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Components of financial mechanism for sustainable development: Theoretical aspect

Abstract. The study aimed to substantiate the theoretical foundations of the financial mechanism for ensuring sustainable development of the agricultural sector. The study analysed scientific approaches to the definition of the essence of the financial mechanism in the context of ensuring sustainable development and formulated a new definition as a complex system of financial relations, which is implemented through a set of interrelated elements aimed at achieving balanced economic growth, social justice and environmental safety. The study defined the structure of the

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financial mechanism, which includes financial methods, levers, instruments, regulatory and information support, and reveals the peculiarities of their application in the agricultural sector, incorporating the specifics. The study established that financial methods form the methodological basis for the functioning of the mechanism, financial levers are the means of implementing the methods, and financial instruments ensure the practical implementation of financial relations. The functions of the financial mechanism (mobilisation, distribution, stimulation, control, stabilisation) were systematised and the specificity in the economic, environmental and social spheres was identified. Based on a comparative analysis of international practices, the study determined that the integration of environmental criteria into Brazil's lending policy reduced greenhouse gas emissions by 10-15% in the agricultural sector, while the Canadian agricultural insurance system reduced the volatility of farm income by 35-40%. The study determined that the Polish Rural Development Programme ensured an increase in the share of organic production from 3.5% to 7.2% in 2015-2020, and in Hungary, more than 12 thousand small farms received access to financing. A system of indicators for assessing the effectiveness of the financial mechanism by three dimensions of sustainability was developed for a comprehensive assessment of performance, incorporating all aspects of sustainable development. The importance of the financial mechanism's adaptability to changing environmental conditions, especially in the context of climate change and market fluctuations, was substantiated. The results obtained can be used to develop strategies and financial programmes for sustainable development of the agricultural sector, incorporating regional specifics

Keywords: financial instruments; greening of production; green financing; investment instruments; triple bottom line; adaptability

INTRODUCTION

The current global challenges related to food security, environmental problems and socio-economic instability are raising the issue of finding new approaches to creating an effective financial mechanism for sustainable development, especially in the agricultural sector. The intensification of agricultural production, unsustainable use of natural resources and growing pressure on ecosystems are driving environmental degradation, soil depletion and loss of biodiversity. These problems are particularly relevant in the agricultural sector, which directly interacts with natural ecosystems and has a significant impact on their condition. At the same time, the agricultural sector is central to ensuring economic growth, rural employment and social development of rural areas. This multifunctionality of the agricultural sector necessitates the search for balanced approaches to its financing that would incorporate not only economic but also environmental and social aspects of development. The agricultural sector is not only a strategically important sector of the economy that ensures national food security but is also central to ensuring balanced economic, social and environmental development. The

transformation of traditional financial mechanisms in line with the principles of sustainable development is becoming an imperative of economic policy in most countries.

The concept of sustainable development, which envisages a harmonious combination of economic, social and environmental aspects, requires the adaptation of existing financial mechanisms to new realities and challenges. This issue is particularly relevant for the agricultural sector, which directly interacts with natural resources and ecosystems. As noted by N. Eisenmenger *et al.* (2020), sustainable development goals often prioritise economic growth, neglecting the environmental dimension, which creates an imbalance in the sustainable development system. Therefore, the development of an effective financial mechanism that incorporates all three dimensions of sustainable development is extremely important.

Many foreign and Ukrainian scholars have studied the theoretical and practical aspects of the financial mechanism for sustainable development. X. Li *et al.* (2019) developed a theoretical framework and mechanism for the formation of a green development system in China,

focusing on the role of financial regulation. The study proposed an integrated system of economic instruments aimed at stimulating environmentally responsible behaviour of business entities and balancing the interests of economic growth and environmental protection. N. Akhtar & A. Rashid (2024) conducted a literature review on the relationship between financial development and sustainable development, identifying the main trends and gaps in this area.

Important aspects of the financial system's impact on sustainable development were studied by I. Szalai & K. Czako (2023), addressing the theoretical framework of sustainable financial development. The study emphasised the need to integrate sustainable financial principles into general economic policy, which creates the basis for further applied research. U.S. Bhutta *et al.* (2022) investigated the role of green bonds in raising finance for environmentally oriented projects. The study emphasised that the development of the green bond market contributes to increased financial sustainability and environmental responsibility in both the public and private sectors. G. Zhou *et al.* (2022) found a correlation between ESG (environmental, social, and governance) indicators and the market value of companies, with financial performance acting as a mediating factor. This suggests that adherence to the principles of sustainable development not only enhances the reputation of companies but also provides real economic benefits.

The Ukrainian scientific community also substantially addressed the financial aspects of sustainable development. R.O. Pridko (2024) emphasised the theoretical foundations of financial support for the development of regions and territorial communities. The study is a significant contribution to the formation of an effective local financial policy in the context of decentralisation and the increased need for sustainable socio-economic growth.

Despite a considerable number of scientific papers on the financial aspects of sustainable development, the issue of forming a comprehensive financial mechanism for ensuring sustainable development of the agricultural sector remains insufficiently researched. There is no unified approach to defining the structure, components and functional interrelationships of

such a mechanism. In addition, the peculiarities of the agricultural sector, such as seasonality of production, dependence on natural and climatic conditions, long production cycles, etc., require adaptation of the general principles of the financial mechanism to the specifics of the industry.

The study aimed to theoretically define the essence, structure and main elements of the financial mechanism that ensures sustainable development of the agricultural sector in the context of modern challenges. To achieve this goal, the following tasks were defined: to clarify the conceptual and categorical apparatus of the study of the financial mechanism of sustainable development; to reveal the relationships between the constituent elements of the financial mechanism and determine their impact on the sustainable development of the agricultural sector; to develop a structural and functional model of the financial mechanism for ensuring sustainable development of the agricultural sector.

MATERIALS AND METHODS

In the process of studying the financial mechanism for ensuring sustainable development in the agricultural sector, a set of scientific methods was applied, which ensured the validity and reliability of the results obtained. The dialectical method was used to study the financial mechanism as a complex economic category in its relationship with the concept of sustainable development. This method was used to analyse the evolution of views on the financial mechanism and its transformation based on the principles of sustainability. To determine the essence and content of the concepts of "financial mechanism", "sustainable development", and "financial support for sustainable development", the terminological analysis was used. This method was used to systematise scientific views and formulate the author's approach to the categories under study.

The system-structural analysis was used to determine the structure and interrelationships between the individual elements of the financial mechanism for ensuring the sustainable development of the agricultural sector. This method was used to identify functional links between financial methods, levers, instruments and other components of the mechanism. To identify the peculiarities of the formation and functioning of

the financial mechanism in the agricultural sector, a comparative analysis was applied, which was used to compare different approaches to financial support for sustainable development in different sectors of the economy and countries. The comparison criteria included the degree of integration of environmental and social aspects into financial mechanisms, the level of development of “green” financial instruments, and mechanisms for stimulating the greening of agricultural production. The method of scientific abstraction was used to identify the most important features and interrelationships in the financial mechanism for ensuring sustainable development, abstracting from unimportant details. This was used to form a conceptual vision of the problem under study. During the study, the best international practices of formation and functioning of financial mechanisms for ensuring sustainable development, including in the agricultural sector, were considered. In particular, the experience of Brazil (Banco do Brasil, 2024), Canada (Agriculture and Agri-Food Canada, 2023; 2024), Poland (Kalinowski & Łuczka, 2021), and Hungary (International Business Information Management Association, 2020) was analysed.

To form a structural and functional model of the financial mechanism for ensuring sustainable development of the agricultural sector, the modelling method was used. The developed model incorporated the specifics of the agricultural sector and the interaction of economic, social and environmental factors in the context of sustainable development. The information base of the study was formed on the scientific works of Ukrainian and foreign scholars on the financial mechanism, sustainable development and its financial support, in the agricultural sector. Particular attention was paid to

the analysis of current research for 2019–2024 the works of U.S. Bhutta *et al.* (2022), G. Zhou *et al.* (2022), which incorporated current trends in the development of financial mechanisms in the context of sustainable development. The selection of scientific sources covered the scientific value and relevance of the research topic, and the results presented.

The theoretical basis of the study included the fundamental provisions of economic theory, finance theory, the concept of sustainable development and the green economy. The use of a wide range of scientific sources ensured the complexity and comprehensiveness of the study, as well as the validity of the results and conclusions. The study analysed the studies of leading researchers, including V. Naciti (2019), N. Eisenmenger *et al.* (2020), J.S. Appannan *et al.* (2023), as well as Ukrainian scientists R.O. Pridko (2024), incorporating both the global and Ukrainian experience in the field of financial support for sustainable development. The study was based on the analysis of scientific publications in leading international journals, which provided a comprehensive approach to the study of the financial mechanism for ensuring sustainable development of the agricultural sector.

RESULTS

Theoretical foundations of the financial mechanism for ensuring sustainable development of the agricultural sector

An analysis of scientific approaches to defining the essence of the financial mechanism for sustainable development has revealed a variety of views on its structure and components. The study systematised the main approaches to the analysis of financial mechanisms in the context of sustainable development (Table 1).

Table 1. Scientific approaches to the definition of the essence of the financial mechanism for sustainable development

Determination of financial mechanism for sustainable development	Key elements
A system of financial methods, instruments and levers aimed at mobilising financial resources to ensure balanced economic, social and environmental development	Financial methods, instruments, levers, economic, social and environmental components
A set of interrelated financial relations that ensure the formation, distribution and use of financial resources to achieve sustainable development goals	Financial relations, formation, distribution and use of financial resources, sustainable development goals

Table 1, Continued

Determination of financial mechanism for sustainable development	Key elements
A set of forms of organisation of financial relations, methods of formation and use of financial resources that provide a triple impact on the social, economic and environmental aspects of development	Forms of organisation of financial relations, methods of formation and use of resources, triple impact
A financial flow management system aimed at ensuring the coordinated development of economic, social and environmental components, considering the interests of future generations	Managing financial flows, sustainable development, and the interests of future generations
Organisational and economic forms of implementation of financial relations, including methods, tools and levers of influence on socio-ecological and economic processes to balance them	Organisational and economic form, methods, tools, levers of influence, balancing processes

Source: compiled by the authors based on V. Naciti (2019), A.G. Scherer & C. Voegtlin (2020), G. Zhou *et al.* (2022), I. Szalai & K. Czako (2023), L. Qing *et al.* (2024)

An analysis of the scientific approaches presented in Table 1 demonstrated a variety of interpretations of the financial mechanism for sustainable development. The common features of most definitions are the systemic nature of the mechanism; focus on ensuring the balanced development of economic, social and environmental components; availability of financial methods, instruments and levers as the main elements of the mechanism; and emphasis on achieving the goals of sustainable development.

Expanding on the previous analysis, it is worth noting that a comparative analysis of the practices of financial support for sustainable development in the agricultural sector in different countries of the world demonstrates a variety of approaches and instruments adapted to specific socio-economic and environmental conditions. The experience of Brazil shows the effectiveness of integrating environmental criteria into credit policy, where the Bank of Brazil has implemented a special ABC (Agricultura de Baixo Carbono) programme, which provides concessional financing for low-carbon agriculture with interest rates 2-4% below market rates, which has contributed to a 10-15% reduction in greenhouse gas emissions in the country's agricultural sector (Banco do Brasil, 2024). Poland demonstrates a successful example of combining national and European financial instruments, through the Rural Development Programme, which finances not only the modernisation of agricultural production but also environmental projects, organic farming, and the development of non-agricultural activities in rural areas. According to

a study by S. Kalinowski & W. Łuczka (2021), this increased the share of organic production in Poland from 3.5% to 7.2% in 2015-2020 and contributed to the diversification of rural incomes.

Canada's experience is notable for the well-developed agricultural insurance and risk management system adapted to climate change. The AgriInsurance programme provides comprehensive protection against production risks, including extreme weather events, and the Agri-Invest programme supports farmers in building financial reserves in case of adverse conditions. According to a study by Agriculture and Agri-Food Canada (2023; 2024), this system reduced the volatility of farm incomes by 35-40% and stimulated the introduction of adaptive technologies. Hungary's experience is valuable in introducing innovative financial instruments for small farms, including microcredit and financial cooperatives. According to the International Business Information Management Association (2020), the Hungarian Rural Development Fund, which combines public and private investments, has provided access to finance for more than 12,000 small farms, which has contributed to the preservation of traditional farming methods and agrobiodiversity.

These international examples demonstrate that an effective financial mechanism for ensuring sustainable development of the agricultural sector must take into account specific factors: the seasonality of production, which requires flexibility of financial flows; the long-term nature of the reproduction of natural resources (soil, water resources), which necessitates strategic

planning; high dependence on climatic factors, requiring the integration of risk management mechanisms; and the multifunctionality of agriculture, which not only provides food production but also supports rural areas, preserves agroecosystems and cultural heritage. These features require the development of specialised financial instruments and mechanisms capable of balancing the economic, environmental and social aspects of agricultural sector development (Farm Europe, 2022; CropLife Brasil, 2024).

The financial mechanism for ensuring the sustainable development of the agricultural

sector is a complex system of financial relations implemented through a set of interrelated financial methods, levers, instruments and regulatory and legal support, the functioning of which is aimed at mobilising, distributing and efficiently using financial resources to achieve balanced economic growth, social justice and environmental safety in the agricultural sector. The study of the structure of the financial mechanism for ensuring sustainable development of the agricultural sector identified its main components and the interrelationships between them (Table 2).

Table 2. Components of the financial mechanism for ensuring sustainable development of the agricultural sector

Group of elements	Component elements	Examples of the agricultural sector
Financial methods	Financial planning Financial forecasting Financial regulation Financial control Financial support Financial incentives	Planning of environmental investments Forecasting financial results from the implementation of environmental technologies Regulating the use of natural resources Monitoring environmental performance Green projects financing Promoting environmentally responsible management
Financial leverage	Taxes and fees Subsidies and grants Environmental payments Financial sanctions Interest rates Pricing policy	Tax benefits for organic producers Subsidies for environmentally friendly technologies Payment for ecosystem services Fines for environmental pollution Preferential loan rates for green projects Price premiums for environmentally friendly products
Financial instruments	Green bonds Environmental loans Insurance products Eco-leasing Futures contracts ESG investments	Agricultural green bonds Loans for environmental projects Insurance against climate risks Leasing of energy-efficient equipment Futures on organic products ESG investing in the agricultural sector
Information support	Financial statements Environmental reporting Information and analytical systems Databases Monitoring systems Rating systems	Integrated financial statements Sustainability reporting Information systems for environmental monitoring Databases on the environmental performance of farms Systems for monitoring the use of natural resources ESG ratings of agricultural enterprises

Source: compiled by the authors based on A.G. Scherer & C. Voegtlin (2020), X. Chen & Z. Chen (2021), Y. Yang et al. (2021), M. Shahzad et al. (2022), Y. Su & Q.M. Fan (2022)

The constituent elements of the financial mechanism for ensuring sustainable development of the agricultural sector form an integral system, the elements of which interact with each other and are aimed at achieving a balanced economic, social and environmental

development. The results of the study structured the components of the financial mechanism by functional groups. Financial methods (planning, forecasting, regulation, control, provision, and incentives) form the methodological basis for the functioning of the financial mechanism.

Functional features of the financial mechanism for ensuring sustainable development of the agricultural sector

Further study of the financial mechanism for ensuring sustainable development of the agricultural sector involves identifying the functional features and patterns of interaction

of its elements in the process of ensuring economic, social and environmental aspects of sustainable development. For systemic analysis, the functions of the financial mechanism were structured by the areas of influence on the sustainable development of the agricultural sector (Table 3).

Table 3. Functions of the financial mechanism for ensuring sustainable development of the agricultural sector

Functions	Manifestation in the economic sphere	Manifestation in the environmental field	Manifestation in the social sphere
Mobilisation	Attracting financial resources to modernise production and introduce innovative technologies	Accumulation of funds to finance environmental protection measures and environmental projects	Formation of a financial base for the development of social infrastructure in rural areas
Distribution	Allocation of financial resources between agricultural production sectors based on economic efficiency	Allocation of funds for greening production processes and restoring natural resources	Redistribution of financial resources to support socially vulnerable groups in rural areas
Stimulating	Encourage investment in high-performance and resource-saving technologies	Stimulating the implementation of environmentally friendly management practices	Motivation to create new jobs and improve the quality of life in rural areas
Control	Monitoring the efficiency of financial resources and achievement of economic results	Monitoring compliance with environmental regulations and production standards	Overseeing the implementation of social commitments and rural community development programmes
Stabilisation	Ensuring the financial stability of agricultural enterprises and reducing market risks	Reducing negative environmental impact and adapting to climate change	Promoting social stability and reducing migration from rural areas

Source: compiled by the authors based on J. Mensah (2019), N. Chams & J. García-Blandón (2019), M.P. Johnson & S. Schaltegger (2020), C. Jiakui *et al.* (2023)

The analysis of the functional aspect of the financial mechanism presented in Table 3 demonstrates the complex nature of the impact on all components of sustainable development. The introduction of comprehensive systems for monitoring and evaluating financial flows in the agricultural sector contributes to increasing the transparency and efficiency of sustainable development financing. The conducted research formulated a conceptual model of the interaction of elements of the financial mechanism for ensuring sustainable development of the agricultural sector (Fig. 1). This model is based on a systematic approach that considers the financial mechanism as an integral system of interrelated elements, the functioning of which aims to achieve the triple goal of sustainable

development – economic growth, social justice and environmental safety.

The effectiveness of the financial mechanism for ensuring sustainable development of the agricultural sector largely depends on the nature of the interaction of its elements. The study determined that the coherence of the use of financial methods, levers and instruments in the context of sustainable development is of particular importance. Financial methods, such as planning, forecasting and regulation, form the basic principles of the financial mechanism and determine the strategic directions of its development. In the agricultural sector, long-term financial planning is of particular importance, incorporating not only economic indicators but also the environmental and social impact of

decisions. Financial forecasting in the context of sustainable development should consider long-term environmental trends, such as climate

change, soil degradation and biodiversity loss, as well as social aspects related to demographic changes and rural development.

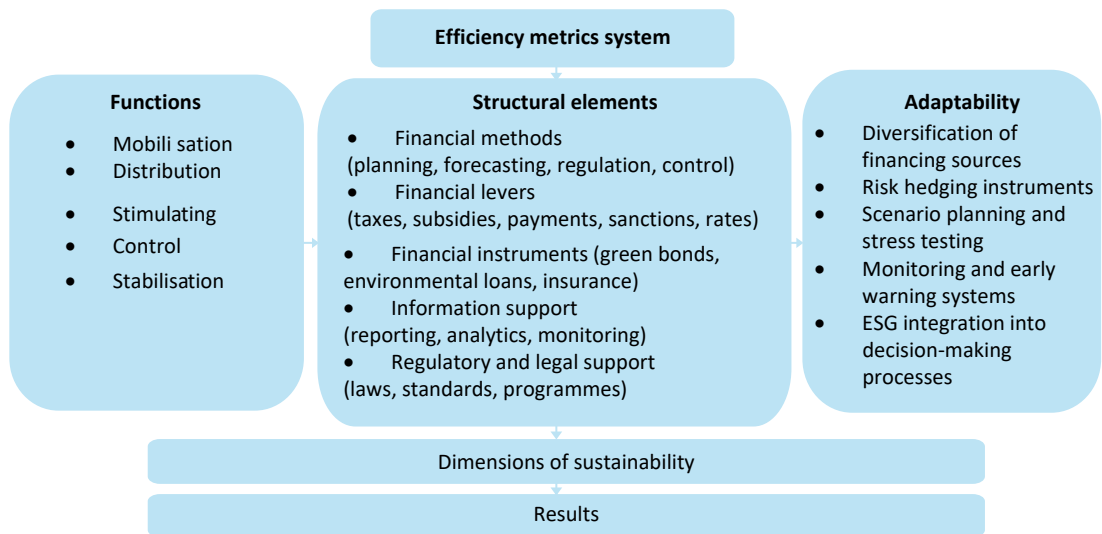


Figure 1. Integrated structural and functional model of the financial mechanism for ensuring sustainable development of the agricultural sector

Source: compiled by the authors

Financial levers can be used to implement financial methods and provide a direct impact on various aspects of sustainable development. In the context of the agricultural sector, financial levers such as environmental taxes, green subsidies, and preferential lending rates for environmentally oriented projects are of particular importance. The effectiveness of financial levers is determined by their ability to create economic incentives for the transition to more sustainable business models without excessive administrative pressure.

Financial instruments ensure the practical implementation of financial relations in the process of ensuring sustainable development. Green bonds, environmental loans, and climate risk insurance products are becoming increasingly popular instruments for financing the sustainable development of the agricultural sector. An important trend is the development of innovative financial instruments, such as payments for ecosystem services, which create economic incentives for the conservation and restoration of natural ecosystems.

Information support is central to the functioning of the financial mechanism, especially in the context of the growing importance of environmental and social aspects of sustainable development. Integrated financial and non-financial reporting, environmental monitoring and environmental impact assessment systems are becoming essential elements of the information infrastructure of the financial mechanism for sustainable development.

An important aspect of the functioning of the financial mechanism is its adaptability to changing environmental conditions. In the context of growing uncertainty associated with climate change, global market fluctuations, and geopolitical crises, adaptability becomes a critical feature of a financial mechanism. An adaptive financial mechanism should be able to quickly reconfigure its elements in response to changes in the external environment while maintaining a strategic focus on sustainable development. This flexibility is achieved through the diversification of funding sources, the introduction of innovative risk-hedging instruments,

and the creation of reserve funds to finance climate change adaptation measures. In addition, an important element of adaptability is the development of scenario planning and stress testing of financial mechanisms to ensure resilience to various types of shocks, including extreme weather events, market crises and changes in the regulatory environment. Continuous monitoring of key sustainability indicators and early warning of potential risks ensure timely adjustment of financial instruments and reallocation of resources in line with new priorities.

Implementation of the concept of sustainable development in the agricultural sector requires a transformation of the traditional financial mechanism to consider environmental and social aspects. This transformation involves not only expanding the range of financial instruments but also changing the paradigm of financial management, which should incorporate the long-term consequences of financial decisions for ecosystems and society.

DISCUSSION

The results of the study of the structure and functional features of the financial mechanism for ensuring sustainable development of the agricultural sector formulated several important conclusions and generalisations that are of both theoretical and practical importance. The proposed definition of the financial mechanism for ensuring sustainable development of the agricultural sector is consistent with modern scientific approaches to this category.

The constituent elements of the financial mechanism identified in the study (financial methods, levers, instruments, information support) correlate with the structure developed by F. Gangi *et al.* (2019), who emphasise the systemic nature of the financial mechanism and the interdependence of its elements. They find that banks that actively integrate environmental responsibility principles into their operational mechanisms demonstrate lower levels of risk, which is particularly important for agricultural financing. However, in contrast to the study, the presented research addressed the specifics of the agricultural sector and the peculiarities of using financial instruments in the context of sustainable agriculture. Complementing these

conclusions, M. Shahzad *et al.* (2022) noted that the structure of the financial mechanism should consider not only sectoral specifics but also innovation processes to accelerate the transition to sustainable management practices.

The functional analysis of the financial mechanism presented in the study extends the traditional definition of its functions to include environmental and social dimensions. M.P. Johnson & S. Schaltegger (2020) also emphasised the need to rethink the functional role of financial mechanisms in the context of global challenges of sustainable development, considering entrepreneurship as a catalyst for systemic change. Developing the thesis, X. Yin *et al.* (2022) proposed the concept of “rural innovation systems” that integrate financial mechanisms into the broader ecosystem of sustainable rural development. The study emphasised the importance of innovative approaches to finance that go beyond the traditional logic of financial markets and incorporate the specifics of rural communities.

The proposed system of indicators for assessing the effectiveness of the financial mechanism for ensuring the sustainable development of the agricultural sector was reflected by M.A. Khan *et al.* (2022), who emphasised the importance of an integrated approach to assessing the effectiveness of green finance. However, in contrast to the study, the present research offered a more detailed system of indicators adapted to the specifics of the agricultural sector. This idea was developed by R. Xie *et al.* (2021), who emphasised the need to consider the spatial aspects of financial agglomeration when assessing its impact on green productivity. The study proposed an econometric modelling methodology that incorporates the spatial effects of financial decisions on environmental sustainability. This approach is particularly relevant for the agricultural sector, where the interaction between economic, environmental and social factors has a pronounced territorial character.

The concept of financial mechanism adaptability presented in the study resonates with the ideas expressed in a study by X. Yin & Z. Xu (2022) on the relationship between green finance and economic growth, demonstrating the significant potential for synergies between

them if properly coordinated. The study demonstrated that financial mechanisms that integrate the principles of sustainable development often demonstrate higher economic efficiency in the long run. This thesis is of particular importance for the agricultural sector, which is characterised by long investment cycles and high dependence on natural and climatic conditions.

The potential of innovative financial instruments, such as green bonds and payments for ecosystem services, identified in the study, was confirmed by Y. Su & Q.M. Fan (2022) in an analysis of the role of technological innovation in green development. However, the study addressed the specifics of applying these instruments in the agricultural sector, given its unique characteristics and challenges. Developing the idea, Y. Yang *et al.* (2021) conducted an empirical analysis of the relationship between green finance, fintech, and quality economic development, demonstrating the significant potential of digital technologies to improve the efficiency of financial mechanisms for sustainable development. The study also emphasised the importance of institutional innovation and public-private partnerships in bridging investment gaps in sustainable agriculture.

A significant achievement of the study is the development of a structural and functional model of the financial mechanism for ensuring sustainable development of the agricultural sector, which integrates economic, environmental and social aspects. This model complements the conceptual framework proposed by N. Chams & J. García-Blandón (2019) by adding agricultural specificity and focusing on the role of financial instruments in ensuring sustainable development. Expanding on this idea, C. Yang *et al.* (2020) proposed a methodology for assessing the coordination of geo-environmental development and urbanisation that can be adapted to assess the interaction between financial mechanisms and sustainable development of agricultural areas. The study demonstrated that the effectiveness of a financial mechanism depends not only on the availability of relevant elements but also on coordinated interaction in spatial and temporal dimensions.

Comparing the results of the study with the results of J. Howard-Grenville *et al.* (2019), it is

possible to note the commonality of approaches to the need to transform traditional management mechanisms following the principles of sustainable development. However, the study offers a more detailed analysis of the constituent elements of the financial mechanism and their interaction in the context of ensuring sustainable development of the agricultural sector. Complementing this idea, C. Tolliver *et al.* (2021) analysed green innovation and finance in the Asian context, emphasising the importance of regional specificity in shaping financial mechanisms for sustainable development. The study demonstrated the significant potential for integrating traditional and innovative approaches to finance, which is especially relevant for the agricultural sector with its rich cultural heritage and deeply rooted management practices.

Additional analysis presented in modern studies expanded the definition of certain aspects of the financial mechanism for ensuring sustainable development of the agricultural sector. The study by J.S. Appannan *et al.* (2023), which substantiated the relationship between sustainable development strategies, environmental management accounting systems, and environmental indicators, is noteworthy. The study empirically confirmed that the introduction of effective environmental accounting systems significantly improves the monitoring and control of financial flows related to the environmental aspects of agricultural enterprises. This is consistent with the conclusions about the need to develop information support for the financial mechanism as an important condition for its effective functioning.

Analysing the technological aspects of the financial mechanism, it is worth analysing the study by C. Jiakui *et al.* (2023) on the correlation between green technological innovation, green finance and financial development. The empirical results demonstrated that green finance is an important intermediary between innovation and productivity, especially in regions with high levels of economic development. This suggests the need for a differentiated approach to the formation of the financial mechanism depending on the level of development of the region, which is especially relevant for the agricultural sector with its significant regional differences.

An important aspect of sustainable development is the digitalisation of the economy, which creates new opportunities for the financial mechanism. K. Luo *et al.* (2022) studied the impact of the digital economy on the efficiency of green development. The study determined that the digital economy has a significant positive impact on the effectiveness of green development through the mechanisms of technological innovation, structural optimisation, and institutional change. This confirmed the thesis that it is necessary to introduce digital technologies into the financial mechanism for ensuring sustainable development of the agricultural sector.

Related to digitalisation is the development of financial inclusion, which is of particular importance for the agricultural sector with its geographical dispersion and large share of small producers. L.Y. Tay *et al.* (2022) considered digital financial inclusion as an important tool for sustainable development. The study demonstrated that digital financial inclusion contributes to economic growth, poverty reduction, and social inclusion by providing access to financial services for vulnerable groups. In the context of the agricultural sector, there is a need to develop accessible digital financial services tailored to the needs of farmers and rural populations. Y. Yang *et al.* (2021) broadened the concept of the relationship between green finance, fintech, and quality economic development. The study demonstrated that the effectiveness of green finance is significantly enhanced when integrated with fintech solutions that provide better risk management and more accurate assessment of environmental projects. This confirms the need to develop innovative financial instruments that combine the advantages of traditional financial mechanisms with the capabilities of modern technologies.

The contribution of X. Yin & Z. Xu (2022), proposing a methodology for empirically analysing the relationship and coordination of green finance and economic growth. The study argued that there is a two-way causal relationship between green finance and economic growth, but that effective coordination between financial and environmental policies is needed to realise this potential. The researchers highlighted the spatial aspect of green finance development, noting the uneven implementation of green

finance in different regions and proposing a model for assessing coordination development that identifies the stages of interaction between financial mechanisms and economic growth.

J. Howard-Grenville *et al.* (2019) noted that sustainable development requires fundamental changes in organisational and management practices, not just superficial adaptations of existing business models. The study emphasised the need to integrate sustainability principles into all aspects of organisations' activities, including financial management, which is particularly relevant for the agricultural sector with its complex impact on ecosystems. J. Mensah (2019) developed the idea, emphasising adaptability as a key characteristic of sustainable development systems that can effectively respond to external challenges and internal transformations without losing functionality.

Additionally, the study by X. Chen & Z. Chen (2021) confirmed the positive impact of green finance development on carbon emissions reduction based on an empirical analysis of data from 30 Chinese provinces. The authors found that a 1% increase in investment in green finance leads to a 0.34-0.41% reduction in carbon emissions, with this effect increasing over time and being regionally specific. The impact is especially significant in regions with a high level of industrialisation and urbanisation, which indicates the need for a differentiated approach to the formation of financial mechanisms for sustainable development.

M.A. Khan *et al.* (2022) emphasised the need for an empirical assessment of the effectiveness of green financial instruments, noting that the impact on sustainable development can vary significantly depending on the institutional environment, level of economic development, and sectoral specifics. Based on a meta-analysis of empirical studies, the study developed a comprehensive methodology for assessing the effectiveness of green finance, which includes three groups of indicators: financial and economic, environmental and social. Such an integrated approach can identify not only direct but also indirect effects of green finance on various aspects of sustainable development, which is especially important for the agricultural sector with its multifunctional nature.

I. Oleksandrenko & R. Levis (2023) investigated the theoretical foundations of managing the financial security of agricultural enterprises, emphasising risks, liquidity, and strategic planning. The study emphasised the importance of using financial instruments and adapting to the specifics of the agricultural sector, in particular price volatility and weather factors. In the context of the agricultural sector, the study by S. Kalinowski & W. Łuczka (2021) on the analysis of the policy of supporting organic farming in the context of sustainable development in the example of Poland, is noteworthy. The researchers determined that the integration of financial instruments of the EU's Common Agricultural Policy with national support mechanisms increased the area under organic production by 107% during 2015-2020, creating a multiplier effect for the rural economy. The study emphasised the importance of a comprehensive approach that combines financial support with the development of market infrastructure, advisory services and certification systems, forming a holistic ecosystem for the development of organic agriculture.

The study by R.O. Pridko (2024) on financial mechanisms to support regional development complements this analysis by focusing on the territorial aspect of sustainable development. The study developed a conceptual model of financial support for the development of regions and communities, which incorporates endogenous potential, institutional capacity and interregional interactions. Particular attention is paid to the mechanisms of fiscal decentralisation and budgetary equalisation, which ensure the financial autonomy of territorial communities and stimulate their self-development. This concept is of particular importance for the agricultural sector, where the development of production is inextricably linked to the development of rural areas and the quality of life of the rural population.

An important aspect of the formation of a financial mechanism for ensuring sustainable development is the role of corporate governance, which was analysed in detail by J.S. Appannan *et al.* (2023). The study investigated the relationship between sustainable development strategies, environmental management accounting systems, and environmental performance of

companies. Based on an empirical analysis of data from 278 companies operating in environmentally sensitive sectors, including agriculture, the study determined that the introduction of environmental management accounting enhances the positive impact of sustainable development strategies on environmental performance by 23-27%. The integration of environmental criteria into the system of budgeting, strategic planning and investment project evaluation proved to be particularly effective, in identifying hidden environmental costs and benefits.

Summing up the results of the discussion, it is possible to note that the study of the financial mechanism for ensuring sustainable development of the agricultural sector is at the intersection of several important scientific areas: the theory of finance, the concept of sustainable development and agricultural economics. The integration of these areas formulated a comprehensive vision of the transformation of financial relations in the agricultural sector based on sustainability, and the proposed conceptual model can be used as a theoretical basis for further research and practical developments in this area.

CONCLUSIONS

The study theoretically substantiated the essence, structure and constituent elements of the financial mechanism for ensuring sustainable development of the agricultural sector in modern conditions. Based on the generalisation of scientific approaches to the definition of the financial mechanism for ensuring sustainable development, the study formulated a unique definition as a complex system of financial relations implemented through a set of interrelated financial methods, instruments and regulatory and legal support, the functioning of which is aimed at mobilising, distributing and efficiently using financial resources to achieve balanced economic growth, social justice and environmental safety in the agrarian sector.

The structure of the financial mechanism for ensuring the sustainable development of the agricultural sector was defined, which includes five groups of interrelated elements: financial methods (planning, forecasting, regulation, control, provision, stimulation); financial levers (taxes, subsidies, environmental payments,

sanctions, interest rates, pricing policy); financial instruments (green bonds, environmental loans, insurance products, eco-leasing, futures contracts, ESG investments); regulatory and legal support; information support. The functional features of the financial mechanism for ensuring sustainable development of the agricultural sector are disclosed by defining five main functions: mobilisation, distribution, stimulation, control and stabilisation, and their manifestation in the economic, environmental and social spheres.

The study developed a system of indicators for assessing the effectiveness of the financial mechanism for ensuring sustainable development of the agricultural sector, which includes three groups of indicators: economic (profitability of agricultural enterprises, volume of investment in innovative projects, labour productivity, etc.); environmental (greenhouse gas emissions per unit of output, share of land under organic production, energy efficiency of production, etc.); social (level of employment of the rural population, ratio of wages in the agricultural sector to the average in the economy, level of development of social infrastructure in rural areas, etc.).

The importance of the adaptability of the financial mechanism to changing environmental conditions is substantiated. The study determined that in the context of growing uncertainty associated with climate change, global market fluctuations and geopolitical crises, adaptability is achieved through diversification of funding sources, introduction of innovative risk hedging instruments and creation of reserve funds to finance climate change adaptation measures, as well as development of scenario planning and stress testing of financial mechanisms. Prospects for further research are to adapt and improve financial mechanisms to support sustainable agriculture, considering the specifics of individual regions and countries.

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REFERENCES

- [1] Agriculture and Agri-Food Canada. (2023). *Evaluation of AgriInsurance Program*. Retrieved from <https://surl.li/jeeyuo>.
- [2] Agriculture and Agri-Food Canada. (2024). *AgriInsurance Program*. Retrieved from <https://agriculture.canada.ca/en/programs/agriinsurance>.
- [3] Akhtar, N., & Rashid, A. (2024). Financial development and sustainable development: A review of literature. *Sustainable Development*, 32(6), 7114-7139. doi:10.1002/sd.3068.
- [4] Appannan, J.S., Mohd Said, R., Ong, T.S., & Senik, R. (2023). Promoting sustainable development through strategies, environmental management accounting and environmental performance. *Business Strategy and the Environment*, 32(4), 1914-1930. doi:10.1002/bse.3227.
- [5] Banco do Brasil. (2024). *Agricultura de Baixo Carbono - ABC+*. Retrieved from [https://www.bb.com.br/pbb/pagina-inicial/agronegocios/agronegocio---produtos-e-servicos/credito/investir-em-sua-atividade/agricultura-de-baixo-carbono-\(abc+\)](https://www.bb.com.br/pbb/pagina-inicial/agronegocios/agronegocio---produtos-e-servicos/credito/investir-em-sua-atividade/agricultura-de-baixo-carbono-(abc+)).
- [6] Bhutta, U.S., Tariq, A., Farrukh, M., Raza, A., & Iqbal, M.K. (2022). Green bonds for sustainable development: Review of literature on development and impact of green bonds. *Technological Forecasting and Social Change*, 175, article number 121378. doi:10.1016/j.techfore.2021.121378.
- [7] Chams, N., & García-Blandón, J. (2019). On the importance of sustainable human resource management for the adoption of sustainable development goals. *Resources, Conservation and Recycling*, 141, 109-122. doi:10.1016/j.resconrec.2018.10.006.
- [8] Chen, X., & Chen, Z. (2021). Can green finance development reduce carbon emissions? Empirical evidence from 30 Chinese provinces. *Sustainability*, 13(21), article number 12137. doi:10.3390/su132112137.
- [9] CropLife Brasil. (2024). *Plano ABC+: A principal estratégia brasileira de produção de alimentos e geração de co-benefícios na agenda climática*. Retrieved from <https://croplifebrasil.org/plano-abc/>.

- [10] Eisenmenger, N., Pichler, M., Krenmayr, N., Noll, D., Plank, B., Schalmann, E., Plank, B., Schalmann, E., Wandl, M.-T., & Gingrich, S. (2020). The Sustainable Development Goals prioritize economic growth over sustainable resource use: A critical reflection on the SDGs from a socio-ecological perspective. *Sustainability Science*, 15(4), 1101-1110. doi: [10.1007/s11625-020-00813-x](https://doi.org/10.1007/s11625-020-00813-x).
- [11] Farm Europe. (2022). *Poland – CAP National Strategic Plan*. Retrieved from <https://www.farm-europe.eu/2022/02/>.
- [12] Gangi, F., Meles, A., D'Angelo, E., & Daniele, L.M. (2019). Sustainable development and corporate governance in the financial system: Are environmentally friendly banks less risky? *Corporate Social Responsibility and Environmental Management*, 26(3), 529-547. doi: [10.1002/csr.1699](https://doi.org/10.1002/csr.1699).
- [13] Howard-Grenville, J., Davis, G.F., Dyllick, T., Miller, C.C., Thau, S., & Tsui, A.S. (2019). Sustainable development for a better world: Contributions of leadership, management, and organizations. *Academy of Management Discoveries*, 5(4), 355-366. doi: [10.5465/amd.2019.0275](https://doi.org/10.5465/amd.2019.0275).
- [14] Jiakui, C., Abbas, J., Najam, H., Liu, J., & Abbas, J. (2023). Green technological innovation, green finance, and financial development and their role in green total factor productivity: Empirical insights from China. *Journal of Cleaner Production*, 382, article number 135131. doi: [10.1016/j.jclepro.2022.135131](https://doi.org/10.1016/j.jclepro.2022.135131).
- [15] Johnson, M.P., & Schaltegger, S. (2020). Entrepreneurship for sustainable development: A review and multilevel causal mechanism framework. *Entrepreneurship Theory and Practice*, 44(6), 1141-1173. doi: [10.1177/1042258719885368](https://doi.org/10.1177/1042258719885368).
- [16] Kalinowski, S., & Łuczka, W. (2021). Organic farming support policy in a sustainable development context: A Polish case study. *Energies*, 14(14), article number 4208. doi: [10.3390/en14144208](https://doi.org/10.3390/en14144208).
- [17] Khan, M.A., Riaz, H., Ahmed, M., & Saeed, A. (2022). Does green finance really deliver what is expected? An empirical perspective. *Borsa Istanbul Review*, 22(3), 586-593. doi: [10.1016/j.bir.2021.07.006](https://doi.org/10.1016/j.bir.2021.07.006).
- [18] Li, X., Du, J., & Long, H. (2019). Theoretical framework and formation mechanism of the green development system model in China. *Environmental Development*, 32, article number 100465. doi: [10.1016/j.envdev.2019.100465](https://doi.org/10.1016/j.envdev.2019.100465).
- [19] Luo, K., Liu, Y., Chen, P.F., & Zeng, M. (2022). Assessing the impact of digital economy on green development efficiency in the Yangtze River Economic Belt. *Energy Economics*, 112, article number 106127. doi: [10.1016/j.eneco.2022.106127](https://doi.org/10.1016/j.eneco.2022.106127).
- [20] Mensah, J. (2019). Sustainable development: Meaning, history, principles, pillars, and implications for human action: Literature review. *Cogent Social Sciences*, 5(1), article number 1653531. doi: [10.1080/23311886.2019.1653531](https://doi.org/10.1080/23311886.2019.1653531).
- [21] Naciti, V. (2019). Corporate governance and board of directors: The effect of a board composition on firm sustainability performance. *Journal of Cleaner Production*, 237, article number 117727. doi: [10.1016/j.jclepro.2019.117727](https://doi.org/10.1016/j.jclepro.2019.117727).
- [22] Oleksandrenko, I., & Levis, R. (2023). Theoretical principles of management of financial security of agricultural sector enterprises. *Economic Forum*, 13(3), 141-147. doi: [10.36910/6775-2308-8559-2023-3-18](https://doi.org/10.36910/6775-2308-8559-2023-3-18).
- [23] Pridko, R.O. (2024). Fundamentals of financial support for the development of regions and communities: Theoretical aspect. *Scientific Bulletin of Uzhhorod University. Economics Series*, 1(63), 136-142. doi: [10.24144/2409-6857.2024.1\(63\)136-142](https://doi.org/10.24144/2409-6857.2024.1(63)136-142).
- [24] Qing, L., Abbas, J., Najam, H., Ma, X., & Dagestani, A.A. (2024). Investment in renewable energy and green financing and their role in achieving carbon-neutrality and economic sustainability: Insights from Asian region. *Renewable Energy*, 221, article number 119830. doi: [10.1016/j.renene.2023.119830](https://doi.org/10.1016/j.renene.2023.119830).
- [25] Scherer, A.G., & Voegtlin, C. (2020). Corporate governance for responsible innovation: Approaches to corporate governance and their implications for sustainable development. *Academy of Management Perspectives*, 34(2), 182-208. doi: [10.5465/amp.2017.0175](https://doi.org/10.5465/amp.2017.0175).
- [26] Shahzad, M., Qu, Y., Rehman, S.U., & Zafar, A.U. (2022). Adoption of green innovation technology to accelerate sustainable development among manufacturing industry. *Journal of Innovation & Knowledge*, 7(4), article number 100231. doi: [10.1016/j.jik.2022.100231](https://doi.org/10.1016/j.jik.2022.100231).

- [27] Su, Y., & Fan, Q.M. (2022). Renewable energy technology innovation, industrial structure upgrading and green development from the perspective of China's provinces. *Technological Forecasting and Social Change*, 180, article number 121727. doi: [10.1016/j.techfore.2022.121727](https://doi.org/10.1016/j.techfore.2022.121727).
- [28] Szalai, I., & Czako, K. (2023). The theoretical framework of sustainable financial development through literature outlook. *Chemical Engineering Transactions*, 107, 595-600. doi: [10.3303/CET23107100](https://doi.org/10.3303/CET23107100).
- [29] Tay, L.Y., Tai, H.T., & Tan, G.S. (2022). Digital financial inclusion: A gateway to sustainable development. *Heliyon*, 8(6), article number e09766. doi: [10.1016/j.heliyon.2022.e09766](https://doi.org/10.1016/j.heliyon.2022.e09766).
- [30] Tolliver, C., Fujii, H., Keeley, A.R., & Managi, S. (2021). Green innovation and finance in Asia. *Asian Economic Policy Review*, 16(1), 67-87. doi: [10.1111/aepr.12320](https://doi.org/10.1111/aepr.12320).
- [31] Xie, R., Fu, W., Yao, S., & Zhang, Q. (2021). Effects of financial agglomeration on green total factor productivity in Chinese cities: Insights from an empirical spatial Durbin model. *Energy Economics*, 101, article number 105449. doi: [10.1016/j.eneco.2021.105449](https://doi.org/10.1016/j.eneco.2021.105449).
- [32] Yang, C., Zeng, W., & Yang, X. (2020). Coupling coordination evaluation and sustainable development pattern of geo-ecological environment and urbanization in Chongqing municipality, China. *Sustainable Cities and Society*, 61, article number 102271. doi: [10.1016/j.scs.2020.102271](https://doi.org/10.1016/j.scs.2020.102271).
- [33] Yang, Y., Su, X., & Yao, S. (2021). Nexus between green finance, fintech, and high-quality economic development: Empirical evidence from China. *Resources Policy*, 74, article number 102445. doi: [10.1016/j.resourpol.2021.102445](https://doi.org/10.1016/j.resourpol.2021.102445).
- [34] Yin, X., & Xu, Z. (2022). An empirical analysis of the coupling and coordinative development of China's green finance and economic growth. *Resources Policy*, 75, article number 102476. doi: [10.1016/j.resourpol.2021.102476](https://doi.org/10.1016/j.resourpol.2021.102476).
- [35] Yin, X., Chen, J., & Li, J. (2022). Rural innovation system: Revitalize the countryside for a sustainable development. *Journal of Rural Studies*, 93, 471-478. doi: [10.1016/j.jrurstud.2019.10.014](https://doi.org/10.1016/j.jrurstud.2019.10.014).
- [36] Zhou, G., Liu, L., & Luo, S. (2022). Sustainable development, ESG performance and company market value: Mediating effect of financial performance. *Business Strategy and the Environment*, 31(7), 3371-3387. doi: [10.1002/bse.3089](https://doi.org/10.1002/bse.3089).

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Складові фінансового механізму забезпечення сталого розвитку: теоретичний аспект

Анотація. Метою дослідження було обґрунтування теоретичних засад фінансового механізму забезпечення сталого розвитку аграрного сектору. Здійснено аналіз наукових підходів до розуміння сутності фінансового механізму в контексті забезпечення сталого розвитку та сформульовано його авторське визначення як комплексної системи фінансових відносин, що реалізується через сукупність взаємопов'язаних елементів, спрямованих на досягнення збалансованого економічного зростання, соціальної справедливості та екологічної безпеки. Визначено структуру фінансового механізму, що включає фінансові методи, важелі, інструменти, нормативно-правове та інформаційне забезпечення, та розкрито особливості їх застосування в аграрному секторі з урахуванням його специфіки. Встановлено, що фінансові методи формують методологічну основу функціонування механізму, фінансові важелі виступають засобами реалізації методів, а фінансові інструменти забезпечують практичну реалізацію фінансових відносин. Систематизовано функції фінансового механізму (мобілізаційна, розподільча, стимулююча, контрольна, стабілізаційна) та виявлено їх специфіку в економічній, екологічній та соціальній сферах. На основі порівняльного аналізу міжнародних практик встановлено, що інтеграція екологічних критеріїв у кредитну політику Бразилії забезпечила скорочення викидів парникових газів на 10-15 % в аграрному секторі, а канадська система агрострахування знизилася волатильність доходів фермерських господарств на 35-40 %. Виявлено, що програма розвитку сільських територій Польщі

забезпечила зростання частки органічного виробництва з 3,5 % до 7,2 % за 2015-2020 роки а в Угорщині доступ до фінансування отримали понад 12 тисяч малих фермерських господарств. Розроблено систему показників оцінки ефективності фінансового механізму за трьома вимірами сталості, що дозволяє комплексно оцінити результативність з урахуванням усіх аспектів сталого розвитку. Обґрунтовано важливість адаптивності фінансового механізму до змінних умов зовнішнього середовища, особливо в контексті кліматичних змін та ринкових флуктуацій. Отримані результати можуть бути використані для розробки стратегій і фінансових програм сталого розвитку аграрного сектору з урахуванням регіональної специфіки

Ключові слова: фінансові інструменти; екологізація виробництва; зелене фінансування; інвестиційні інструменти; триєдина концепція; адаптивність