CHAPTER 2
"GREEN" TRANSFORMATION OF THE AGRARIAN SECTOR OF THE UKRAINIAN ECONOMY: CHALLENGES, PREREQUISITES AND IMPLEMENTATION MECHANISMS

DOI https://doi.org/10.30525/978-9934-26-632-4-2

2.1 Global Environmental Challenges and Prerequisites for the "Green" Transformation of the Ukrainian Economy

Climate change and the looming threat of an ecological catastrophe represent some of the most pressing challenges currently confronting humanity. A principal driver of climate change is the increasing reliance on hydrocarbons, which emit substantial amounts of carbon dioxide into the atmosphere, thereby accelerating global warming. However, human impact on natural ecosystems extends beyond greenhouse gas emissions. Intensive exploitation of natural resources has led to a range of environmental problems including air and water pollution, deforestation, soil erosion, and the conversion of vast land areas for urban development and infrastructure projects.

Environmental protection and the pursuit of ecological sustainability have become critical priorities for nations worldwide. Ukraine, endowed with significant industrial capacity and abundant natural resources, faces urgent needs for economic reforms aimed at fostering sustainable development while minimizing environmental degradation. Like many countries, Ukraine experiences depletion of natural resources and escalating pollution levels, but there is hope that through the ecologization of the economy and efforts to reduce carbon emissions, these challenges can be mitigated.

Agriculture, as a key sector of the Ukrainian economy and a major player in global markets, stands at the forefront of this ecological transformation. Greening agricultural practices not only reduces the environmental footprint of production but also creates strategic economic advantages. The adoption of organic farming methods, energy-efficient technologies, biotechnological innovations, and alignment with European Union environmental standards

enhances both the ecological resilience and international competitiveness of Ukrainian agricultural enterprises [1].

Therefore, advancing ecological modernization within Ukraine's economy offers a viable pathway to address environmental challenges, promote sustainable development, and secure the country's long-term economic and environmental well-being. This ongoing transition requires integrated policy measures, technological innovation, and the active participation of all stakeholders to ensure a sustainable future for Ukraine and its agricultural sector.

Ecological modernization of the agricultural sector in Ukraine is critical for achieving sustainable development and ensuring food security. This modernization involves adopting environmentally sound agricultural practices that enhance soil fertility, conserve water resources, and reduce the ecological footprint of farming activities. Despite the absence of a formal legal definition of agricultural ecologization in Ukrainian legislation, scholars and practitioners emphasize the need for comprehensive state, sectoral, and regional measures aimed at implementing competitive and sustainable agricultural production systems. Key directions include the application of soil conservation technologies, minimization of technogenic impacts on agricultural lands, and integration of adaptive landscape management approaches. Legislative frameworks and environmental standards continue to evolve, promoting energy-efficient, low-waste, and eco-friendly technologies. Such efforts will contribute not only to environmental protection but also to improving the long-term economic viability and competitiveness of Ukraine's agricultural enterprises.

Improving the management of business processes on the enterprise with regard to the environmental component is an integral part of the greening of the economy. In general, this quality management process has gone through many stages, and the environmental component began to play an important role only at the beginning of the XXI century (Table 2.1).

Modern enterprises increasingly integrate environmental management systems such as ISO 14001, EMAS, and GlobalG.A.P. into their operations. These systems ensure continuous monitoring of environmental impact, compliance with regulatory norms, and resource efficiency. Certification under such systems not only reduces risks of sanctions but also enhances reputation and facilitates access to environmentally conscious markets.

Table 2.1

Stages of development of quality management at the enterprise

Historical period, years	The name of the stage of quality management	The purpose of the stage	Quality management tools
1900-1940	Quality control	prevent defective products from reaching the consumer	new profession "controller", improvement development of devices and methods of control
1940-1980	Quality management	prevent the production of defective products	quality management systems, statistical sampling methods of quality control
1980-1990	Quality management in accordance with the requirements of international standards	to ensure the production of quality products based on the world's only defined approach to quality management	creation of international quality management standards, certification of quality management systems
1990-2010	Total quality management	satisfaction of consumer needs for quality products	principles of total quality management, national and international quality awards
2010 – to the present day	Environmenta-lization of quality management	an effective combination of satisfying consumer needs for quality products and environmental protection, meeting environmental requirements for the company's work	17 Sustainable Development Goals, 10 Principles of the UN Global Compact

Source: created by the author based on [2]

Despite the fact that over the past 100 years product quality has significantly increased and become more environmentally friendly, businesses remain largely uninterested in environmental protection, as minimal environmental costs are economically beneficial. Moreover, low environmental tax rates do not motivate enterprises to improve eco-friendliness. Therefore, the state should stimulate businesses toward greener

production by transforming technological processes. In perspective, this will allow the enterprise to: gradually reduce environmental costs; produce environmentally friendly products and sell them at higher prices; be exempt from income tax when producing environmentally friendly products (for example, as in the United States), if this is agreed with other legislative and regulatory acts of our country [3, p. 85].

For sustainable development of the economy, and in particular its environmental component, it is necessary to implement technologies in enterprises that are aimed at eco-friendly production processes and end products. To achieve this process, it is important for the enterprise to meet certain conditions. To understand what conditions are being referred to, it is appropriate to consider the diagram proposed by one of the domestic scientists, Nagara M.B., the corresponding diagram is presented in Figure 1 [4, p. 93].

The model of ecological sustainability of an enterprise involves achieving three objectives: ensuring social justice, economic efficiency, and ecological imperative, which results in a systemic-synergetic effect of developing environmentally responsible entrepreneurship. Therefore, as shown in Figure 1, the ecological conditions of sustainable enterprise functioning affect socio-ecological-economic efficiency, mobilization of "green" investments in ecological infrastructure, development of renewable energy sources, and modernization of business processes [4, p. 93].

Considering the importance of the development of organic production at the current stage of enterprise functioning, it is obvious that a systemic approach is necessary for the development and implementation of a complex of measures that will stimulate, promote, and regulate the development of ecological agriculture in Ukraine, including expected environmental effects. In addition, the environmentalization of production activities of agricultural enterprises is a component of basic strategies for increasing their competitiveness and primarily involves satisfying consumers with environmentally safe products, reducing the negative impact of agricultural production on the environment and preserving natural resources, introducing environmental innovations for the restoration of qualitative components of the natural environment by means of the process of self-restoration based on the use of modern environmentally safe technologies and innovative developments [5, p. 81].

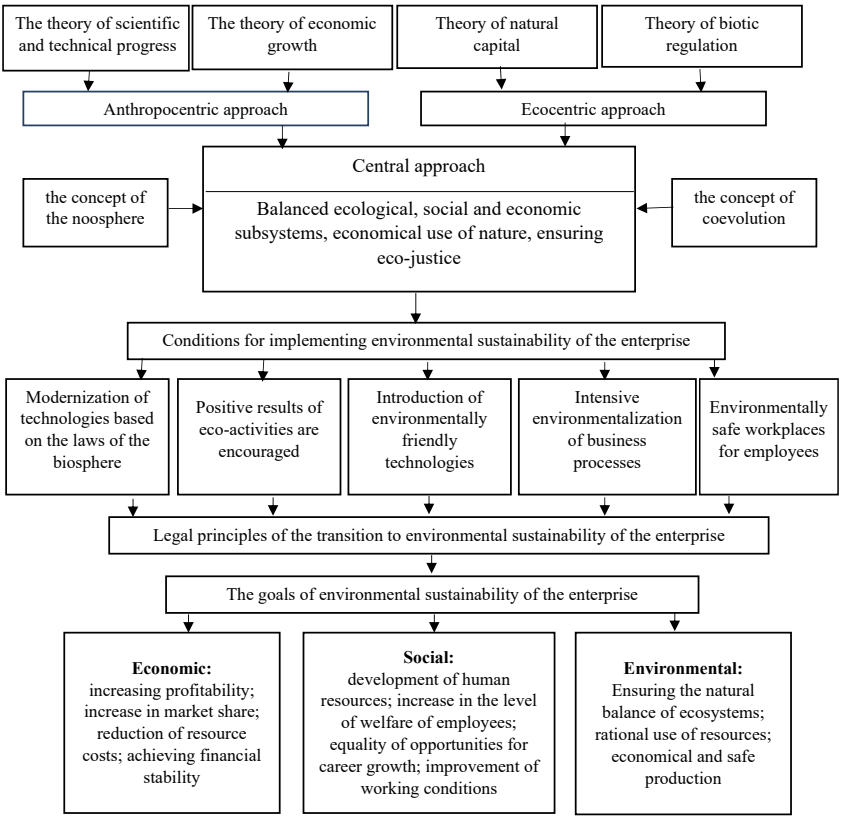

Figure 2.1. Environmental conditions for sustainable operation of the enterprise

Source: created by the author based on [4]

Agricultural enterprises have unique opportunities to combine economic benefits with ecological responsibility. Organic production, reducing the use of chemical fertilizers and pesticides, and the development of biological farming technologies create additional product value, which is increasingly appreciated in global markets. This opens the way for Ukrainian producers to enter premium market segments, where the price is determined not only by quantitative characteristics but also by the quality and ecological

safety of the product. Compliance with European standards in the field of production greening becomes not only a condition for integration into the European market but also a source of long-term competitive advantages for Ukrainian agricultural enterprises.

Experience from EU member states shows that greening measures directly enhance competitiveness. For instance, Denmark's agricultural enterprises have successfully integrated renewable energy into livestock and crop production, reducing production costs by up to 30%. In the Netherlands, eco-certification of dairy products has led to higher export prices and stronger market positions. These examples highlight that ecological modernization is not merely a cost but an investment in competitiveness.

In general, the greening of the economy can be seen as a process of reevaluating the role of natural resources in the production of material goods and the satisfaction of other societal interests, particularly entrepreneurial interests. The foundation of greening the economy should be based on fundamental principles that serve as guiding points for transforming natural resource legislation as a legal basis for involving natural resources in the economic sphere. These principles include: prioritizing safe use of natural resources for human life and health, including a scientifically substantiated assessment of the safety of implementing "green technologies"; reducing anthropogenic pressure on the environment, including consideration of natural laws and properties of natural resources, particularly in regulating relations in the field of emissions and discharges of pollutants, placement and disposal of household, industrial and other waste, etc. [6, p. 156].

Ecologization of Ukraine's economy can have many advantages. For example, it can lead to a reduction in emissions of toxic substances and environmental pollution, which will improve the quality of air and water resources. In addition, it can lead to increased resource efficiency and reduced costs for energy and raw materials.

One of the main advantages of ecologizing the economy is the reduction in costs for energy and raw materials. If production is less dependent on fuel resources, energy costs will be significantly reduced. In addition, the use of secondary raw materials reduces the need for direct sources of raw materials, which can help reduce production costs.

Another important advantage of ecologizing the economy is the improvement of air and water quality. Reducing emissions of toxic

substances into the air and water can have a positive impact on the health of people and nature as a whole. In addition, improving water quality can help preserve natural water resources and reduce pollution of marine and ocean waters.

Increasing competitiveness is also one of the advantages. Environmental technologies and processes can also enhance the competitiveness of companies and the economy as a whole. For instance, companies that implement eco-friendly technologies and processes can attract more investments and ensure greater resilience in the future. Moreover, such companies may be more appealing to consumers who are increasingly concerned about the environmental impact of production and prefer companies that care about the environment.

Apart from economic efficiency, greening improves a company's image among consumers, investors, and local communities. Environmentally responsible enterprises gain social capital, which translates into long-term stability, improved relations with regulatory authorities, and better access to financing, especially through 'green' credit lines and ESG investment funds.

For the agricultural sector, greening has an even more pronounced economic effect. The use of renewable energy in farms, the introduction of biogas plants, the utilization of livestock waste for biofuel production, and the implementation of drip irrigation systems and precision farming make it possible to significantly reduce production costs. At the same time, enterprises reduce their carbon footprint, which increases their attractiveness in international supply chains. As a result, agricultural enterprises gain a synergistic effect a combination of economic benefits, environmental safety, and strengthened competitive positions in the global market.

Among the main directions that will contribute to increasing the efficiency of the national mechanism of nature management and forming an effective strategy for the transition to sustainable economic development, the following can be highlighted:

Ecologization of lifestyle, reproduction of ecologically oriented human motives and factors of ecologization: stimulation of "ecologically balanced" behavior – formation of demand and need for eco-goods and products for individual consumption, ecologically oriented way of life, means for the

production sector and natural complexes, and disposal of household and industrial waste.

Ecologization of worldview, formation of mass ecological culture, education and upbringing of future generations, ecologization of the spiritual sphere of human activity. To educate members of society who are aware of the need to preserve both regional and global ecological balance and promote this.

Ecologization of the economy, growth of its energy efficiency. This problem relates not only to reducing the energy intensity of sectors of the economy, ecologization of goods and technologies that contribute to the conservation of material and energy resources in the production of certain types of products, means of processing waste and by-products of production, means of ecologizing technological processes and production.

Regulation and protection of national ecological interests in international politics, monitoring the production processes and volumes of "anti-ecological" products, that is, hazardous goods and services from an ecological point of view (food products, medical and cosmetic products, including genetically modified products) [7, p. 37].

It should be noted that Ukraine's geopolitical location enables it to develop economic relations with many countries around the world. Currently, the priority direction for our country's integration into the global economic space is the European vector of development. In the context of Ukraine signing the Association Agreement with the EU, the coordination of the main components of cooperation in this direction is of significant importance. Considering the specificity of the current stage of development of the world economy, focused on the concept of sustainable development, an important component of interaction should be environmental. Despite Ukraine having significant reserves of natural resources, their use in the national economy is not sufficiently rational. This concerns, in particular: the high resource intensity of GDP, which is two to three times higher than the average level characteristic of EU countries; the low level of depth of mineral raw materials processing; the inadequacy of ecologically clean territories in relation to the total area of the country; reduction in funding for environmental activities, etc. On the other hand, the European Union puts forward high environmental requirements for participants, being the initiator of concluding and implementing agreements to address the most

significant global problem – climate change, as well as a number of other environmental issues. All of the above necessitates, first and foremost, the need to develop an effective system of nature management in Ukraine, taking into account European trends in environmental development [8, pp. 31-32].

If we examine the European experience of eco-friendly economic policies, it can be said that the ecological focus of Europe's policies involves the creation of economic models that can function while implementing the concept of sustainable development and taking into account the resource, technical, and technological capabilities of countries. A crucial mechanism for positively impacting the resolution of eco-economic problems is the rational use of natural resources, which should provide urgent economic needs and positive production dynamics. It is essential to pay attention to the importance of increasing ecological efficiency through the use of specific financial instruments that will create additional opportunities for reducing the harmful impact on the environment and become a powerful incentive for ecological investment. A critical component of balanced natural resource utilization is the creation of systemic environmental impact mechanisms that contribute to achieving a certain eco-economic balance [9, p. 57].

2.2 "Green" Transformation of Agricultural Production as a Source of Competitive Advantages for Ukrainian Agribusiness Enterprises

European experience shows that the main directions of environmental protection in agriculture are consolidated in documents in the form of programs, meaning that regulation of agrarian economy is based on a program-targeted method. In turn, these programs include a strategy for the development of eco-friendly agricultural production. It is important to adhere to the principles of forming a strategy for the development of eco-friendly agricultural production, as this will improve the quality and safety of agricultural products, comply with environmental requirements in the production process, increase the ecological-economic efficiency of land use and conservation, provide favorable conditions for balanced development of rural areas and efficient land management, diversify land use and create an investment-attractive environment in the land use system,

and improve the ecological situation in the country as a whole. These principles establish frameworks and provide recommendations for agrarian enterprises on how to act, taking into account the factor of environmental friendliness. These principles can be grouped and presented as follows (Figure 2.2) [10].

Figure 2.2. Classification of the principles of the development strategy of eco-safe agricultural production

Source: created by the author based on [10]

These principles will enable the development of an effective strategy for eco-friendly agricultural production that will involve implementing a range

of measures aimed at reducing the negative impact of the agricultural sector on the environment and preserving natural resources. The main directions of the strategy include:

– Use of environmentally friendly technologies and soil treatment methods, which will reduce the amount of chemicals such as fertilizers, pesticides, and other agrochemicals used.

– Development of organic production, which involves using natural methods to preserve soil fertility and avoiding the use of chemical fertilizers and pesticides.

– Reduction of waste and use of secondary processing of waste in the agricultural sector.

– Development of agro-ecotourism and agro-ecological education.

– Implementation of a sustainable agriculture management system that involves a balance between production and natural resource conservation.

– Strengthening control over resource use, environmental pollution, and compliance with environmental standards and regulations in the agricultural sector.

Ecologization of agro-ecosystems involves the implementation of new technologies that reduce the negative impact on the environment and ensure production sustainability in the agricultural sector. The main economic indicators characterizing the ecologization of agro-ecosystems include:

1) Reduction of production costs. The use of energy-efficient technologies, renewable energy, and other environmentally friendly solutions allows for a reduction in production costs, which positively affects the financial performance of agricultural enterprises.

2) Increase in output. The use of environmentally friendly technologies and smart resource management allows for an increase in output per unit of land, which ensures the growth of production indicators of agricultural enterprises.

3) Increase in product quality. The use of environmentally friendly technologies allows for the reduction of harmful substances in products and an increase in the content of useful substances, which enhances product quality and its competitiveness in the market.

4) Reduction of negative impact on the environment. Ecologization of agro-ecosystems allows for a reduction in the amount of harmful substances

released into the air, as well as a reduction in negative impact on soil and water resources, which positively affects the environment.

5) Increase in social responsibility. Ecologization of agro-ecosystems allows agricultural enterprises not only to ensure production sustainability but also to become more socially responsible on a global scale, preserving natural resources for future generations.

6) Strengthening consumer trust. Growing consumer attention to the quality and ecological purity of food products creates additional demand for products that have been grown using environmentally friendly technologies. Such products have a higher price and greater export potential.

7)Increase in resource use efficiency. Ecologization of agro-ecosystems allows for more efficient use of resources such as water, land, fertilizers, and others. This reduces costs and increases output, making agriculture more sustainable and profitable.

Therefore, the ecologicalization of agroecosystems ensures comprehensive improvement of economic indicators in agriculture. This contributes to the growth of incomes of agricultural enterprises, the improvement of product quality, the reduction of negative impact on the environment, and the provision of production sustainability.

When determining the prospects for the development of the ecological economy in Ukraine, its ecologicalization status should be assessed. In general, the state of the ecological economy in Ukraine can be evaluated as ambiguous.

On the one hand, a number of legislative acts and programs aimed at improving the state of the environment and ecological safety have been adopted in Ukraine. In particular, Ukraine has joined a number of international agreements, such as the "Paris Agreement on Climate Change" [11], and has developed its own programs of ecological development, such as "Forecast of Economic and Social Development of Ukraine for 2022-2024" [12].

On the other hand, in practice, the implementation of these laws and programs remains unsatisfactory. A significant portion of enterprises in the country do not comply with environmental norms and standards, leading to environmental pollution. Additionally, infrastructure for renewable energy and the use of renewable energy sources is underdeveloped in Ukraine.

In addition, economic difficulties in the country contribute to some uncertainty in planning and financing environmental projects, which slows down their implementation and development. Therefore, there are both positive and negative trends in the field of eco-economics in Ukraine, and systemic reforms and efforts from businesses and government are needed for further improvement of the environmental situation.

However, if we evaluate the state of eco-economics in Ukraine based on specific indicators, they would be as follows:

1) The Environmental Performance Index (EPI) – this is an indicator that reflects the relationship between economic indicators and environmental production costs. This indicator is one of the key factors for evaluating the effectiveness of the economy from the standpoint of sustainable development. The higher the index, the more efficient the economy is in terms of ecological productivity.

It was developed based on cooperation between Yale University and Columbia University in 2001, and it evaluates countries according to their productivity in five categories: environmental protection, environmental health, air, water, and living organisms.

The Environmental Performance Index (EPI) is a ranking system used to compare the environmental productivity of countries worldwide. The EPI assessment takes into account 32 indicators that reflect the state of the environment, as well as the economic and social policies of the country.

Indicators used in the assessment of the Environmental Performance Index (EPI) can be divided into 11 categories:

– Population health.
– Air quality.
– Water quality.
– Environmental quality (assessed by two indicators: noise and waste).
– Climate change.
– Energy efficiency.
– Industrial emissions.
– Agriculture.
– Forestry.
– Fisheries.
– Biodiversity and ecosystems.

Each indicator has a weight coefficient that reflects its significance in the overall EPI score. The weight coefficients are updated with each new EPI assessment.

According to the latest EPI assessment conducted in 2022, Ukraine ranks 52nd out of 180 countries worldwide with a score of 49.60. Over the last 10 years, Ukraine has increased its overall score by 6.20 points, indicating significant progress in reducing the impact of economic activity on the environment. However, Ukraine still remains among countries with low environmental performance, although its progress in this direction is significant. Notably, in the category of "Agriculture", Ukraine's efforts to support healthy populations while minimizing threats to the environment are measured by two indicators: the Sustainable Nitrogen Management Index (SNMI) and Sustainable Pesticide Use. Ukraine ranks 53rd out of 180 countries worldwide with a score of 44.70, and over the last 10 years, Ukraine has increased its overall score by 9.10 points, which is a very significant growth and one of the highest among the surveyed countries [13].

2) The Sustainable Development Index (SDI) is a comprehensive indicator that reflects the level of sustainable development of a country as a whole. The Sustainable Development Index is composed of 17 indicators that cover aspects such as social and economic development, environmental protection, and ecological safety. The Sustainable Development Index in Ukraine is calculated annually by the National Institute for Strategic Studies with the support of the UN Development Programme in Ukraine.

Overall, recent calculations show that Ukraine has a slightly lower level of sustainable development compared to most European Union countries and some other countries in the world. It should be noted, however, that the index itself does not provide a complete picture of the country's economic and social development. Evaluating sustainable development in Ukraine is a complex task that must take into account many other factors such as economic development, human rights and security, environmental protection, social and cultural integration, and so on. Nonetheless, the Sustainable Development Index is one of the convenient and informative tools for measuring a country's progress towards sustainable development.

According to the website of the Sustainable Development Solutions Network (SDSN), Ukraine's Sustainable Development Index in 2022 was

75.69 points, compared to 63.40 in 2021. Overall, Ukraine ranks 37th out of 165 countries in the world in terms of sustainable development.

The Sustainable Development Index (SDG Index) is assessed based on the 17 Sustainable Development Goals (SDGs) adopted under the United Nations' Global Sustainable Development Program for 2030, as well as 169 sub-goals. According to SDSN data, Ukraine has made the most progress in achieving sustainable development goals related to transparency and data accessibility, as well as ensuring the health and well-being of its population. However, Ukraine has the lowest scores in achieving goals related to climate protection and sustainable use and protection of oceans, seas, and marine resources [14].

3) The Climate Protection Index (CPI) is an indicator that reflects a country's level of protection against climate change. This index includes various indicators such as greenhouse gas emissions, energy efficiency, the use of renewable energy sources, and others.

The Climate Protection Index (CPI) is a global index that compares countries' efforts to reduce greenhouse gas emissions, as well as their compliance with the obligations undertaken under the Paris Agreement to minimize climate change. This index was developed by the German organizations “Germanwatch” and “Climate Action Network Europe”.

According to data from the Climate Action Network Europe (CAN) and Germanwatch for 2021, Ukraine scored 41.02 points and ranked 32nd out of 58 countries in the world that were evaluated based on the indicators of the Climate Protection Index. The rating is based on several indicators, including greenhouse gas emissions per capita, the use of renewable energy sources, energy efficiency, and emissions reduction policies.

Compared to the previous year, Ukraine maintained its position in the ranking but decreased its score by 0.16. The top five countries in the 2021 ranking were Sweden, Denmark, the United Kingdom, the Netherlands, and Finland. According to the "Climate Change Performance Index 2022" report by Climate Action Network Europe (CAN) and Germanwatch, Ukraine received an overall score of 20.03 and ranked 47th out of 58 countries evaluated by the Climate Protection Index (CPI).

Ukraine received the following scores for individual CPI indicators:

– Indicator “Greenhouse Gas Emissions”: a score of 17.28 and 51st place out of 58 countries;

– Indicator “Energy Efficiency”: a score of 19.41 and 44th place out of 58 countries;

– Indicator “Renewable Energy”: a score of 25.72 and 35th place out of 58 countries;

– Indicator “Land Use”: a score of 12.38 and 56th place out of 58 countries;

– Indicator “Climate Policy”: a score of 25.64 and 26th place out of 58 countries;

It should be noted that in this report, Ukraine was included in the group of countries with a “low” level of compliance with international commitments to reduce greenhouse gas emissions [15, 16].

An additional characteristic of the state of eco-economic development is the level of investment in environmental projects. The more investment in eco-friendly technologies and resource conservation, the greater the chances of improving the state of the environment and reducing the impact of human activity on nature. In addition, investments in ecology can lead to the creation of new jobs and the growth of a country's economic potential.

Another indicator is the level of resource and energy consumption. The less natural resources and energy are used per unit of production, the more environmentally friendly the economy is. This can be achieved by implementing energy-efficient technologies, using renewable energy sources, and rational use of resources.

The degree of use of secondary raw materials and waste recycling is also an important indicator. The more secondary raw materials are used in production, the less need to extract new resources. Waste recycling can also significantly reduce the amount of waste and pollution in the environment.

So, national indicators that reflect the state of greening the economy include indicators such as levels of emissions of pollutants, use of environmentally friendly technologies and materials, investments in ecology, levels of resource and energy consumption.

2.3 Mechanisms and Strategies for Implementing the “Green” Transformation of Ukrainian Agribusiness Enterprises

Having assessed the state and outlined the potential benefits of greening the economy, there are some challenges and obstacles that need to be taken into account when implementing it in Ukraine.

One of the key risks of green transformation is the uneven capacity of enterprises to finance modernization. Small and medium-sized farms often lack access to credit or subsidies, which limits their ability to adopt eco-technologies. Therefore, state programs should focus on creating targeted financial instruments – such as green bonds, preferential loans, and innovation grants – to ensure equitable participation of all agricultural producers in the greening process.

First of all, not all companies and industries are currently ready to transition to eco-friendly technologies and processes. Many of them will face high costs for the development and implementation of new technologies, which can be a challenge for them. In addition, not all companies are ready for changes in their business models and market strategies.

The second challenge is the instability of legislation and the lack of clear rules for the application of eco-friendly technologies. Insufficient regulatory framework can be an obstacle to the implementation of new technologies and processes in production.

It is logical to assert that at the state level, an effective management strategy prioritizing the implementation of environmentally friendly agricultural development projects with maximum economic and social impact should be developed. The main economic instruments of such a strategy should be:

a) Payments (taxes) for environmental pollution, calculated based on the amount of pollutants and the level of environmental safety; an environmental tax (fee, eco-excise) on products that cause pollution during production, consumption, or disposal;

b) User fees for collective services (e.g. waste or sewage collection and disposal fees);

c) Environmental restrictions in the form of environmental standards and norms that regulate the maximum possible level of interference in the ecosystem;

d) Environmental sanctions in the form of fines, administrative and criminal liability for environmental violations;

e) Implementation and use of energy-saving technologies in production (geothermal, wind and solar energy);

f) Use of secondary raw materials and zero-waste production complexes in production;

g) Research and testing of innovative nature conservation technologies and production tools [17, p. 202].

In addition, greening the economy may require significant investments from both the government and private sector. Although the long-term benefits may outweigh the costs, the need for investment can be a barrier to implementing green projects in Ukraine.

The greening of a company's development is associated with both direct and indirect costs. However, it is also aimed at generating positive financial flows and achieving advantages that are strategically important in terms of positioning the company in the market. Firstly, an environmentally-oriented company is an innovation-oriented company. Researching the company through the lens of ecological priorities, trying to find development reserves, allows for a deeper understanding of its peculiarities, hidden advantages, and potential opportunities. Such a company is more inclined to implement innovations, quickly accumulates experience, and becomes more efficient in the segments of the market it occupies. Secondly, an environmentally-oriented company feels the trends of external environment development much better and adapts to its conditions faster, becoming a leader in implementing certain innovations, initiating new trends [18, p. 115].

In addition, Ukraine faces the challenge of low environmental awareness among the population and business community. The lack of knowledge about environmental issues and responsibility for their preservation can hinder the implementation of environmental initiatives. Furthermore, insufficient understanding of environmentalism can decrease demand for products and services that use eco-friendly technologies.

Therefore, in order to successfully implement the eco-modernization of Ukraine's economy, these challenges and obstacles must be taken into account and ways to overcome them must be found.

One key aspect is to create a favorable legal environment for environmental initiatives. This requires regular updates to legislation and the establishment of special mechanisms to support environmental initiatives and investments.

It is also necessary to create incentives for companies that use eco-friendly technologies, such as tax discounts or support from government agencies. Specifically, the government can reduce taxes for companies that use renewable energy sources or have a low carbon footprint.

To attract investments in the field of ecological economy, special funds and support programs can be created. Such funds can be created both at the state and private levels. For example, the European Bank for Reconstruction and Development has created the "Green Climate and Sustainable Development" support program, which provides funding to companies engaged in environmental initiatives.

To increase environmental awareness among the population and business community, it is necessary to conduct educational campaigns and open a dialogue with the public regarding environmental issues. Companies can focus on promoting environmental practices, reducing waste and energy conservation, as well as organizing educational events on natural resources and their use. It is also important to involve young people in these campaigns to engage a new generation in the fight for environmental sustainability.

At the state level, special programs can be created to support small and medium-sized enterprises (SMEs) engaged in environmental activities. For example, such programs can include funding for the implementation of environmental technologies, stimulating investments, and more.

One of the key directions for greening the economy of Ukraine is the use of renewable energy sources (RES). Renewable energy sources such as solar, wind, and hydro energy are environmentally safe and sustainable sources of energy. There are already programs in place in Ukraine to support the use of RES, such as the Wind Energy Program and the Solar Energy Program. However, to further develop RES in Ukraine, it is necessary to create a favorable investment and legal environment.

In addition to using RES, it is important to reduce the use of hydrocarbons and other harmful resources for the environment. This can be achieved by promoting the use of energy-efficient technologies and reducing waste. Companies can also focus on raising awareness of the harmful effects of environmental degradation and ways to prevent it, as well as increasing public interest in the development of an ecological economy.

For example, advertising campaigns can be aimed at popularizing eco-friendly products and emphasizing that companies striving to preserve the environment are more competitive and successful in the future.

Attention needs to be paid to the issue of ecologizing regional and local development strategy. It should be noted that currently, Ukrainian legislation does not address the ecological basis of regional development,

particularly regarding the practice of united territorial communities. The need for the development and adoption of an appropriate document format is due to the complicated environmental situation and the lack of a comprehensive approach to integrating international requirements for implementing European practices at the territorial level in order to more effectively protect the environment and use natural capital rationally.

In this context, agricultural enterprises should be viewed as key agents of ecological transformation. They are capable of combining innovative technologies with efficient resource use, creating unique competitive advantages in the global agricultural space. The development of the brand "ecologically clean products from Ukraine" can become a powerful tool for promotion in world markets, as modern consumers are guided by the quality, safety, and environmental sustainability of food products. Participation in international organic production programs and compliance with sustainable development standards not only expands export opportunities but also strengthens the positive image of the state in the global arena.

Taking into account the concept of "green" economic development at both the regional and local levels, it should determine:

– the economic component, which cements the growth of economic potential in a sectoral breakdown;

– the social component, which serves as the basis for improving the population's livelihood system in a particular territorial community;

– the ecological component, which forms the basis for the implementation of an environmentally safe policy at all levels of territorial development.

The main strategic orientations for ensuring harmonization of eco-economic relations both at the regional and local levels should be:

– strengthening the role and responsibility of local self-government bodies in addressing environmental problems;

– continuous implementation and strengthening of innovative processes management, improvement of environmentally friendly technologies, dissemination of environmental management standards, etc.;

– ensuring clear delineation of powers between central and regional (local) branches of government and agencies, while at the same time strengthening their responsibility for increasing innovation in the eco-economic sphere and the effectiveness of eco-economic reforms [19, pp. 175-176].

The strategy for ecological regional and local development in Ukraine aims to ensure sustainable development of regions and local communities while preserving the environment and ecological balance.

To achieve this goal, it is necessary to:

1) Identify the potential of each region and local community in terms of ecological resources and opportunities for their use.

2) Develop and implement local strategies for ecological development that will meet the needs and opportunities of each region and local community.

3) Support and stimulate the development of ecological businesses and investments in ecological projects in regions and local communities.

4) Engage the public in ecological development and involve them in decision-making regarding ecological policy.

5) Ensure efficient use of natural resources and increase energy efficiency in construction, transportation, and other areas of the economy.

6) Support research and innovation in the field of ecological technologies and stimulate their implementation in practice.

It is also necessary to take into account that the process of ensuring ecological regional development should include the following stages:

– determining the natural resource potential and state of the environmental infrastructure of the region as one of the main criteria for achieving "green" growth;

– focusing regional policy on factors and processes that affect further ecological development of the region;

– forecasting the economic and social consequences of "green" growth, taking into account ecological criteria and resource opportunities for regional development;

– developing specific proposals for improving the regional governance system as an effective mechanism for enhancing the efficiency of state policy.

The implementation of these strategies will help ensure the sustainability of regional and local communities' development in Ukraine and preserve the environment for future generations.

The empirical and theoretical analysis confirms that the greening of agricultural production is not only an environmental or ethical imperative but also an economic necessity. It serves as a multidimensional mechanism

for improving efficiency, strengthening international integration, and ensuring food security in the context of climate change. For Ukraine, adopting a strategic approach to greening is vital for aligning with the European agricultural model and building resilience in a globalized market.

In conclusion, it can be inferred that the eco-modernization of Ukraine's economy is an important component of the country's development, which ensures a balanced development of the economy and the preservation of natural resources. It is necessary to consider the challenges and obstacles that may arise on the path to ecological development and use the most effective tools to overcome them. These tools can include creating a favorable legal environment, stimulating businesses that apply eco-friendly technologies, attracting investments, conducting educational campaigns, and engaging the public in the development of the ecological economy. Accomplishing these tasks will help ensure the sustainable development of Ukraine's economy and the preservation of natural resources for future generations.

In this regard, the greening of agricultural production should be considered not as an auxiliary direction, but as a strategic foundation for the competitiveness of Ukraine’s agricultural enterprises. It allows combining ecological safety with economic benefits and social responsibility, creating a comprehensive model of sustainable development. Precisely through the formation of competitive advantages based on greening, the agricultural sector can become the locomotive of economic growth, integration into the European market, and the establishment of Ukraine as a leading supplier of high-quality, safe, and environmentally friendly products worldwide.

In summary, the greening of agricultural production is not only a requirement of the present but also a strategic resource for enhancing the competitiveness of Ukraine’s agricultural enterprises. The combination of economic efficiency, ecological responsibility, and social significance provides a foundation for the sustainable development of the agricultural sector, ensures its resilience in the dynamic conditions of the global economy, and opens new opportunities for Ukraine’s integration into the international community. Precisely through greening, agricultural production can become a driver of economic growth and an instrument for shaping a positive international image of the state.

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