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ACCOUNTING AND ANALYTICAL ASSESSMENT OF THE
EFFECTIVENESS OF AGRICULTURAL ENVIRONMENTAL
MANAGEMENT

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Abstract

The article deals with the issues of sustainable development in the global economy and its components, which, since the late 80s of the 20th century, have been the main direction of management. Despite some successes, it is still not possible to solve most of the tasks facing society in this area. Suffice it to recall the sharp imbalance in the climate, the growing shortage of food, the increased depletion of natural resources, and other similar processes. In particular, if we consider the food component of sustainable development, then there is a contrary between the requirements for increasing the production of environmentally friendly products and the problems associated with food shortages in general, increasing the productivity of land resources and maintaining their level of fertility. Moreover, in these contraries, there are not only economic but also environmental, social, technological, and political aspects. This makes it intractable to optimize the combination of interests of various parties involved in agricultural production. As part of this optimization, it is necessary to search for and practically test the information components of sustainable development in relation to various fields of activity and sectors of management, which would not conflict with existing accounting institutions. The article presents the author's methods and approaches to determining the environmental and economic efficiency of agricultural nature management and the level of sustainable development, and considers the concept of using national accounts from the standpoint of accounting for the environmental component.

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1. Introduction

When considering the economic aspect of the rational use of natural resources, including land resources, in the agricultural sector within the framework of the requirements of sustainable development, it is necessary to understand whether agricultural enterprises can ensure the fulfillment of the above requirements without significant financial and economic support. The first experience of deploying a “green economy” in the countries of the European Economic Community (EEC) indicates substantial state support for these projects, although many of them are temporary (Eurostat, 2016). However, it remains unknown to what extent they can and will be continued in terms of permanence. In this context, it is highly expedient to present the problem through the prism of the totality of interests, limitations, and requirements of all participants in this process.

Despite the number of contradictions between the individual components of the economy of environmental management of the agro-industrial complex (AIC), one cannot speak of a contradiction between them. The exception is the discrepancy between the growing demand for food, even of low quality, from the side of a growing and, in some cases, starving world population and the desire of producers to maximize their income and minimize costs.

This minimization applies to all classical factors of production and financial activity, including, first of all, labor and material resources. Therefore, any attempts to supplement these costs in terms of greening, socialization, and others are considered unwanted, primarily because of their costly approach. The result of this approach is the absolute predominance in the world markets of commodity mass from China, India, Pakistan, and other countries. The European model focused on the principles of sustainable development, and the green economy is not very competitive. The widespread use, especially in European countries, of energy obtained from renewable production sources does not lead to cost reduction. From the classical market economy and the laws of competition point of view, this path is controversial and unpromising (Janssen, 2015). However, it is difficult to imagine the incompetence of the European and North American financial and economic systems. This means that other tools for obtaining competitive advantages based on sustainable development principles will be used. These tools involve the active use of the capabilities of the state. One example here is the introduction of a hydrocarbon tax when crossing the borders of countries for several types of raw materials (including Russian gas) and material resources. The introduction of these customs duties will lead to an increase in billions of dollars in losses for a large group of suppliers from China, Russia, and other countries, replenish the budget of the European Economic Community, and the actual rejection of the principles of the World Trade Organization (WTO).

In other words, the transition to the principles of sustainable development and an inclusive economy implies extensive use of non-price instruments in economic activity with the most active participation of the state. This gives rise to a contradiction with the current neoclassical economic laws and categories. At the same time, it is impossible to provide an unequivocal affirmative answer to the question of the possibility of a full-scale replacement of the traditional mass of goods of material resources and energy.

However, general economic and political changes have been outlined here, associated with attempts to transition to the so-called inclusive economy, the key objectives of which are declared to be

growing stability and equitable distribution of wealth. For the agricultural sector, this means the impossibility of completely replacing traditional agricultural products with environmentally friendly ones, since alternatively there will be a total food shortage with all the ensuing political and economic shocks. Maintaining even the current food balance leads, and in some cases has already led to a catastrophic deterioration in the balance of land productivity. Based on this threat, the United Nations (UN) adopted a program to restore and preserve land fertility in accordance with the concept of a neutral balance (United Nations, 2011). In practice, this approach assumes observance of at least an approximate equality between the removal of nutrients and their recovery in different options. At present, the consumption of natural resources is approximately 30 % greater than the possibilities for their restoration. The further preservation of this situation in two or three decades can lead to catastrophic consequences, although it is difficult to expect a sharp decrease in the anthropogenic impact on nature. In this case, society and its productive forces found themselves in the position of an “environmental stalemate”.

Another essential point contributing to the transition to a “Green Economy” and the requirements of sustainable development is the gradual reorientation of stock markets to a system of indicators that reflect this development direction. The latter implies a shift in emphasis from the category of profit to the capital category. The total (integrated) capital is capable of reflecting the social, environmental, financial, and production aspects of the activities of business entities (Tkach, 2019). In information and practical terms, this means the widespread use of integrated systems and not just financial and management accounting. From this point of view, a distinction should be made between the term non-financial reporting and integrated reporting. The first focuses on a disaggregated system of indicators, while the second tends to aggregation.

2. Problem Statement

The use of principles of sustainable development in modern financial and economic realities objectively requires the search for transformational approaches focused on the integration of environmental, social, and self-economic aspects of social development (Bobylyev et al., 2019). In this regard, it is necessary to significantly reduce the restrictive beginnings regarding the greening of the economy at the micro-, meso-, and macroeconomic levels, in particular, the problems of microeconomic complications. They are related to the difficulties of the transition from the priority of increasing profits and added value to the priority of increasing total capital, including natural capital. In addition, the meso- and macroeconomic level involves the intensification of the use of the tools of the systems of national accounts. Such activation necessitates the structuring and clarification of individual components of the national accounts, as well as their simultaneous orientation to reflect not only the economic processes themselves but also the processes of nature management, understood both in terms of reproduction and environmental protection. The latter circumstance involves solving a range of issues by aggregating private indicators and indicators of sustainable development into the category of total capital.

3. Research Questions

The subjects of the article are:

- i. Features of the reproduction cycle focused on finding and solving the problems of agrarian nature management in relation to agricultural land.
- ii. Transformation of methodological tools for assessing the environmental and economic efficiency of the functioning of economic entities at the micro- and meso-economic levels focused on an expanded understanding of the category of capital and systemic components of national accounts.

4. Purpose of the Study

The paper aims to study contemporary features related to the principles of sustainable development to the functioning of the modern neoclassical economic model. It is fundamental to reveal the potential and real possibilities of methodological tools of an aggregated and disaggregated nature, the forms of their manifestation in various systems of nature management, and evaluation of the effectiveness of the latter at the micro- and meso-economic levels.

5. Research Methods

The following approaches and methods were used in the article:

- i. theoretical methods in terms of studying the views of various authors on the range of problems under study, analyzing existing sources of information in the field of accounting, and analytical issues of assessing the environmental and economic efficiency of nature management;
- ii. an integration approach that allows using elements of existing methods of environmental and economic assessment of the effectiveness of nature management in conjunction with the international concept of a neutral balance (United Nations, 2016);
- iii. a set of methods for subjective and objective assessment of the level and effectiveness and rationalization of the use of natural potential;
- iv. an ecosystem approach that allows assessing the factors of ecological, economic, climatic, and natural character that affect the ecological and economic efficiency of agricultural nature management.

6. Findings

Economic and financial constraints are considered in the study for ecological and economic optimization of agricultural production. It is necessary to focus primarily on the micro-level since the specific use of natural resources is carried out by economic entities. They affect land resources with varying degrees of intensity, and the level of the greening of production depends on their skills, capabilities, and desires. In the conditions of the neoclassical economic system, the purpose of the functioning of economic operators is to increase profits, even though the essential criterion of efficiency has begun to shift towards capital growth. From these positions, one of the main points of the aggregated

ecological and economic model for optimizing agricultural production should be considered the level of break-even functioning of economic entities. For these purposes, the well-known formula is usually used:

$$R_{kp} = \frac{Z_{const}}{P - Z_{varunit/unit}} \quad (1),$$

where R is the breakeven point,

Z_{const} is the constant value of fixed costs;

P is the price per unit of the n-th type of product;

$Z_{varunit/unit}$ is the variable costs per unit of output.

The amount of fixed and variable costs are subjective, but they are the real benchmark. Transformations of formula (1) make it possible to reach the minimum allowable price level. The comparison with the last conjuncture of real prices makes it possible to determine the margin of financial stability of the economy.

Of great importance is the fact that the minimum allowable volume of production is determined in output measures. As is known, the production of agricultural products consumes a certain amount of nutrients and elements, primarily NPK (nitrogen, phosphorus, potassium), as well as a large group of microelements. Consequently, any reproduction cycle leads to a change in the level of soil productivity for a group of nutrients in terms of their reduction and depletion. The restoration of this reserve requires the use of measures for their artificial replacement, primarily in the form of an appropriate list of mineral fertilizers and other substances. The minimum value of the volume of production allows determining the size of the equality between the production and the volume of use of artificial means of stimulating productivity within each economy. Any increase in output volumes requires a corresponding increase in land productivity.

At the same time, increments cannot be carried out for a long time, since both the actual production-technological and ecological limits come. It is impossible to obtain, for example, from one hectare a full-grain yield of 300-400 centners, and milk yield from one cow, shearing wool from a sheep is above certain limits. Moreover, high productivity in the agro-industrial complex is fraught with the grave environmental and health consequences that lead to the deployment of the “green revolution” (Ministry of Agriculture, 2018). In an aggregated form, the removal of nutrients and substances is determined as the sum of the product of the volume of production of the 1st type of product by the amount of consumption of different types of nutrients.

$$\sum \Pi_{n.B} = \sum Y_{a,b,c...n} \times \sum X_{a,b,c...n} \quad (2)$$

Expanded formula:

$$\sum \Pi_{n.B} = Y_a \times X_{1,2,3...n} + Y_b \times X_{1,2,3...n} + Y_c \times X_{1,2,3...n} + Y_n \times X_{1,2,3...n} \quad (3)$$

where $\sum \Pi_{n.B}$ is the volume of consumption of nutrients in output measures;

Y is the productivity (volume of obtaining the n-th type of agricultural products);

1,2,3..n is the removal of specific types of nutrients and elements.

To obtain reliable and objective information, digital platforms play a significant role, showing the political ties of agricultural enterprises with suppliers of mineral and organic fertilizers. Voluntary provision of this kind of information by business entities in the current conditions is practically impossible, including due to trade secrets. The creation of distributed ledgers as part of the digitalization of accounting and economic processes allows interested users, represented by regional statistical bodies

and governing territorial structures of the agro-industrial complex, committees for environmental protection, and nature management, to receive the initial data collection. On its basis, it is possible to monitor current processes that reflect the level of depletion of land resources. However, to produce the final result, it is necessary to build on a defined initial state of these land resources (Belousov & Zakalyukina, 2020).

In this regard, most researchers are analyzing specific forms of environmental damage, although there are various uncertainties. The information related to the determination of damage is oriented on the state of human health, which is also typical for experimental work. In some cases, causing damage seems to be a complex methodological task, although, in terms of anthropogenic and natural assets, the damage functions are less demanding, and more dependent on the specificity of place and time. The damage assessment degree, based on the principles and methods of assumption and inaccurate data, can significantly distort the utility function, which is the main category in neoclassical economic theory. The use of subjective assessment methods is characterized by high current levels of uncertainty and even greater inaccuracy since it focuses on the behavior of real or hypothetical risks. In this case, one has to choose between environmentally unfavorable consequences, the transition from one type of production, goods, and services to others. The magnitude of the difference between environmentally friendly and non-environmental goods, works, and services, as well as between inputs, are considered more or less accurate criteria for environmental management assessments. Linking raw materials and resources with the ultimate environmental friendliness of finished products and services is beyond doubt. Neutralization of the parameters of the initial contamination of resources with subsequent stages of product processing is theoretically possible, but in practice, its implementation faces various difficulties.

When using the subjective assessment methods of negative environmental consequences, it must be borne in mind that they are focused on the depth of knowledge and the amount of information in terms of actual damage from various types of activities. At the same time, objective assessment methods are based on the study of the causal relationships between the magnitude of the negative impact and the magnitude of the expected damage.

And in this regard, the use of national accounts is very productive. Using the proportional method of accounting for national income will keep track of general economic conditions. Unlike other competitive methods, here it becomes possible to evaluate the stocks of economic benefits, and the extent of their use, including in time. Among the shortcomings here is the focus on the gross domestic product, which does not fully show the well-being of people and does not measure sustainability in its broadest sense, in accordance with the UN recommendations. At the microeconomic level, it is advisable to use elements of a static accounting concept adapted to the current methodology for determining the financial result and integrated reporting and based on the concepts of private and total capital, their increment, and the possibility of further transformation in relation to the requirements of national accounting. The interpretation of the second version of the International Financial Reporting Standard concerning the understanding of the category of capital is developing in the same direction. If to adapt this mixed approach to assessing the environmental, economic, and financial efficiency of agricultural enterprises, then in a formalized form it can be represented as:

$$\text{Profit} = \text{Income} - \text{Expenses} \pm \text{Capital}_{\text{at the end of the period}} - \text{Capital}_{\text{at the beginning of the period}} \quad (4)$$

Both disaggregated and aggregated version of the environmental and economic efficiency assessment is possible at the micro-level. The disaggregated version can only refer to the ecological components of the reproduction process, relating to income and expenses in the framework of environmental activities, reflected in the environmental accounting, as well as the increment of natural capital (assets) in the framework of the use of structured synthetic accounts. Therefore, it is interesting to consider such a concept as the depreciation of natural assets. That is the repair of these assets, the negation of their "mort". "Mort" in Latin-oriented linguistic perception means death, murder, "a" is a pretext for its denial. However, it is impossible to use depreciation for natural resources without their classification detailing. If in relation to renewable natural resources (assets), this category is suitable, then for non-renewable resources it is not. In the latter case, such a tool as additional payments for the depletion of subsoil and the consumption of natural resources has been used. At the same time, if the volume of production (consumption) of these resources is less than their renewable growth, then natural capital is considered untouched. The aggregated approach assumes a general assessment of financial and economic performance, including the environmental component, but without its detailing.

7. Conclusion

This paper has clearly shown that considering the issues of depletion and degradation of natural resources associated with environmental pollution, it is necessary to focus on the category of natural capital and the natural assets category closely related to it. At the same time, along with changes in the stocks and flows of natural resources, it is beneficial to take advantage of the possibilities of the current system of national accounts, where, however, various adjustments are necessary. Two versions of system accounts are most commonly used: resource and environmental accounts, as well as integrated accounts. A distinctive feature of the first version of system accounts of a resource nature is the complementary nature, which determines their compromise nature. In addition, resource and environmental accounts make it possible to assess the reserves and movement of certain natural resources, both extracted and discovered, as well as their exploitation, assessment of specific types of pollution, environmental protection costs, including in a disaggregated form. The classical system of national accounts should have integrated accounts, where the depletion of natural resources and polluting impacts on the environment, can be measured more accurately and objectively. As a result, it becomes possible to form alternative tools for assessing the effectiveness of nature management and the level of sustainable development. It is possible to calculate net domestic product, where environmental factors are present, using integrated accounts. In addition, it becomes possible to transform the elements of environmental accounting into the creation of single information and analytical vertical linking micro- and meso-economic levels into a holistic perception.

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