2) aerogenic infection of the population with viruses contained in dust particles of urban aerosols; and 3) airborne infection of people with artificial fogs from fountains and industrial air conditioners [10]. Eco-villages are initially designed in such a way that they minimize the considered causes of infection of the population.

The development of eco-farms in the Belgorod and other regions of the Russian Federation can become the basis for the formation of a clear, conceptually built, systemic national economic theory and national idea that has arisen at the regional and even rural level, as one of the the best contemporary critics of liberal economics, prof. Moskovkin V.M., it is quite obvious that within the framework of the neoliberal doctrine and the domination of transnational capital, it is impossible to achieve sustainable socio-economic and environmental development, as well as to build a just world [11].

In this regard, the next regional project, one of the engines of which can be activists of eco-farms in Russia, may be the one proposed by V.M. Moskovkin powerful, existing on a permanent and parity basis, an Internet forum for discussing global crisis problems between Russian and foreign intellectuals in order to overcome them - which will help to overcome Russia's isolation from the Western world [12].

2. Materials and methods

Our studies on a regular long-term basis, based on scientific expeditions and, above all, the experimental method (when the leaders and participants of the expeditions acted as settlers in eco-farms along with the owners), showed that, in general, both economic activity and the cooperative movement in rural eco-farms of the Russian Federation, despite more than ten years of existence and comprehensive government support, are in their infancy.

For example, ecological agriculture in the Belgorod region in the form of family homesteads, as of 2020 and 8 months of 2021, were engaged almost exclusively in subsistence farming. Small surpluses were sold to the side, which gave a low level of profit and profitability of production and sales. The level of integration within and between farms was very low. Eco-cooperatives were absent as a phenomenon.

However, the low level of marketability and integration was combined with the desire to implement the basic principles of organic agriculture:

1. Combination of traditional and innovative technologies. So, our observations have shown that totally in all family estates:
   - no pesticides or herbicides were used;
   - most of the farms used green siderates, silt and compost as the main fertilizers;
   - all endemics are regularly embedded in the soil during their active growing season;
   - various types of mulch were widely used both as an additional fertilizer and as a means to avoid frequent irrigation and tillage;
   - the technology of shallow plowing to a depth of 5-7 cm was used. At the same time, the technology of zero plowing, which has long been proven in many Western European farms, has not found its supporters in any farm. At the same time, shallow plowing replaced a whole range of agronomic measures: deep fall plowing, harrowing in the spring, cultivation before sowing seeds, rolling, stubble plowing;
   - the main pests of agricultural crops are scared away either by the selection of special plants that emit a large amount of phytoncides (calendula, celery, tagetes), or by the correct combination of crops (carrots are sown next to cabbage beds), or by rational crop rotation (for example, after corn and sunflowers, lupine is always sown, peas and other legumes).

2. The use of traditional - and innovative technology. So, tractors, combines, rollers, disc and fine harrows, sprayers are not used. At the same time, such small equipment as cultivators and lawn mowers is very widely used. Each settler has a private car.

3. Diversity of biological plant species. All eco-farms are trying to use both zoned varieties, which in this region have given a stable harvest for a long time, as well as zoning new varieties and
developing their own varieties by creating a stable seed base. At the same time, farms are engaged in the introduction of such valuable tree species as various cedars, rare varieties of apple and birch trees. Work is also underway to preserve local endemics in all areas free from economic activity.

In the ancestral estates of the Belgorod region, according to data for 2020-2021, such varieties were cultivated (Table 1).

**Table 1.** The main crops of eco-farms in the Belgorod region (on the example of ancestral estates) with data on the average yield by farms.

| Culture                        | Yield (quantity) | Weight of 1 fruit (gr.) | Application          |
|--------------------------------|------------------|-------------------------|----------------------|
| Siberian cedar                 | 159              | 76                      | Decorative, food     |
| Cedar Malachite                | 360              | 36                      | Decorative           |
| Cedar Forest Beauty            | 910              | 42                      | Decorative           |
| Wild strawberry (strawberry)   | 6                | 6                       | Food, decorative     |
|                               |                  |                         | Food                 |
| Strawberries (strawberries)    | 11               | 11                      | Food                 |
| Baron Solemacher               |                  |                         |                      |
| Malvina                        |                  |                         |                      |
| Strawberry (strawberry) Gigantella |         | 12                      | Food                 |
| Strawberry (strawberry) Queen Elizabeth 2 | | 30                      | Food                 |
| Black Prince                   | 50               | 40                      | Food                 |
|                               | 60               | 40                      |                      |
| White cabbage June             |                  | 3000                    | Food                 |
| White cabbage Amager 611       |                  | 4000                    | Food                 |
| White cabbage Languedaker      |                  | 5000                    | Food                 |
| White cabbage Tobia           |                  | 5000                    | Food                 |
| White cabbage Slava 1305       |                  | 5000                    | Food                 |

Figures 1-2 show the low level of the main indicators of economic efficiency for agricultural eco-farms in the Belgorod region.

![Figure 1. Dynamics of changes in the average profitability of an enterprise in the family estates of the Belgorod region, 2018-2020.](image-url)
Based on the analysis of the activities of the ancestral estates of Russia over the past ten years, and above all the eco-farms of the Belgorod region over the past three years, we propose to implement in the practice of managing agricultural cooperatives that unite ecological farms, the principles of the leading Russian agrarian with a worldwide reputation - A.V. Chayanov. An empirical analysis, combining observation, survey, experiment, showed that the principles of a peasant labor economy put forward by him a hundred years ago fully correspond to the specifics of modern ecological farming [16].

Table 2 shows the results of an expert analysis of the degree of implementation in agriculture of the ecological orientation of the Belgorod region of the basic principles of the organization of peasant farms by A.V. Chayanov, carried out by us over a long period of time. Our experts were the owners of family homesteads (total number of 125 people), the survey was conducted on a regular basis for three years (2018-2020) in oral, written form, using e-mail, social networks and mobile telephony. The significant factual material obtained by us made it possible to carry out a correlation-regression analysis, taking into account a number of influencing factors. At the same time, we set ourselves the task of identifying the key factors that have a decisive impact on the economic progress of the studied farms, as well as the degree of such influence. The results of economic and mathematical analysis and its interpretation are presented below.

**Table 2.** Informational data obtained on the basis of the expert method for agricultural eco-farms in the Belgorod region, 2018-2020.

| The years | Self-sufficiency, %, ($x_1$), (%) | External integration, %, ($x_2$) | Internal integration, %, ($x_3$) | Average profit from sales, rubles in year ($Y$) |
|-----------|---------------------------------|---------------------------------|-------------------------------|---------------------------------|
| 2018      | 15                              | 45                              | 5                             | 40 156                           |
| 2019      | 25                              | 50                              | 10                            | 42 065                           |
| 2020      | 30                              | 55                              | 15                            | 49 506                           |

**3. Theory and modelling**

Regression equation:

$$Y = 1106.4x_1 + 1094.475x_2 + 1500.125x_3$$

(1)

where $x_1$ – the principle of self-sufficiency; self-collectivization (internal cooperation); $x_2$ – external integration principle; $x_3$ - internal integration principle.

Analysis of the derived regression equation shows that:

1) an increase in the implementation of the principle of self-sufficiency by 1 unit of measure leads to an increase in the average profit from sales by 1106.4 units;
2) an increase in the implementation of the principle of external integration by 1 unit of measure.
leads to an increase in the average profit from sales by 1094.475 units.;
3) an increase in the implementation of the principle of internal integration by 1 unit of measure.
leads to an increase in the average profit from sales by 1500.125 units.

According to the maximum coefficient $\beta_3=1.245$ we conclude that the factor $x^3$ - the principle of internal integration - has the greatest influence on the result $Y$.

4. Results and discussion
Correlation-regression analysis allows us to draw the following preliminary conclusions, which in the course of further observations will require a more detailed analysis.

The principle of internal integration has the greatest influence on the economic performance of eco-farms, including family homesteads. At the same time, both the self-observations of the expert owners and our external research unequivocally indicate that this principle in the farms under consideration as of 2020 was implemented only by 15% on average across farms. And this despite the fact that the correlation principles should penetrate into all aspects of the life of this kind of farms, fastening like cement all the bricks and blocks of the outbuilding. The analysis shows that family estates tend to combine in many respects two opposite principles of economic activity: private property with collective labor, which leads both to constant internal conflicts of interest between family estates and to a high degree of self-liquidation among such kind of farms. At the same time, A.V. Chayanov, on the basis of many years of observations of peasant farms in various regions of Russia and other countries, argued that small agricultural enterprises always strive to ensure maximum internal stability, for which they constantly make efforts to strengthen the collective spirit within the economy [14]. Therefore, we can unequivocally assert that the low, despite the long-term existence (10 or more years) of ancestral estates, the level of development of internal integration ties within such farms is the main reason for their low economic indicators.

The second most important principle for the development of eco-farms is the principle of self-sufficiency of the economy. As A.V. Chayanov has shown in detail, the stability of different forms of peasant farms in different historical periods and in different economic formations was ensured primarily due to the absence of the category of "wages" and "profit" in them [15]. Peasant farms were mainly based on the labor of the owners, almost without the use of hired labor, and as the main goal of their activities they set the provision of the members of the peasant family with their basic needs. Thanks to the development of all the main industries within the economy, the relative independence of the farms from any external influences was ensured. Our research shows that the generic farms of the Belgorod Region are currently self-sufficient only by 35% on average across all farms, which indicates an extremely low degree of implementation of the principle of self-sufficiency. To increase the profitability of eco-farms, the implementation of this principle must be at least doubled.

The third most important principle for the development of eco-farms is external integration. As you can see, most experts agree that at the moment this principle has been implemented by a maximum of 55% within the framework of the ancestral estates of the Belgorod region. The data we have on the development of eco-economies in the Russian Federation as a whole indicate that cooperation between such economic structures as a whole across the country is only at the very beginning of its development. And this despite the fact that eco-cooperatives could solve most of the problems currently facing Russian eco-farms:

1) the lack and high cost of innovative technology, including providing sustainable energy sources, for the needs of organic farming and organic animal husbandry;
2) high prices for imported technologies for organic agriculture;
3) the rudimentary level of development of the organic goods trade network;
4) almost complete absence of PR-management of eco-farms and organic products;
5) low level of competitiveness of small eco-farms in comparison with large agricultural holdings;
6) the difficulty of obtaining private and public investment;
7) extremely low level of forecasting the innovative development of agriculture, including environmental orientation [9].
8) lack of reliable stable sources of long-term investment;
9) lack of labor force;
10) low level of special qualifications of employees;
11) lack of experience in export activities in eco-farms [6].
4. Fairness: organization, management, motivation and control within eco-farms should be based on an equally positive relationship between the owners and in the relationship of the management of the cooperative to each of its members.

5. The prevalence of moral incentives over material ones: both separate family estates and eco-cooperatives are created and exist not to maximize profits, although the receipt of significant income can be one of the effects from their activities. The main mission of this kind of organizational forms of management is living in harmony with nature and the surrounding noosphere, ensuring a healthy lifestyle for each of the farm workers [5].

6. A healthy psychological environment: maximum satisfaction in work and personal and social life should be the most important goal of collective eco-farms. At the same time, a psychological environment should be created in which life within the framework of an eco-cooperative would be perceived by each of its members as existence within the boundaries of one single family, where all forms of infringement by age, gender and nationality would be absent.

7. Creative spirit: the spirit of innovation should be encouraged in every possible way within the framework of eco-cooperatives, while at general meetings all participants in economic activity should have the right to vote, regardless of their labor and financial contribution to the common cause. The decision on the choice of one or another innovative way of development of eco-farms united in a cooperative must be made by a majority vote. At the same time, if there is a special point of view of the minority, there should be an opportunity to reconsider and adjust the already adopted decision. It should be assumed that there are no time and always established ideal forms of organization of production, the most effective means and objects of labor, any technique and technology needs constant improvement. On the other hand, one should also avoid “innovations for innovations”: the traditional forms of production that have been tested over a long period of practical experience and adopted by the entire team can be used for a fairly long time without any significant modifications.

The principles of organizing eco-cooperatives have already found their practical embodiment in the experience of economic activities of eco-farms in the Belgorod region and can be used in the future by all eco-oriented farms of the Russian Federation and other states.

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