Economics and Business Management

16(4), 43-62
Journal homepage: https://economicscience.com.ua/en
Received: 03.06.2025 Revised: 20.10.2025 Accepted: 27.11.2025

UDC 338:631 DOI: 10.31548/economics/4.2025.43

Yuliia Nehoda
Doctor of Economic Sciences, Professor
National University of Life and Environmental Sciences of Ukraine
03041, 15 Heroiv Oborony Str., Kyiv, Ukraine
https://orcid.org/0000-0002-9714-5438

Oleksandr Labenko
Doctor of Economic Sciences, Associate Professor
National University of Life and Environmental Sciences of Ukraine
03041, 15 Heroiv Oborony Str., Kyiv, Ukraine
https://orcid.org/0000-0001-9192-9891

Olena Zharikova
PhD in Economic Sciences, Associate Professor
National University of Life and Environmental Science of Ukraine
03041, 15 Heroiv Oborony Str., Kyiv, Ukraine
https://orcid.org/0000-0002-1259-1712

Rostyslav Sabluk*
PhD in Economic Sciences, Associate Professor, Senior Researcher
PHEI "European University"
03115, 16V Academician Vernadskyi Blvd., Kyiv, Ukraine
https://orcid.org/0009-0002-7085-3028

Financial and economic support for the implementation of resource-saving practices in the agricultural sector

Abstract. The purpose of this study was to identify effective financial and economic instruments for the implementation of resource-saving technologies in Ukrainian agriculture in the context of rising energy costs, climate change, and military challenges. The study analysed the regulatory framework, state, and international support instruments, as well as the dynamics of investment flows and the implementation of environmental practices in the agricultural sector. The study found that despite a decline in investment in 2024 to UAH 42.89 billion, the agricultural sector's profitability increased to a record UAH 327 billion and its profitability to 35%. With state support exceeding UAH 7 billion in 2025, over 8,750 agricultural enterprises received soft loans worth UAH 46.9 billion, and about 2,000 received compensation for purchased machinery worth UAH 486 million. Significant emphasis was placed on expanding the area of organic farming (up

Suggested Citation:
Nehoda, Yu., Labenko, O., Zharikova, O., & Sabluk, R. (2025). Financial and economic support for the implementation of resource-saving practices in the agricultural sector. *Economics and Business Management,* 16(4), 43-62. doi: 10.31548/economics/4.2025.43.

*Corresponding author

to 550,000 hectares) and digitalising agricultural production. The effectiveness of public-private partnerships was determined, particularly through the attraction of USD 480 million in joint projects of the International Development Finance Corporation, the European Bank for Reconstruction and Development, and the role of the Digital Restoration Ecosystem for Accountable Management digital platform for accountable management, in the implementation of over 8,600 projects worth more than UAH 572 million. There is a growing interest in biogas complexes, precision agriculture, and digital platforms, including those involving Myronivskyi Khliboprodukt, Astarta, and Kernel. The study suggested ways to improve support through tax and credit incentives, public-private partnerships, and digital solutions. The practical significance of this study lies in the possibility of using its findings to develop targeted support programmes for the agricultural sector

Keywords: lending; investment; climate; agriculture; precision agriculture

INTRODUCTION

The need to transform agricultural production in the face of limited resources, high costs, and climate change requires the introduction of innovative technologies with a strong level of resource efficiency. At the same time, the spread of such practices is constrained by insufficient funding, limited access to investment, and imperfect incentive mechanisms. In these circumstances, it is of particular relevance to develop effective financial and economic approaches that can ensure sustainable modernisation of the agricultural sector, improve its environmental and food sustainability, increase private capital participation, strengthen institutional support, and account for the needs of different categories of producers. Insufficiently effective financial incentives for the adoption of environmentally friendly technologies in agriculture continue to be a key barrier to greening production. V. Holian *et al.* (2024) covered this subject, finding that accelerating the implementation of resource-saving practices is possible only if an effective financial and economic toolkit is developed that focuses on investment support for environmental infrastructure and innovative agricultural technologies.

The lack of economic levers that encourage agricultural producers to use natural resources sustainably complicates the implementation of resource-saving approaches in agriculture. This aspect was studied by V. Halanets & A. Kolodiy (2025), who determined that the effective implementation of environmentally oriented agricultural policy depends on the ability of the state to create a favourable financial and institutional environment, including investment support, subsidy mechanisms, and incentives for the transition to organic production. Their conclusions emphasise the significance of adapting European practices to the national context and the role of local governments in implementing such initiatives. The insufficient level of economic efficiency of resource use in rural production necessitates the search for innovative approaches to optimising financial support. This area was studied by V. Kovalenko *et al.* (2023), who emphasised the significance of adapting investment strategies to the needs of agricultural production, particularly through improved financial planning and state support mechanisms. The researchers proved that effective resource provision is possible if innovative financial instruments are combined with a strategic management system at enterprises.

The complexity of providing agricultural producers with financial resources hinders the renewal of production processes and the introduction of resource-saving solutions. This issue was investigated by N. Hryshchuk (2021), who focused on the impact of state support, bank lending, and investment policy on the development of agricultural production. The researcher identified the need to create favourable conditions for attracting external and internal sources of financing, emphasising the value of affordable credit and guarantee mechanisms. The limited impact of existing financial instruments on the intensification of resource-saving practices in rural production indicates the need to rethink approaches to supporting the agricultural sector. H. Kryshtal *et al.* (2025) analysed the current state of financial support for

agricultural enterprises and emphasised the significance of focusing investment policy on innovative environmental technologies, as well as the need to develop effective interaction between government agencies, banking institutions, and agricultural producers. The researchers focused on the need to improve state regulation and institutional support.

The instability of the economic environment and external challenges limit the access of agricultural businesses to financial resources, which reduces investment activity in the implementation of resource-saving technologies. S. Moshenskyi *et al.* (2023) explored ways to improve the efficiency of agricultural financing under martial law, emphasising the significance of adapting credit and investment policy to new risks and conditions. The researchers substantiated the role of government support programmes, institutional stability, and tax incentives in ensuring the sustainability of the agricultural sector. Restrictions in financial access and inefficient management of investment flows in agriculture reduce the possibility of modernisation and transition to resource efficiency. P. Nesenenko *et al.* (2024) analysed the key factors influencing the development of agricultural production in an unstable economy, focusing on the need to revise state support mechanisms and intensify local investment. The researchers substantiated the expediency of using integrated financial models and adaptive cost management, which can ensure the economic sustainability of enterprises.

Insufficient efficiency in managing financial resources aimed at increasing the sustainability of agriculture hinders the widespread introduction of resource-saving innovations. R. Dimitrov *et al.* (2024) examined approaches to implementing green transformation in agriculture, focusing on the value of a systematic approach to investment support, the introduction of digital technologies, and strengthening the institutional capacity of farms. The researchers showed that the combination of environmental and financial instruments allows creating a new rural economy. At the same time, the existing studies do not sufficiently cover the issue of integrating resource-saving practices with mechanisms of public financing, tax incentives, and institutional and financial support, do not reveal the specifics of adapting such solutions to the conditions of micro and small enterprises, limited budgets, risky environment and post-crisis challenges, and do not sufficiently analyse the effectiveness of combining financial instruments with motivational mechanisms and opportunities to attract private capital, which requires further research.

The purpose of this study was to substantiate approaches to improving the efficiency of financial and institutional mechanisms that promote the introduction of energy and resource-saving technologies in rural production in the context of economic instability. For this, the following objectives were set: to analyse the current state of financing of agricultural enterprises in terms of introducing innovative eco-technologies; to explore the potential of public-private partnerships and tax instruments in stimulating resource conservation.

MATERIALS AND METHODS

The study was practical in nature and covered the period from 2021 to March 2025. The study analysed the economic nature and classification of resource-saving technologies in agriculture by energy sources, level of application, and types of innovations – mechanical, digital, and bioenergy. To assess the investment activity of the agricultural sector, the level of capital investment for 2021 – early 2025 was analysed (AgroPortal, 2025b). The study also investigated which actions in Ukraine were considered violations of environmental legislation and analysed the possible consequences of such violations (Kurkul, 2025). The study included an analysis of the dynamics of certified organic land areas in 2021-2024, which helped to track changes in the implementation of environmentally friendly farming.

The study defined the basis for regulatory support for the implementation of resource-saving practices. Specifically, the Constitution of Ukraine (1996), the Law of Ukraine No. 1264-XII (1991), the Law of Ukraine No. 962-IV (2003), the Law of Ukraine No. 2496-VIII (2018), as well as the Strategy for the Development of Agriculture and Rural Areas for 2025-2027 (Order of the

Cabinet of Ministers of Ukraine No. 1163-2024-p, 2024) were analysed. This was done to define the legal framework that would regulate the implementation of resource-saving practices in agriculture, ensure their compliance with environmental standards, and create institutional conditions for the effective use of financial and economic support instruments. The levels of state support in 2024 were determined (Gontagro, 2025), particularly based on data from the State Agrarian Register (n.d.). The analysis covered such programmes as "Financial Support for the Development of Farms" (Resolution of the Cabinet of Ministers of Ukraine No. 384-2021-p, 2021), "Provision of Partial Compensation for the Cost of Agricultural Machinery and Equipment" (Ministry of Economy, Environment and Agriculture of Ukraine, 2024), "Support for Organic Producers" (SSUFSCP, 2022), and the Unified State Register of Entities Receiving State Support (State Tax Service of Ukraine, 2023).

In the context of international cooperation, the study analysed how the state cooperated with the World Bank (Ukraine Plan 2024-2027, n.d.), the Food and Agriculture Organisation of the United Nations (n.d.), the United Nations Environment Programme (n.d.), and the United States Agency for International Development (n.d.). The empirical part of the study analysed the sources of funding for resource-saving solutions, including investments by leading Ukrainian agricultural holdings – MHP (n.d.), Kernel (n.d.), Astarta-Kyiv (n.d.), Agro-Region (n.d.), Agroprosperis (n.d.) – in the implementation of biogas plants, digital platforms, and energy-efficient equipment. This data was collected and systematised based on open sources and industry analytical reports (AgroPortal, 2024a; Latifundist Media, 2024; Shevchenko, 2025). Regional differences in the structure and specifics of small and medium-sized agricultural producers were also identified (Strategy for the development of agriculture..., 2024), which helped to identify the specific features of financial support for agricultural production in different parts of the country. Statistical data for 2021-2025 were analysed, which provided a basis for substantiating financial and economic processes in the agricultural sector of Ukraine. The sources of information were the official data of the Ministry of Finance of Ukraine (2025), as well as sectoral analytical reviews, including reports on state support and tax revenues (Skilky-skilky, 2023; AgroPortal, 2025c). The following evaluation criteria were employed in the study: total investment (UAH billion), level of state support (UAH billion), tax revenues (UAH billion), net profit of enterprises (UAH billion), and profitability (%). This helped to quantify the dynamics of key financial indicators and compare the effectiveness of various forms of support and investment in the agricultural sector. At the final stage of the study, the study outlined areas for strengthening financial and economic instruments for the implementation of resource-saving practices, as well as prospects for the development of public-private partnerships (SuperAgronom, 2025), which were examined considering the practices of the Digital Restoration Ecosystem for Accountable Management (DREAM, n.d.).

RESULTS AND DISCUSSION

Theoretical and methodological foundations of financial and economic incentives for resource conservation in agricultural production

In the context of transformation processes in the agricultural sector of Ukraine, the key factor in ensuring the sustainability of production is the introduction of resource-saving technologies. Their economic essence is to reduce production costs through more efficient use of natural, energy, financial, and labour resources, which contributes to the productivity and competitiveness of agricultural enterprises. The key categories of such technologies include energy-saving (use of bioenergy solutions, solar panels), water-saving (drip irrigation, water-retaining soil treatments), precision farming technologies (Global Positioning System (GPS) navigation, sensor systems, remote monitoring), as well as models of minimal or zero tillage (No-till, Strip-till) (Dejanovic *et al.*, 2023).

The relevance of introducing such technologies is confirmed by capital investment statistics. In 2021, about UAH 68 billion was invested in Ukraine's agricultural sector, which amounted to approximately USD 2.5 billion – the most successful year before the war. In 2022, due to economic instability and military risks, the volume of capital investments decreased to

UAH 49.6 billion, which is 27% less than in 2021. However, over 82% of these funds were used to upgrade the technical base and implement resource-saving solutions. In 2023, the investment rate partially recovered, reaching UAH 63.8 billion (AgroPortal, 2025b). In 2024, the overall level of investment was at around USD 100 per hectare of agricultural land, which is still one of the lowest in Europe (AgroPortal, 2025a). Specifically, investments in agricultural machinery are reduced by 39%, the need for tractor capacity is reduced by 75%, labour costs by 80%, and fuel consumption by 84%. No-till technology can save up to 60 litres of diesel per hectare by reducing the number of mechanised operations, including sowing (5-6 L/ha), spraying (4 L/ha), and fertilising (2 L/ha) (WEAGRO, 2024).

Precision agriculture plays a special role, enabling an increase in yields by 15-30%, saving up to 30% of fertilisers and plant protection products, and up to 20% of seeds. For example, the HarvEast agricultural holding (n.d.) managed to increase the yield of moisture-sensitive crops by 15-25% in the southern regions of the country, while the Continental Farmers Group (n.d.) reduced production costs by 15% through the introduction of GPS navigation and differentiated input application (WEAGRO, 2024). Since 2019, precision farming elements have been applied on 20-30% of the cultivated area in Ukraine (approximately 8 million hectares), while in large agricultural holdings – up to 50%. Digital resource accounting tools are widely used: GPS monitoring, sensors, Business Automation Software (BAS), Agro Accounting, and Enterprise Resource Planning (ERP) solutions that automate management processes (SuperAgronom, 2019).

In Ukraine, violations of environmental legislation in agriculture are subject to various forms of liability, ranging from administrative fines to criminal prosecution, depending on the nature and severity of the violations. One of the most widespread environmental offences in the agricultural sector is the burning of dry vegetation. Such actions are subject to fines: for individuals – UAH 3,060-6,120, for legal entities – UAH 15,300-21,420. If the arson caused thedeath of people or animals, or led to significant environmental consequences, criminal liability is stipulated – up to 10 years in prison. Under martial law, such actions may be classified as sabotage (Kurkul, 2025). Furthermore, fines are imposed for late or intentional non-payment of environmental tax. In case of a delay of up to 30 days, a fine of 5% of the amount owed is imposed, over 30 days – 10%, and in case of proven intent – up to 25% of the unpaid amount (Onyshchenko, 2025). There are fines for violations of water protection legislation, including for illegal discharges of pollutants into water bodies: individuals can pay up to 100-200 tax-free minimums, and officials – up to 200 minimums (Government Portal, 2025c). Additionally, unauthorised collection of birch sap in rural areas is subject to fines ranging from UAH 850 to UAH 1,700 (Teryukhanova, 2025). The combination of environmental violations typical of the agricultural sector – excessive use of chemicals, soil degradation, water pollution, and uncontrolled burning – creates critical risks to the environment, public health, and biodiversity. In this regard, there is a tendency to strengthen government control and increase the amount of fines.

Against this backdrop, Ukraine continues to gradually expand the environmental segment of agricultural production. In 2023-2024, the area of certified organic land amounted to 470-550 thousand hectares, which is about 1.5-2% of all agricultural land (approximately 30 million hectares). For comparison, the average share of certified organic land in the European Union (EU) was 9-10% of the total area of their agricultural land (Organic, 2025). Despite the war, Ukraine's organic sector is showing a gradual recovery, especially in the cultivation of grains, soybeans, oilseeds, berries, and vegetables. The government is actively promoting the transition of the agricultural sector to sustainable production. As of the beginning of 2025, the total amount of budget support for agriculture exceeded UAH 5 billion (11% more than in 2024). A significant part of these funds is allocated for environmental modernisation: the introduction of resource-saving technologies, support for organic farming, digitalisation of production, and development of alternative energy sources.

Separately, the state compensates up to 25% of the cost of energy-efficient equipment (UAH 800 million in 2025) and provides grants of up to UAH 1 million for digital technologies

(drones, precision farming systems, software) – over 300 farms have already received such support in 2024 (Gontagro, 2025). International donors, including the World Bank, have provided USD 500 million to restore the agricultural sector, part of which is also directed to environmental projects (Ukraine Plan 2024-2027, n.d.). The State Agrarian Register (SAR) plays a significant role in the financial support of agroecologisation, providing subsidies of UAH 3,100 per hectare in 2024-2025 for farmers with land up to 120 hectares (maximum UAH 372,000 per farm) (State Agrarian Register, n.d.). Thus, increased environmental control, expanded penalties, a growing number of organic producers, and increased financial support form a systemic environment for the environmental modernisation of Ukraine's agricultural sector.

The mechanisms of state regulation of sustainable agricultural production in Ukraine are formed based on a combination of legal, economic, institutional, and financial instruments aimed at ensuring environmentally safe and resource-efficient agricultural development. The basis of the regulatory framework for resource-saving agricultural production in Ukraine is the Constitution of Ukraine (1996), which mandates the right of citizens to a safe environment. The Law of Ukraine No. 1264-XII (1991) defines the general principles of state environmental policy, resource protection, and environmental safety. The Law of Ukraine No. 962-IV (2003) sets out requirements for soil conservation, prevention of soil degradation and erosion, which is critical in the context of climate change. The Law of Ukraine No. 2496-VIII (2018) creates a legal framework for the development of the organic sector, which is a component of the ecological transformation of the agricultural sector. The state strategy in this area is set out in the Order of the Cabinet of Ministers of Ukraine No. 1163-2024-p (2024), which identifies key priorities, such as soil protection, adaptation to climate change, development of small farms, and support for organic farming. Financial and economic support mechanisms are implemented through a series of government programmes. The programme "Financial support for the development of farms" (Resolution of the Cabinet of Ministers of Ukraine No. 384-2021-p, 2021) provides subsidies and soft loans: farmers receive a subsidy per ha of cultivated land (especially newly established farms – up to UAH 60 per ha) and a special subsidy for keeping cows (up to UAH 100 per head), as well as access to compensation for cheap loans (the total budget of the programme is over UAH 200 million) (Review of state support in the agribusiness..., 2021). The programme "Provision of partial compensation for the cost of agricultural machinery and equipment" (Ministry of Economy, Environment and Agriculture of Ukraine, 2024) is aimed at updating the farmers' production park: 15% of the cost of Ukrainian machinery and equipment is compensated, with localisation of over 60%, which helps to support Ukrainian producers and energy efficiency. There is a separate programme called Support for Organic Producers (SSUFSCP, 2022), which provides partial reimbursement of the costs of certification and implementation of organic practices, with compensation reaching 80-100% of the cost of certification for farms that meet the organic criteria.

At the international level, Ukraine actively cooperates with leading organisations in the field of agriculture and the environment. Specifically, the Food and Agriculture Organisation of the United Nations (n.d.) is implementing the Emergency and Early Recovery Response Plan for 2025-2026 with a budget of USD 150 million, which provides support to more than 500,000 residents of rural communities through the provision of agricultural inputs, aid in land rehabilitation, and the development of market infrastructure. Additionally, under the EU-supported investment grant programme, USD 2.8 million has been allocated for 237 farms in the Carpathian region since 2023 for energy-saving solutions, equipment, and training (Food and Agriculture Organisation of the United Nations, 2024). The United Nations Environment Programme (n.d.) provides advisory and methodological support for the implementation of ecological farming practices and the reduction of harmful emissions in agricultural production. Since 2022, the United States Agency for International Development (n.d.) has over USD 350 million to provide farmers with seeds, fertilisers, storage services, and financing, of which about USD 49.8 million

has been allocated as so-called bridge financing. In 2023, in cooperation with Bayer, an additional USD 15.5 million was raised for digital agricultural solutions and educational programmes (Bayer United States, 2023). Another valuable partner is the European Bank for Reconstruction and Development (Ministry of Finance of Ukraine, n.d.), which in 2023, together with the Clean Technology Fund, provided USD 30 million to Astarta-Kyiv Holding (n.d.) for projects in the field of energy efficiency, implementation of Environmental, Social and Governance (ESG) solutions, and modernisation of agricultural production (Astarta-Kyiv, 2023). Overall, such cooperation allows combining state support instruments with financial resources from international donors and private investors, ensuring the sustainable development of Ukrainian agriculture even under martial law. A special place is occupied by Ukraine's participation in the European Green Deal, which is focused on deep decarbonisation, reducing the environmental impact of the agricultural sector, and supporting sustainable production practices. Together, these documents and programmes form a comprehensive regulatory and institutional framework for the implementation of resource-saving technologies in Ukrainian agriculture.

M. Sanyaolu & A. Sadowski (2024) considered precision agriculture as a tool for cost optimisation and efficiency improvement, with a focus on economic feasibility for large farms. The Net Present Value (NPV) calculations showed that the technology is only profitable at revenues above EUR 100,000. The present study focused on supporting the adoption of resource-saving solutions through government programmes, tax incentives, and environmental regulations. While M. Sanyaolu & A. Sadowski used a predominantly financial and analytical approach, the present study also covered institutional and legal aspects. The approach proposed by G. Timpanaro & V.T. Foti (2024) was based on the concept of agroecology and the participation of local communities in building sustainable rural areas. The focus was on small farmers, cooperatives, and the circular economy. This was different from the structure of this study, where the drivers of change were public investment and external partners. Thus, the Italian study proposed a bottom-up socio-ecological approach, while the present study proposed a top-down macroeconomic model of support. G. Betti *et al.* (2025) discussed the consequences of the war in Ukraine for the EU agricultural market. The Agricultural Member State Modelling (AGMEMOD) model helped to estimate the dynamics of production, prices, and trade as a result of external influences. At the same time, the present study considered concrete tools for responding to the crisis within the country, such as financing, modernisation, and legislative support. As a result, the studies do not duplicate each other but expand the understanding of the impact of military events on the agricultural sector: one through an international model, the other through an example of national recovery.

This approach contrasts significantly with the Ukrainian context, where the focus has been on large-scale government stimulus and modernisation of large enterprises. Although the goal of strengthening resilience was common to all the studies, the ways to achieve it demonstrated opposite models: decentralised social versus centralised institutional. Overall, in the context of the transformation of Ukraine's agricultural sector, the present study showed that resource-saving technologies play a crucial role in strengthening its sustainability and competitiveness. Despite the challenges posed by the war and economic instability, the government has consistently implemented financial, legislative, and organisational mechanisms to support environmental modernisation.

Assessment of financial capabilities and investment activity in the agricultural sector of Ukraine

In 2025, over UAH 6 billion was allocated from the state budget for the agricultural sector, including UAH 1 billion for the development of livestock and agro-processing; UAH 4.726 billion for subsidies per hectare and livestock; UAH 200 million for land reclamation; UAH 1.37 billion for grants for gardens and greenhouses; and UAH 1 billion for the demining of agricultural land (Government Portal, 2024b). The programme to support small and medium-sized farms under the Emergency Project for Inclusive Assistance for the Recovery of

Ukraine's Agricultural Sector (ARISE) (ARISE project, n.d.) provided compensation per hectare of land, with 4,139 farmers receiving subsidies worth UAH 316.9 million in 2025. Another 1,421 recipients received UAH 44.8 million for cattle (Stepanenko, 2025). Within the framework of the programme to compensate 25% of the cost of machinery in 2023-2025, thousands of agricultural producers purchased over 8,000 units of Ukrainian machinery. In 2025 alone, as of April, more than 2,000 farmers received compensation worth almost UAH 486 million (Debet-Kredyt, 2025). At the same time, the programme "Affordable Loans 5-7-9%" (PrivatBank, n.d.) was active, with more than 17,000 loans worth UAH 58.3 billion issued in 2023-2025, of which more than 12,000 were to agricultural enterprises. In 2024, 8,750 farms took advantage of the loans, and in 2025, 3,965 farms did so (Government Portal, 2025a). At the same time, a special place in the financing structure is occupied by enterprises' own funds, which are often used to implement large-scale infrastructure and energy efficiency projects. The largest agricultural holdings such as Myronivsky Hliboproduct (MHP, n.d.), Kernel (n.d.), Astarta-Kyiv (n.d.), Agro-Region (n.d.), Agroprosperis (n.d.) are actively investing in biogas complexes, cogeneration plants, solar power plants, and digital precision farming systems. Table 1 presents the estimated amounts of investments and key areas of innovation in these companies.

Table 1. Investments of Ukraine's leading agricultural holdings in resource-saving and energy-efficient solutions in 2023-2025

Agricultural holding	Amount of investments	Key energy efficiency and innovation projects
MHP	USD 20 million + additional investments	12 MW biogas complex, 20 MW cogeneration plant
Kernel	USD 150 million (loans + investments from FMO)	20 MW cogeneration plant, DigitalAgriBusiness
Agro-Region	USD 12 million per year	Energy independence, expansion of machinery fleet, wagons
Agroprosperis	Not specified	800 MW solar power plant, drones for plant protection products
Astarta	~ USD 80 million	Deep soybean processing plant, electricity, and gas supply systems

Source: compiled by the authors of this study based on AgroPortal (2024a), Latifundist Media (2024), A. Shevchenko (2025)

These examples demonstrate the prominent level of private capital involvement in the development of energy efficient agricultural production in Ukraine. Specifically, MHP agricultural holding invested over USD 20 million in the 12 MW Biogas Ladyzhyn biogas complex (The world's largest biogas complex was..., 2019), which processes more than 300 tonnes of chicken manure per day, provides up to 40% of the company's energy consumption and reduces CO_2 emissions by 100 thousand tonnes annually (MHP. The example of Ukrainian..., n.d.). Kernel has implemented a 20 MW biomass cogeneration project that allows it to simultaneously generate heat and electricity for its own production. Agro-Region annually invests about USD 12 million in expanding its machinery fleet, upgrading its logistics facilities, and taking steps to ensure energy independence. Agroprosperis is building an 800 MW solar power plant and introducing agrodrones for plant protection products, which reduces resource consumption and increases the accuracy of agricultural operations. Astarta has invested about USD 80 million in a deep soybean processing plant and energy infrastructure upgrades, as well as introduced the AgriChain digital platform and certified its energy management according to the International Organisation for Standardisation (ISO) 50001 standard (Liga Zakon, 2025a). Taken together, these initiatives demonstrate the reorientation of large agricultural enterprises towards a sustainable production model with a focus on renewable energy, digital

solutions, and reducing environmental impact. Most investments are aimed not only at reducing resource consumption but also at ensuring energy independence of farms, introducing precision farming, digitalising management, and expanding processing capacity. Combined with government support and international technical assistance, these sources form a multi-component financial model for implementing resource-saving solutions in agriculture.

Regional differences in the structure and specifics of small and medium-sized agricultural producers in Ukraine continue to be a key factor in the development of effective state support for the agricultural sector. In 2024-2025, about 94% of enterprises in the agricultural sector are small, 5.8% are medium-sized, and less than 1% are large enterprises. The number of medium-sized agricultural enterprises is estimated at around 2,900, while the number of large enterprises is only 27. The geographical structure of agribusiness shows a clear concentration of large and medium-sized producers in strong agricultural regions such as Poltava, Dnipro, Odesa, Vinnytsia, and Lviv regions. In less agriculturally oriented regions, small farms predominate, due to natural and climatic features, resource constraints, and the level of infrastructure development (Strategy for the development of agriculture..., 2024). In terms of cultivated land, most small enterprises operate on plots of 20-50 hectares, while medium-sized enterprises cultivate between 50 and 250 hectares. In the western and mountainous regions, the share of small farms with small areas is dominant, while in the steppe regions there is a greater concentration of medium-sized farms. Large agroholdings operate on areas of more than 1,000 hectares, but they make up a small proportion of the total number of farms. In terms of production figures, according to some estimates, as of 2015, small and medium-sized farms accounted for about 83% of total marketable agricultural output, of which medium-sized farms accounted for 51% and small farms for 32.3%. Large enterprises accounted for only 16.7%. In 2023, the growth in production of grains and oilseeds was partly driven by small and medium-sized farms. Specifically, regions with active production of vegetables, fruits, and berries – Vinnytsia, Chernivtsi, Khmelnytskyi, Dnipro, Lviv, and Poltava regions – demonstrate a strong level of participation of small producers (The agricultural sector of Ukraine in 2023..., 2024).

The specifics of financing also have regional differences. In 2025, the Ukrainian government has allocated more than UAH 4.7 billion in subsidies per hectare, primarily targeting small and medium-sized enterprises. Specifically, farms cultivating between 1 and 120 hectares are eligible for UAH 4 thousand per hectare. The most active applications were recorded in Vinnytsia, Poltava, Odesa, Dnipro, and Lviv regions. For example, in Vinnytsia region, over UAH 475 million has already been received in 2025 to support cultivated land, which indicates that hundreds of farms are actively involved in aid programmes (AgroPortal, 2024b). At the same time, regions directly affected by the hostilities, such as Donetsk, Kharkiv, Zaporizhzhia, and Kherson regions, have lost a considerable number of small and medium-sized agricultural enterprises. The total number of lost agricultural enterprises as of 2024 is estimated at 1,261. In these regions, a sizeable number of farmers have suspended operations or been forced to relocate. In 2025, the state budget allocates UAH 1 billion for the demining of agricultural land, which allows resumping activities in the de-occupied territories (SuperAgronom, 2025).

In terms of exports, small and medium-sized farmers play a significant role, particularly in the context of global food security. Although there is no precise data on the share of exports by region, activity is observed in the central, southern, and western regions. Cooperation between farmers helps to improve export chains, which is a key factor in accessing foreign markets. Of particular note is the development of organic production in the western regions, which are leaders in terms of the number of organic farms, although official sales volumes are not yet detailed (Liga Zakon, 2025b).Overall, the regional structure of the agricultural sector in Ukraine clearly demonstrates the predominance of small and medium-sized producers, which not only form the basis of national production but also ensure the flexibility and adaptability of the agricultural system in challenging socio-economic conditions.

In 2021-2025, investment activity, tax burden, state support, and profitability of agricultural enterprises in Ukraine underwent substantial changes, reflecting the transformation of the financial and economic environment in the wake of war and recovery. In 2021, agriculture, forestry, and fisheries received UAH 51.44 billion in capital investments (12.6% of the total economy), of which over UAH 49.6 billion was in agriculture, hunting, and related services. This was the basis for record profitability: the net profit of agricultural enterprises reached UAH 238.8 billion, with a profitability of 36.4%, and the most profitable areas were the cultivation of grains, pulses, and oilseeds (44%), and livestock (12.7%). In 2022, investments stayed at the level of the previous year, but real investment activity decreased by 26.1% due to military risks. The agricultural sector's net profit decreased to UAH 87.1 billion, and the share of loss-making enterprises increased to 21.6%. Despite this, the sector remained profitable, with operating margins exceeding 20%, indicating that its internal potential was maintained (Skilky-skilky, 2023).

The year 2023 was marked by a recovery: investment increased to UAH 63.8 billion (USD 1.7 billion), and profitsrose to UAH 65.8 billion. At the same time, the tax burden on farmers included income tax (18%), unified social contribution (USC) (22%), military duty (5%), and land tax. The establishment of limits for individual entrepreneurs affected the taxation structure of small agribusinesses. In 2024, investments decreased to UAH 42.89 billion (8% of total capital investments), due to increased security risks and tighter budget discipline. Still, the agricultural sector's profits rose sharply to UAH 327 billion, five times greater than in 2023. The sector's revenues reached UAH 2.4 trillion, driven by a shift in exports, high grain prices, and the development of processing. The agricultural sector became the largest excise taxpayer: UAH 85.9 billion (81.7% of the total). This confirmed its leading role in filling the budget (AgroPortal, 2025c).

In 2025 (as of May), the trend of high fiscal activity continued: in the first four months of the year alone, the budget received UAH 1.266 trillion, of which UAH 105 billion was income tax, UAH 146.5 billion was personal income tax (PIT) and military duty, and UAH 35.9 billion was excise tax. The Ministry of Agrarian Policy estimates that the agricultural sector will pay an additional UAH 5.2 billion to the budget due to an increase in the military tax rate to 5% and changes in the criteria for critical enterprises. The total amount of state support in 2025 will exceed UAH 7 billion. The financial forecast for 2025 envisages a 3% increase in production and a further recovery in profitability, while maintaining a lower level of gross product than in 2021. The financial analysis also revealed a substantial difference between the types of agricultural enterprises. In 2022, large agricultural companies had revenues that were 15 times greater than those of medium-sized companies and 345 times higher than those of small ones. However, it was small and medium-sized enterprises that demonstrated the best growth dynamics in 2010-2022: +17 and +10 times, respectively (against a threefold increase in large enterprises). This demonstrates their flexibility and adaptability in a crisis. The greatest profitability rates in all years were observed in grain producers and livestock producers, particularly in dairy farming (27.9%) and pig farming (8.6%) (Ministry of Finance of Ukraine, 2025). Table 2 summarises key economic indicators for 2021-2025.

Table 2. Dynamics of investments, tax revenues, state support, and profitability of agricultural enterprises in Ukraine in 2021-2025

Year	Investments, billion UAH	State support, billion UAH	Taxes (main), billion UAH	Net profit, billion UAH	Profitability, %, UAH
2021	51.44	~6.0	~60.0	238.8	36.4
2022	48.8	~4.5	~53.0	87.1	20.3
2023	63.8	~5.5	~65.0	65.8	~18.0
2024	42.89	~6.5	85.9 (excise tax)	327	~35.0
2025 (o.)	–	>7.0	>105 (profit) + other	projected ↑	projected ↑

Source: compiled by the authors of this study based on Skilky-skilky (2023), Ministry of Finance of Ukraine (2025), AgroPortal (2025c)

A comparative analysis of investment activity shows that the largest investment volumes were in 2021 and 2023, but in 2024, despite the decline in investment, there was a sharp increase in profitability. This confirms that not only the size but also the quality of investment, particularly in precision agriculture, bioenergy, and digitalisation, is crucial. Despite a substantial decline in investment in 2024, agricultural enterprises demonstrated record profitability, reflecting more efficient use of resources and increased productivity. At the same time, the level of state support tended to increase gradually, reaching over UAH 7 billion in 2025, which, together with tax revenues exceeding UAH 105 billion, confirms the stable fiscal role of the sector. Profitability, although fluctuating, almost reached the level of 2021 in 2024, demonstrating the high recovery potential of the agricultural sector even under martial law.

F.J. Castillo-Díaz *et al.* (2025) focused on the relationship between land use and sustainable development in Spain, while the present study analysed the financial and institutional instruments for implementing resource conservation in Ukraine. Despite the different geography and subject matter, both approaches focused on the introduction of innovations such as digitalisation and the bioeconomy, although the barriers were identified differently: environmental in the Spanish case and financial in the Ukrainian. One focused on the analysis of the efficiency of economic systems, while the other focused on the strategy of state support and investment. E.M. García-Granero *et al.* (2025) covered the interaction of EU policies and circular economy principles in the development of sustainable agri-food systems. In comparison, the present study focused on the practical implementation of resource conservation through financial incentives and support programmes. In both cases, the environmental transformation of the agricultural sector was discussed, but while one tended to focus on strategic concepts, the other was more focused on applied tools.

The approach of the Chinese researchers M. Du *et al.* (2025) was aimed at building a comprehensive model for assessing the sustainability of agricultural production based on quantitative analysis and multi-criteria assessment. This study relied on empirical data, financial mechanisms, and regulatory analysis. The unifying element was the idea of combining economic and environmental factors to achieve sustainable development. While S. Erfanian *et al.* (2024) covered the global context of climate challenges and the impact on food security, this study looked at a narrower one – the national level of support for resource conservation. Both approaches were aimed at increasing the adaptability of the agricultural sector but differed in their methods: S. Erfanian *et al*. used climate modelling, while the present study focused on financing policies. In 2023-2025, a multi-component system of financing resource-saving technologies in the agricultural sector was formed in Ukraine, combining state support, international aid, banking programmes, and private investment. Leading agricultural holdings are actively implementing innovative and energy-efficient solutions, demonstrating a strong interest in increasing energy autonomy and technological development. Government programmes are focused mainly on small and medium-sized farms, which form the backbone of the country's agricultural system and play a vital role in ensuring food security. Thus, the combination of state support and business activity contributes to the sustainable development of the agricultural sector even in the face of crisis challenges.

Areas for strengthening financial and economic instruments for implementing resource-saving practices

Expansion of financial and economic instruments for implementing resource-saving practices in Ukrainian agriculture is a critical element of the state policy of sustainable development. In the context of climate change, rising energy costs, and military challenges, the agricultural sector faces the challenge of efficient resource management, which requires both innovative technologies and flexible financial mechanisms for their implementation. In 2023-2025, the government is introducing mechanisms for concessional lending, grant support, attracting investment through public-private partnerships, and creating digital platforms to coordinate investment flows.

One of the key support instruments was concessional lending to farmers under the government programme "Affordable Loans 5-7-9%".

The programme allows farmers to receive loans at a reduced interest rate, depending on the purpose and size of the enterprise. In 2023, 10,300 agricultural enterprises received 33 billion in soft loans under this programme (Yur-gazeta, 2023). In 2024, 8,750 enterprises received a tot UAH al of UAH 46.9 billion, and in the first half of 2025, 3,965 enterprises attracted UAH 24.4 billion (PrivatBank, n.d.). This data is presented in Table 3, which demonstrates an increase not only in the volume of financing but also in the average loan size per enterprise, which indicates that businesses are focused on modernising their production facilities.

Table 3. Dynamics of the use of concessional loans by agricultural enterprises (5-7-9% programme) in 2023-2025

Year	Number of enterprises	Volume of loans, billion UAH	Average loan amount, million UAH
2023	10,300	33	3.8
2024	8,750	46.9	5.4
2025 (April)	3,965	24.4	6.2

Source: compiled by the authors of this study based on Yur-gazeta (2023), Government Portal (2025b)

As Table 3 demonstrates, there is a clear trend towards a decrease in the number of entities receiving credit support, while the amount of funding and the average size of one loan are growing significantly. This indicates a concentration of resources on supporting capital-intensive projects, particularly those related to the purchase of innovative equipment, modernisation of irrigation infrastructure, and installation of biogas plants. The state programme of partial compensation for the cost of Ukrainian-made agricultural machinery is of particular significance: over 11,900 units from 144 enterprises are included in the register, and the level of compensation is up to 25%. This mechanism supports the localisation of production, reduces farmers' costs, and stimulates the renewal of the technical park (Government Portal, 2024a).

A grant support system operates in parallel with credit instruments. For example, the eRobota programme (eRobota, n.d.) provided more than 1,156 grants totalling more than UAH 5.8 billion in 2022-2024. In 2024, 375 grants worth UAH 1.79 billion were awarded. The grants cover the modernisation of production facilities, purchase of precision farming equipment, development of greenhouse complexes, and installation of energy-saving systems. This helps to encourage small and medium-sized producers to transform their farms environmentally (Financial Club, 2025). A prominent component was the creation of a favourable institutional environment. In 2023, the Ukraine Facility digital tool (Ukraine Facility in..., n.d.) was launched, a platform that enables transparent tracking of investment and grant flows and evaluation of the effectiveness of implemented projects. This ensures not only control and transparency but also increases the level of trust of international partners in Ukrainian aid recipients. An analysis of the dynamics of investment in agriculture shows that the share of projects related to resource conservation has increased from 8% in 2021 to more than 17% in 2024, reflecting a shift in funding towards greening agricultural production (Ukraine Plan, n.d.).

In the context of the financial and economic transformation of agricultural production in Ukraine, the development of public-private partnerships (PPPs) deserves special attention, as it is increasingly demonstrating its effectiveness as a tool for mobilising investment, reducing financial risks and introducing innovations. In practice, PPPs are implemented by combining government initiatives and resources with private capital and the expertise of international partners. Successful examples of this approach include projects involving the World Bank, the International Finance Corporation (IFC), the United States Agency for International Development (USAID), and the European Bank for Reconstruction and Development (EBRD), which act not only as donors but also as guarantors of the financial stability of investments in the face of macroeconomic instability. In 2023, IFC, in partnership with the EBRD and DFC, provided a

USD 480 million financing package to MHP: specifically, USD 130 million from IFC, USD 100 million from the EBRD and USD 250 million from the U.S. International Development Finance Corporation (DFC), to support production continuity, energy efficiency, and carbon footprint reduction (IFC, EBRD, DFC help bolster Ukrainian..., 2023). Within the framework of the Trade Facilitation Programme, the EBRD is implementing a trade finance mechanism to support the import of agricultural machinery – specifically, in 2024-2025, the bank provided guarantees worth EUR 5 million for the import of tractors and equipment for Ukrainian farmers (Ministry of Finance of Ukraine, n.d.). Such projects demonstrate the effectiveness of attracting international capital to modernise agricultural production, reduce environmental impact, and increase the sector's resilience in wartime. The DREAM digital platform (n.d.) is a tool for transparent management of restoration projects that provides public access to all information about their financing, implementation, and results. It covers more than 8,600 projects with a total budget of over UAH 572 billion and integrates with state registries, the Prozorro system, and Geographic Information System (GIS) solutions, which allows attracting investors through open data and standardised monitoring. The platform is actively used by communities, authorities, and international donors to assess the effectiveness of infrastructure, energy, and agriculture projects. The platform coordinates hundreds of agricultural projects with a focus on energy efficiency, renewable energy sources, and greening of production processes. Specifically, the platform is implementing initiatives to introduce energy-efficient grain dryers, solar photovoltaic systems, and smart irrigation systems, each of which is accompanied by government guarantees or co-funding. This allows attracting foreign private capital, reducing investment risks, and providing flexibility in project financing even in wartime or political uncertainty (The DREAM project management..., 2025).

In the bioenergy sector, the development of partnership models is particularly evident in the implementation of biomethane projects, where state support is combined with private investment in agricultural waste disposal technologies. The potential of biomethane production in Ukraine is estimated at 21.8 billion m^3 per year, and ten new biomethane plants are planned to be launched in 2025 with a total investment of over USD 50 million. This will simultaneously reduce energy dependence on imported gas, reduce greenhouse gas emissions, and promote the circular use of biomass (Investors plan to build..., 2024). An equally significant area is the modernisation of irrigation systems, which is being carried out under the PPP with the involvement of FAO, USAID, and EBRD. Pilot projects are being implemented in the southern regions of Ukraine – specifically, in Dnipro, Mykolaiv, and Odesa regions – to restore irrigation infrastructure, introduce energy-saving pumping stations, and digital water consumption monitoring and management systems. The integration of private technology solutions and international funding has resulted in water savings of up to 25-30% and an increase in crop yields of 15-20% (SuperAgronom, 2025). Thus, public-private partnerships in Ukraine's agricultural sector are gradually turning into a systemic tool for modernisation, adaptation to climate challenges, and expanding access to innovation. Its further development requires institutional strengthening, including the creation of regional grant platforms, guarantee mechanisms for small producers, simplification of procedures for attracting investors, and digitalisation of performance monitoring processes. In the long term, this will contribute to achieving not only economic efficiency, but also environmental sustainability of agricultural production based on green growth.

S. Zhu *et al.* (2024) focused on the impact of green lending on the sustainable development of farms in China. The researchers employed econometric modelling to identify the relationship between the volume of lending and environmental performance. In contrast, the present study focused on the broader system of resource conservation financing in Ukraine, which included both government support and investments by agricultural holdings. X. Zhong & J. Wang (2024) offered a different vision, analysing the institutional conditions for green efficiency in the Chinese agricultural sector. Their approach was quantitative and based on

efficiency calculations, while the present study relied on examples of practical implementation of government programmes and investment models. Thus, both studies emphasised that environmental modernisation cannot be achieved without a regional approach and innovative content. Z. Zhang *et al.* (2025) examined the impact of institutional quality on the effectiveness of green finance in the agricultural sector. The researchers emphasised the role of the regulatory environment and institutional barriers. The present study provided an applied analysis of state support, investments, and programmes for small agricultural enterprises. Despite the differences in methods, both studies demonstrated the need to combine environmental and economic efficiency. Integrative approaches to assessing green progress, such as in D. Li *et al.* (2022), provide a multidimensional picture of the greening of the agricultural sector, covering economic, social, and natural aspects. The current model, on the other hand, was based on an empirical analysis of national programmes that ensured the adaptation of financial instruments to the concrete needs of the sector. This approach proved effective in assessing the applicability of innovations in practice.

K. Sekine (2024) analysed the Japanese practices of structural transformation, particularly in land management and support for farming communities. Against this background, the Ukrainian approach appears more technocratic, with a predominance of financial incentives, institutional partnerships, and support for innovation, while the Japanese model is more focused on long-term social change. T.K. Nath *et al.* (2024) presented a study on the bioeconomy in the Global South. It concerned not so much the financial instruments as the social practices, transdisciplinary approaches, and local community participation. The present study had different optics, focusing on institutional support, tax incentives, and digital tools. Still, there is a significant point of overlap between the studies: both considered environmental modernisation as a comprehensive, multifactorial strategy. The expansion of financial and economic mechanisms to support resource-saving practices in Ukrainian agriculture indicates the development of a systemic approach to the greening of agricultural production. There is a positive trend in the increase in financing, the average loan size, and the intensification of grant programmes, accompanied by the digitalisation of investment coordination processes. This integrated approach is viewed as a key factor in ensuring the sustainability and competitiveness of the agricultural sector in the face of external challenges.

CONCLUSIONS

In 2023-2025, Ukraine has formed a comprehensive financial and economic model for supporting resource-saving technologies in agriculture, which combines government programmes, international aid, banking instruments, and agricultural enterprises' own investments. Specifically, capital investments in the agricultural sector amounted to UAH 49.6 billion in 2022, UAH 63.8 billion in 2023, and in 2024, investments were kept at around 100 USD/ha, which continues to be one of the lowest in Europe. Over 17,000 loans worth UAH 58.3 billion were disbursed under the government's 5-7-9% programme in 2023-2025, of which over 12,000 loans were to agricultural enterprises. The average loan amount was UAH 3.8 million in 2023, UAH 5.4 million in 2024, and UAH 6.2 million in the first half of 2025. This indicatesa reorientation of funding towards larger, more technically complex projects, such as the introduction of biogas plants, GPS navigation, drones, digital platforms, etc.

The programme to compensate 25% of the cost of agricultural machinery in 2023-2025 covered more than 8,000 units of Ukrainian-made machinery, including more than 2,000 farmers in 2025, worth almost UAH 486 million. At the same time, over 1,156 grants under the eRobota programme totalling UAH 5.8 billion were implemented to modernise farms. In 2025, the state allocated over UAH 6 billion to the agricultural sector, including UAH 4.726 billion in per-hectare subsidies, UAH 1 billion for mine clearance, and UAH 1.37 billion for grants for gardens and greenhouses. The share of resource-saving projects in all investments is increasing – from 8% in 2021 to over 17% in 2024. Private agricultural holdings such as Kernel, MHP, Astarta, Agro-Region, and Agroprosperis have invested hundreds

of millions of dollars in bioenergy, precision farming, and digital solutions. There has also been a gradual increase in organic farming areas – 470-550 thousand hectares, or 1.5-2% of all agricultural land. At the same time, the increase in fines for environmental violations, including up to 25% of the unpaid tax or up to 10 years in prison for intentional arson, demonstrates the consistency of government policy towards environmental responsibility. All this suggests that despite the war and economic instability, Ukraine is systematically creating conditions for the environmental transformation of the agricultural sector: through increased financial support, institutional modernisation, and stimulation of investment activity, especially in the areas of precision agriculture, energy efficiency, and digitalisation of production. A limitation of the present study was that it mainly covered macroeconomic indicators and the activities of large agricultural enterprises, which complicates the holistic assessment of the effectiveness of financial mechanisms for micro and small farms. Prospects for further research include assessing the impact of financial instruments at the level of individual regions and types of farms, particularly by analysing the effectiveness of support for micro-producers in the combat zone and in the de-occupied territories.

ACKNOWLEDGEMENTS

None.

FUNDING

None.

CONFLICT OF INTEREST

None.

REFERENCES

[1] AgroPortal. (2024a). *Investments of the largest: Where do leading agricultural holdings take and invest funds*. Retrieved from https://surl.li/oaqkox.
[2] AgroPortal. (2024b). *Subsidies per hectare and for livestock: UAH 4.7 billion was allocated to the budget*. Retrieved from https://surli.cc/czhcok.
[3] AgroPortal. (2025a). *Attract capital. How the agricultural sector develops under conditions of minimal investments per hectare*. Retrieved from https://surl.li/buwnva.
[4] AgroPortal. (2025b). *The volume of capital investments in the agricultural sector of Ukraine is the lowest compared to the EU*. Retrieved from https://surl.li/plctnn.
[5] AgroPortal. (2025c). *Ukraine's agricultural sector profits exceeded pre-war results*. Retrieved from https://surl.lt/hroztp.
[6] Agroprosperis. (n.d.). Retrieved from https://agroprosperis.com/.
[7] Agro-Region. (n.d.). Retrieved from https://agro-region.com/.
[8] ARISE project. (n.d.). Retrieved from https://surl.li/uxxuov.
[9] Astarta-Kyiv. (2023). *EBRD provides Astarta with a financial package worth 30 million US dollars*. Retrieved from https://astartaholding.com/yebrr-nadaye-astarti-finansovyj-paket-na-sumu-30-miljoniv-dolariv-ssha/.
[10] Astarta-Kyiv. (n.d.). Retrieved from https://astartaholding.com/.
[11] Bayer United States. (2023). *USAID and Bayer expand partnership and provide additional $15.5 million to support Ukrainian farmers*. Retrieved from https://www.bayer.com/en/us/news-stories/supporting-ukrainian-farmers?utm_source.
[12] Betti, G., Gagliardi, F., Mecca, A., Riccaboni, A., & Tozzi, C. (2025). Sustainability and circularity of the agri-food systems: How to measure it? A first attempt on the Italian system. *Sustainability*, 17(7), article number 3169. doi: 10.3390/su17073169.
[13] Castillo-Díaz, F.J., Belmonte-Ureña, L.J., Martín-Navarro, C., & Camacho-Ferre, F. (2025). Balancing agricultural sustainability and conservation: Strategies for resource intensive systems in Spain and beyond. *Global Ecology and Conservation*, 60, article number e03633. doi: 10.1016/j.gecco.2025.e03633.
[14] Constitution of Ukraine. (1996, June). Retrieved from https://zakon.rada.gov.ua/laws/show/254к/96-вр#Text.

[15] Continental Farmers Group. (n.d.). Retrieved from https://cfg.com.ua/.
[16] Debet-Kredyt. (2025). *Compensation for agricultural machinery and equipment – 2025: New figures from the Ministry of Economy*. Retrieved from https://surl.li/bmifpe.
[17] Dejanovic, M., Popovic-Pantic, S., & Kovačević, A. (2023). The significance of digital transformation in agriculture for sustainable development. In *Sustainable agriculture and rural development – IV* (pp. 14-15). Belgrade: Institut Mihajlo Pupin.
[18] Dimitrov, R., Trunina, I., Druzhynina, V., Ismailov, T., & Bilyk, M. (2024). Innovative support for sustainable development of the agricultural sector. *BIO Web of Conferences*, 114, article number 01009. doi: 10.1051/bioconf/202411401009.
[19] DREAM. (n.d.). Retrieved from https://dream.gov.ua/ua.
[20] Du, M., Lei, J., & Li, S. (2025). Navigating the path to food security in China: Challenges, policies, and future directions. *Foods*, 14(4), article number 644. doi: 10.3390/foods14040644.
[21] Erfanian, S., Zhou, Y., & Baloch, Q.B. (2024). Enhancing sustainable agricultural performance in selected Chinese region: The role of food supply chain management, resource utilization, and government support. *Frontiers in Sustainable Food Systems*, 8, article number 1502145. doi: 10.3389/fsufs.2024.1502145.
[22] eRobota. (n.d.). Retrieved from https://erobota.diia.gov.ua/.
[23] Financial Club. (2025). *Ukrainian manufacturers received grants from the state for 1.8 billion UAH in 2024*. Retrieved from https://surl.lu/chmzcs.
[24] Food and Agriculture Organisation of the United Nations. (2024). *FAO launches a $150 million emergency and early recovery response plan for Ukraine to support war-affected rural communities*. Retrieved from https://surl.lt/mpmdrx.
[25] Food and Agriculture Organisation of the United Nations. (n.d.). Retrieved from https://www.fao.org/countryprofiles/index/en/?iso3=UKR.
[26] García-Granero, E.M., Piedra-Muñoz, L., Galdeano-Gómez, E., & Sorroche-del-Rey, Y. (2025). A path towards sustainability through the circular economy phenom: Indicators from the Spanish agri-food sector. *Sustainability Accounting, Management and Policy Journal*, 16(7), 28-61. doi: 10.1108/SAMPJ-05-2024-0509.
[27] Gontagro. (2025). *State support and financing of agriculture in Ukraine in 2025: What's new and how it works for farmers*. Retrieved from https://surl.li/accdni.
[28] Government Portal. (2024a). *"Made in Ukraine": The list of agricultural machinery within the framework of the compensation program (25%) has been expanded to 8.7 thousand items*. Retrieved from https://surli.cc/nykafa.
[29] Government Portal. (2024b). *The state budget-2025 was signed by the president. What are the benefits for farmers?* Retrieved from https://surl.lu/ohuhls.
[30] Government Portal. (2025a). *"Affordable loans 5-7-9%": UAH 12.5 billion has already been attracted by farmers in 2025*. Retrieved from https://www.kmu.gov.ua/news/dostupni-kredyty-5-7-9-125-mlrd-hrn-uzhe-zalucheno-ahrariiamy-u-2025-rotsi.
[31] Government Portal. (2025b). *"Affordable loans 5-7-9%": UAH 24.4 billion has already been attracted by farmers this year*. Retrieved from https://www.kmu.gov.ua/news/dostupni-kredyty-5-7-9-244-mlrd-hrn-uzhe-zalucheno-ahrariiamy-tsoho-roku.
[32] Government Portal. (2025c). *The government approved a bill that provides for an increase in fines for violations of water protection legislation*. Retrieved from https://surl.li/jlbcdk.
[33] Halanets, V., & Kolodiy, A. (2025). Features of resource and financial support of production activities of agricultural producers. *Economy and Society*, 72. doi: 10.32782/2524-0072/2025-72-117.
[34] HarvEast. (n.d.). Retrieved from https://harveast.com/.
[35] Holian, V., Zastavnyy, Y., Bardas, V., & Levytskyi, V. (2024). Financial and economic regulation of ecologization of agricultural nature management in the context of decentralisation: Investment aspect of resource saving in agriculture. *Agrosvit*, 7, 12-22. doi: 10.32702/2306-6792.2024.7.12.

[36] Hryshchuk, N. (2021). The role of credit resources in financial support of agricultural manufacturers in modern economic conditions. *Economics. Finances. Law*, 12/2, 14-19. doi: 10.37634/efp.2021.12(2).3.
[37] IFC, EBRD, DFC help bolster Ukrainian agribusiness sector, strengthen global food security. (2023). Retrieved from https://surl.li/svflmb.
[38] Investors plan to build 10 more biomethane plants – experts. (2024). Retrieved from https://surl.li/yvssky.
[39] Kernel. (n.d.). Retrieved from https://www.kernel.ua/ua/.
[40] Kovalenko, V., Sheludko, S., Semenova, V., Kotsiurubenko, G., & Danylina, S. (2023). Credit and investment support for the development of Ukraine's agricultural and economy sector. *Scientific Horizons*, 26(5), 151-163. doi: 10.48077/scihor5.2023.151.
[41] Kryshtal, H., Bezhenar, I., Khimich, S., & Skyba, H. (2025). Financing of agricultural enterprises in times of war as a guarantee of sustainable development of the state economy. *Ekonomika APK*, 32(2), 28-38. doi: 10.32317/ekon.apk/2.2025.28.
[42] Kurkul. (2025). *In Ukraine, it is proposed to increase fines for burning dry vegetation tenfold*. Retrieved from https://kurkul.com/news/38154-v-ukrayini-proponuyut-udesyatero-zbilshiti-shtrafi-za-spalyuvannya-suhoyi-roslinnosti.
[43] Latifundist Media. (2024). *Wartime dividends. With what results and achievements will Ukrainian agroholdings end 2024?* Retrieved from https://surl.li/vcgnng.
[44] Law of Ukraine No. 1264-XII "On Environmental Protection". (1991, June). Retrieved from https://zakon.rada.gov.ua/laws/show/1264-12#Text.
[45] Law of Ukraine No. 2496-VIII "On the Basic Principles and Requirements for Organic Production, Circulation and Labeling of Organic Products". (2018, July). Retrieved from https://zakon.rada.gov.ua/laws/show/2496-19#Text.
[46] Law of Ukraine No. 962-IV "On Land Protection". (2003, June). Retrieved from https://zakon.rada.gov.ua/laws/show/962-15#Text.
[47] Li, D., Nanseki, T., Chomei, Y., & Jinsong, K. (2022). A review of smart agriculture and production practices in Japanese large-scale rice farming. *Journal of the Science of Food and Agriculture*, 103(4), 1609-1620. doi: 10.1002/jsfa.12204.
[48] Liga Zakon. (2025a). *"Astarta" will build a plant for the production of soy concentrate*. Retrieved from https://surl.li/vgzjoa.
[49] Liga Zakon. (2025b). *In search of margin: The path of Ukrainian grain in 2025*. Retrieved from https://surl.li/fhygbn.
[50] MHP. (n.d.). Retrieved from https://mhp.com.ua/uk/glorytoUkraine.
[51] MHP. The example of Ukrainian – German eco-innovative partnership. (n.d.). Retrieved from https://surl.li/kypvnz.
[52] Ministry of Economy, Environment and Agriculture of Ukraine. (2024). *"Made in Ukraine": Farmers can receive partial compensation for the cost of agricultural machinery from 44 domestic manufacturers*. Retrieved from https://surl.li/fazpgn.
[53] Ministry of Finance of Ukraine. (2025). *In March, UAH 313.5 billion was received into the general fund of the state budget*. Retrieved from https://surl.li/caydwl.
[54] Ministry of Finance of Ukraine. (n.d.). *European Bank for Reconstruction and Development*. Retrieved from https://mof.gov.ua/uk/ebrr.
[55] Moshenskyi, S., Grytsyshen, D., & Petruk, O. (2023). Agricultural and resource economy of Ukraine and problems for economic growth. *Scientific Horizons*, 27(1), 152-161. doi: 10.48077/scihor1.2024.152.
[56] Nath, T.K., Inoue, M., Wey, Y.E., & Takahashi, S. (2024). Globally important agricultural heritage systems in Japan: Investigating selected agricultural practices and values for farmers. *International Journal of Agricultural Sustainability*, 22(1) article number 2355429. doi: 10.1080/14735903.2024.2355429.

[57] Nesenenko, P., Lazaryshyna, I., Oplachko, I., Martyniuk, O., & Proshcharuk Y. (2024). Analysis of investment and innovation support for the agricultural sector of Ukraine. *BIO Web of Conferences*, 114, article number 01027. doi: 10.1051/bioconf/202411401027.
[58] Onyshchenko, V. (2025). *Environmental tax 2025: Payers, rates, calculation examples*. Retrieved from https://buhplatforma.com.ua/article/7127-ekologchniy-podatok-2019.
[59] Order of the Cabinet of Ministers of Ukraine No. 1163-2024-p "On Approval of the Strategy for the Development of Agriculture and Rural Areas in Ukraine for the Period until 2030 and Approval of the Operational Plan of Measures for its Implementation in 2025-2027". (2024, November). Retrieved from https://zakon.rada.gov.ua/laws/show/1163-2024-%D1%80#Text.
[60] Organic, G. (2025). *World Organic Production 2025*. Retrieved from https://surl.li/tcajha.
[61] PrivatBank. (n.d.). *PrivatBank – participant of the program "Affordable loans 5-7-9%"*. Retrieved from https://privatbank.ua/business/5-7-9.
[62] Resolution of the Cabinet of Ministers of Ukraine No. 384-2021-п "On Amendments to the Procedure for the Use of Funds Provided in the State Budget for Providing Financial Support for the Development of Farms". (2021, April). Retrieved from https://zakon.rada.gov.ua/laws/show/384-2021-%D0%BF#Text.
[63] Review of state support in the agribusiness sector of Ukraine. (2021). Retrieved from https://kse.ua/wp-content/uploads/2021/10/State-support-review-20211009.pdf.
[64] Sanyaolu, M., & Sadowski, A. (2024). The role of precision agriculture technologies in enhancing sustainable agriculture. *Sustainability*, 16(15), article number 6668. doi: 10.3390/su16156668.
[65] Sekine, K. (2024). Political shifts toward family farming and agroecology in Japan? The impact of United Nations campaigns. *Cahiers Agricultures*, 33, article number 19. doi: 10.1051/cagri/2024014.
[66] Shevchenko, A. (2025). *Top 10 agricultural holdings of Ukraine in 2024: Land bank, profitability, social projects*. Retrieved from https://surl.li/zkhqgl.
[67] Skilky-skilky. (2023). *In 2022, the volume of capital investments decreased by 39%*. Retrieved from https://surl.lt/aiqgkz.
[68] SSUFSCP. (2022). *Ukrainian producers of organic products can participate in the grant program initiated by the Organic Initiative association*. Retrieved from https://surl.li/mgfatx.
[69] State Agrarian Register. (n.d.). *Support programs. Budget subsidy per unit of arable land*. Retrieved from https://www.dar.gov.ua/sards-support-programs/pidtrymka-na-hektary.
[70] State Tax Service of Ukraine. (2023). *Unified register of business entities that can sell ownerless property and property that is transferred to the state for 2023*. Retrieved from https://tax.gov.ua/dovidniki--reestri--perelik/reestri/647042.html.
[71] Stepanenko, I. (2025). *In May 2025, farmers received over UAH 360 million in state support*. Retrieved from https://agroweek.com/agroekonomika/travni-2025-roku-fermery-otrymaly/.
[72] Strategy for the development of agriculture and rural territories in Ukraine for the period until 2030. (2024). Retrieved from https://surl.li/sjlyus.
[73] SuperAgronom. (2019). *Precision farming will increase the efficiency of agricultural management in Ukraine, – Topchiy*. Retrieved from https://surl.li/xyivwl.
[74] SuperAgronom. (2025). *Ukraine's agricultural sector after three years of war: Losses and challenges*. Retrieved from https://surl.lu/rlella.
[75] Teryukhanova, M. (2025). *Fine for birch sap: Amounts of fines in 2025*. Retrieved from https://fakty.com.ua/ua/ukraine/20250326-shtraf-za-berezovyj-sik-sumy-styagnen-u-2025-roczi/.
[76] The agricultural sector of Ukraine in 2023: Components of sustainability, problems and future tasks. (2024). Retrieved from https://niss.gov.ua/doslidzhennya/ekonomika/ahrarnyy-sektor-ukrayiny-u-2023-rotsi-skladovi-stiykosti-problemy-ta.
[77] The DREAM project management ecosystem has received legislative regulation. (2025). Retrieved from https://mtu.gov.ua/news/36415.html.
[78] The world's largest biogas complex was launched in Vinnytsia region. (2019). Retrieved from https://surl.li/cabbtd.

[79] Timpanaro, G., & Foti, V.T. (2024). Recovery and resilience of rural farms in Sicily (Italy): The COVID-19 pandemic and the Russia-Ukraine conflict. *Journal of Rural Studies*, 112, article number 103485. doi: 10.1016/j.jrurstud.2024.103485.
[80] Ukraine Facility in Prozorro. (n.d.). Retrieved from https://surl.lt/wcnvir.
[81] Ukraine Plan 2024-2027. (n.d.). Retrieved from https://surl.li/ogltnu.
[82] United Nations Environment Programme. (n.d.). Retrieved from https://www.unep.org/.
[83] United States Agency for International Development. (n.d.). Retrieved from https://www.usaid.gov/.
[84] WEAGRO. (2024). *Precision farming in Ukraine: Definition and prospects*. Retrieved from https://weagro.com.ua/blog/tochne-zemlerobstvo-v-ukrayini-vyznachennya-ta-perspektyvy/.
[85] Yur-gazeta. (2023). *In 2023, agricultural enterprises attracted almost 37 billion hryvnias in bank loans*. Retrieved from https://surl.li/zkibhy.
[86] Zhang, Z., *et al.* (2025). Water-saving strategies across prefectures should target the manufacturing and agriculture sectors in China. *Communications Earth & Environment*, 6, article number 349. doi: 10.1038/s43247-025-02292-3.
[87] Zhong, X., & Wang, J. (2024). Empowering agricultural economic resilience in China: Does green finance matter? *Advances in Agriculture*, 2024, article number 350399. doi: 10.1155/aia/1350399.
[88] Zhu, S., Li, Y., Wang, S., Liu, J., Cui, J., & Yamaka, W. (2024). The double-edged sword effect of agricultural technological progress on agricultural carbon emissions: Empirical evidence from China. *Frontiers in Sustainable Food Systems*, 8, article number 1489448. doi: 10.3389/fsufs.2024.1489448.

Юлія Негода
Доктор економічних наук, професор
Національний університет біоресурсів і природокористування України
03041, вул. Героїв Оборони, 15, м. Київ, Україна
https://orcid.org/0000-0002-9714-5438

Олександр Лабенко
Доктор економічних наук, доцент
Національний університет біоресурсів і природокористування України
03041, вул. Героїв Оборони, 15, м. Київ, Україна
https://orcid.org/0000-0001-9192-9891

Олена Жарікова
Кандидат економічних наук, доцент
Національний університет біоресурсів і природокористування України
03041, вул. Героїв Оборони, 15, м. Київ, Україна
https://orcid.org/0000-0002-1259-1712

Ростислав Саблук
Кандидат економічних наук, доцент, старший науковий співробітник
ПВНЗ «Європейський університет»
03115, бульв. академіка Вернадського, 16В, м.Київ, Україна
https://orcid.org/0009-0002-7085-3028

Фінансово-економічне забезпечення впровадження ресурсозберігаючих практик в аграрному секторі

Анотація. Метою даного дослідження було виявлення ефективних фінансово-економічних інструментів для впровадження ресурсозберігаючих технологій у сільському господарстві України в умовах зростання енергетичних витрат, кліматичних змін та воєнних викликів. У межах дослідження проаналізовано нормативно-правову базу, інструменти державної й міжнародної підтримки, а також динаміку інвестиційних потоків і впровадження екологічних практик в агросекторі. У результаті встановлено, що попри скорочення інвестицій у 2024 році до 42,89 млрд грн, прибутковість агросектору зросла до рекордних 327 млрд грн, а рентабельність – до 35 %. За державної підтримки, яка перевищила 7 млрд грн у 2025 році, понад 8 750 агропідприємств отримали пільгові кредити на суму 46,9 млрд грн, а близько 2 000 отримали компенсацію за придбану техніку на 486 млн грн. Значний акцент було зроблено на розширенні площ органічного землеробства (до 550 тис. га) та цифровізації агровиробництва. Визначено ефективність публічно-приватного партнерства, зокрема через залучення 480 млн доларів США у межах спільних проєктів International Development Finance Corporation, Європейського банку реконструкції та розвитку і International Finance Corporation, а також роль цифрової платформи Digital Restoration Ecosystem for Accountable Management для підзвітного управління, у реалізації понад 8 600 проєктів на суму понад 572 млрд грн. Зафіксовано зростання інтересу до біогазових комплексів, точного землеробства та цифрових платформ – зокрема, за участі Миронівського хлібопродукту, Астарти та Kernel. Запропоновано напрями вдосконалення підтримки через податкові й кредитні стимули, публічно-приватне партнерство та цифрові рішення. Практичне значення дослідження полягає у можливості використання його результатів для розробки цільових програм підтримки аграрного сектору

Ключові слова: кредитування; інвестиції; клімат; сільське господарство; точне землеробство