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Backgrounds for Improving Resource Management of Agricultural Enterprises Based on Economic Diagnostics of Biofuel Consumption

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Abstract

The research paper deals with the formation of new scientific decisions regarding the improvement of the processes of resource management of agrarian enterprises on the basis of economic diagnostics of biofuel consumption. In the course of the research, the essence of the research paper is revealed and the features of the use of tools of economic diagnostics in relation to a particular energy resource as the basis for substantiation of effective management decisions concerning resource management of a modern agricultural enterprise are described. The research methodology is based on the system approach, the identification of causal relationships (deduction, induction) and the synthesis of factors that influence the implementation of the development potential and improvement of resourcing for the operation of modern agricultural enterprises in Ukraine. The research paper systematically presents the processes of providing agricultural enterprise with fuel resources as an element of the resource management system, which focuses on the direction of biofuel consumption, its economic diagnostics, the identification of problems, prospects of use and developmental prerequisites. It is shown that structured integrated economic diagnostics of biofuel consumption by agricultural enterprises as part of a certain system, action algorithm, to a large extent positively influences on the success of application in practice of the tools of resource management of these enterprises, increasing the soundness of managerial decisions in this area. This contributes to a more efficient organization of the processes of the agrarian enterprises of Ukraine, giving an opportunity to respond adequately to the variability of the market environment and create the preconditions for the long-term development.

Keywords: Resource management; Agricultural enterprise; Economic diagnostics; Biofuel; Energy resources; Potential; Ukraine.

1. Introduction

Dynamic development of the global economy, which, in particular, has effect on the development of transport operations, the active use of energy resources, along with many benefits, also leads to the emergence of serious global problems caused by increased demand for energy in the conditions of depletion of natural non-renewable energy sources and the gradual degradation of the natural environment (as a result of excessive use of natural resources and significant emissions of greenhouse gases). As a way of a partial solution to this problem, a significant number of researchers, in particular Abbot (2013), De Gorter *et al.* (2013), Tyner (2010) consider the development of the renewable energy sector, including the liquid biofuels sector.

The concept of using raw materials of agricultural origin for energy purposes is not new, it has a history of formation for more than a hundred years, but over the past ten years there has been an increase in the role of renewable fuels, reflected in increasing its production and consumption. This determines the importance of considering biofuel as an important factor in shaping the modern energy policies of many countries and agrarian sectors of the economy of these countries, in particular, the agrarian sector, where, in fact, biomaterials used for biofuel production are produced, and it is possible to directly and actively use the biofuel to meet the needs of agricultural enterprises in fuel and energy resources.

Consequently, modern agricultural enterprises are developing, their functions change. In addition to the most important task, being the production of food products, industrial fodder, now agricultural enterprises are increasingly considered as a producer of raw materials for the growing sector of biofuels. Potential of using energy of agrarian products relate mainly to rape, beets and oilseeds.

These processes are accompanied by an increase in the interdependence between the sector of production of liquid biofuels and agricultural markets, where products that can be used as raw materials for biofuel production are sold. On the one hand, one can foresee that the production and use of liquid biofuels will help to overcome the problems of providing agricultural producers with fuel resources and will be a source of additional benefits from the sale of biofuels. On the other hand, the economic potential of biofuel production from raw materials of agricultural origin and its subsequent consumption by agricultural enterprises may be limited due to the adverse effect on the

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environment and the impact on the fulfilment of the traditional functions of agricultural enterprises to supply agricultural products to the society. It should be taken into consideration that, seeing more potential in energy sector, agricultural enterprises will limit the development of the core activities, creating threats to a strategically important food security of the country.

The aforementioned range of problems caused the need to find new scientific solutions in the direction of creating effective tools for managing the resources of agricultural enterprises on the basis of economic diagnostics of biofuel consumption, determining the preconditions for improving the process of managing resources on this basis.

The research objective is to formulate scientific solutions regarding the improvement of resource management processes of agricultural enterprises on the basis of economic diagnostics of biofuel consumption. The achievement of this objective involves revealing the essence and peculiarities of using the tools of economic diagnostics as the basis for substantiating managerial decisions that should be incorporated into the model of efficient resource management of agricultural enterprises that consume or plan to consume biofuels for their own industrial and organizational needs.

In general, the range of problems of increasing the efficiency of the resource base of agricultural enterprises is directly related to their activities as producers of agricultural products. The assimilation of new technologies, the development of organizational and economic conditions of the activity of enterprises under the influence of this technology, determine the possibility of increasing the efficiency of the enterprise. At the same time, these processes require constant analysis and monitoring; in this context, the economic diagnostics of biofuel consumption by agricultural enterprises is a topical direction of scientific research.

The novelty of the study is to consider the processes of providing agricultural enterprises with fuel resources as an element of the resource management system, which focuses on the direction of biofuel consumption, its economic diagnostics, identification of problems, prospects for the use of biofuels by agricultural enterprises and the preconditions for the development of resource supply through the expansion of biofuel use.

1.1. Literature Review

The concept of sustainable development as a theoretical and methodological basis of the development of alternative energy, and in particular - the production and consumption of biofuels, formed as a result of rethinking the socio-economic processes of “socialization” and “ecologization” of the modern economy. This concept has revealed attempts to resolve the contradictions between the phenomena of “efficient economy” and “future of new generations”, “social responsibility”, “conservation of biodiversity” (Bastia, 2017; Fiore and Tamborrini, 2014). The works (Barua *et al.*, 2014); are devoted to the study of sustainable development issues, which deal with the emergence of the concept of sustainable development as a key paradigm and a trajectory of socio-economic progress.

There are ongoing discussions about the role of the state in ensuring the conditions for sustainable development of enterprises (Artemov *et al.*, 2008; Bastow, 2013; OECD, 2012), the soundness of the state regulation measures and the formation of a balance of state intervention in market processes.

The works on comparative analysis of solving specific problems of sustainable development in the developing countries (Kamel and Dahl, 2005); (Report of the International Ministerial Conference, 2003) are worth mentioning. These studies are important for understanding the specifics of the development activities at the macro- and micro-levels in the countries of the former USSR, along with works devoted to the reflection of successful experiences in Eastern European and developing countries (Imas *et al.*, 2009; Nilsson *et al.*, 2016).

At the same time, a full-fledged integrated approach to managing and assessing the sustainable development potential at the micro-level in specific areas does not exist so far, which may be useful for solving sustainable development problems. One of these areas is the biofuel consumption by agricultural enterprises, which, to a certain extent, is studied in the works of contemporary authors such as Tyner *et al.* (2012), but does not contain any signs of complexity and the use of the potential of tools for economic diagnostics of biofuel use in the practice of agricultural enterprises is substantially limited.

It is also important that in forming such an approach, account should be taken of the influence of a significant number of factors (economic, political, environmental, social) on the development of the biofuel production and consumption. Although in this research paper the economic activity of agricultural enterprises that consume or plan to consume biofuels is a major point of consideration, it is also important to take into account the impact of the economic activity of agricultural enterprises on the environment and society.

The scientific developments of modern researchers, in particular Allen and Berg (2014) raise a wide range of issues of enterprise development, the formation of economic priorities and ways to improve the performance.

The work Hamann *et al.* (2015) is of particular interest in view of the need to reveal the peculiarities of social and environmental systems, determination of the factors influencing the dynamics of their development. The work (Jiang *et al.*, 2018) deals with urged importance of entrepreneurship participation in ensuring environmental safety and sustainable development.

This problem with regard to renewable energy is covered in the paper (Ossai *et al.*, 2014), which presents the basics of sustainable asset management in relation to renewable energy installations. The authors conclude on the possibility of mitigating the negative impact on management of increased idle time, low power consumption, high cost of maintenance and repair operations through the introduction of a structured procedure that combines socio-economic and environmental requirements in support of decisions for the management of facilities.

Environmental planning, verification of the fulfillment of tasks are vital for health, safety and environmental protection, while the improvement of the life cycle of assets can be achieved through competence, compliance, control, communication and cooperation between management and staff (Ossai *et al.*, 2014).

An important problem in this context is the problem of finding a method for economic evaluation of the potential of using specific areas of improvement of the enterprise's development within the resource management process, in particular - the economic diagnostics of biofuel consumption, and the identification of the preconditions and priorities for improving resource provision on the basis of the results of this diagnostics. Thus, the researchers Carpenter and Mossand (2014) still consider the priority to increase profits as a way of accumulating financial resources and their subsequent effective distribution. At the same time, this cannot be accepted in modern conditions, as the experience of developed countries shows that the solution of problems of development requires a comprehensive consideration of the priorities of resource supply of agricultural enterprises, which can include, in addition to profits, increasing the scale of presence in the markets, solving global problems of supplying food, ensuring social and environmental prerequisites for the development of society through increased environmental sustainability of agribusiness (Srebotnjak *et al.*, 2010).

The issues of biofuel market development are covered in the works (Bozhydarnik *et al.*, 2014; Burlaka and Kostyuk, 2014). To evaluate the opportunities and challenges associated with the use of biofuels, past experience has been reviewed, country-level capacity was quantified, and determinants of the attractiveness of countries for investors are identified in the works (Deininger, 2013; Yakubiv *et al.*, 2014). Appropriate models have been built that reflect the dependence of agricultural sector indicators related to the production and consumption of biofuels.

In the work Landis *et al.* (2018), biomass is considered as a promising energy source, but its recycling for the production of biofuels typically requires heat energy, which often comes from non-renewable energy sources. The use of solar energy to covert biomass through the thermochemical transformation significantly improves the overall process performance.

The issues of the development of the liquid biofuel sector on a global scale and in individual countries are addressed in the research environment (De Gorter *et al.*, 2013; McPhail and Babcock, 2012; Tyner *et al.*, 2012), but to a significant extent, especially in the United States and EU countries, these works are most often focused on determination of the possible influence of liquid biofuel production on the value of agricultural raw materials, as well as on the problems of production itself, rather than the consumption of biofuels by agricultural enterprises.

The range of problems of the introduction of biodiesel (on the basis of palm oil) in a particular country is substantively presented in the paper (Szulczyk and Atiqur Rahman Khan, 2018) through the example of Malaysia. It is concluded that palm biodiesel fuel could lead to increased employment in agriculture, but also prompt an increase in prices for agricultural products, loss of export income and import growth.

The work De Souza *et al.* (2018) analyzes the impact of the use of cars with different fuel options on the environment of Brazil, the topicality of the distribution of hybrid and electric vehicles in the country, which will contribute to ensuring its sustainable socio-ecological and economic development.

The research Rajak and Verma (2018) aims at studying the characteristics of emulsion fuel with biodiesel and its impact on the performance, combustion and emissions of a direct injection diesel engine.

The problem of fuel saving due to the use of biodiesel is considered in (Kryshtopa *et al.*, 2018).

The work Bush and Martiniello (2017) examines food issues in developing countries in the context of the financial, food and global energy crises of 2007-2008. The use of biofuels has been determined as one of the factors which contributes to the improvement of economic situation in the countries.

One of the important achievements of the work Bringezu (2015) is to substantiate the conclusion that the countries importing raw resources achieve higher material performance, thereby increasing their own independence from supply of resources, resulting in higher innovation capacity.

According to the author of the research paper, considering biofuel consumption as an object of evaluation, the research groundwork and models concerning the tools of economic diagnostics of certain processes should be considered in greater detail. In this context, domestic and foreign science has formed some scientific groundwork regarding problems and application of the tools for economic diagnostics by the agricultural enterprises. Thus, the problems of economic diagnostics of agricultural enterprises and its application in the process of determining the efficiency of using biofuels as sources of alternative energy are addressed by Herasymchuk (1995), Hudz (2009), Hudz (2012), Kaletnik (2015), (Prutska, 2010), Samoilenko (2009), Savchuk (2001), Sokolovskaia (1995), Shvydanenko (2002).

When studying the EU's experience in the field of environmental protection in (Selin and Van Deveer, 2015), the effectiveness of the establishment of detailed management systems and mechanisms for the development, implementation and enforcement of pro-environmental policies is emphasized. In the end, it contributes to greater resource efficiency and stability in Europe and beyond.

In the work Scarpellini *et al.* (2018) the definitions are suggested, a classification is presented and the eco-innovation financing processes are evaluated, as well as the impact of business-technology and environmental potential on the efficient allocation of these resources for investing in eco-innovations was assessed. The approach to considering resources volumes and their quality are suggested which is based on the model of partial least squares structural equation (PLS-SEM) tested on a sample of Spanish companies. As a consequence, the nature of the impact of different financial resources on eco-innovative investments and internal management of environmental innovations was determined.

The development of the Ukrainian biofuel market in the context of international trends is covered in the works (Chybiskova, 2008; Kaletnik, 2008).

The financial and economic aspects of the development of bioenergy and its use in the context of ensuring Ukraine's energy independence are considered in the works (Karpenko *et al.*, 2015; Myronenko *et al.*, 2017; Popadynets and Maksymiv, 2016; Schaffartzik *et al.*, 2014). Modern tendencies are studied and priority directions of development of the market of solid biofuels as a factor which will have a positive influence on strengthening of energy and economic components of national security of Ukraine are determined. The solid biofuel market was analyzed by solid biofuel products made of biomass of wood and agricultural raw materials, as well as by consuming relevant products by households and enterprises. It is proved that the development of the internal market for solid biofuels is important for strengthening the energy independence and economy of the country.

The works of Pravdiuk (2005), Zarubynskyi (2002), Tsal-Tsalko (2001), Shcherbak (2008) deal with the range of problems of informational and analytical support of economic diagnostics of various aspects of the activity. In the writings of these authors the foundations of economic diagnostics of certain areas, activities are thoroughly covered, the methodological approaches to diagnostics are worked out, the algorithms for calculating diagnostic indicators are provided, etc. However, this groundwork is not sufficiently systematized in the scientific publications to distinguish one of the studies as an integrated and comprehensive, the interrelations between different elements of diagnostics of the development and activity of a particular enterprise that consume (or plan to) energy are also not taken into account.

Thus, the study and generalization of scientific works of economists showed that the aspects related to the specifics of operation of agricultural enterprises in terms of the need to improve their resource support where biofuel is an important factor in ensuring resource independence, autonomy in production processes and minimizing of costs through the use of industrial waste and cultivation areas not used in production are not enough explored, but are topical and actively developed.

2. Methods and Materials

To achieve the objective of this research paper the system of general scientific and special methods of research of processes and phenomena in their interrelation and development was used, namely: the methods of theoretical analysis and synthesis (to characterize the essence of the concept of "economic diagnostics"); methods of theoretical modelling (for choosing the optimal structure of the process of economic diagnostics); methods of systematization, grouping and logical generalization (for systematization of information, drawing conclusions and scientific suggestions of the article); methods of structural and logical analysis - for presenting the scheme of economic diagnostics of biofuel consumption by agricultural enterprises.

The research methodology is based on a systematic approach and generalization of factors that influence the realization of the potential of agricultural enterprises using biofuels in their current production activities. The methodological means that logically continue the systematic approach are the synergetic approach and the co-evolution principle. The synergetic approach is based on the theory of self-organization and involves a comprehensive accounting of the links between different levels and forms between elements of the system, the development of which strengthens its integrity and efficiency, makes possible the emergence of new quality. Application of the co-evolution principle in this study can be specified in the context of the unity and interaction of natural, economic and social in the process of achieving the development goals.

In the work, the process of managing the resources of the agricultural enterprise, with the biofuel consumption being its element, is presented as a complex of elements and properties, the interaction between which forms new prerequisites for increasing the efficiency and use of resources by agricultural enterprises.

3. Results

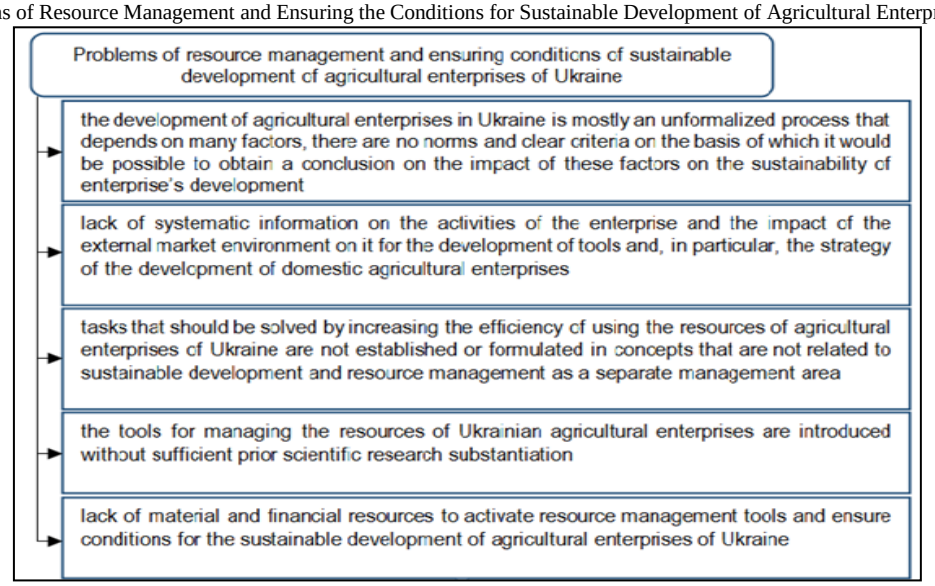
3.1. Economic Diagnostics of the Use of Biofuel by Agricultural Enterprise as an Element of the Resource Management System

Traditional methods for managing the resources of agricultural enterprises in Ukraine are not sufficiently effective in a fast-moving, highly competitive business environment. Sustainable development of enterprises involves the coordination of short-term goals and interests of different groups and individuals as part of the company with long-term strategic objectives, stipulated by the requirements for its development and available resources. In this regard, the resource management of an agricultural enterprise is an important condition for the efficiency of the domestic agricultural enterprises. That is why one of the important scientific tasks is to create ways to improve the efficiency of the process of managing the resources of domestic agricultural enterprises in accordance with the new conditions of management.

The current state of ensuring sustainable development of agricultural enterprises of Ukraine is characterized by the following problems (Figure 1).

It is obvious that there is a need for a full evaluation of the potential of certain areas for improving the use of resources or resource support as an informative basis for substantiating the resource management tools of agricultural enterprises.

Figure-1. Problems of Resource Management and Ensuring the Conditions for Sustainable Development of Agricultural Enterprises of Ukraine



Source: developed by the author.

As objectives of such an evaluation, it is appropriate to identify the preconditions for the provision through the use of certain types of resources:

- higher financial and economic efficiency of the functioning of enterprises, their financial stability;
- greater technological conformity of production processes to modern requirements and new opportunities;
- greater competitiveness of enterprises and their products;
- higher efficiency of realization of production processes;
- more complete satisfaction of social needs of employees of the enterprise and citizens of the country;
- more complete provision of safe ecological conditions for the employees of enterprises and mitigation of the devastating impact of the consequences of production and economic activity on the environment.

Thus, one of the most important aspects of improving the management of resources of agricultural enterprises is the assessment of the potential of certain areas of resource consumption, in particular, in accordance with the objectives of this research paper - the area of biofuel consumption. This assessment, as part of a set of measures for the economic diagnostics of biofuel consumption by the enterprise must be distinguished by the purposefulness and complexity of the approaches, as well as the systematic and effective use of the analytical tools applied.

As a result, the potential economic effect of using the existing opportunities for the development and competitiveness of the agricultural enterprise due to the use of biofuel as a productive resource in its activity should be evaluated, which is possible while ensuring the principles of complexity, systemicity, optimality and objectivity in the process of economic diagnostics.

Information and analytical support for economic diagnostics of biofuel consumption by agricultural enterprises is also closely intertwined with solving the problems of accounting, statistics and reporting (Tsal-Tsalko, 2001); (Hudz, 2009). The production processes and their consequences are reflected in statistical, financial, tax reporting and accounting (P(S)BO 1). For the adoption of managerial decisions, the users of the reporting require accurate data on the financial and economic situation, its fluctuations and changes, the effects of production activities, etc. These needs stipulated the composition of reporting of enterprises, in particular, the Balance Sheet, the Cash Flow Statement, the Profit and Loss Statement, the Equity Statement, and various notes on accounts. The information array should provide sufficient objective and easy-to-use information about the financial and economic condition of the enterprise, the intensity, rhythm of the movement of its financial flows, fluctuations in capital parameters and its structure, etc.

The quality of informational and analytical support for economic diagnostics of biofuel consumption by agricultural enterprises is measured by the possibility of early prevention and correction of detected threats. Weaknesses in building the composition of information and analytical support may result in unexpected deformations and crisis manifestations, since the information array is a platform for the economic diagnostics of threats, prediction of their impact, determination of the effectiveness of approved strategic measures, etc. (Maliuha, 1998; Tsal-Tsalko, 2001).

3.2. Current State and Prospects of Using Biofuel by Agricultural Enterprises of Ukraine in the Context of Global Trends

The level of energy dependence of Ukraine is average European. The need for fuel and energy resources is satisfied for only 53%. Under these conditions, agricultural production consumes 35 million tons of conventional fuel per year, yielding only to ferrous metallurgy (50 million tons of conventional fuel per year) in terms of the level of energy consumption in the economy of Ukraine (Korpaniuk, 2016a).

Studies of international energy conservation experience point to the application of different approaches to energy policy implementation. At the same time, the basis of the environmental strategy of most countries of the

world is the support of technological and innovation activities, the industry of the developed countries reoriented to the innovation economic production (Korpaniuk, 2016b).

In our opinion, these measures are more effective in the countries of the European Union. With the 2009 Renewable Energy Directive, the European Commission obliged to increase the share of renewable energy sources of European countries to 10% by 2020 (Zubkova, 2008).

In the context of meeting the needs of sustainable socio-ecologo-economic development through the use of renewable energy potential, it should be noted that there is currently no known source of energy that is fully balanced (Abbot, 2013). Of course, renewable energy sources are largely in line with the requirements of balance: they do not exhaust limited natural resources, their use is associated with significantly less negative environmental impact than oil, gas and coal, and are generally socially, economically and environmentally acceptable. However, some of them have serious problems. For example, wind energy, which is a completely renewable source, does not guarantee the stability of energy supply. On the other hand, biomass (cereals, oilseeds, energy crops for the production of biofuels) is a source of natural and renewable sources.

Biofuel production has a positive effect on the development of agriculture and the increase in incomes of agricultural enterprises (forming an additional demand for raw materials), but, at the same time, the production process itself requires significant energy consumption (directly - in connection with the production of raw materials and their processing, indirectly – in connection with the production of fertilizers, protection of plants used as raw materials, their transportation). It is obvious that these processes involve the emission of pollutants into the atmosphere.

The problems of production and consumption of biofuels include the need to increase the cultivation area for energy crops (mainly cereals, oilseeds), which is reflected in the reduction of biodiversity and can lead to degradation of soil, or excessive water and energy consumption in the production processes of agricultural raw materials. For this reason, it would be advisable to consider the balance of benefits and losses from the use of biofuels by agricultural enterprises. Based on the objective and theme of this work, this balance will primarily be considered in the context of the economic development of agricultural enterprises, while aspects of social and environmental development should also be taken into account, as in the modern world they have a significant impact (primarily through regulatory policies and a system of public and state control and supervision) on the economic efficiency of enterprises and the success of the implementation of economic development goals. It is also important to focus on the problem of biofuel consumption by agricultural enterprises, that somewhat narrowes the research field and focuses on the formation of prerequisites for improving resource supply, and, at the second place, generation of profits from biofuel production.

The main problems of using biofuels as a key resource for the production and economic activity of modern domestic agricultural enterprises are analyzed in Table 1.

Independent estimates show (Abbot, 2013) that biomass remains the dominant source of renewable energy, despite the changes in the energy mix, with a chance (provided the development and expansion of third generation biofuels) becoming the main source of energy in the 21st century.

Table-1. Key Problems of the Use of Biofuel by Agricultural Enterprises

Problem	Problem description	Ways of solving the problem
Ability to use biofuel for the existing vehicles of agricultural enterprises	Most new diesel engines do not require any modification or only insignificant one when using biofuel. Biofuels are more dangerous in terms of corrosion and should not be used in engines with rubber seals and seams - this can cause corrosion of these elements. Diesel engines built up to 1995 (which are quite numerous in Ukrainian agribusinesses) may have problems of operation on biodiesel fuel.	Special methods of engine diagnostics are used to evaluate the possibility of using biofuels in vehicles. In order to be able to use biodiesel or bioethanol in motor vehicles, a conversion kit should be used to prevent problems with starting engines at low temperatures and problems associated with increased biofuel viscosity when cooling engine. It is necessary to replace rubber elements in the engine with elements made of stainless materials
Relevance of the manufacturer's warranty conditions in case of using biofuel	At present, no manufacturer guarantees the quality of the vehicle operation when using bioethanol. All modern diesel engines are covered by a 5% biodiesel warranty. Some manufacturers provide an extended warranty for a mixtures of up to 30% biodiesel with diesel.	Typically, in vehicles using biofuels, the warranty period has already expired. Suppliers of biofuel conversion kits usually offer a 12-month warranty. In the event of problems during the warranty period, the maximum amount of biodiesel in the fuel that can be used without losing the warranty should be checked.
Cost of biofuel	The cost of biofuels will vary depending on the availability of such raw materials as rapeseed, raw material prices	As in the case of petroleum products, it is necessary to know the factors that affect the cost of fuel and reflect the costs of transportation and storage of biofuel
Biofuel storage	Condensation of moisture during storage affects the quality of biofuels. Fuel storage tanks such as industrial tanks made of copper, brass, alloys containing lead, tin and zinc (corrode with biodiesel) are an unacceptable way of storing biofuels, because UV rays lead to biofuel degradation through oxidation	Biodiesel can be stored and transported using the same procedures as in the case of diesel fuel. The fuel should be stored in a clean, dry and dark environment. Tanks made of aluminum and steel, perfluorinated polyethylene, perfluorinated polypropylene and teflon are allowed. Tanks must be stored indoor/ in containers with limited access to air, as oxygen causes the oxidation of biofuels
Terms of storage of biofuel	Biofuels are biodegradable, prone to hardening and decomposition over time, and has a limited storage life - should not be stored for more than 6 months (preferably within 3 months).	It is necessary to plan a delivery schedule in such a way as to ensure the storage of biofuels for not more than 6 months

3.3. Features of the Implementation of the Process of Economic Diagnostics of Biofuel Consumption by Agricultural Enterprises of Ukraine

The financial and economic condition of an agricultural enterprise is considered as an integrated many-sided characteristic of its production and financial activity, which determines the movement, composition and effective use of resources, and the effectiveness of the implementation of economic relations. The economic condition of an agricultural enterprise can be objectively estimated only through the indices, indicators and criteria for both fixed period and in dynamics, which detail and comprehensively characterize its economic condition and development prospects. It is through economic diagnostics that it is possible to evaluate in detail and forecast the development of the agricultural enterprise as a whole, as well as the prospects of realization of certain directions of its development, in particular, the prospects of expanding biofuel consumption in the production and economic activity.

The purpose of the economic diagnostics of biofuel consumption by the agricultural enterprise can be considered as informational and analytical provision of managerial decisions on resource management based on the analysis of the enterprise's potential to benefit from the use as a biofuel energy resource, as well as to reveal the weaknesses or potential opportunities to improve the resource provision of the enterprise.

Lack of a single concept of financial and economic diagnostics of the enterprise at the present time is to some extent compensated by the urging and deepening of its role and the expansion of its functions in the enterprise management system (Hudz, 2012; Samoilenko, 2009; Savchuk, 2001), at the same time, a certain direction of economic diagnostics as part of fulfilling the tasks of managing the resources of the enterprise has not been singled out so far.

An excellent scientific approach to the determination of the essence of economic diagnostics is found in Sokolovskaia (1995), which outlines this process in the context of a systematic approach. This allows to not only more objectively assess the outline of an agricultural enterprise according to the scenario of asymmetry of information flows, but also reveal latent problems of its activities and outline directions for their solution, taking into

account changes in enterprise parameters. In such a consideration, financial and economic diagnostics enables fulfilling of the following tasks (Sokolovskaia, 1995):

- assess the financial and economic parameters of the enterprise;
- assess the balance of its activities;
- identify possible scenarios for the development of financial and economic trends, taking into account the structural interrelationships between the parameters;
- predict the possible consequences of management measures related to the efficiency and effectiveness of production, solvency, sustainability, etc.

It should be noted that the process of economic diagnostics of biofuel consumption implemented in stages at the level of a particular agricultural enterprise, as an integrated economic research, is a part of the mechanism of resourcemanagement of this enterprise, which determines, in particular, what type of competitive struggle - defensive or offensive - is expedient to use in the near future.

Thus, according to Skybytskyi (2009), carrying out of economic diagnostics involves the use of an array of information regarding the results and prospects of the economic activity of the enterprise, its financial and property situation, obtained from internal and external sources. The ability to carry out diagnostics is recognized as the most important and well-founded factors, since access to certain sources of information determines the completeness and reliability of information, the choice of research methods, the correctness of the conclusion drawn from diagnostics (Skybytskyi, 2009).

The set of such indicators should not be broad, as this will greatly complicate the calculation process, increase the time spent on diagnostics, cause a mathematical error, and thus create opportunities for formulating unwarranted and false conclusions (Zubkova, 2008).

Indicators and indices selected for the financial and economic diagnostics of biofuel consumption by agricultural enterprises must meet the following requirements:

- be reliable and detailed, that is, accurately and in detail reflect the real results of economic activity of agricultural enterprises associated with the use of biofuels;
- be specific, that is, reflect the specifics of activity of agricultural enterprises and specifics of biofuel consumption as an energy resource in the agricultural sphere;
- be large-scale, that is characterize all essential functional directions, problems, opportunities and prospects of biofuel consumption by agricultural enterprises;
- be comparable, that is taken during the same period of time.

In the process of economic diagnostics of biofuel consumption by agricultural enterprises special attention should be paid to fluctuations of indicators in time.

3.4. Content and Sequence of Economic Diagnostics of Biofuel Consumption by Agricultural Enterprises

According to the author of this research paper, the economic diagnostics of biofuel consumption by an agricultural enterprise contains the following key evaluation units:

1. assessment of “weak signals” coming to the enterprise. At this stage, a preliminary quantitative and qualitative assessment of the cycle of resources at the enterprise at a certain point in time (static), as well as for a certain period of time (dynamic) is carried out. A preliminary determination of the current place and potential of biofuels in the resource provision of the enterprise also takes place.
2. in-depth diagnostics of the key areas of activity. The set of measures of economic diagnostics at this stage include:

– the parameters of deformations and violation of proportions in the circulation of resources and capital of agricultural enterprises are evaluated, quantitatively in statics and in dynamics, using the current model of provision of resources and using a model based on biofuel consumption. Comparison of the results of evaluation using the given models;
– causes of deviations from expectations and standards, distortions and violations in the proportions of the cycles of the resources circulation of agricultural enterprises, the dynamics of the change of their influence in case of implementation of specific options for the use of biofuels as energy resources for the solution of the problems of operation and development of the enterprise, are determined;

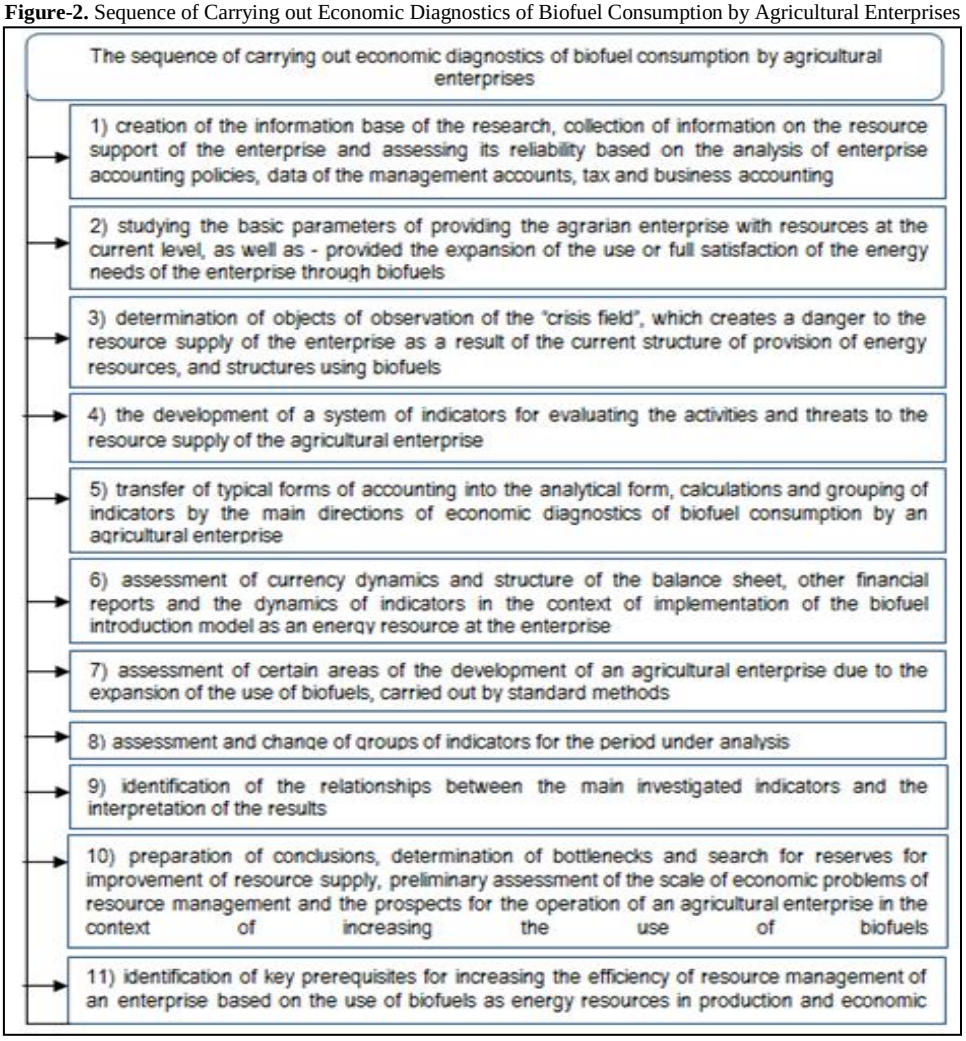
3. identification of opportunities for deepening and ways to solve the economic problems of an agricultural enterprise through the use of biofuels in production and economic activities are determined;
4. generalization of the results of economic diagnostics of biofuel consumption and their impact on the activity (state, development, sustainability of operation) of an agricultural enterprise.

According to the author of this research paper, the economic diagnostics of biofuelconsumption by an agricultural enterprise should be carried out by the following main stages (Figure 2).

The publications on the problems of economic diagnostics of management measures show a number of indicators and coefficients, which, depending on the purpose and tasks of the diagnostics, are grouped according to certain clusters. Analytical approaches to the determination of the financial and economic contour of the enterprise, which were widely used in previous periods, can also be taken into account today to characterize the economic condition of the enterprise. But a significant disadvantage of such a review is that the determination of the correspondence and the deviation from the given plan parameters does not make it possible to determine why certain

indicators have a deviation and how the desired result can be achieved (Herasim *et al.*, 2007; Maliuha, 1998; Shcherbak, 2008; Tsal-Tsalko, 2001; Zarubynskyi, 2002).

Figure-2. Sequence of Carrying out Economic Diagnostics of Biofuel Consumption by Agricultural Enterprises



Source: developed by the author

Currently, agricultural enterprises widely use identification of the economic situation, taking into account aspects such as composition of the balance sheet, capital and solvency. Most methodological approaches involve the use of various identifiers that reflect different aspects of financial and production activities of the enterprise. At the same time, the wider range of identifiers is used, the more controversial the conclusion may be.

Thus, the information and analytical support for economic diagnostics of biofuel consumption by agricultural enterprises has certain problem areas, the key areas being lack of insufficient elaboration of standards for most identifiers. As a result, the economic diagnostic of biofuel consumption by agricultural enterprises is primarily subjective, which negatively affects measures to balance the formation, accumulation and use of resources of agricultural enterprises, the efficiency of resource management.

In order to identify and predict reserve capabilities for stabilizing the resource supply of agricultural enterprises, it is necessary, first of all, identify the causes that affect it, and reveal the intensity of such influence. It is advisable to determine the effects of such an impact with the use of the apparatus for evaluating correlation-regression dependencies, which will help determine the parameters of closeness of the relationship between the investigated processes and form the corresponding regression matrix ($y = a0 + a1 \cdot x1 + a2 \cdot x2 + \ldots\ldots\ldots + an \cdot xn$), which reflects the procedure for building the factors of influence, depending on their intensity (Korpaniuk, 2016b).

3.5. Tools for Economic Diagnostics of Biofuel Consumption by Agrarian Enterprises. Resource Management of an Enterprise on the Basis of This Tools

The tools for economic diagnostics of biofuel use by agricultural enterprises should focus on identifying opportunities for achieving specific goals of sustainable development through characterizing specific factors based on the use of certain resources or potentials. Such factors include: the sphere of activity of the agricultural enterprise; enterprise scale (small, medium, large); stages of the life cycle; conditions of the internal and external environment; mission and formulated goals of enterprise's development; selected development strategies; methods of evaluation; involvement of external (internal) consultants; personal qualities of the manager and his priorities, etc.

Thus, the model of the mechanism of economic diagnostics of biofuel consumption by agricultural enterprises involves taking into account the influence of factors of internal and external environment on the activity of domestic

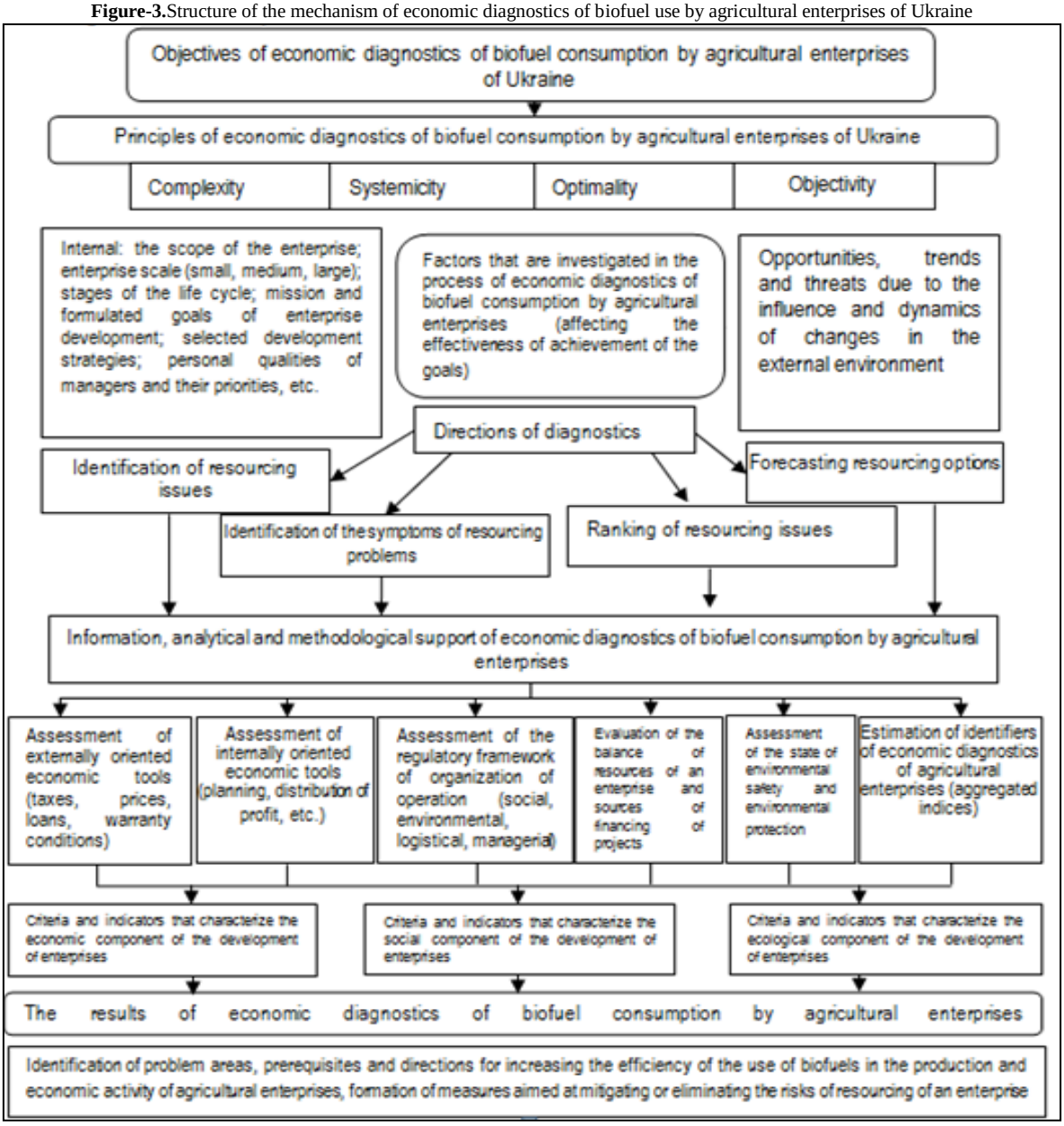
enterprises and allows not only assessing the potential of using biofuels as a type of resources, but also clearly outlining the problem areas and directions of possible increase of the general level of development on the basis choosing a resourcing development option. As a result of the evaluation, deviations from the desired target state are analyzed, a list of measures aimed at minimizing or eliminating developmental risks is formulated, an appropriate strategy of resource provision is proposed and developed.

The mechanism of economic diagnostics of biofuel consumption by agricultural enterprises is a system of goals, principles, criteria (quantitative analogue of objectives) and indicators that allow characterizing quantitatively and qualitatively the factors of influence (elements of the object of management and their relationships, which are influenced to achieve the goals goals) on the possibility of realizing the potential of biofuel use in the production and economic activities of agricultural enterprises. This is possible through the use of a certain methodological basis:

- evaluation methods;
- resources used for evaluation (material and financial, the use of which is implemented by the chosen method of management and ensures achievement of the set evaluation objectives).

The scheme of the mechanism of economic diagnostics of biofuel consumption by agricultural enterprises of Ukraine is presented in Figure 3. This mechanism is a set of ways to assess the economic, social, environmental, organizational and legal components of the socio-ecologo-economic potential of an agricultural enterprise development in the context of the process of improving the resource provision of the enterprise, in accordance with the objectives of resource management.

Figure-3. Structure of the mechanism of economic diagnostics of biofuel use by agricultural enterprises of Ukraine



Source: developed by the author.

The presented mechanism of economic diagnostics of biofuel consumption by agricultural enterprises of Ukraine is oriented on a balanced assessment of the social, economic, ecological subsystems of the enterprise as a basis for effective management of resourcing and development of enterprises. In view of this, this mechanism should be comprehensive and reflect the economic and organizational aspects of an enterprise, being as the source element

of the resource management system of the agricultural enterprise, which is realized through the following main stages:

1. Comprehensive evaluation of the potential of improvement of resourcing of the enterprise based on the results of economic diagnostics of biofuel consumption.
2. Identification of the problems of resourcing and development of agricultural enterprises.
3. Formation of a system of preconditions and directions for increasing the efficiency of biofuel use in the production and economic activity of agricultural enterprises.
4. Formation of a set of measures aimed at minimizing or eliminating the risks of resourcing of an agricultural enterprise.
5. Formation of the strategy of sustainable development of enterprises, which will contain elements aimed at improving the resourcing of the enterprise on the basis of the expansion of biofuel use in its own production and economic practice.

Monitoring of the development of agricultural enterprises in the process and after implementation of the established strategy of sustainable development.

So, the economic diagnostics of biofuel consumption by agricultural enterprises of Ukraine is considered as an organic component of the resource management system of the agricultural enterprise, and is therefore based on the key principles of resource management, which should be an integrated, coordinated approach to the assessment, regulation and planning of measures to increase the efficiency of resourcing and the formation of the fundamentals of the development of enterprises in modern conditions, under the influence of external and internal factors.

4. Discussion and Limitations

The concept of sustainable development has been a guiding principle for humanity for more than two decades and is expanding over time into new spheres of socio-economic life. To some extent this also applies to the energy sector, including the renewable energy sector. Although it is well known and widely accepted that the use of biofuels should also be included in this concept (and the idea of sustainable development of agriculture), in practice there are certain problems in this area.

The concept of sustainable development supports, among other things, the idea that biofuels are renewable, biodegradable and environmentally safe, that allows limiting the dependence on oil resources, as well as create an additional source of demand for agricultural products and wastes that can increase the incomes of agricultural enterprises and promote the development of agriculture and rural areas. In turn, there is a limitation regarding such an optimistic view on biofuel consumption, primarily due to the dubious and controversial situation regarding the reduction of greenhouse gas emissions, as well as the necessity to constantly increase the cultivation area under agricultural crops for the purposes of energy sector. With regard to the economic aspect, the most important problem is the adverse impact of biofuel production on the cost of agricultural products and food products (De Gorter *et al.*, 2013; McPhail and Babcock, 2012; Tyner *et al.*, 2012). The identified problems are restrictions that do not provide for the full fulfilment of the goals of sustainable development of energy and agrarian sector.

The study presented in the research paper largely coincides with the principles of the New Growth Theory, developed by the American economist Romer (1999) in the 1980's (Endogeous Technological Change), which implies the endogenous nature of technological development. The key value of the research paper is an attempt to assess the potential of biofuel consumption by agricultural enterprises in the framework of a certain system, an algorithm of actions embodied in the form of a structured mechanism of economic diagnostics of biofuel consumption by agricultural enterprises of Ukraine, the application of which, in turn, somewhat influences the formation of resource management tools for these enterprises. In this connection, some limitations can be made in applying the results of this research paper, namely, resource management tools that are appropriate to apply in the course of a given economic diagnostics of biofuel consumption by agricultural enterprises in Ukraine may be quite different, therefore the research paper is more abstract in nature and needs further detailing of management and evaluation tools. At the same time, this restriction does not reduce the scientific and practical value of this research paper and characterizes to a greater extent the prospects for further development of scientific results obtained by the author.

5. Conclusions

The economic diagnostics of biofuel consumption by agricultural enterprises is focused on the adoption of harmonious and effective management measures within the resource management process, based on the collected information array and processed analytical data, which are subject to ranking and contribute to the identification of the financial and economic situation, the development of recommendations for prevention or elimination of "problem aspects". In addition, economic diagnostics of biofuel consumption by agricultural enterprises can be considered as an effective tool for informational support for the adoption of management measures for the correction of financial and economic condition and resource provision, as it, due to its significant impact on all economic activities of the enterprise, requires timely control, correction and forecasting.

Structured economic diagnostics of biofuel consumption by agricultural enterprises as part of a certain system, algorithm of actions embodied in the form of assessment mechanism, largely positive effect on the success of the practical application of tools for resource management of agricultural enterprises. It has been determined that the formation of the mechanism of economic diagnostics of biofuel consumption by agricultural enterprises contributes to more efficient organization of processes which ensure the enterprise development in the current economic

conditions, enabling it to adequately respond to the volatility of the market environment and creating conditions for long-term sustainable development.

Creation and implementation of the mechanism for economic diagnostics of biofuel consumption by agricultural enterprises promotes formation of the directions that would make it possible to implement effective measures to ensure effective reproduction of the sustainable development potential of the enterprise, because the hidden unused potential opportunities contribute to adequate responding to environmental variability and establishing development priorities. This feature necessitates developing measures to ensure the sustainable development potential of an agricultural enterprise within the strategy of sustainable development, continuous diagnostics of its components, monitoring and forecasting, which should be based on an integrated approach.

The users of economic diagnostics of biofuel consumption by agricultural enterprises may be various economic entities, who need true and objective information about the state of the resource supply of an agricultural enterprise and who need to determine various threats and risks of its activities. These are, first of all, owners, lessors, managers, employees of the enterprise, that is, those who are interested in the success of the operation of the enterprise, the efficiency of managing its resources. Potential users of the results of economic diagnostics of biofuel consumption by agricultural enterprises are also banks which, in the case of granting loans to enterprises, can apply it to determine the possibilities for timely repayment of credit and payment of interest.

The proposed scheme of implementation of the mechanism of economic diagnostics of biofuel consumption by agricultural enterprises contributes to the formation of a qualitative objective information array and its structuring. This allows timely access to the information about the threats of enterprise resource provision and the formation of a qualitative basis for improving the enterprise resource management system.

The practical implementation of the suggestions and conclusions of this research paper should be considered in the context of their importance to stimulate the development of agricultural enterprises of Ukraine in modern conditions that requires the formation of a certain form of interaction of economic entities within the paradigm and the principles of sustainable development.

The prospects for further research on the basis and using the scientific results of this research paper consist in the analysis, structuring and formalization of models and a balanced system of indicators of economic diagnostics of the use of biofuels and other key energy resources in the activities of agricultural enterprises.

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