

## Motivational Management of the Environmentally Sound Development of Agricultural Enterprise in Ukraine

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### ABSTRACT

*The article analyzes the methodological approaches to the development of agricultural enterprises taking into account an environmental component. The methodology for assessing the state of environmental orientation of agricultural production is justified. It has been found that when planning production volumes, the number of resources used, the level of technology, emissions, etc., an economic entity should predict the level of the government regulatory influence under a certain mode of motivational management. It has been proven that the methodological prerequisite for choosing a motivational management mode is to take into account an integral natural-territorial complex, the state of which depends on the intensity of business activity rather than any land plot of an economic entity that is owned or leased by an agricultural enterprise for agricultural production. The estimated cost of creating a purchasing center for biological agricultural products (investment costs) is calculated. A constructive way to solve the problem of assessing the intensity of the environmental situation of the territory under the conditions of economic management is the step-by-step comparison of volumes of environmental substances used and the potential for restoring these substances by an agricultural ecosystem. An organizational mechanism for marketing biological agricultural products as an incentive for the environmentally sound development of enterprises is proposed.*

**Keywords:** environmental safety, motivational management, biological agricultural products, agricultural production greening, economic incentives for landowners.

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## 1. INTRODUCTION

The production and sale of biological agricultural products is a fairly common practice for many countries of the world, primarily, developed countries with a sufficiently high level of income for the majority of population. To facilitate the search for such products in the retail trade system, they are located on special shelves, marked with special signs or symbols, and contain labels, etc. As a rule, such products are sold at significantly higher prices.

The transfer of the global experience in arranging the sales of biological products without its significant adaptation to the Ukrainian realities will not give the expected results, since there are specific factors, which are missing or have a significantly lower impact in other countries (Reynaud, et al., 2019). These factors include, but not limited to, the following.

Firstly, Ukraine has no national standards for biological products. There are only maximum permissible limits for the content of certain substances, the exceedance of which is theoretically unacceptable for manufacturers. In practice, more often than not, products are not tested for the content of some of these substances, or the results of such control are not available to consumers.

Secondly, the market of biological products is still in its infancy. Only in the last decade, the growth of real per capita income led to the emergence of a sufficiently large number of consumers ready to pay a higher price for environmentally friendly and safe products. In addition, information that the use of various agricultural production technologies may result in manufacturing agricultural products that differ significantly in quality has been disseminated in the mass media and special literature. The possibility of using the best practices of other countries determines the relevance of the formation of a market of biological agricultural products in Ukraine.

Thirdly, significant difficulties may arise in the process of arranging the sales of biological products in the state. In countries, where the sale of such products is well-arranged, the two key points are used: special labeling of products and placing them on the so-called “environmental shelves” in the points of sale. At the same time, consumers feel certain that the products labeled in this way are actually of high quality and ready to pay a higher price for them.

For Ukraine, these measures will not be enough. After all, in many cases, the sale of products from the above list of biological agricultural products is carried out without packaging, respectively, and without any labeling. In addition, inspections of retailers (supermarkets, markets, etc., and even chemist's shops) reveal the facts of the sale of products with expired shelf life, products with an increased grade of quality, etc. Since consumers are aware of these facts, it will be very difficult to convince them that salesmen of a supermarket, market or other shops have put biological, but not standard products, on the “environmental shelves”.

Fourthly, the current legislation of Ukraine does not provide for such a significant punishment of entrepreneurs for fraudulent misleading of consumers, so that it would stop them if there were a possibility of obtaining excess profits. This is a systemic problem that is equally relevant for the market of biological products, as well as for any other commodity markets. Therefore, possible solutions to this problem should be multi-faceted.

Thus, we have a situation where the market of biological agricultural products in Ukraine and in the region, in particular, could exist and develop, if we have managed to solve at least three main problems:

- 1) if potential consumers are provided with the information on places where they may buy biological agricultural products and in what way these products differ from standard ones, and consumers are sure that the products they purchase are actually produced using environmentally friendly technologies and have a proper quality;
- 2) agricultural enterprises will only be engaged in the production of biological agricultural products if they are able for sure to sell the main part of them at prices that will cover the increased production and marketing costs and provide the expected level of profit;
- 3) if the state, local authorities, public organizations, consumers and other interested entities are able to check biological products for compliance with appropriate parameters at any time, without hindrance and with minimal costs, and any violators of these parameters are severely punished.

*The goal of the study* is to develop scientifically grounded proposals for the development of a system of motivational management of agricultural enterprises with regard to an environmental component of production and sale of biological agricultural products to improve environmental safety by developing theoretical, methodological and organizational provisions and improving existing ones.

## **2. RESEARCH DESIGN AND METHOD**

### **2.1. Research design**

It is essential to start solving these problems with the development and adoption of national standards for biological agricultural products. These standards should not be interpreted ambiguously and should include requirements for the minimum permissible content of the main useful substances in products and the maximum permissible content of harmful or undesirable substances, as well as for the conditions and terms of storage and sale. The development of such standards should not be based on rewriting foreign analogues, but on the developments and recommendations of nutrition experts.

In parallel with the development and approval of standards, it is expedient to carry out active work in the field of technological support for achieving new standards in the process of agricultural production. We are talking about the fact that each producer of agricultural products has already applied certain technologies, and their further improvement in the direction of manufacture of biological products may require both dramatic technological innovations and minor adjustments to individual technological processes. This plan will need an individual assessment of the existing production process, which will ultimately be formalized in the form of a standardized feasibility study of required actions for transition to more environmentally-friendly technologies and manufacture biological agricultural products (Hrabak, 2013).

Such feasibility study may be carried out by specialists of the enterprise itself or by third-party public or non-public organizations for an appropriate fee. As an additional measure of motivation, the government may set preferential prices for conducting such feasibility study by specialists of public institutions. The key condition for the effective preparation of a feasibility study is that its developers

are aware of the impact of certain technological stages of agricultural production on the quality and environmental safety of agricultural products, as well as of the criteria for classifying such products as biological (Skryl, et al., 2019).

Speaking from the perspective of motivational management of the environmentally sound development, the availability of a feasibility study for an agricultural enterprise in order to switch to environmentally safe and resource-saving technologies for agricultural production should provide it with a number of advantages over agricultural enterprises without such feasibility study. These advantages are as follows:

- an opportunity for an enterprise to make a fairly accurate estimate of the necessary costs based on the existing feasibility study, which will enable to determine the required volume of attracting external sources of financing;
- against the feasibility study, banks may provide loans without requiring additional submission of a business plan for the use of loan proceeds;
- availability of a feasibility study should be included in a list of necessary conditions for obtaining the status of a biological agricultural enterprise.

Since environmentally friendly agricultural production combines economic, environmental and production components, it is advisable to include indicators according to these components in the analysis of the state of environmental orientation of agricultural production (Schusser, et al., 2019). Therefore, the assessment of the state of environmental orientation of agricultural production will contain such blocks as: natural and technological, which reflects the impact of agricultural activities on the environment, and contains indicators of a product quality as a result of the technological process; economic, which reflects the economic expression of the destructiveness of agricultural production and the state of development (distribution) of technologies of environmentally friendly agricultural production.

The natural and technological block of indicators of environmental orientation of agricultural production consists of the following:

1. *Product quality* – the share of domestic organic agricultural products on the national market of food and raw materials.

2. *Production technologies taking into account environmental restrictions:*

- volumes of application of mineral and organic fertilizers;
- volumes and terms of application of pesticides, agrochemicals, growth-promoting factors, etc.;
- volumes of use of genetically modified plant varieties and animal breeds;
- compliance of animal care conditions with the requirements of environmentally friendly agricultural production;
- structure of acreage, including the share of land occupied by sunflower, black fallow, grass and leguminous crops, the share of arable land;
- share of agricultural land occupied by environmentally friendly agricultural production (by types);
- emissions of pollutants into the atmosphere, etc.

3. *Environmental management soundness:*

- level of soil ploughness;
- share of degraded and polluted land in the total area of agricultural land;

- changes in humus content in the arable layer;
- use of fresh water in agriculture;
- change in species biodiversity: estimated by the number and dynamics of plant and animal species included in the Red Book.

4. *Environmental restoration activities* – by types of the implemented measures, is evaluated using economic indicators (paragraph 2.2).

## **2.2. Methodology for assessing the state of environmental orientation of agricultural production.**

The block of economic indicators for assessing the state of environmental orientation of agricultural production consists of those that are based on the monetary value of the environmental destructiveness of agricultural activity, and the indicators that reflect the level of government financial support for environmentally friendly agricultural production, as well as the level of the development of environmentally friendly agricultural production (Pirozhkov, et al., 2015):

1) effectiveness of costs for environmental restoration activities that is calculated as the ratio of losses caused to the environment and the costs of environmental restoration activities and gives an idea of the amount of unavoidable losses caused to the environment accounting for 1 US dollars of environmental restoration costs:

$$RC_{env} = \frac{\sum_{i=1}^n \sum_{j=1}^m EL_{ij}}{C_{env}}, \quad (1)$$

where:  $RC_{env}$  – the ratio of losses, caused to the environment and the costs of environmental restoration activities, US dollars/US dollars;  $n$  – the number of agencies controlling the environmental component of agriculture, the data of which calculations are made on;  $m$  is the number of types of environmental law violations within the jurisdiction of one agency controlling the environmental component of agriculture;  $EL_{ij}$  – the amount of environmental losses and fines imposed for violations of environmental legislation  $j$  within the competence of one of the agencies controlling the environmental component of agriculture  $i$ , US dollars.

Environmental losses (pressure) of the industry are calculated as the sum of indicators of any environmental losses caused and fines imposed for violations of environmental legislation by economic entities according to the data of the agencies controlling the environmental component of agriculture;

2) level of financial support for environmentally friendly agricultural production that is determined by the government agrarian policy and calculated as follows:

$$LFS = \frac{Sg}{P_c + C_{env}} \times 100\%, \quad (2)$$

where:  $LFS$  – level of financial support for environmentally friendly agricultural production by government authorities, %;  $P_c$  – production costs, US dollars;  $C_{env}$  – costs of environmental restoration

activities, US dollars;

3) one of the possible ways to assess the level of environmental orientation is an indicator of assessment of the level of environmental friendliness of products by largest environmental costs proposed by the author (Melnyk, 2016):

$$y_m = \frac{\sum_{i=1}^n D_{pi} \times y_{pi} + \sum_{j=1}^m D_{lj} \times y_{lj} + \sum_{z=1}^k D_{oz} \times y_{oz} + \sum_{q=1}^l D_{nq} \times y_{nq} + \sum_{g=1}^p D_{bg} \times y_{bg}}{Q}, \quad (3)$$

where:  $y_m$  – indicator for assessing the environmental level of products through monetary estimates;  $D_{pi}$ ,  $D_{lj}$ ,  $D_{oz}$ ,  $D_{nq}$ ,  $D_{bg}$ , – quantitative indicators of pollution types, destructive effects on landscape, human body, psychological discomfort and impact on biological objects;  $y_{pi}$ ,  $y_{lj}$ ,  $y_{oz}$ ,  $y_{nq}$ ,  $y_{bg}$  – respectively relative indicators of economic costs, US dollars;  $Q$  – the cost of goods and services, the production or consumption of which have led to negative changes, US dollars.

However, the existing system of economic, statistical information and reporting of government bodies controlling the environmental component of agriculture is not adapted to the accumulation of data required for calculation, some indicators are difficult to measure and require a complex expert work that does not contribute to the efficiency and cost reduction of obtaining assessment results. In addition, it is difficult to determine the specific economic costs per unit of the type of negative impact.

It is expedient to calculate indicators for determining the ecological and economic characteristics of agriculture (one of which is an indicator of economic efficiency of production of environmentally friendly products, which is equal to “additional profit from reducing the concentration of a certain pollutant in the environment”) (Hrabak, 2013). Another indicator is the environmental friendliness of agriculture, which is determined by “the ratio of the cost of resources that could be lost if environmental standards are not met (expressed as losses of agricultural products) and the cost of actually spent resources” (Pirozhkov, et al., 2015). However, the operational application of these approaches in practice is quite difficult, and it is expedient to use a set of indicators based on the amount of damage caused to the environment by production entities to characterize the environmental destructiveness of the industry. It should be noted that the idea of calculating the amount of environmental damage (pressure) per capita, area unit, etc. is not new, and is highlighted in particular in the work (Khomushyna, et al., 2018).

Indicators based on the economic equivalent of the ecological destructiveness of agricultural production include:

- environmental pressure of the industry per one inhabitant of rural area:

$$EP_N = \frac{\sum_{i=1}^n \sum_{j=1}^m EL_{ij}}{N}, \quad (4)$$

where:  $EP_N$  – environmental pressure per one inhabitant of rural area, the ecosystem of which is the base of agricultural production, US dollars/persons;  $N$  – population of rural area (average during the study period or at the moment of time, persons);

- environmental pressure of the industry per 1 ha of acreage as the part of agricultural land that is actively affected by physical and chemical effect:

$$EP_s = \frac{\sum_{i=1}^n \sum_{j=1}^m EL_{ij}}{S}, \quad (5)$$

where  $EP_s$  – environmental pressure of the industry per 1 ha of acreage, US dollars/ha;  $S$  – acreage, ha;

- ecological harmfulness of the obtained agricultural products that gives an idea of the amount of dollars one dollar of the manufactured gross products (type of the manufactured products) harms the environment:

$$EH = \frac{\sum_{i=1}^n \sum_{j=1}^m EL_{ij}}{CP}, \quad (6)$$

where:  $EH$  – ecological harmfulness of the obtained agricultural products (type of products), US dollars/US dollars;  $CP$  – cost of gross products (type of the manufactured products), US dollars;

4) indicators of the development of environmentally friendly agricultural production consist of:

- share of agricultural land plots occupied by environmentally friendly agricultural production (by type) in their total area, %;
- share of organic products of domestic agricultural production in the domestic market of food and raw materials, %;
- share of domestic organic production in the gross domestic product, %;
- structure of products of domestic organic production.

In addition, it is advisable to study the effectiveness of control activities of the bodies supervising the environmental component of agricultural production in the field of environmental protection and management using the index of elimination of offenses as the ratio of the number of eliminated offences against the environment and the number of offences against the environment detected during the year and not detected at the beginning of the year.

In the assessment practice, it is customary to investigate processes and states (Kutsenko, et al., 2016), and since environmental orientation is, in fact, a vector of development, it is advisable to consider its indicators in dynamics.

Points, the sum of which determines the state of environmental orientation of agricultural production, are set depending on values of the assessment indicators. The assessment of individual indicators by points determined for product quality and environmental restoration groups is higher than that for other groups that is explained by their importance. However, in aggregate the indicators of the second and third groups have a larger number of points during their assessment, as production technologies and environmental soundness have the greatest impact on environmental orientation of agricultural production: production quality depends on production technologies, and environmental restoration activities are aimed at eliminating negative environmental effects of management.

The range of points varies from 27 to -27, and depending on the total score for all indicators the state of environmental orientation of agricultural production is characterized as follows:

27 – 15.5 – environmental orientation of sufficient level;

15 – 3 – environmental orientation of low level;

2.5 – 0 – conditionally neutral agricultural production;

-0.5 – -27 – environmentally destructive agricultural production.

The range limits are determined in accordance with the maximum possible (in absolute value) sum of points for each of environmental orientation states. At the same time, for conditionally neutral production, the limits are set from the maximum possible sum (2.5 points), which is scored by points shared with other groups, to zero.

The proposed approach to assessing the environmental orientation of agricultural production makes it possible to determine the strengths and weaknesses of agricultural production from the standpoint of its environmental component, to form goals and objectives of management activities in the field of its environmental orientation.

### **2.3. Methodological basis for the development of agricultural enterprises taking into account the environmental component**

The environmentally sustainable operation of the agricultural sector of economy can be achieved by ensuring that the performance of enterprises in all sectors is linked to the effectiveness of their environmental measures: prevention of environmental pollution; manufacture of environmentally friendly products; increase in soil fertility, which should be regulated by economic standards.

Along with the introduction of economic standards, it is essential to apply in full economic sanctions for reduction in soil fertility, deterioration of the air, water sources, and other important environmental parameters. If an economic entity has exceeded the maximum permissible content of substances in products or significantly oversaturated soil with water during irrigation resulting in its erosion; improperly applied mineral fertilizers leading to a decrease in soil fertility, etc., this would accordingly affect the amount of its profit. For example, in conditions of reduced soil fertility, the amount of funds required for the soil restoration should be excluded from the income of economic entities in proportion to a decrease in soil fertility and the volume of land use.

Foreign practice (see the works of . Sahrbacher, et al., 2017 and Standar, et al., 2017) provides for the wide application of the principles of both negative motivation for environmental activities (payments, fines) and positive motivation (loans, benefits, borrowings), which are missing in Ukraine that significantly complicates the process of production greening. The formation of a full-fledged system of economic regulation of environmental management is one of the decisive directions of the state policy of Ukraine in the field of environmental protection. Ukraine's entry into the regulated market environment has significantly affected the nature of land relations: a number of land users of various forms of ownership have significantly increased, but material and moral incentives have not been introduced to increase the level of soil fertility yet. A significant deterioration in the quality of land requires the implementation of its economic protection through the interest of land owners and land users in investing in the protection and reproduction of soil fertility (Semenda, et al., 2018).



The existing legal and regulatory framework on land issues makes it possible to develop economic incentives for improving the agro-ecological assessment of land that will ensure the expanded reproduction of soil fertility (Land Code of Ukraine, 2002). An integrated approach provides for the government control over the agro-ecological state of soil, the level of its fertility, and economic incentives for making investment in the protection and reproduction of soil fertility. Such drastic measures will help prevent an environmental crisis in land use.

The use of land resources in Ukraine is on a fee basis, and the land fee is charged in the form of land tax for land owners and land users. These funds should be used exclusively for the purpose of financing the rational use of soil fertility. Moreover, additional sources of incentives for improving the efficiency of land use may include payments to the budget when withdrawing marginal land from agriculture and funds obtained from paying penalties for land use (Boronos, et al., 2016).

Economic incentives for improving the agro-ecological status of agricultural land are based on the method of monetary assessment of land. The motive for economic incentives for landowners and land users is to increase the score of agro-ecological assessment of land, which is determined during the next agrochemical survey. A prerequisite for introducing incentives is an increase in all agrochemical indicators of soil fertility (Table 1).

**Table 1:** Amount of economic incentives for increasing the agro-ecological assessment of land

Increase in the value of agro-ecological land assessment, points	Amount of economic incentives relative to the monetary land assessment, %	Increase in the value of agro-ecological land assessment, points	Amount of economic incentives relative to the monetary land assessment, %
0.1 – 1.0	0.5	10.1 – 11.0	5.5
1.1 – 2.0	1.0	11.1 – 12.0	6.0
2.1 – 3.0	1.5	12.1 – 13.0	6.5
3.1 – 4.0	2.0	13.1 – 14.0	7.0
4.1 – 5.0	2.5	14.1 – 15.0	7.5
5.1 – 6.0	3.0	15.1 – 16.0	8.0
6.1 – 7.0	3.5	16.1 - 17.0	8.5
7.1 – 8.0	4.0	17.1 – 18.0	9.0
8.1 – 9.0	4.5	18.1 – 19.0	9.5
9.1 – 10.0	5.0	19.1 – 20.0	10.0

A lever of economic influence on the efficiency of land use is the ecological and agrochemical assessment of land in points; the amount of penalty for deterioration in the ecological state of land is given in Table 2. If the agro-ecological score of soils has not changed during the next agrochemical survey and stimulation is not appropriate to carry out, it is essential to encourage expanded reproduction of soil fertility, because it motivates a land owner and land user to invest additional capital in the protection and reproduction of soil fertility.

**Table 2:** Amount of penalties for reducing the agro-ecological land assessment

Decrease in the value of agro-ecological land assessment, points	Amount of penalties regarding monetary land assessment, %	Decrease in the value of agro-ecological land assessment, points	Amount of penalties regarding monetary land assessment, %
0.1 – 1.0	1.0	10.1 – 11.0	11.0
1.1 – 2.0	2.0	11.1 – 12.0	12.0
2.1 – 3.0	3.0	12.1 – 13.0	13.0
3.1 – 4.0	4.0	13.1 – 14.0	14.0
4.1 – 5.0	5.0	14.1 – 15.0	15.0
5.1 – 6.0	6.0	15.1 – 16.0	16.0
6.1 – 7.0	7.0	16.1 – 17.0	17.0
7.1 – 8.0	8.0	17.1 – 18.0	18.0
8.1 – 9.0	9.0	18.1 – 19.0	19.0
9.1 – 10.0	10.0	19.1 – 20.0	20.0

Economic incentives should not exceed the amount of penalties if the agro-ecological assessment is changed by an equal amount in the direction of increase or decrease. The above version of the economic mechanism for rational use and protection of land resources will contribute to the economic interest of landowners and land users in increasing the level of soil fertility that is, increase in the value of the agro-ecological assessment in points.

### 3. EMPIRICAL RESULTS ANALYSIS

#### 3.1. Organization of sales of biological agricultural products as an incentive for the environmentally sound development of enterprises

The sale of agricultural products is the final and effective stage of economic activities of enterprises. A low environmental culture and low level of consumer confidence in the quality of agricultural products creates a barrier to the environmentally sound development of agricultural production. The system of sales of biological agricultural products, the objective of which is to provide consumers with agricultural products of appropriate quality and reliable information on them, ensures a high level of income for the manufacturer, is an incentive tool for the environmentally sound development (Brosig, et al., 2016).

The ultimate goal of all possible measures of motivational management of the environmentally sound development of agricultural enterprises is: 1) to reduce the level of harmful impact on the environment from agricultural producers; 2) to make a gradual transition to the use of a greater volume of renewable resources and reducing the use of non-renewable resources; 3) to ensure the production of environmentally friendly agricultural products, which are safe for human life and health.

The achievement of these goals is a long-term process that requires the willingness and constant work of all parties involved: agricultural enterprises, the government, local authorities, processing enterprises, retail chains, consumers, and others (). At the same time, the interests of all stakeholders should be coordinated, since each of them may negate the efforts of other parties by their action or

omission to act. An important aspect of this is that these goals are very closely linked, as it is impossible to develop environmentally friendly products using technologies, which are harmful to humans and the environment, and low-quality resources.

The specifics of the sale of products that are processed and delivered to the final consumer in a modified form are not the research object, as they are products of the processing industry but not agriculture. The main groups of agricultural products that may be sold to the final consumer in an unprocessed form include: vegetables, potatoes, fruit, berries, honey, fresh fish, eggs, fresh herbs, nuts. It is these product groups that we will focus on when developing a sales system that is adapted to the specifics of the product, the requirements of customers and the competitive environment. We will use hereinafter the term "biological products" to describe these types of products.

In this study biological agricultural products are understood as any agricultural products that meet the following basic criteria:

- environmentally friendly technologies are used in the production of these products;
- content of nitrates, radionuclides and other dangerous substances in these products is significantly less than the maximum permissible limit;
- after the products have been produced, they are not treated with substances intended to facilitate and increase the shelf life, which by their composition do not meet the environmental requirements and may impair the biological cleanliness of the products themselves.

A key point in forming an effective system of sales of biological agricultural products in Ukraine is the creation of a responsible link of intermediate trade between biological agricultural enterprises and ultimate customers. In the period of the formation of the domestic market of biological agricultural products, a national culture of production and consumption of such products, the functions of this mediation should be performed by specially established agencies. After all, the occurrence of at least a few facts of consumer fraud at the initial stage of market formation may negate all the efforts of the state, agricultural enterprises and other entities, and undermine confidence in the idea of creating such a market.

### **3.2. Assessment and analysis of the organization of sales of biological agricultural products in Ukraine**

The most promising option for organizing sales of biological agricultural products is considered to be the creation of a corporate structure incorporated in the form of a private joint-stock company (hereinafter referred to as the "Company"). The shareholders of this Company will be biological agricultural enterprises of the corresponding region. Being the co-founders of this Company, biological agricultural enterprises will be able to influence its activities.

The main objectives of this Company involved in sales are: purchase of biological agricultural products from manufacturers in a certain region; verification of purchased products for compliance with the quality requirements of state standards for this category of products; storage and pre-sale preparation of purchased products; sale of biological agricultural products through its own sales network and through the existing retail network of other entities under relevant agreements; marketing activities aimed at informing potential consumers of the benefits of biological products, expanding markets and sales volumes, etc.

To perform the above-mentioned functions, the Company should have the necessary technical support. The most expensive items of such support will be vehicles for delivery of products from agricultural producers, warehouses for storage and pre-sale preparation of products and laboratory equipment for checking the quality of agricultural products. The value of these assets will make up the lion's share of the Company's authorized capital.

Centers for purchasing biological agricultural products should be located in places that meet the following criteria:

- distance from agricultural enterprises that will deliver their products there should not exceed 50 km, since the products will be delivered to the pick-up center in small batches and a longer distance may significantly raise the cost of production;
- purchasing center should be relatively equidistant from the suppliers in order to create approximately the same conditions for the delivery of products for them;
- place of the center location should be provided with appropriate transport services, electricity, centralized water supply and sewerage system.

In most cases, the centers of administrative districts meet the above criteria in the conditions of Ukrainian reality. Therefore, it is proposed to place in them purchasing centers, which will operate as enterprises for the collection, storage and packaging of biological agricultural products. Each such purchasing center may be created as a branch of a joint-stock company (Table 3).

**Table 3:** Estimated cost of creation of a center for purchasing biological agricultural products (investment expenses)

Work type	Amount, US dollars
Rent of premises (office, laboratory, warehouses)	4,800
Purchase and installation of equipment	5,600
Recruitment and training of personnel	400
Certification works	1,600
Creation of a database of suppliers and potential customers	267
Total	12,667

The arrangement of a purchasing center requires costs (both fixed and variable) to be reimbursed from the received revenue. Fixed costs include the cost of creating (renting) premises, purchasing equipment, certifying the laboratory, recruiting staff, creating an information base for suppliers and network of customers, etc. Variable costs are expenses for staff salaries, taxes, maintenance of premises, storage and transportation of products from agricultural enterprises-producers and to consumers (Table 4).

**Table 4:** Structure of volumes of operating costs for ensuring the operation of a center for purchasing biological agricultural products for the year

Expenditure item	Amount, US dollars	Structure, %
Personnel salary	12,000	41.6
Payment for utilities	1,333	4.6
Motor vehicle rental	8,000	27.8
Purchase of packaging material	533	1.8

Rental of premises (office, laboratory, warehouses)	4,800	16.7
Depreciation of equipment	560	1.9
Personnel development	267	0.9
Certification works	400	1.4
Updating the database of suppliers and potential customers	133	0.5
Other expenses (reagents, communication services, etc.)	800	2.8
Total	28,826	100.0

When the volume of turnover increases, fixed costs per unit of production decrease. The dynamics of variable costs per unit of production corresponds to the decreasing returns law. But it also takes into account the personnel's accumulated experience, thus, for the sake of simplicity, let us assume that the volume of variable costs per unit of turnover will be constant.

The operation of each purchasing center should result in obtaining, at least, normal profit by its founders at the level of the bank's interest rate on long-term deposits. It is assumed that the purchasing center as an enterprise will be a VAT payer.

The delivery of products to the purchasing center may be carried out by transport of an agricultural enterprise or by transport of the Company. In the first case, the products delivered to the purchasing center are checked in the laboratory and transferred to the warehouse. Any delivered products that do not meet the required parameters are immediately returned to the supplier.

If a biological agricultural enterprise intends to deliver products on an ex works basis, it should send a relevant order to the purchasing center indicating the desired date of transportation and the expected quantity of each type of products. This system will enable the Company involved in sales to plan the optimum routes of transport on the basis of logistics. All purchased products will be subject to immediate verification in the laboratory of the purchasing center.

If products that do not meet the requirements of the standards are detected during the verification, information about this fact will be immediately reported to the manufacturer. Then the following actions may be carried out:

- 1) the agricultural enterprise takes the rejected products at its own expense;
- 2) products are accepted by the company as ordinary, not biological, at a reduced price. Each fact of delivery of low-quality products shall be recorded by the Company in a special register.

The purchasing center will be able to accept products not only from biological agricultural enterprises, but also from other producers, including from households. This opportunity will provide incentives for the gradual transition of all categories of agricultural producers in the region to the use of environmentally safe and resource-saving technologies. In addition, an increase in the volumes of manufacture of biological agricultural products will make them cheaper and more accessible to a greater number of consumers.

All accepted biological agricultural products should be sorted and stored at the purchasing center for no more than a certain period. Commodity batches should be formed from products of the same type and variety, accepted from different manufacturers, at the purchasing center. After their formation,

products will be collected by the Company's transport and delivered to the places of sale to the ultimate customer.

Biological agricultural products will be subject to mandatory packaging at the purchasing center. The most promising package is in the form of a thick paper bag. The advantages of such packaging may include: a) relative cheapness of the material and manufacturing process; b) such packaging is environmentally friendly, since it is easy to dispose of and does not harm the environment; c) products in such packaging do not lose their properties and will be properly transported; d) marking is easily applied to a paper package, and it is possible to apply it during the manufacturing of the package itself.

The marking of packaging of biological agricultural products should ensure easy recognition of such products and their isolation from other similar products, as well as provide sufficient information about the content and environmental safety of these products. The specified marking shall have the same manner of execution, made in the same color scheme, regardless of which region the products are delivered from. It is advisable to specify the standards for this type of products by the content of useful and harmful substances, as well as the actual content of these substances in a specific batch of goods, being sold, on the packaging.

In the formation of the market of biological agricultural products, it is the packaging in which such products will be delivered to the retail network that performs an information and awareness-raising function. Therefore, in addition to traditional data on the producer, the date of production, storage period, composition, etc., it should be given space to place information on what biological agricultural products mean, how their production technology differs from traditional ones, what advantage may be provided by the consumption of such products, etc.

The Company will enter into contracts or agreements for the supply of products with retail companies on its own behalf and in its own name. This will enable to centralize marketing functions, optimize product batches, and monitor the product sales process more effectively. At the same time, purchasing centers will actually serve as production sites, and will not be distracted by searching for sales markets, agreeing on contractual obligations, etc.

The Company's revenue forecast is based on the provisions of modern microeconomics and marketing. This forecast assumes that the buyers (consumers) of biological agricultural products will be representatives of the population of the region with income above the subsistence minimum, since such products today are more likely to be a luxury item, and only in future may become an article of daily necessity. The amount of expenditure on biological agricultural products per inhabitant in monetary units should be determined using the Tornqvist curves, which characterize the relationship between the amount of consumer income and the amount of expenditure on luxury items and goods of prime necessity.

For persons with per capita income at the subsistence level (approximately 85 US dollars per month or 1,020 US dollars per year), biological products are a luxury item, therefore, there is little demand for them. When income increases, the volume of demand should increase and the dynamics of costs for the purchase of this product will correspond to the parabola graph  $y = ax^2 + bx + c$  (Fig. 1).

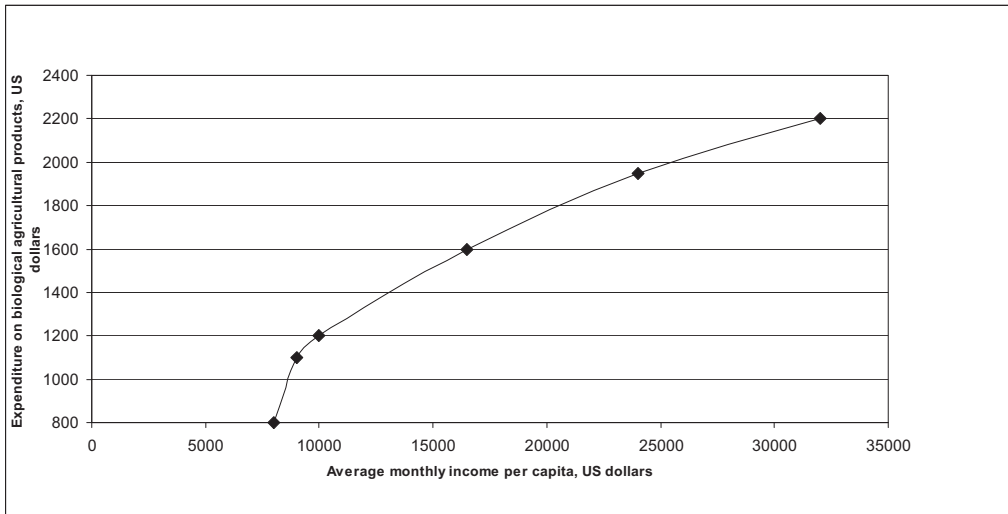
The empirical values of the parameters of the Tornqvist parabolic curve are defined as follows:

$$a = E_1 / (I_1 - SL)^2; \quad b = -2aSL; \quad c = aSL^2, \quad (7)$$

where  $SL$  – the subsistence level,

$I_1$  – the amount of income, at which biological agricultural products are transformed from a luxury item to an article of daily necessity,

$E_1$  – the amount of consumer spending on biological agricultural products corresponding to this income amount.



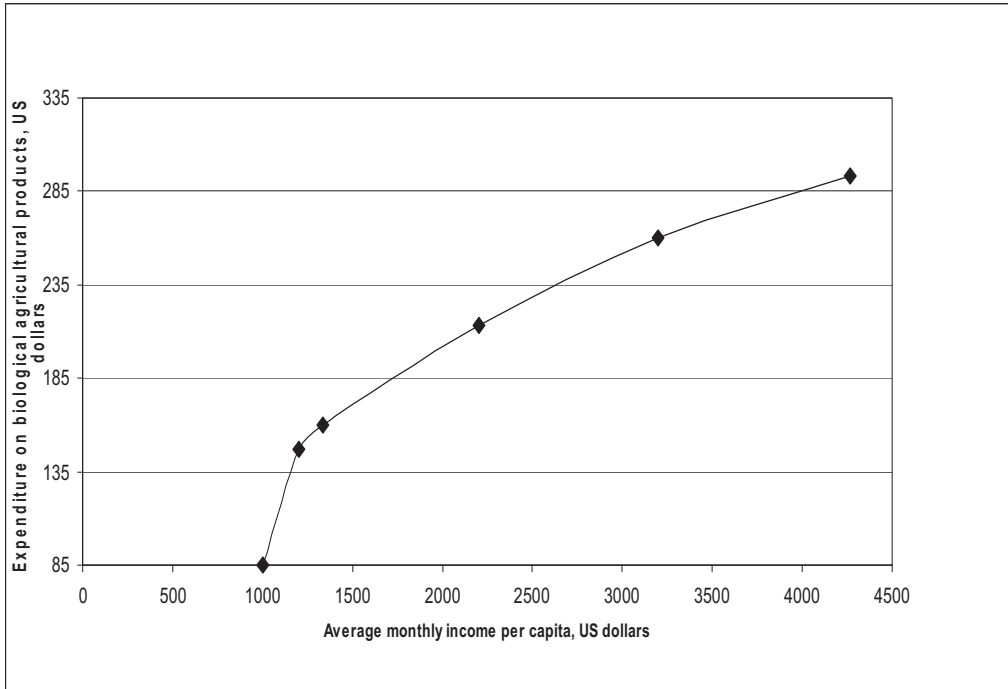
**Figure 1. Dependence of expenditure on biological agricultural products on consumer income (for consumers with income above the subsistence level)**

For consumers whose average monthly income is 10 times higher than the subsistence level, biological agricultural products become an article of daily necessity, and the nature of the expenditure curve changes accordingly (Fig. 2):

$$y = k\sqrt{(x - I_1)} + E_1 \quad (8)$$

The empirical value of  $k$  is determined based on the fact that the coefficient of elasticity of demand for articles of daily necessity based on income is less than one ( $E_R=0.5$ );  $k = 8.944272$ .

The obtained results show that the income of enterprises that will produce and sell biological products is directly dependent on the level of income of consumers.



**Figure 2. Dependence of expenditure on biological agricultural products on consumer income (for high-income category of consumers)**

In order to determine the feasibility of creating a purchasing center as a special intermediary structure in the system of sales of biological agricultural products, it is essential to compare the costs of its creation with the received income. The income of the purchasing center will be formed depending on the number and level of income of consumers of the final products. The annual turnover of the purchasing center *TR* is defined in Table 5.

**Table 5:** Example of determining the annual turnover of a purchasing center, US dollars

Indicators	Calculation	Amount, US dollars
Expenses for organization and operation	-	28827.00
Target net profit	$0.18 \times 28827.00$	5188.86
Profit before tax	$5188.86 / 0.75$	6918.48
Total value added	$28827.00 + 6918.48$	35745.48
Added value together with VAT	$35745.48 \times 1.2$	42894.58

Based on the fact that the readiness of consumers to buy biological agricultural products disappears if their cost is more than twice the cost of similar standard products, the annual turnover of the purchasing center should be at least 86 thousand US dollars.



**Table 6:** Determination of the critical number of customers of a purchasing center

Indicator	Average monthly income per capita, US dollars						
	120	187	267	1,067	2,133	3,200	4,267
Expenditure on biological agricultural products, US dollars/month	0.15	5.56	20.10	106.70	213.30	257.52	291.42
Expenditure on biological agricultural products, US dollars /year	1.80	66.72	241.20	1,284.00	2,559.60	23,176.5	3,137.04
Number of consumers whose expenses enable to consider the activity of the center appropriate, persons	347,758	9,660	2,429	67	34	28	25

The data in Table 6 show that about 350 thousand persons with the average income earned per person amounting to 120 US dollars per month (the population of the regional center) or about 10 thousand persons with the average income earned per person amounting to 187 US dollars per month or 67 people with the average income earned per person amounting to 1 thousand US dollars per month should live in the region, which provides biological agricultural products to the purchasing center.

The proposed measures may become the basis for the formation of a regional and national market for biological agricultural products. Having earned customer loyalty, manufacturers of such products will be able to increase production volumes and eventually compete with manufacturers of “normal” or standard products not only in quality, but also in price. In addition, the compliance of biological agricultural products not only with national but also international quality standards will enable to consider them as a promising export product.

#### 4. DISCUSSION AND CONCLUSION

The study has shown that part of the incentive mechanism is a set of criteria (indicators and their normative values) that enable to choose the mode of motivational management for a particular business entity. When planning production volumes, the number of resources used, the level of technology, emissions, etc., an economic entity that is an agricultural enterprise should predict the level of the government regulatory influence under the intensive, moderate or strategic mode of motivational management. In our opinion, when choosing the motivational management mode, it is important to take into account not only the immediate area of land plot owned or leased by an agricultural enterprise for agricultural production, but also an integral natural landscape complex, the state of which depends on the intensity of economic activity, as the territory of operation of an economic entity.

A constructive way to solve the problem of assessing the intensity of the environmental situation of the territory under the conditions of economic management is the step-by-step comparison of volumes of environmental substances used and the potential for restoring these substances by an agricultural ecosystem. The comparison of the nature intensity of production and environmental

technological capacity of the territory enables to set the level of the environmental situation tension and consequently, to determine the mode of motivational management.

The manufacture of agricultural products which are biological and safe for human life and health is a priority goal of applying measures of motivational management of the environmentally sound development of agricultural enterprises. The transfer of the global experience in arranging the sales of biological products to the national reality without its substantial adaptation will not give the expected results as Ukraine has no national standards for biological products, the market of biological products is at a nascent stage and existing laws of the country do not provide for such a significant punishment of entrepreneurs for fraudulent misleading consumers, so that it would stop them if there were a possibility of obtaining excess profits. These are systemic problems that should be addressed comprehensively.

A key point in forming an effective system of sales of biological agricultural products in Ukraine is the creation of a responsible link of intermediate trade between biological agricultural enterprises and ultimate customers. The most promising option for organizing sales of biological agricultural products is considered to be the creation of special sales structures incorporated in the form of a private joint-stock company. The shareholders of this Company will be biological agricultural enterprises of the corresponding region.

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