NORMATIVE MONETARY EVALUATION OF AGRICULTURAL PROJECTS TOWARDS SUSTAINABLE LAND AND SOIL MANAGEMENT

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\textbf{Purpose.} The purpose of the paper is to describe and reveal the issue of the efficiency of agricultural projects regarding the sustainable management of land (soil) resources based on improvement of project management with the necessary elements of normative monetary evaluation (NME).

\textbf{Results.} The paper deals with agricultural projects and the mechanism for the formation of economic evaluation. The problem of sustainable land and soil management (SL&SM) is quite acute in the world, but it is decisive for Ukraine. In the conditions of low interest of agrarian business in issues of sustainable reproduction of land potential and greening of production, the need for accuracy of evaluations when creating projects is becoming increasingly important. Since July 2021, the market for agricultural land has been opened in the country, which only increases the need to use effective tools that take into account the consequences of changes in the capitalization of land (soil) resources as a reason for creating projects. The need to take into account in land use not only economic results, but also ecological, technological and other types of effects is revealed. A lot of scientific and practical papers are presented taking into account these types of effects in the direction of reproduction of soil fertility and their protection. These research and developments cover the issues of agricultural reclamation of solonetzic soils (salinity), processing of poultry manure into high-quality composts with ameliorative action, contamination of the earth (soil) with heavy metals, optimal choice of agricultural technologies and machine-tractor units, etc. In general, the success of agrarian business is closely related to activity in the project development and innovation. Innovativeness and accuracy in the calculation of effects are fundamental to sustainable land and soil management (SL&SM). For this aim, the pivotal scheme of the flow process for ensuring sustainable land and soil management (SL&SM) has been developed, where the influence of agricultural projects on them is linked using numerical approaches. At the same time, in order to develop an agricultural project with high implementation efficiency, an addition to the previous scheme was proposed, which combines a comprehensive assessment (CA) with the adjustment of sustainable development goals, namely setting the aim and goals (SAGs). Due to formalization of the decision-making algorithm for project management, a block (element) of economic assessment of object changes (EAOC) related to land (soil) was determined based on the method of normative monetary evaluation (NME). Some of the methods for calculating the NME have shown which them have advantages and are more accurate.

\textbf{Scientific novelty.} For the first time, this study presents and discusses a pivotal scheme for ensuring sustainable land and soil management that highlights the impact of agricultural projects and the importance of monetary evaluation for their effectiveness. The relationship between the
comprehensive assessment (CA) of agricultural projects and the formation of sustainable land and soil management (SL&SM) is clearly shown. It is compiled according to the rules of the algorithm and indicates the sequence of actions to develop a managerial decision on the problem.

**Practical value.** It has been determined that the basis of changes in the economic assessment of lands and soils can be their normative monetary evaluation (NME). Therefore, agricultural projects with the usual approach to the economic assessment of the effects must also take into account the indirect action on the object of influence – land (soil). The offered scheme for evaluating agricultural projects makes it possible to make timely adjustments to the goals (SAGs) set and to fully implement them in the direction of sustainable land and soil management (SL&SM).

**Key words:** agricultural project, effect, greening of production, innovation, market turnover of lands, normative monetary evaluation, project management, rent, sustainable land and soil management.

**Introduction.** In recent decades, regardless of certain positive dynamics at development by agricultural production in Ukraine, it should be noted that the management of land (soil) resources remains a weak place. The lands as the main resource agricultural branch need more attention to themselves in view of its preservation of production potential, natural fertility, quality and protection from degradation. The outlined issues can not be resolved without the involvement of organizational, staff, scientific, innovation and investment, financial and other types to support by agrarian sector of the economy.

The management of land (soil) resources is a complex process that includes many aspects. One of these is the value assessment of relevant changes in land (soil) resources. These changes are caused by the impact of certain measures in the land (soil) resources management system. However, the complexity of the issue arises due to the need to measure certain achievements in the direction of sustainable management of agricultural lands. Therefore, primary economic changes should be made through the monetary valuation of land as an object to which improving factors are directed. The latter are the result of the implementation of modern project solutions in the agricultural sector.

In addition, sustainable land management projects contain not only economic effects, but also many others, including environmental ones. It is an inseparable part of the formation of sustainable land use as a whole. And without a comprehensive monetary assessment of these projects, it is impossible to note the accuracy and profitability of projects in agriculture in general and, in particular, in land use. The proper methodical approach to the normative monetary evaluation of land is the is a decisive moment for determining better solutions in the selection of promising agricultural projects related to land use and restoration of soil fertility. Therefore, sustainable management of land (soil) resources is based not only on rational land use projects, but also takes into account the dynamics of changes in the monetary value of land capital in agricultural production.

The traditional methodological approach to the evaluation of projects in the agricultural sector does not take into account the value of land or the impact of these projects on the qualitative change of land resources, and therefore their value [1]. The
project management in agricultural sector mainly concentrates its attention on project itself, and not on the consequences of the influence on the main resource – the land. Hence, it is difficult to talk about the sufficiency of efforts aimed at the observance of sustainable land development as a challenge of the present and the target areas defined within the framework of the UN.

**Review of literature.** The issues of use and improvement of normative monetary evaluation (NME) of agricultural lands were studied in the works by O. Buhalo [2], O. Chumachenko [3], Yu. Kirichek [4], A. Martyn [5], V. Mesel-Veseliak [6], A. Tretiak [7], O. Ulyanchenko [8] and others. The problems of economic evaluation and improvement the mechanism of management projects at agricultural sector are considered in many scientific works, including L. Kucher et al. [9].

V. Ya. Mesel-Veseliak & M. M. Fedorov note the need to determine the indicators for normative monetary evaluation according to the normative values will allow to objectively evaluate the land plots of various business entities in the agrarian sector, to carry out a fair redistribution of land rent in favor of agriculture through the introduction of land tax and rent for land, depending on its normative monetary evaluation [6, p. 21].

A. Tretiak, V. Tretiak, O. Kovalyshyn & N. Kryshenyk have revealed that new methods for proving the objectivity of the results requires grounding of information regarding the determination of the boundaries of natural-agricultural regions and objectivity of differentiation of indicators of capitalized rental income from the general (in Ukraine) to partial one (the land plot) [7, p. 40].

Thus, according to scientists by L. Kucher, M. Heldak & L. Orochovska, in the agricultural sector and in animal husbandry, in particular, large enterprises had a higher integral indicator of readiness for the implementation of innovative projects than medium and small enterprises, and medium enterprises are characterized by relatively lower readiness. In crop production, small enterprises were distinguished by a relatively higher level of readiness, the second position was occupied by large ones, but the differences between them were not as significant as in livestock production. A very low and low level of readiness for the implementation of innovative projects and their management is inherent in the vast majority of the studied agrarian enterprises of the Kharkiv region, and therefore needs to be improved [9, p. 225–226].

However, despite the significant contribution of scientists to this issue, the place and role of land evaluation in projects aimed at sustainable land management (SLM) remains not completely clear. Therefore, the relevance of this scientific aim is more than obvious.

**Materials and methods.** The purpose of the paper towards efforts to describe and reveal the issue of the efficiency of agricultural projects regarding the sustainable management of land (soil) resources based on improvement of project management with the necessary elements of normative monetary evaluation (NME).
The methodological basis of the research was general scientific methods and a dialectical understanding of the processes associated with obtaining theoretical and practical generalizations on the sustainable management of lands and soils based on the functioning (development and implementation) of agricultural projects. Weaknesses of the existing mechanisms for evaluating the effects obtained during design were considered by analytical tools, and the use of an abstract-logical approach made it possible to offer specific solutions based on the algorithmization of the evaluation of agricultural projects and the correction of their primary goals.

Analysis and synthesis is an important method in the knowledge and formulation of results in project management, the development of measures for the operating system is completely related to specific blocks (elements) of the formation a single project process in a business environment towards sustainable land use. The settlement-constructive method makes it possible to determine the normative monetary evaluation of land (soils), and the comparative one – to choose the most appropriate variety.

Also, despite the theoretical focus of the study, special methods have been widely used, namely observation – when collecting useful information on a significant number of design developments in agriculture sector, especially those containing an innovative type; the indicated proposals to create a concept (algorithm) for ensuring sustainable land and soil management are based on the numerical approaches of existing developments and/or innovations; processing information from index, normative and classification tools to schematize the improvement of the control process and the efficiency of agricultural projects. A graphical method for constructing schematic diagrams and displaying relationships in a system for ensuring sustainable land and soil management in a project-based approach.

All the above methods serve as a theoretical and practical basis for the formation of a hypothesis and proposals for increasing the efficiency of agricultural projects and achieving sustainable development within innovative type of agribusiness. The proposed division of agricultural projects on the object of influence determines the direct and indirect actions, rising their practical ability.

**Results and discussion.** Sustainable land management (SLM) includes measures and practices adapted to biophysical and socio-economic conditions aimed at the protection, conservation and sustainable use of resources (soil, water and biodiversity) and the restoration of degraded natural resources and their ecosystem functions. SLM is based on four principles [10]:

i) targeted policy and institutional support, including the development of incentive mechanisms for SLM adoption and income generation at the local level;

ii) land-user-driven and participatory approaches;

iii) the integrated use of natural resources on farms and at the ecosystem scale;

iv) and multilevel, multistakeholder involvement and partnerships at all levels – land users, technical experts and policy-makers.

The sustainable management of land (soil) resources is based on crucial
parameters. However it requires an improving system of indicators, including the use of cost (monetary) evaluation [11]. We have the normative monetary evaluation of agricultural land, which is used in real economics activity. It is closely related to methodology of rental income [12]. Also, it has a lot of weaknesses [11; 12]. In addition, our previously results of the research indicate that there is a sufficient number of deficiencies [12].

The methodological principles of ecological research of their consequences based on the use of various assessment tools and modeling of such estimated values, and are not less important in management than the use directly normative values during planning economic use and reproduction of resources of agricultural producers. This case is especially acute in the management of land resources, and primarily, this is related to characteristic of the data resources and its role as the main asset of production, which does not have a full-fledged category of embodiment (by classical political economy), instead it has fertility (by soil science).

Sustainable land management (SLM) with determining the economic effect also includes an ecological evaluation. We should have a clear understanding of these components, and correctly measure economic and ecological effects. The latter is an part of formation of sustainable land use, and therefore must be evaluated for changes in the value of land assets as a result of the use of projects that will directly or indirectly affect the asset itself. It is clear, that those agricultural projects, in which the object is the lands, themselves have a direct action, that is, investments in land projects (land management) to increase ecological stability, in particular, combating soil degradation.

Hence, the indirect affect includes those moments in which efforts are not directed at the land resources themselves, but changes in the quality of land, yield, price, etc. occur from the creation of agricultural projects. This should be considered as a generalized division of agricultural projects by the object of influence. According to this approach into division of agricultural projects, two of their varieties are considered in the article, but due to the multivariate nature, mainly agricultural projects are distinguished.

The agricultural projects should provide for a separate assessment of the possibility of ensuring sustainable land and soil management. This task is not simple, as it takes into account the multidirectionality of processes and does not often cover the synergy of such solutions. Sometimes there are not considered at all, although it has a place in the design results [13; 14]. As the authors note, the adverse combination of reducing capacities and increasing demands requires rapid transition towards sustainable soil and land management that mitigates trade-offs and creates synergies. Likewise, a transformation of soil and land research is required to scientifically support the sustainable transformation [15]. If necessary, this component should be taken into account both when formulating the goals of the project, especially if it is a multitasking type, and in the general evaluation of the obtained effect(s).
Sustainable land (soil) management (SL&SM) requires the comprehensive assessment (CA) as shown in Figure 1.

Figure 1. The pivotal scheme to ensure compliance with agricultural project assessment to achieve sustainable land and soil management

*Note. CA – comprehensive assessment; AAIsSD – assessment of the achievement according to indicators of sustainable development; SEC – scientific and expert conclusion; APPs & SOVs – adjustment of project parameters and search for optimal values; RI – refusal (rejection) from implementation; QQIs – quantitative and qualitative indicators; SL&SM – sustainable land and soil management.

*Source: developed by author.*

Sustainable land and soil management requires the development and implementation of agricultural projects aimed at ecological production, organic carbon sequestration and/or reducing the anthropogenic load on agroecosystems [16]. This problem is especially aggravated in conditions of global climate change. In appointment, this refers to formation of a management system based on the principles of eco-safety in Ukraine.

The problem of the economic effect is no less important than the ecological effect, etc. At the same time, the comprehensive assessment (CA) of the agricultural project becomes crucial, since the economic effect may have a smaller value than other effects, and traditionally, it is easier to include the economic feasibility in the calculation, expressing it through the commercial ability to implement the project.

When determining the feasibility of implementing an agricultural project, the obtained components should be compared as a comprehensive assessment (CA) with indicators of sustainable development (AAIsSD) that were taken during design and meet international requirements, including those outlined as the UN Sustainable Development Goals (SDGs). The main criterion in achieving the set goals and according to which the final decision is made should be the scientific and expert conclusion (SEC), which will be based on the indicators (QQIs) of the agricultural
project (see Figure 1).

However, if it is not possible to achieve the specified parameters of the agricultural project, then the general design is adjusted by entering a set of refined and/or optimal values, and if this stage is not fulfilled, then it is rejected as undesirable for use. That is, a repeated cycle of calculations is possible in the case of a set of parameters and a search for a better decision. In this case, the setting of the parameters should be professional, and the implementation should be carried out by a highly qualified employee from the design work group. The data itself must meet the general requirements for accuracy, reliability and verification of expected results.

The initial data of the project (QQIs), which have passed all stages of assessment, in this case most meet the requirements for sustainable land and soil management (SL&SM) and acquire the greatest practical value. In the process of searching for the best project parameters, a multitasking implementation of various options and modeling of probable cases or scenarios of the development of events is performed, and redundant projects are rejected as those that do not meet the chosen goals.

Consideration of issues related to the implementation of the set design goals is a separate scientific problem, and in multitasking projects, in particular those related to the simultaneous impact on several researched objects, becomes a significant technical task. The priority of criteria in project selection also has a significant, and often decisive, value for one of them. For example, an investment project of land use will prevail in terms of economic evaluation than others, since domestic experience proves that a private investor will willingly invest in those projects that will allow it to increase profits.

This problem (issue of priority) is widespread in Ukraine’s agribusiness, without exception in both crop and livestock branches. On the contrary, it will be treated with great skepticism if the agricultural project is aimed at exclusively ecological norms and standards, preserving land (soil) resources from intensive use [17; 18]. Therefore, the balance of interests between all project participants is not excluded, and the goal shifts to the institutionalization of land relations.

The projects relate to fertility and sustainable land and soil management are among the priorities in determining the cost changes on the object of influence and the overall effectiveness of the selected measures. Whether or not to evaluate such projects does not seem questionable, but the objectification of the obtained evaluations depends on perfection of the methodology of economic evaluation of such an object.

This applies to both conventional projects aimed at the economic effectiveness of the object, as well as its ecological or other effect. The amount of rental income for land plays an important role in monitoring changes in the main capital of agricultural production – land. In this case, any expected changes should be noted, especially those that can lead to deterioration of its quality, which is an undesirable case.

Within the project design, a single process should be followed from defining
aim and goals (SAGs), planning and budgeting (P&B), obtaining the expected results (ORS) to conducting reverse control (RC) over defined goals. So, reverse control (RC), which plays a special role in the ability to fulfill the goals, should be based on a complete analysis of the data as much as possible, namely by applying a comprehensive assessment (CA). At the same time, there is a combination of both direct and indirect actions (DA & IA) on the project assessment (see Figure 2). That is, it provides a more accurate definition of the achievement of the project’s goals and the possibilities of their adjustment (SAGs).

**Figure 2. The pivotal scheme of comprehensive assessment (CA) of an agricultural project by direct and indirect action on the object of valuation**

_Note._ SAGs – setting the aim and goals; PRs & Ps – providing the resources and participants; RRs & EBs – restriction of the resources and existing barriers; ER(s) – expected result(s); OI – object of influence; EAOC – economic assessment of object changes; P&DME – present and discounted monetary estimate; CA – comprehensive assessment; DA – direct action; IA – indirect action; P&B – planning and budgeting (design of project); ORs – obtaining the results; RC – reverse control.

_Source:_ developed by author.

A project with an indirect action (IA) is sufficiently complex and multitasking, requiring additional approaches to its assessment. In this case, the agricultural project involves the assessment of land (soil) resources due to the indirect action (IA) on this object (Figure 2). Otherwise, the assessment is carried out only on the basis of one or more effects on land (soil) resources. In any case, these projects increase the ability to provide ecosystem services and cost of land (soil) respectively.

The comprehensive assessment (CA) of an agricultural project with direct and indirect impact on the object of land (soil) evaluation includes the traditional approach to determining the effectiveness of the project based on current and discounted monetary estimate (P&DME) and is separately supplemented with a new
block of data for economic assessment of object changes (EAOC), which is an agricultural land. At the same time, various effects also acquire a monetary estimate. The normative monetary evaluation (NME) of land (soil) acts as a certain measure of market changes as a result from implementation of an agricultural project, and in general, it is included in the common block of economic evaluation, because it corresponds to the general purpose.

However, there are a number of questions regarding the correctness and/or accuracy of the calculation of the normative monetary evaluation (NME) of agricultural land, since it is calculated on the basis of differentiated income by grain crops and should take into account the quality of land (soil) more fully. The existing methodological approach, namely by grain crops, indicates a significant discrepancy in the distribution of the amount of NME by soil quality.

This indicates the imperfection of the NME methodology, which, despite all the updates, did not get rid of the main problems. Therefore, the clarification of rent crops (by introducing additional agricultural crops) improves the situation in terms of a more guaranteed assessment of land (soil).

In study [12], the NME of arable land for five crops differs significantly from the method of calculation only for cereals, while the amount of NME of arable land for the latter in terms of absolute and relative comparison is significantly inferior. It has been established that as a result of the calculation of the NME of arable land for five crops (variant II), there is a positive change in this indicator, particularly in the Chutovsky district, for which the relative increase is 182.7% compared to variant I and 88.4% according to the third (variant III, namely for adjusting the second option). However, the existing changes in the values between the II and III variants show the presence of significant differences due to the frequent discrepancy between the distribution of rental income among administrative districts based on soil quality and the grain correction factor.

In this case, the quality becomes more noticeable when evaluating land (soils), and econometric modeling based on stochastic harmonic models (SHM) indicates a high increase in the significance of the quality and reliability of the correlation relationship. Thus, according to the methodology for cereals, the correlation coefficient in the regression (model) between the content of humus in the soil and NME was 0.385, and for 5 agricultural crops (including cereals), the coefficient increased to 0.775. In turn, the adequacy of the model increased according to the F-distribution (Fisher–Snedecor distribution), respectively, from 3.65 (tabular or critical value – 3.44) to 31.58 (tabular or critical value – 3.04). At the same time, the model with five agricultural crops is characterized by a smaller error of approximation – 5.1%, and than for grain crops – 8.4% [19]. That is, only a change in the methods for calculating the NME of arable land began to reveal a connection with such an important indicator as the content of humus in the soil, which is one of the important factors in assessing the quality of lands (soils) [20; 21].

Choosing the best NME approach allows us to get more adequate values in the
assessment of land (soils), which affects the choice of the most effective agricultural project [22–24]. We also note that this concept is important not only for project management, but plays an essential role for the economy of Ukraine as a whole and the agricultural land market. The influence of the method is obvious on the formation of rent for land, deductions in the form of taxes, for the protection of land (soil) from degradation [11].

In agricultural projects, it is difficult to make a correct and accurate assessment. This is due to the fact that more than one effect is obtained, for example economical, and often there is a need to include various effects and/or additional ones. Meanwhile, the reason for this may be the innovative component of the projects, which increases the variety of such effects. In this case, the impact on the object becomes quite important, and on this basis it is necessary to determine its market changes.

The multivariate evaluation of projects on the use of ameliorant by ecological impact (effects) made it possible to more accurately determine the innovativeness agro-ameliorative measures in the conditions Northern Steppe of Ukraine [25]. The processing of poultry manure into high-quality composts is also based on a comprehensive assessment, and not exclusively on sales prices (on the market), which in this case is quite practical and at the same time innovative [26]. At the same time, the selection of optimal combinations of machine-tractor units on the basis of monetary assessment, including the provision their extended reproduction, also turned out to be quite an effective way.

In any case, the need to use modernized methods taking into account changes to objects of influence, and in agricultural projects – land (soils), is a rather breakthrough tool. Therefore, the NME of land (soil) is a key factor in the formation of sustainable management of land and soil resources.

**Conclusions.** Agricultural projects are an important element of the functioning and development of the agricultural sector. Ukrainian realities prove that projects are often not properly evaluated. Therefore, the traditional or partial approach followed by executors (developers) in determining the results of implementations often leads to errors in management decisions. Timely identification of errors and correct assessment of effects are the key to the success of agrarian business and design companies. Everyone participant of project must do as a single mechanism for achieving the set goals.

In this study, for the first time, a pivotal scheme for ensuring sustainable land and soil management is given and considered, which highlights the impact of agricultural projects, as well as the importance of monetary evaluation of their effectiveness. It is shown that the comprehensive assessment (CA) of agricultural projects combines at least two blocks of assessments. The first block includes traditional indicators that characterize the expected result that designers hope for, and are a consequence of the direct action (DA) of project implementation. Instead the second block (setting) is characterized by an economical assessment of changes in the
The value of the object itself (land and/or soil), which may be to cause by indirect action (IA) from its implementation. In this case, the normative monetary evaluation (NME) of land and/or soil is directly related to this element and fully corresponds to it in terms of purpose. These blocks are used to provide a comprehensive assessment (CA) of the calculate indicators of an agricultural project even at the stages of both its preparation and implementation monitoring, clarifying its main goals (SAGs) with the help of establishing reverse control (RC) over them. Moreover, this approach makes it possible to achieve the set goals of the project in a more efficient way.

The comprehensive assessment (CA) is a component of effective agricultural project management. However, sustainable land and soil management (SL&SM) should not be limited to this. For this purpose, the need to introduce such an element as the assessment of the achievement for indicators of sustainable development (AAIsSD) was proposed. And only as a result of the previous steps, it will be the basis for a scientific and expert conclusion (SEC) regarding the declared (specified) focus of the agricultural project.

Improving the mechanism of sustainable management of land (soil) resources is today’s challenge and a need for the further development of agrarian business in Ukraine. Innovative projects in the agricultural sector need a critical review of the principles and methods of their valuation to improve the quality selection, and focus on the greening of agricultural production, restoration of fertility and protection of soils. Therefore, in this article, the proposed methodological approach increases the ability to overcome the primary problems in this area of research and successfully reveals the interrelationships between the assessment of agricultural projects, their setting goals and the achievement of sustainable land and soil management (SL&SM).

Further scientific and practical research should be aimed at deepening the comprehensive assessment of agricultural projects with environmental and economic performance (effectiveness). On this basis, it is necessary to determine the criteria for sustainable management of land and soil resources, as well as to improve the mechanisms for such provision.

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