Sustainable development of agricultural enterprises: economic component

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Abstract. The issues of the economic component of the sustainable development of enterprises (economic sustainability) belong to the category of one of the most frequently consecrated in various scientific researches and developments. This fact is explained by the complexity, a certain ambiguity of this category, starting with an understanding of its nature and ending with methods for managing it. Undoubtedly, economic sustainability is one of the key guidelines for evaluating and implementing management aimed at achieving the best mode of operation of an enterprise, especially within the framework of modern realities related to instability, problems in predicting the external environment, as well as the strongest interdependence of all without exception business entities. The most acute aspects regarding economic sustainability, which require elaboration, refinement, detailing, are: expanding ideas about the economic sustainability of the enterprise by moving to a two-criteria system for its consideration; the formation and implementation of a mechanism for managing economic sustainability; a comprehensive methodological approach to assessing and analyzing the economic sustainability of an enterprise, within the framework of which not only an assessment would be carried out, but also a further analysis of the state of the enterprise from the standpoint of economic stability according to the criteria, the principles of adjusting management activities to increase its level were determined.

1. Introduction

Issues of assessing and managing the economic sustainability of enterprises are investigated in a number of scientific papers. So, Sally J. Goerner, Bernard Lietaer, Robert E. Ulanowicz devoted their research not only to assessing the economic sustainability of enterprises, but also to the consequences that it has for the theory, politics and practice of free enterprise [1]. Leslie E. Sekerka, Derek Stimel in his work [2] raises the question regarding the strength of the enterprise, characterized as sustainable. The potential that is needed to achieve sustainability of social enterprises is considered by Gerard Doyle [3]. Moreover, this author focuses on the reuse of enterprises. The sustainability of enterprises through its three-dimensional analysis is considered in the work of Sidney Leung, Phyllis Mo, Howard Ling, Yanto Chandra, So Sum Ho [4]. Anupama Prashar devoted his work to finding the path that the company should follow in order to achieve sustainable development, focusing on energy sustainability [5]. Sustainable development of enterprises (on the example of small and medium enterprises in Taiwan) is represented by An-Yuan Chang, Yen-Tse Cheng [6]. Also, using the example of Taiwanese enterprises, only in this case in the manufacturing industry, Ville Matinaro, Yang Liu, Tzong-Ru (Jiun-Shen) Lee, Jurgen Poesehe study the key factors that influence sustainable development [7]. Of undoubted interest are the questions that Masayoshi Ike, Jerome Denis Donovan, Cheree Topple,
Eryadi Kordi Masli raise in their work - corporate sustainability in terms of management in multinational companies in Japan [8]. Amir Rahdari, Sahar Sepasi, Mohammad Moradi considers the sustainability of enterprises through social entrepreneurship, which is of high interest, both from a theoretical and practical point of view [9]. The interconnection and mutual influence of sustainability and innovation are considered in particular by such authors as Sonal Khurana, Abid Haleem, Bisma Mannan [10], Scuotto Veronica, Garcia-Perez Alexeis, Cillo Valentina, Giacosa Elisa [11]. In the first case, the authors cite data on manufacturing enterprises based in India, in the second case, the authors prove the possibility of introducing sustainable innovative solutions in small and medium enterprises in Italy. It should be noted that the study of sustainable development of enterprises is not limited to the industrial sphere, but also extends to the service sector, such as in the works of Elizabeth Agyeiewaah [12], Diego Augusto de Jesus Pacheco, Carla Schwenger ten Caten, Carlos Fernando Jung, Claudio Sassanelli, Sergio Terz [13]. Also, in the practice of research activities, studies are presented on the problems of indicators that reflect the results of enterprises in the context of indicators characterizing their sustainability. So, Nastja Tomšič, Štefan Bojneć, Blaž Simčič [14] analyze the economic performance of enterprises (small and medium) in the context of corporate sustainability. Andrea Trianni, Enrico Cagno, Alessandra Neri, Mickey measures industrial sustainability [15]. Their study is practical, focusing on the empirical data of small and medium-sized manufacturing enterprises in Italy and Germany. Muhammad Kashif Shad, Fong-Woon Lai, Chuah Lai Fatt, Jiří Jaromír Klemeš, Awais Bokhari consider reporting on sustainable development of enterprises in the context of integration into the risk management system and, accordingly, in relation to its effectiveness [16].

Therefore, we can conclude that, circumstances characteristic of the modern functioning of the economic complex determine the fundamental role of managing the economic sustainability of enterprises. However, it should be borne in mind that, firstly, management requires a structured activity carried out within the framework of the corresponding mechanism, which is embedded in the general organizational and economic mechanism of enterprise management, and, secondly, it is not possible without taking measurements, i.e. implementation of the assessment. At the same time, the information obtained from the results of the assessment should be characterized by such a semantic load that, by incorporating back into the management process, it would facilitate the most complete observance of especially important principles of continuity and variability of control actions. It seems possible to obtain such information through a criteria-based assessment. In this regard, there is a need to develop theoretical and methodological aspects of managing the economic stability of an industrial enterprise based on a comprehensive assessment and analysis of its level according to criteria.

2. Materials and Methods
The methodological basis of the study is the general scientific methods of cognition that predetermine the study of socio-economic phenomena, processes and patterns in their constant development and relationship. To solve the set tasks, general scientific methods were used: analysis, synthesis, grouping and comparison; special methods: problem decomposition, qualimetric analysis methods, as well as tabular data visualization techniques.

3. Results
The analysis of interpretations of the economic sustainability of the enterprise (more than 60 definitions) showed that one of the main issues that requires further clarification is the concept of equilibrium in its context. In order to clarify the “equilibrium” in the context of the economic stability of an enterprise, we compared definitions containing a reference to the state of equilibrium and those methodological approaches to assessing economic stability proposed by the authors of these definitions. The analysis of the basic components for assessing economic stability according to the definitions based on equilibrium showed that in the context of economic stability it is associated with the ratio of the values of the indicators of the current period forming it with the normative, maximum, and industry average values, with the values of the indicators of the previous period. Some authors in their developments indicate that the integral indicator of economic stability when a unit is reached,
which occurs when the relations indicated above are equal, indicates equilibrium, which is also called a stable state. The excess of the integral indicator of unity, which is respectively achieved when the values of current indicators are superior to the normative (maximum, industry average, values of the previous year) indicate economic stability. The reverse situation, i.e. in the case of an integral indicator below unity - about economic instability. Thus, the views of the authors, who in their definitions of economic sustainability refer to equilibrium, mainly vary between its understanding as a state and ability. In our opinion, the approach to economic sustainability as a state does not reveal the significance of sustainability, defining it as a simple name for the state of the enterprise or, what happens in the cases under consideration, as a synonym for equilibrium. Economic sustainability is also seen as the ability to return or accept a new state of equilibrium. In our opinion, in the first case, the assessment and analysis of economic stability most closely matches and reflects a similar approach to understanding it in the case of fixing the output of indicators from the state of equilibrium, calculating the values that characterize this output, and the rate of return to the initial state of equilibrium. If stability is the ability to return to the initial state of equilibrium, then it is possible to measure the level of stability either by the rate of return, or by comparing deviations from equilibrium in the current period from deviations in previous periods in which they were recorded. In our opinion, a simple assessment of deviations is not a correct assessment of economic stability, if we consider it from the point of view of the ability to restore the initial equilibrium state. In addition, a return to the initial equilibrium may not be possible for a number of internal reasons for the enterprise, however, the indicators that characterize it may still not be in a critical area from a security perspective for the functioning of the enterprise. More correct is the approach according to which the enterprise can achieve a state of new equilibrium. However, the main problem is the fact that the definitions in the framework of this approach involve a transition to a higher level of equilibrium. In our opinion, there is also a previous comment on the possibility of achieving a new state of equilibrium not only of a higher, but also of a lower level if the indicators that characterize the activity of the enterprise can still be not in a critical area from a safety position for functioning enterprises. In general, among the approaches to economic sustainability identified at the beginning of the study — economic sustainability as a condition, ability, process, attribute, factor, property — in our opinion, the approach to property has the greatest advantage. The advantage of determining economic sustainability as a property, rather than as an ability consists in emphasizing in this way attention on management, in the process of which this property is formed, on relations with the external environment and organizational and economic relations in dry your enterprise. In addition, abilities, as a rule, are associated with the success of the activity, therefore, in our opinion it would be more correct in determining the economic stability of the enterprise to consider “ability” as a certain content of the formed property of sustainability.

We offer our own approach to understanding the economic sustainability of the enterprise, the prerequisites for the development of which were the conclusions made above the results of a critical analysis. So, based on the understanding of economic sustainability as a property, it is proposed to apply the principles of technical sciences and turn to the following approach to sustainability: when moving, the property remains in a certain space limited by certain values of indicators (in fact, a certain coordinate system). This approach allowed us to consider economic stability as a property, but to link it with the concept of equilibrium, while not “equilibrium as equality,” but “equilibrium as balancing.” So, when considering economic sustainability, the indicators characterizing it are within certain boundaries, making oscillatory movements, but do not go beyond them, i.e. there is balancing, maintaining equilibrium under environmental conditions. Since the indicators can be attributed conditionally to several levels - in particular, high, medium, low, then each of them, of course, must have boundaries so that these levels can be determined. If the indicators balance, but do not go beyond the level, then in accordance with the proposed approach, they are in a state of equilibrium: from the first to the third degree. A general equilibrium state means balancing indicators between a minimum threshold value of a low level and a maximum threshold value of a high level, i.e. between the lower boundary of the equilibrium of the first degree and the upper boundary of the equilibrium of the third
degree. Returning to the accepted approach to stability, the replacement of the coordinate system indicated in it is the space of the strategic regime in which there are three degrees of equilibrium. Obviously, the achievement of one degree or another of equilibrium (its retention), i.e. the successful balancing of indicators within certain boundaries under environmental conditions is the result of management activities. We have identified two criteria by which economic sustainability is simultaneously considered - reliability, i.e. compliance of the values of indicators characterizing it with normative and dynamism, i.e. rate of change of indicator values. The selection of these criteria also allows us to emphasize the synthetic nature of economic stability within the framework of the presented approach to understanding equilibrium in its context. This is a property formed in the management process, the content of which is: the ability to achieve performance indicators not lower than the maximum permissible standards, which can be assessed through the reliability criterion, the ability to achieve not lower than the maximum established rate of change in the context of goals - an assessment through the dynamic criterion.

In our opinion, the economic stability of the enterprise is the ability to maintain its position in the space of the strategic regime, formed by mutually agreed management aimed at countering and adapting to environmental influences (negative and positive, respectively), and characterized by finding enterprise indicators in terms of its functional elements not lower than the maximum permissible level from the standpoint of such criteria as reliability and dynamism. It is well known that economic sustainability is a determinant of sustainable development, its provision creates the appropriate conditions. However, when analyzing, it becomes clear that sustainable development is considered through a simple increase in the values of indicators of economic sustainability (in the case of consideration through the excess of actual values over the baseline; in the case of consideration through equality of values, it is incorrect to talk about the relationship between economic stability and sustainable development). So, in accordance with the presented approach, we have determined that sustainable development is a consistent, progressive movement precisely in terms of types of sustainability, including economic, and not just continuous growth of its values.

Going to the practical issues of economic sustainability of enterprises, we present our approach to the management mechanism and its assessment within it. The economic sustainability management mechanism is focused on regular monitoring, timely assessment of enterprise performance according to the economic sustainability criterion, identification and analysis of deviations by economic sustainability indicators, formation of a system of actions to eliminate deviations, analysis of changes in economic sustainability indicators, development and adoption of management decisions regarding the achieved level of economic sustainability, the formation and implementation of tools for appropriate adjustments within the overall organizational and economic enterprise management mechanism, the formation of the specification and performance management, assessment of actual performance and effectiveness of the management decisions to maintain (increase the level of economic sustainability). The composition of the mechanism: blocks of information and methodological support, analytical, updating of analytical information, development and management decisions. The measures of the information and methodological support block are preparatory in nature, as a result of which the necessary information and initial data are determined to assess and manage economic sustainability. As the final result of the activities of the analytical unit and the unit for updating analytical information is the preparation of a report on the state of the enterprise from the position of economic sustainability and the effectiveness of its management. The report should also justify options for possible solutions to ensure the optimal level of economic sustainability. The activities of the next block are aimed at preparing conclusions and recommendations for making decisions, developing the necessary corrective measures, anticipatory control actions are modeled. Systematic monitoring of economic stability is carried out, the implementation of the adopted management decisions and the results of the developed corrective actions are monitored. Economic sustainability management should be carried out taking into account the timely introduction of necessary changes and adjustments to the elements of an integrated organizational and economic management mechanism. External conditions and restrictions: information on other management
mechanisms, the synthesis of which occurs within the framework of an integrated organizational and economic management mechanism; information about the external environment of functioning, factors affecting the enterprise. The parameters of the mechanism determined by the center: settings for the procedure for assessing and analyzing the results of the enterprise in terms of functional elements according to sustainability criteria; settings for the formation of enterprise development tools taking into account the level of its economic sustainability. Input information from agents (objects) necessary for making a managerial decision: information on the results and conditions of the enterprise in terms of functional elements. The result of the mechanism (solution): instructions and recommendations aimed at ensuring the optimal level of economic stability in the context of the functional element for each criterion - adjustment of development programs. The economic sustainability management mechanism is designed to interact with other management mechanisms within the framework of the complex organizational and economic mechanism of enterprise management, effectively complementing it in the synthesis process with other mechanisms and, if necessary, adjusting its elements. Additional information is assessment and analysis methods, the results of which provide the basis for decision-making on the implementation of management tools.

We have developed a methodology for assessing economic sustainability and a method for recognizing the stages of a crisis by the criteria of economic sustainability, which occupy a key place in the management mechanism. The methodology for assessing economic sustainability (tables 1), firstly, is two-component, according to the criteria of reliability and dynamism, and differs in not compiling the indicators of economic stability by them (criteria) into one complex indicator, because to a greater extent, this reflects the picture of the enterprise from the position of economic sustainability and serves as a guideline for making management decisions within the framework of the management mechanism. Secondly, in accordance with this methodology, the law of least stability is taken into account during calculations, which is reflected in obtaining a negative value for the component if it is in a nonequilibrium state, and its inclusion in the formula for calculating the final coefficient of economic stability with maintaining the minus sign (in fact, the coefficient of economic stability (KES) is the higher, the greater the set of distances by equilibrium is not lower than the maximum permissible degree over the set of distances by nonequilibrium states).

**Table 1.** Description of the methodology for assessing the economic sustainability of the enterprise.

| Stage | Description |
|-------|-------------|
| Formation of a system of indicators (multilevel structural scheme or tree of properties) for assessing economic sustainability (ES) | property of the 0th level - ES, the 1st level - the distance to the maximum permissible level (to the lower boundary of the equilibrium of the first degree) in the context of functional elements (FE), the 2nd level - indicators in the context of FE determination of scores by values and scores taking into account ICV; points are awarded from 1 to 4 depending on the degree of equilibrium: 1 - nonequilibrium state, etc. |
| Determination of the weighting factors of the components of the ES and indicators within them | Calculation of a generalized indicator for functional elements that determines the degree of equilibrium for an element calculation for each component of the ES of the actual, minimum and maximum possible total number of points with ICV; determination of the boundary of the degrees of equilibrium and nonequilibrium state according to the FE |
| Rationing indicators: determining the boundaries of equilibria, assigning indicators to their degrees | Calculation of the remoteness of the generalized indicator to the maximum permissible level for all FEs - the determination of the stability of the components of ES (financial FU, market U, production PU, personnel KU) |
| Collection and calculation of indicator values | The calculation of the remoteness of the generalized indicator to the maximum permissible level for all FEs - the determination of the stability of the components of ES (financial FU, market U, production PU, personnel KU) |

\[
D_e = KES_{c+} = \frac{x_{r-x_p}}{x_{max-x_p}}, \quad D_{ne} = KES_{c-} = \frac{x_{r-x_p}}{x_{p-x_{min}}}
\]

\[
x_f = \sum_{i=1}^{n} a_i \times A_i \times B_i
\]

\[
x_{max/min} = \sum_{i=1}^{n} a_i \times A_i \times B_{max/min}
\]
where $\frac{D_{e}}{D_{ne}} = \frac{KES_{e}}{KES_{ne}}$ is the distance from the threshold value for the equilibrium and nonequilibrium state ($D_{e} \in [0; 1]$ and $D_{ne} \in [-1; 0]$), i.e., indicator of component stability; $X_{p}$ - the actual total score of indicators in the context of FE; $X_{f}$ - threshold value corresponding to the lower boundary of the equilibrium of the first degree; $X_{max}$ - the maximum possible amount of points in the context of FE; $X_{min}$ - the minimum possible amount of points in the context of FE (in case all indicators are in a nonequilibrium state); and $I$ is the weight of the component; and $J$ is the weight of the indicator by component; $n$ is the number of indicators; $B_{i}$ - score assigned to the indicator; $B_{max}$, $B_{min}$ - the maximum and minimum score that can be assigned.

Calculation of the integral indicator of ES according to the criterion based on all components

$$ES = \sum_{i=1}^{m} a_{i} \times \frac{D_{e/ne}}{KES_{e/1}}$$

$$ES - \text{coefficient of ES according to the criterion; } M \text{ is the number of components; and } J \text{ is the weight}$$

Thus, the assessment of the economic sustainability of an industrial enterprise consists of seven successive stages, each of which must be repeated according to two sustainability criteria presented within the framework of the proposed approach to understanding the economic sustainability of an industrial enterprise. The economic stability coefficient, as well as the stability coefficients of its components, can take values in the range from -1 to 1 (inclusive). The interval of division into levels, presented in Table 2, is based on the “golden ratio” from 33% to 66%, noted in the studies of authors dealing with the sustainability of economic systems of various scales. This assessment complies with the principles of its organization, such as consistency, comparability, relevance of results, continuity, profitability, scientificness, priority and so on.

| Quantitative value | Zone of economic instability | Quality characteristic |
|--------------------|-----------------------------|------------------------|
| -1                 | Zone of economic instability| Absolute instability    |
| (-1; -0.66]        | Critical instability        |
| (-0.66; -0.44]     | High instability            |
| (-0.44; -0.33]     | Middle instability          |
| (-0.33; 0)         | Low instability             |

| Zone of uncertainty | 0 | Uncertain sustainability |
|---------------------|---|-------------------------|
| (0; 0.33]           | Critical sustainability |
| (0.33; 0.44]        | Low sustainability       |
| (0.44; 0.66]        | Middle sustainability     |
| (0.66; 1)           | High sustainability       |
| 1                   | Absolute sustainability   |

The second developed method, namely the method for recognizing crisis signals according to the criteria of economic sustainability of an enterprise, is based on the following provisions. Firstly, the scale (width of coverage of lines of activity) and the intensity (depth) of crisis phenomena in the enterprise are estimated by the indicators of the economic stability of the enterprise in terms of its functional elements according to the criteria of reliability and dynamism, which makes it possible to identify and evaluate crisis phenomena by the areas of their occurrence. Secondly, the gradation of the stages of the crisis: potential, hidden (actually means the pre-crisis stage), progressing, turning into an acute crisis (before the critical level of loss of economic stability), acute crisis (critical level of loss of economic stability and complete loss). Thirdly, a 10-point severity scale of crisis signals is applied in order to assess the severity of crisis processes at all levels of economic stability and all trends (for example, a low level of economic stability, despite the tendency to increase indicators, nevertheless speaks of quite obvious crisis phenomena). Fourth, the analysis of trends in levels of economic stability for a certain period is carried out by calculating the Spearman coefficient, which avoids
considering the random nature of changes in the values of indicators. The generated set of signals allows you to detect and evaluate the stages of the crisis, analyze and prevent its development. The interpretation of the possible results and the necessary formulas are presented in Table 3.

**Table 3. Recognition of the stages of the crisis according to the criteria of economic sustainability.**

| Scale (M),% | Intensity (I),% | Crisis stage          |
|------------|---------------|-----------------------|
| 0-30       | 0-30          | Potential             |
| 30-50      | 0-30          | Potential             |
| 30-50      | 30-50         | Hidden nascent        |
| 50-60      | 0-30          | Hidden nascent        |
| 50-60      | 30-50         | Hidden developing     |
| 50-60      | 50-60         | Hidden developing     |
| 60-70      | 0-30          | Hidden nascent        |
| 60-70      | 30-50         | Hidden developing     |
| 60-70      | 50-60         | Hidden progressive    |
| 60-70      | 60-70         | Hidden progressive    |
| 70-90      | 0-30          | Hidden progressive    |
| 70-90      | 30-50         | Hidden progressive    |
| 70-90      | 50-60         | Hidden progressive    |
| 70-90      | 60-70         | Progressive to acute  |
| 70-90      | 70-90         | Progressive to acute  |
| 90-100     | 0-30          | Hidden developing     |
| 90-100     | 30-50         | Hidden progressive    |
| 90-100     | 50-60         | Hidden progressive    |
| 90-100     | 60-70         | Progressive to acute  |
| 90-100     | 70-90         | Acute                 |
| 90-100     | 90-100        | Acute                 |

4. Discussion
The practical application of the methodological approach to the criteria-based assessment and analysis of economic sustainability proved its fundamental role in the framework of the management mechanism, thereby improving it and, together with its practical focus on introducing into the general organizational and economic mechanism of enterprise management, distinguishing it from previously existing similar mechanisms. This approach allows you to: calculate indicators that characterize economic sustainability; determine its level; determine trends in stability indicators, determine the strength of crisis signals based on them, calculate the scale and intensity of signals; determine the stages of the crisis from the perspective of economic sustainability; to analyze the indicators characterizing it in terms of components, to determine the principles of actions to adjust managerial actions to increase them; to model and predict the economic stability and stability of the components according to the criteria as a result of applying these principles. The information obtained by the results of evaluations carried out according to the proposed methods can significantly complement the reporting, planning and management system of the enterprise.

5. Conclusion
In the conclusion, we systematize the key findings of our study. Firstly, economic stability was first determined simultaneously by two criteria, which allows emphasizing the synthetics of this category and resolving the inconsistencies between the own dynamics of the values of the indicators characterizing it and their compliance with regulatory values. Secondly, a description of the mechanism of economic sustainability management is provided for the items that allow solving key tasks associated with its implementation in the general organizational and economic management mechanism. Thirdly, the developed methods for assessing economic sustainability and recognizing the stages of the crisis by its criteria are presented, which together allow you to determine the basic principles for adjusting management activities to increase the level of economic stability. Thus, the
presented theoretical provisions and methodological developments are characterized by the possibility of practical implementation, as they contribute to solving a number of specific tasks in the framework of managing the economic stability of the enterprise. The results of the study can be used in further scientific substantiation of the problems of measuring and assessing economic sustainability, and developing programs for the sustainable development of the enterprise.

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