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Prospective analysis of the implementation of the “green” economy in the agricultural sector of Ukraine for the next 10 years

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Abstract. The realities of modern economic development require significant changes in the existing economic system and a transition to a fundamentally new model based on the basic approaches of sustainable development. According to the world's scientists, one of the best options for ensuring this change is the concept of a “green” economy. The relevance of the topic of green economy development is based on its potential to solve urgent environmental problems and promote sustainable development that meets the needs of society and the international community. The purpose of the article is to assess the prospects of the agricultural sector of Ukraine's economy within the framework of the transformation strategy based on the principles of the green economy. This takes into account a whole range of factors in which agricultural enterprises exist and develop, as well as the conditions that have developed in connection with military aggression in the country. To achieve this goal, the following methods were used: system-structural analysis, method of analysis, synthesis, method of generalization, methods of deduction and induction, and methodology of modified, improved SWOT analysis. A number of factors influencing the investment and

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innovation processes at agricultural enterprises are identified, including external threats and opportunities and internal strengths and weaknesses. The study also summarizes the aspects of the transition from the concepts of "sustainable" development to the concept of "greening" the economy, taking into account international experience, and the inclusion of Ukraine in the list of countries that ensure the fight against climate change and harmful emissions. The conclusions obtained about the prospects of investment projects in the agricultural sector, namely investment and innovation projects of agricultural enterprises characterized by a high level of attractiveness for investors in terms of the directional vector of development, confirm the relevance of implementing the concept of a green economy in the agricultural sector of Ukraine. The use of such an assessment methodology in practice will make it possible to select and analyse promising areas of project financing and investment, as well as to adjust the development strategies of Ukrainian agricultural enterprises

Keywords: ecologization; globalization; development strategies; targets; sustainable development

INTRODUCTION

In recent years, starting from 2019, it has become evident that environmental threats due to climate change and deteriorating environmental conditions have become the primary risks for global development. This is confirmed by documents from the United Nations (UN) and its specialized agencies, as well as the outcomes of G20 and G7 meetings and the activities of the World Economic Forum, as reflected in the annual "The Global Risks Report" (Brende *et al.*, 2022). Restoring natural ecosystems to functional levels within the framework of ecological security and ensuring economic efficiency in economic and social spheres, as well as in terms of development sustainability, have become priorities in the political programs of countries worldwide. The first two decades of the 21st century have opened a "window of opportunity" for radical reforms and a transition to a different model of economic development, where the concept of a "green" economy plays a key role. This transition applies to European countries and the application of their experience in Ukraine, particularly in the agricultural sector.

Notable contributions to the development of this concept have been made by authors N. Fedorchuk (2021) and O. Pishchenko (2020), who have identified its fundamental principles and the necessity of transitioning to such a development model for agricultural enterprises. N. Fedorchuk (2021) examines the European experience of transitioning to a "green" path of economic development, using a new model for agribusinesses, and explores the opportunities and challenges that can arise when implementing such conceptual approaches in Ukrainian agribusinesses. The work of O. Pishchenko (2020) is dedicated directly to the development of the country's agricultural enterprises within the framework of the "green" economy concept. The author highlights all the obstacles that arise on the path of implementing such a business model in the context of a "green" course, and emphasizes the need for strategic and legal support at the state level. The work emphasizes the necessity of aligning state policy with the "greening" of the economy.

The "green" economy forms the basis for implementing the principles of sustainable development,

specifically energy efficiency, environmentally friendly resource utilization, and reduction of carbon dioxide emissions. This takes into account the development of a socially integrated society and its characteristics. The agricultural sector is one of the industries showing the highest rates of dynamic development and is promising for transitioning to "green" development. This sector is constantly transforming under the influence of growing demands from the European market, which is one of Ukraine's most important trade partners. These assertions are noted in the works of authors L. Smolii and N. Dikhtyatenko (2023). In their work, they emphasize the necessity of building a transformational strategic model for "green" economy for agricultural enterprises, taking into account the main principles of the European Green Deal. However, it should be noted that the authors do not address the issue of sources for attracting investment funds for project implementation within the framework of strategic development. Technologies such as renewable sources are discussed in the research by A.A. Barylo *et al.* (2020). Authors dedicate their work to assessing the prospects and effectiveness of implementing different types of energy using "green" technologies, without harming the environment. It should be noted that several questions related to state support and providing investment flows for the realization of such projects remain open.

The European Union's (EU) Common Agricultural Policy (2022) envisions the "greening" of the agricultural sector and rural areas, and this is a strategic direction for the country's agricultural sector development. The EU provides financial support for implementing ecological schemes, safe technologies, biodiversity conservation, landscape preservation, climate support, and rural bioeconomy development. Funding for these measures can constitute up to 35% of the combined agricultural budget of EU countries. Considering Ukraine's strategic direction in foreign economic policy towards alignment with the EU and the existing conditions in the agricultural sector, there is a need to transform this development direction with the main principles of "green" economy in mind. This will ensure a proper level of national

food security, reduce environmental risks in the agricultural sector, meet social demands, and strengthen competitive positions in international markets.

The aim of the article was to determine the prospects for sustainable development of Ukraine's agro-sector based on the principles of "green" economy in the modern conditions of management, under the influence of various factors and strategic orientations in the next decade. Achieving the main research goal will enable the practical use of the toolkit in developing regional development strategies in the future, adjusting local programs and plans for the strategic development of agricultural enterprises, implementing "green" technologies, and attracting "green" investments.

MATERIALS AND METHODS

The following research methods were employed to achieve the objectives: systemic-structural analysis, methods of analysis and synthesis, generalization, deductive and inductive methods, as well as SWOT analysis (S – strengths, W – weaknesses, O – opportunities, T – threats). The systemic-structural analysis method was used to construct the research logic and systematize the terminology related to the conceptual framework of "green" economy and the dynamic changes of global trends in "sustainable development". Using the methods of analysis and synthesis, the essence of the "green" economy, its constituent elements, characteristics, and its impact on Ukraine's agricultural sector were determined, considering contemporary changes. Through synthesis, the peculiarities of strategic conceptual principles based on the European initiative "Green Deal" for Ukraine's agricultural sector were combined (Fedorchuk, 2021).

The generalization method was applied to systematize the directions of "greening" economies' development and evaluate international experiences and practices in the world and European countries. This was aimed at implementing such experiences in domestic enterprises in the near future, taking into account the country's specific conditions. The methods of deduction and induction were used to study trends in the transformation of economic relations within the framework of "greening" the economy under the influence of external factors, internal changes, opportunities for economic digitization, and the use of modern information resources and programs. The induction method allowed for studying trends in analytical indicators and drawing conclusions about the prospects of the country's "green" economy and the agricultural sector in particular. Through the deduction method, by assessing general transformational processes in the global economic space and the transition to a "green" economy worldwide, positive decisions were made on implementing measures for "greening" economic sectors and developing new strategic solutions.

SWOT analysis was employed to identify key factors influencing a strategic project or program and to identify "weak points" for further adjusting their

effectiveness indicators. Through this method, by comparing potential opportunities and threats affecting Ukraine's agricultural sector with its strengths and potential opportunities, it's possible to determine the prospective direction of Ukraine's "green" economy development at the present moment and evaluate its future development prospects. Successful development and achievement of strategic goals for the "green" economy in Ukraine's agricultural sector will position the country among those minimizing ecological risks and effectively competing in international markets.

RESULTS

Starting from the 1970s and up to the present day, various aspects of the interaction between society, the environment, and the economy have been explored in global literature, leading to the emergence of a new direction known as "ecologization of the economy". According to the generally accepted definition, "ecological" economics studies the connection between ecological and economic systems. These interconnections form the basis of many contemporary issues such as global warming, increased acid rain, desertification, biodiversity loss, depletion of natural resources and energy, water and food shortages (United Nations, 2012; Selwyn, 2021). The rapid growth of global production over the last decades has resulted in increased levels of greenhouse gases (GHG), leading to global climate changes and significant ecological risks and threats to humanity. The dynamics of global CO₂ emissions indicate that the world economy has reached a critical level of carbon saturation. Since 2008, there have been instances where CO₂ emissions growth in the world has exceeded the growth rates of gross domestic product (GDP), primarily driven by populous countries like China, India, and Japan (European Union, 2022).

With each passing year, the pace of this process has accelerated, posing a threat to the socio-economic development of many nations. Addressing climate change, both in developed and developing countries, requires immediate political actions to implement unprecedented decisions in economic domains, changes in production technologies, and social welfare. Global leaders have agreed to collaborate in order to limit the rise of the global average temperature to a level significantly below 2°C compared to pre-industrial levels by the end of the century. Starting in the 1990s, countries actively joined the fight against climate change to avoid a global catastrophe in accordance with the terms of the Kyoto Protocol (United Nations, 1998). The transformative economy, focused on ecological development, laid the foundation for the concept of sustainable development, which became a crucial step in aligning environmental issues with plans for socio-economic growth and realizing the negative consequences arising from the activities of certain sectors on the environment and society. The definition of "sustainable development"

was officially adopted during the UN Conference in Rio de Janeiro (European Environmental Agency, 2012). It

was during this time that the fundamental principles of sustainable development were also outlined (Fig. 1).

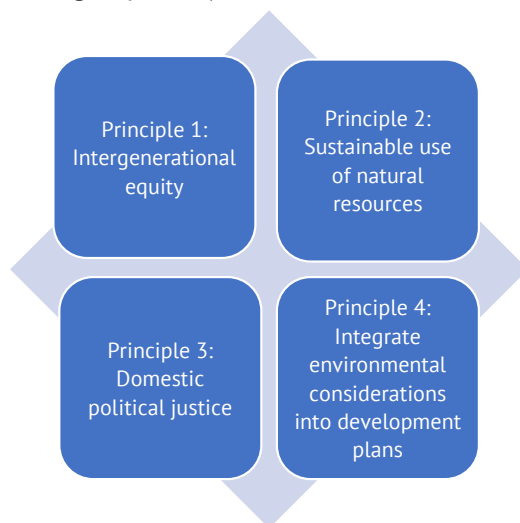


Figure 1. Principles of the concept of sustainable development

Source: compiled by the authors based on European Environmental Agency (2012), K. Markevich and V. Sidenko (2019)

The first principle is to protect natural resources for future generations; the second is to ensure the use of natural resources from the long-term perspective, considering their impact on the environment; the third is to take responsibility for the effects of national strategies on the use of natural resources, taking into account the needs of other countries; and the final principle is integration, where ecological considerations should be integrated into the development plans and projects of each country. Since then, the concept of sustainable development has been widely utilized in major international agreements. For example, around 200 countries joined the “GGGI Strategic Plan 2015-2020” (2015), which includes key global goals and tasks for sustainable development, aiming to balance economic, social, and ecological aspects to heal the planet and eradicate poverty.

The global financial crisis of 2008-2009 became a pivotal moment in the international growth of the “green” economy. This prompted global experts to reconsider the traditional model of economic development.

During this period, the concept of the “green” economy gained widespread societal recognition and began to be actively discussed by governments and experts at various international forums and conferences. For instance, after the United Nations Environment Programme initiated the “Green Economy Initiative” at the beginning of 2008, the term “green” economy started being used in UN documents. Additionally, the UN issued a statement in support of the “green” economy as a means to address numerous social issues (United Nations Department..., 2009). The UN conference addressing key issues related to the principles of sustainable development, Rio+20 (European Environmental Agency, 2012), triggered the formulation of the core principles of the “green” economy and their implementation into international practice. The “green” economy was defined as a relevant tool linked to sustainable development (United Nations, 2023). During the same period, the fundamental structure of the “green” economy was established (Fig. 2).

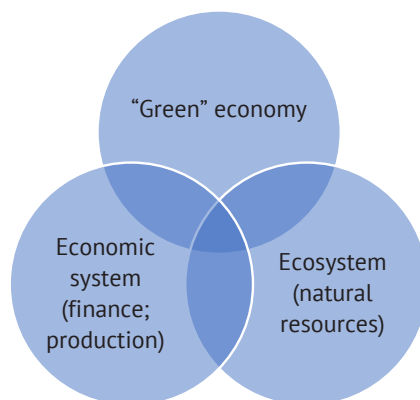


Figure 2. The basic structure of the “green” economy

Source: L. Smolii and N. Dikhtyarenko (2023), United Nations (2023)

The main goal of the “green” economic concept is to achieve significant progress in the interrelation of ecology and economy, which serves as the basis for implementing the concept of sustainable development. It encourages governments to transition towards balanced development, including investments in renewable energy resources, addressing energy efficiency and energy independence issues, solving problems related to the production of biological food products, rational land use, and optimal resource management. All of this is aimed at transitioning to an efficient economy, adopting environmentally friendly and resource-saving technologies that aim to reduce emissions of pollutants, cease the unrestricted use of valuable minerals, and mitigate the negative impact on climate change (European Commission, 2016). The core principles of the “green” economy have had a significant impact on the strategic and political development of most world-leading countries, emphasizing its role in various aspects of socio-economic orientation. For the UK, as well as France and China, the main directions have been defined as economic development and maintaining competitiveness. Conversely, African countries such as Rwanda and Morocco, as well as Ethiopia, Senegal, and South Africa, highlight their transformative opportunities that will allow them to “leapfrog” the current “polluting” development model and transition to a new, innovative, “clean” model. Countries in the Asia-Pacific region prioritize redirecting processes towards social issues, such as employment and retaining a skilled workforce, eradicating poverty, and achieving sustainable development (Georgeson *et al.*, 2017).

Despite the lack of a universally accepted definition of the “green” economy on the international level, a widely used working version was developed in 2011. According to this definition, the “green” economy is an instrument that contributes to improving the environment. Human well-being and social equality also significantly mitigate the negative impact on the environment and minimize the risk of environmental degradation (OECD, 2023). It also underscores the connection between “green” economic concepts and sustainable development. However, it’s important to note that the “green” economic concept cannot replace the concept of sustainable development. The realization of sustainable development largely depends on the economy’s revival through creating conditions for innovation, investment, and competition. The European Environment Agency proposes a simplified interpretation: the “green” economy is a policy of investment and innovation that encourages society to develop production systems that preserve natural resources and implement projects focused on nature conservation start-ups, digitization projects, advanced technologies. Considering the above, “green economy” can be defined as an economic development concept that promotes ecological sustainability and social equality through reorient-

ing production to a stable level, increasing resource and energy efficiency, developing renewable energy sources, implementing biological and innovative technologies, and increasing investment in projects aimed at popularizing “eco-friendly” production.

Similar to leading developed countries and fast-growing markets, Ukraine has embarked on a path towards sustainable development based on the “green” growth concept. This approach incorporates knowledge, innovation, energy-efficient production lines, advanced technologies, as well as social and environmental progress. This concept is significant worldwide for adapting the principles of sustainable development to the conditions of most countries, including Ukraine. Considering the current state of socio-economic development, the agro-industrial sector, the technological level of the industrial sector, the question of enhancing energy efficiency in both production and residential-communal sectors, as well as the negative geopolitical situation resulting from the military aggression of the Russian Federation, which has notably impacted policies related to carbon energy resources, the transition to a sustainable development model becomes a priority for Ukraine. The Association Agreement between Ukraine and the EU plays a crucial role in this context (Potapenko, 2013). According to the agreement, Ukraine commits to harmonizing its legislation with European standards in the specified area of sustainable development. The agreement explicitly emphasizes the importance of considering development and the state of the economy, ecology, and the social sphere, which impact not only the current situation but also the lives of future generations.

One of the key tasks facing Ukraine today is the transition of its national economy based on the principles underlying the core approaches of the “green” economic model, namely: sustainable production, energy efficiency, resource conservation, business support, ecological safety, and stable economic development. The agricultural sector of Ukraine, as a flagship of the country’s economic development, has high prospects for the implementation of “green” economic principles. However, there are several unresolved issues that need to be addressed. Among these problems, the depletion and degradation of agricultural lands, pollution of water resources, and high levels of air emissions due to outdated equipment (Lishchuk *et al.*, 2022) should be highlighted. According to a report by the National Institute for Strategic Studies of Ukraine, the state of agricultural lands in the country is highly vulnerable, especially considering the high level of landmines in certain areas. Natural processes of soil degradation and erosion also continue, affecting over half of the total agricultural area (Potapenko, 2013). Among other economic sectors, the agricultural sector stands as one of the main sources of undesirable waste production. According to the report from the National Cadastre of Ukraine, from 1990 to 2020, the volume of GHG

emissions from various categories of sources in Ukraine's agricultural sector accounted for nearly 13% of the total GHG emissions in 2020 (Table 1). Therefore, despite the

implementation of global experience and eco-technologies in agricultural production, Ukraine's agribusiness still hasn't achieved a significant level of ecologization.

Table 1. Changes in the volume of GHG emissions in different categories of sources of the agricultural sector of Ukraine, expressed in thousand tons of CO₂ equivalent

Years	Names of agricultural industries in the agricultural sector with the most significant GHG emissions in Ukraine						Total
	in crop production			in animal husbandry			
	rice cultivation	agricultural land	liming	urea application	internal fermentation	manure management	
1990	216.43	35709.95	2592.08	270.14	45924.87	7308.44	92021.91
2000	187.12	15264.85	63.47	82.23	18468.6	2441.46	36507.73
2001	140.86	16769.07	71.47	117.02	18746.74	2399.3	38244.46
2002	140.75	16647.36	53.78	116.91	18926.94	2556.43	38442.17
2003	166.13	13927.54	49.37	1911.11	16984.02	2372.71	33690.88
2004	158.16	16962.84	83.33	35.83	16016.58	2179.28	35436.02
2005	158.57	17011.59	90.92	138.32	15719.51	2222.95	35341.86
2006	161.01	16979.44	105.99	171.32	15460.79	2314.25	35192.8
2007	156.72	15731.11	112.35	212.11	13998.08	2244.39	32454.76
2008	146.85	21054.47	124.95	355.18	13241.48	2187.15	37110.08
2009	181.97	19622.78	151.88	175.03	12767.38	2251.1	35150.14
2010	217.31	19348.96	127.46	334.73	12191.9	2334.19	34554.55
2011	219.98	24080.83	127.16	391.52	11784.12	2317.52	38921.13
2012	191.74	22948.71	161.72	351.36	12016.15	2357.81	38027.49
2013	179.32	27008.06	182.25	381.75	12257.78	2407.11	42416.27
2014	75.58	27413.42	156.26	386.03	11681.1	2344.2	42056.59
2015	86.72	25979.33	169.83	372.5	10970.24	2224.99	39803.61
2016	89.07	28876.25	140.09	457.62	10752.01	2126.43	42441.47
2017	94.11	29697.25	168.6	512.07	8597.04	2022.17	41091.24
2018	93.58	33479.29	163.74	201.18	8298.21	2002.73	44238.73
2019	94.83	33004.02	163.23	316.84	7918.02	1958.37	43455.31
2020	82.99	31845.54	131.35	235.51	7447.07	1944.65	41687.11

Source: compiled by the authors based on the European Union (2022), Ministry of Environmental Protection and Natural Resources of Ukraine (2023)

In order to transform the agricultural sector on the basis of the "green" economy, it is necessary to establish strategic guidelines, common principles, directions and define the mechanisms and appropriate tools for its implementation. These elements should form a single system of transformations aimed at preserving, increasing and restoring natural capital in the agricultural sector, which is the most important economic asset and source of public goods (Figure 3). Formulation of the strategy and its control should take into account the expected results in relation to all strategic priorities. The main goal is to achieve specific target indicators

and perform the corresponding tasks. In the field of agriculture, it is important to take into account the goals of the European Union during the strategic planning of its development, taking into account the national characteristics of the development of the agricultural sector in Ukraine and based on the existing positions. The main principles of the ecologization of rural production should be increasing the level of food security, effective use of resources from the ecological and economic point of view, reducing energy dependence, improving the export image of the industry, ensuring the international competitiveness of agricultural enterprises.

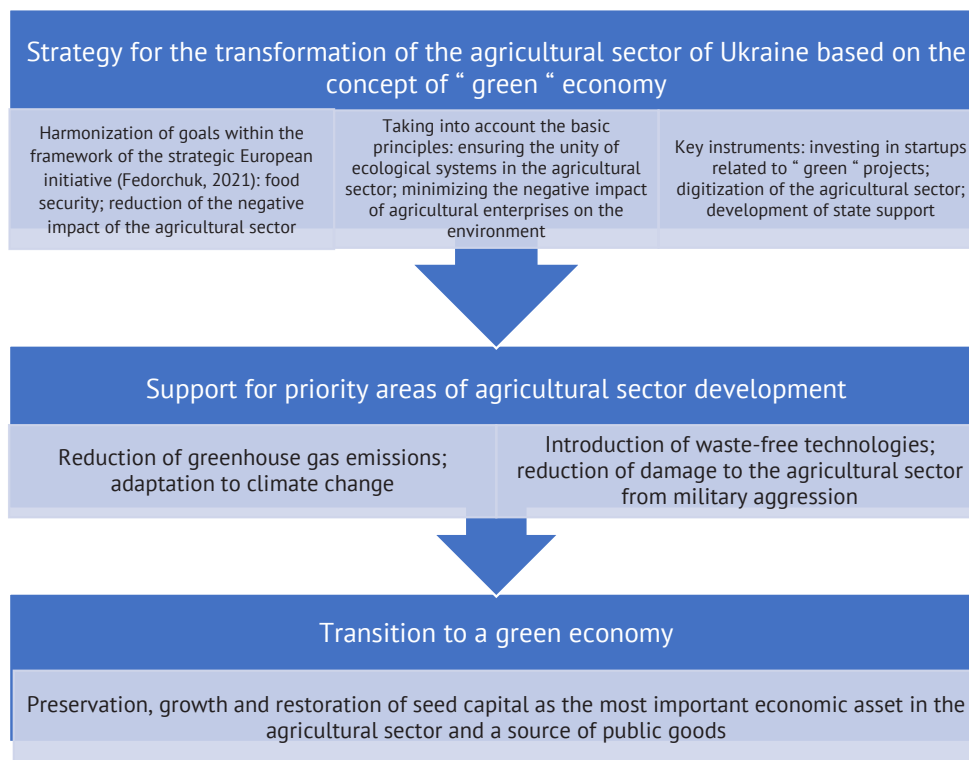


Figure 3. Formation of the transformational strategy of the agricultural sector of Ukraine, taking into account the principles of the "green" economy concept

Source: compiled by the authors based on the European Union (2022)

For the transformation of the agricultural sector based on the principles of the "green" economy, it is necessary to establish strategic guidelines, unified principles, directions, and mechanisms, as well as define the tools for its implementation. These elements should form a cohesive system of transformations aimed at conserving, increasing, and restoring natural capital in the agricultural sector, which is the most important economic asset and a source of societal benefits (Fig. 3). The formulation of the strategy and its monitoring should consider the expected outcomes in relation to all strategic priorities. The main goal is to achieve specific target indicators and accomplish

corresponding tasks. In the sphere of agriculture, it's crucial to take into account the goals of the European Union while strategically planning its development. This should be done by considering national peculiarities of agricultural sector development in Ukraine and building upon existing positions. The core principles of agricultural production's ecological transformation should include increasing food security, efficient resource utilization from both ecological and economic perspectives, reducing energy dependence, enhancing the industry's export image, and ensuring international competitiveness of agricultural enterprises (Tables 2 and 3).

Table 2. List of factors for evaluating the impact of Opportunities and Threats of the external environment on investment attraction

Opportunity		Threats	
1	Strategy for the development of the "green" economy	1	Fall in GDP, gross rating point (GRP)
2	State programs for the development of the agricultural sector, support for the "European Green Course"	2	Inefficient industry structure
3	Creating an attractive investment climate for financing environmental protection measures and start-ups	3	Unsatisfactory level of financing of innovative projects in the agricultural sector
4	Defining the agricultural sector as the vanguard of innovative development	4	The riskiness of financing due to military aggression
5	Targeted programs for the introduction of innovations and staffing	5	Pressure from international competing manufacturers

Table 2, Continued

Opportunity		Threats	
6	Availability of high-tech production capacities of agricultural enterprises	6	Loss of part of the territories due to military actions
7	High rates of infrastructure development	7	Loss of part of highly qualified personnel

Source: compiled by the authors based on S.V. Filippova et al. (2015)

In order to carry out the assessment, all factors of the internal environment are grouped according to the principle of comprehensive analysis, for the assessment of the activities of enterprises in the agricultural sector.

Table 3. List of factors for evaluating the internal environment of agricultural enterprises

Group name's	No.	Internal environmental factors
Enterprise resource provision	1	The state of production facilities, the level of wear and tear, renewal plans, war losses
	2	The level of management of intangible assets, the dynamics of their use and implementation
	3	Energy efficiency and resource availability
	4	The level of staffing and personnel management
	5	The level of transport and logistics support
Organizational and production activity of enterprises	6	Strategic direction of enterprise development
	7	Organizational structure of enterprises
	8	The level of production quality, compliance with modern needs
	9	The level of marketing and sales activity
	10	The level of application of innovative technologies in production
"Greening" of enterprises and competitiveness	11	Positions of agribusiness among competing eco-enterprises
	12	Corporate ties and their strength
	13	The level of product safety from its environmental friendliness
	14	Ensuring market share
Financial and economic condition of enterprises	15	The level of solvency of enterprises
	16	Dynamics of available funds and working capital at agricultural enterprises
	17	The level of financial stability of enterprises
	18	Dynamics of production profits and losses
	19	The ratio of own and borrowed investment funds

Source: compiled by the authors based on S.V. Filippova et al. (2015)

The result of the SWOT analysis, according to the proposed algorithm, is the determination of the vectors of possible development directions of enterprises in the agrarian sector. In addition, it is important to characterize each quadrant of the matrix. When compiling a list of the main characteristics of each quadrant of the SWOT matrix, the author adheres to the principle of priority from the point of view of attrac-

tiveness for investors. For a potential investor, projects that are less dependent on environmental factors will be more attractive, as such factors are characterized by a high degree of uncertainty and risk. Table 4 shows the results of constructing the characteristics of the direction vector of the development of the investment and innovation project based on the results of the SWOT analysis.

Table 4. Interpretation of the results of the SWOT matrix and determining vector of directed development

Quadrant of the matrix	Characteristics	Possible reaction of a potential investor
I	Potentially very high level of Opportunities from the external environment + Strengths from the internal environment. The most favourable development option	Such a scenario is considered the most optimistic and causes the least expectations of risky and negative consequences of project implementation

Table 4, Continued

Quadrant of the matrix	Characteristics	Possible reaction of a potential investor
I	Internal Strengths + sufficiently high Opportunities from external factors. They differ from the previous ones by a lower probability of an optimistic forecast. The direction is promising.	It is considered by the investor as a promising and realistic investment option in the absence of additional threats
II	Opportunities of the external environment are high + Weaknesses of the internal environment are at a low level. It is attractive if it is possible to solve the problems of the internal environment with management solutions.	Such projects cause a positive reaction in case of cooperation with effective risk management
II'	High Internal Weaknesses + low External Environmental Opportunities. Potentially risky projects that require additional refinement.	As a rule, if an investor takes the risk of investing in such projects, he hopes for a fairly high-risk premium
III	High Strengths of the internal environment + low Threats of the external environment. Such projects are quite dependent on the influence and dynamics of changes in external factors.	The reaction can be positive if the investor assesses the risk and the expected effect and settles the issue of their ratio
III'	The factors of the internal environment characterize the low potential of Strengths + a high level of Threats from the external environment. Such projects require detailed diagnostics.	For an investor, such projects are riskier and, if there are alternatives, not attractive. They need refinement
IV	High level of Threats + Weaknesses of internal environment, low level. Such projects need to be refined.	From the investor's point of view, the project does not meet the expected results and requires detailed analysis and refinement
IV	High level of Threats + high level of Weaknesses of the internal environment. In this version of the development of events, the project needs a complete review.	The highest level of danger for the investor. It can receive financing with a very low probability only in the case of complete absence of alternatives

Source: compiled by the authors based on S.V. Filippova et al. (2015), A. Sherafat et al. (2013)

As can be seen from the proposed methodology, the main role of research at this stage consists in grouping projects according to the degree of their attractiveness for potential investors, according to the criteria of the direction of their development. This analysis compares external opportunities and threats with internal strengths and weaknesses. The next step is to determine the assessment of the level of influence of factors of the external environment according to the algorithm, which makes it possible to determine those that affect

the enterprises of the agricultural sector the most (Tables 5 and 6).

In order to determine the final result according to the given analysis, only those connections were selected where the level of influence corresponds to rank 1-3, "Opportunity" is marked as a positive result, and threats as a negative one.

Correlations and evaluations for the factors of the internal environment are similarly determined (Table 7).

Table 5. Analysis of the influence of environmental factors

	Opportunities	Degree of impact (D _i)		Probability		Impact coefficient (C _i)	Association	Average rating	Rank
		Assessment	Score	Assessment	%				
1	Strategy for the development of the "green" economy (within the framework of the Green Deal)	high	3	average	50	150	Strategic direction of enterprise development	188	2
2	State programs for the development of the agricultural sector, support for the "European Green Course"	high	3	high	75	225			

Table 5, Continued

	Opportunities	Degree of impact (D _i)		Probability		Impact coefficient (C _i)	Association	Average rating	Rank
		Assessment	Score	Assessment	%				
3	Creating an attractive investment climate for financing environmental protection measures and start-ups	high	3	average	50	150	The level of application of innovative technologies in production	188	1
4	Defining the agricultural sector as the vanguard of innovative development	high	3	high	75	225			
5	Targeted programs for the introduction of innovations and staffing	average	2	high	75	150	The level of production quality, compliance with modern needs	150	3
6	Availability of high-tech production capacities of agricultural enterprises	average	2	high	75	150			
7	High rates of infrastructure development	average	2	average	50	100	Ensuring market share	100	4
	Threats	Degree of impact (D _i)		Probability		Impact coefficient (C _i)	Association	Average rating	Rank
		Assessment	Score	Assessment	%				
1	Inefficient industry structure	average	2	reality	100	200	The level of solvency of enterprises	-175	2
2	Unsatisfactory level of financing of innovative projects in the agricultural sector	average	2	high	75	150			
3	The riskiness of financing due to military aggression	high	3	high	75	225	Positions of the enterprise among competing eco-enterprises	-188	1
4	Pressure from international competing manufacturers	high	3	average	50	150			
5	Loss of part of the territories due to military actions	average	2	low	25	50	Corporate relations	-50	4
6	Loss of part of highly qualified personnel	high	3	low	25	75	The level of staffing and personnel management	-88	3
7	Inefficient industry structure	average	2	average	50	100			

Source: compiled by the authors based on S.V. Filippova et al. (2015)

Table 6. Evaluation factors of the SWOT analysis of the external environment of the agricultural sector

Opportunities			Threats		
Factor	Rating	Rank	Factor	Rating	Rank
Strategic direction of enterprise development	188	1	Positions of the enterprise among competing eco-enterprises	-188	1
Support for the development of agricultural enterprises	188	2	The level of solvency of enterprises	-175	2
The level of application of innovative technologies in production	150	3	The level of staffing and personnel management	-88	3
Average score	175		Average score	-150	

Source: compiled by the authors

Table 7. Evaluation of Strengths and Weaknesses of the internal environment

Group of factors	No.	Strengths	Summary score	Group of factors	No.	Weaknesses	Summary score
Resource support	2	The level of management of intangible assets	109	Organizational and production activity	9	The level of marketing and sales activity	-73
	4	The level of staffing and personnel management	82	"Greening" of entrepreneurship and competitiveness	12	The level of product safety from the point of view of its environmental friendliness	-55
Organizational and production activity	6	Strategic direction of enterprise development	145		Financial and economic condition	13	Ensuring market share
	7	The level of application of innovative technologies in production	18	18		Dynamics of profits and losses	-200
	10	The level of production quality, compliance with modern needs	55	19		The ratio of own and borrowed investment funds	-55

Source: compiled by the authors based on S.V. Filippova et al. (2015)

Factors whose score exceeds the indicator (≤ 50) are considered more influential, then they are ranked from 1 to 3, the results of determining the average score

are shown below (Table 8). After calculation, all data summarized in Table 9. Graphically, it was presented on Figure 4.

Table 8. Determination of the average score based on the results of the analysis of the internal environment of the enterprise

Group of factors	Rank	Strengths	Summary score	Group of factors	No.	Weaknesses	Summary score
Resource support	2	The level of management of intangible assets	109	Organizational and production activity	2	The level of marketing and sales activity	-73
	3	The level of staffing and personnel management	82	"Greening" enterprise and competitiveness	4	The level of product safety from the point of view of its environmental friendliness	-55
Organizational and production activity	1	Strategic direction of enterprise development	145	Financial and economic condition	1	Dynamics of profits and losses	-200
	4	The level of production quality, compliance with modern needs	55		3	The ratio of own and borrowed investment funds	-55
Average score			112	Average score			-109

Source: compiled by the authors based on S.V. Filippova et al. (2015)

Table 9. Data for the graphic determination of the vector of prospects for the direction of the development of enterprises in the agricultural sector

Factors of the external environment		Factors of the internal environment	
Opportunities	175	Strengths	112
Threats	-150	Weak sides	-109
Opportunities + Threats = X	25	Strong + Weak = Y	3

Source: compiled by the authors

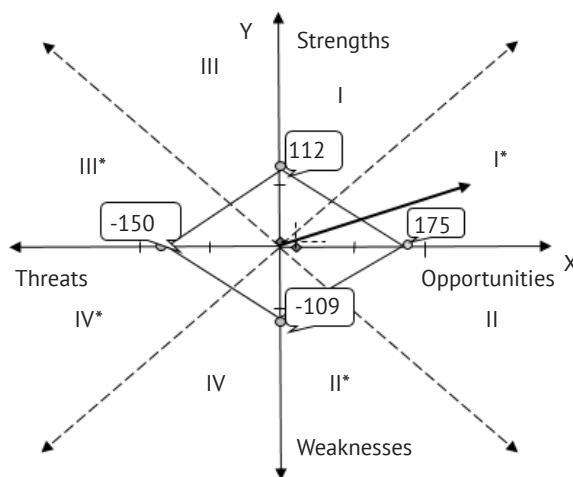


Figure 4. Graphical definition of the perspective vector of the direction of the development of the enterprises of the agrarian sector of Ukraine

Source: compiled by the authors

As seen from the presented vector scheme, the direction of development is situated in a quadrant that characterizes the potential for development with a high level of opportunities for investment attraction and the utilization of maximum levels of external opportunities and internal resources. However, it is necessary to consider the realities of time and the facts that, due to military aggression, the sown areas in Ukraine have decreased by 25% as of the year 2023. The agrarians suffer from losses caused not only by disruptions in markets and unfavourable new economic conditions, but also from the disruption of the “grain initiative”, constant instability, equipment and personnel losses, animal deaths, and land losses due to landmines. Nevertheless, there are also positive aspects: the agricultural sector shows significant resilience and adaptation to new economic conditions; the opportunity for alignment with the requirements associated with the prospect of joining the European Union; the “grain initiative” has enabled the agricultural sector to realize a substantial portion of its production; in 2022, Ukraine exported agricultural products worth \$21.1 billion; the prospects for the 2023 harvest are expected to be positive (Ministry of Environmental Protection and Natural Resources of Ukraine, 2023).

It should also be noted that in Ukraine, the Decree of the President of Ukraine (2019) was signed. Among the main priorities, the development of agricultural enterprises is identified as a forefront in the innovative development of the agricultural sector. Additionally, the “Low-Carbon Development Strategy of Ukraine until 2050” (2018) has been developed and adopted, which envisions Ukraine’s transition to a low-carbon development model, including the reduction of GHG emissions and the minimization of the use of fossil fuels. Simultaneously, an increase in investments in the development of renewable energy sources and the transition

to environmentally friendly production using “green” technologies in all sectors of the economy, including agriculture, is planned. Particularly emphasized in the practical part are recommendations for steps related to the agricultural sector, which involve numerous innovations and new production requirements, innovative waste processing methods, improved energy efficiency, specifically:

1. Increase carbon absorption through the implementation of better climate-friendly agricultural methods.
2. Reduce GHG emissions, specifically methane and nitrous oxide, which are primarily associated with agricultural production, livestock farming, and resource extraction.

In conclusion, considering the obtained results of the assessment of prospects and the strategies developed by the Government, it can be concluded that overall, based on the analysis results and forecast expectations, the prospects for the agricultural sector are quite positive, even in the context of the current complex situation.

DISCUSSION

The trend of the “green” economy is gradually being incorporated into the development strategies of most countries worldwide, particularly in Europe. The support for climate agreements, the safety of agricultural and food production, the application of new soil processing technologies, waste recycling, everything related to emissions reduction and GHG reduction, the development of energy independence and security, energy efficiency, and numerous other issues in this direction are all encompassed by the concept of “greening” the economy. Even in works published in the 1990s, researchers like K.P. Bruce *et al.* (1996) pointed out that economic development would be impossible without the implementation of the “green” economy concept, given that

the impact of climate change is reflected in the activities of enterprises across all sectors of the economy. These authors emphasized that the implementation of the core elements of the “greening” concept is necessary both in the economic and social aspects of each country’s development.

Scholars like K. Baylis *et al.* (2022) examined the implementation of the principles of the “green” economy in the production sectors of the United States and Canada. They studied the historical aspects and dynamics of these processes and highlighted the necessity of such an economic development model, especially in the agricultural sector. The importance of government support for agricultural sector development programs is noted. The agricultural sector in the Ukrainian economy has all the prospects for successfully adopting and implementing the fundamental principles of the “green” economy. However, this requires addressing a significant number of challenges that remain unresolved today, including the depletion and degradation of agricultural lands, water pollution, and significant atmospheric emissions resulting from outdated equipment and pollutants.

The orientation towards the ecologization of agricultural production should prioritize enhancing food security, elevating the environmental and economic efficiency of resource utilization, reducing energy dependency, and increasing the export potential of agricultural products, industrial sectors, and the entire national economy. This perspective is supported by researchers like O. Drebot and V. Tarnavskiy (2022), who underline the prospects for the development and implementation of the core principles of the “green” economy on Ukrainian agricultural enterprises. They emphasize the need to change strategic orientations, taking into account new realities related to the military conflict and the new perspectives provided by agreements with the EU. The transformation of the agricultural sector based on the “green economy” should have clear goals, principles, directions, and implementation tools. These elements will form a unified transformation system that will help preserve, enhance, and restore the natural capital in the agricultural sector as a crucial source of economic assets and societal well-being.

Achieving sustainable development goals by regions, countries, and society as a whole overcomes many problems related to food security, fosters the economic growth of the agricultural sector, and enhances its competitiveness in international markets. The implementation directions of the “green economy” concept encompass virtually all spheres of development and activities within the country’s agricultural sector, making it a priority in the formulation of strategic programs and plans for the future. Similar perspectives on agricultural safety are revealed in the works of authors like B. Hasler *et al.* (2022), who examine the European approach to implementing the principles of the “green” economy and the political regulation of this process.

The study extensively reviews the European agroecological policy, which has various and competing goals. The Common Agricultural Policy was the main political foundation that guided the development and implementation of mandatory and voluntary instruments of agroecological policy in the EU and its member states. The voluntary agroecological scheme, initiated in the 1990s, continues to play a central role in achieving the EU’s environmental and climate goals. These programs have faced challenges in achieving their goals, including limited environmental impact, low farmer participation, and conflicts between ecological goals and income support objectives. Lessons from the past and potential future research and policy directions aimed at improving the EU’s agroecological and climate goals can be informative for the development of strategic orientations in development programs. Furthermore, the works of G. Pe’er *et al.* (2020) highlight the necessity of control throughout the entire cycle of agricultural crop cultivation and the quality of agricultural products up to the point of consumption.

Considerable attention is also given to food security. For example, in the research of K. Eckerberg *et al.* (2023), questions of land policy are interconnected with other domains: food security, energy supply, environmental protection, stimulation of sustainable development. The values proclaimed by these new realities sometimes conflicted or were not always easily reconciled with the values of those who previously managed agricultural policies. Their research in this field shows that value conflicts are resolved differently, leading to various paths of inter-agency coordination and decision-making. The study of the formation of inter-agency policy in the field of agricultural development management has the potential to contribute to the theoretical development of state policy analysis, just as research on land policy did in the past (Eckerberg *et al.*, 2023). Defining new priority directions and implementing an enhanced SWOT analysis method based on characteristics of external and internal factors, as well as its interpretation, enables the evaluation of prospects based on the obtained results. In this regard, the list of Opportunities and Threats, as well as Strengths and Weaknesses for agro-sector enterprises in Ukraine, was determined considering all perspectives for investment and innovation projects, as well as the country’s situation in relation to military aggression.

In the works of researchers S.V. Filippova *et al.* (2015) and A. Sherafat *et al.* (2013), examples of using the directional analysis methodology are provided to determine the attractiveness of investment and investment-innovation projects when selecting alternatives and assessing their prospects. An outstanding feature of the proposed method is its application to determine the direction vector of the agro-sector’s development prospects, taking into account factors of strategic development for the “green” economy in

the country, maintaining sustainable growth despite external threats, supporting a course aimed at implementing principles within the “European Green Deal”, endorsing investment-innovation development of agrarian enterprises, startup implementation, digitization of the agro-sector, ensuring high levels of safety and environmental friendliness of products, and their competitiveness in domestic and international markets, among others. The question of the necessity for financing “green” projects is explored in the works of Q. Yin (2023) and W. Pan *et al.* (2023). In their research, the authors address the issues of attracting investment funds into innovative projects and mechanisms for evaluating their effectiveness within the framework of environmental policies. All these issues resonate with the thematic focus of the aforementioned study and remain relevant in the context of Ukraine.

The further development of Ukraine’s economy necessitates a complete transformation of the existing economic system, a shift towards a renewed business model, and the implementation of sustainable development concepts based on “green” economic principles. It holds prospects for realizing investment and innovation projects in the agro-sector in the coming decade.

CONCLUSIONS

The new challenges of modernity, created by threats to ecology under the influence of society’s activities on climate change, require fundamental solutions at the economic, social and technological levels. More and more often, environmental issues are resolved at global conferences or summits, and their results require funding for implementation and new approaches to assessing the prospects for the development of the sphere of activity of enterprises in different countries. A “green” economy based on alternative sources of energy and fuel, ecologically clean production technologies, agricultural clean technologies, “green buildings” and programs for cleaning air, water and soil pollution, processing and disposal of waste is an urgent issue today. It is the “green” economy that can be promising, and the creation of a “green” economy model in Ukraine becomes a necessary and quite achievable goal.

The implementation of the European integration strategy of Ukraine and its goal of entering the European economic space requires an approach to the development of an economic policy aimed at ensuring the production of products that are environmentally safe

for the environment and consumers, which at the same time will have competitive qualities at the national and international levels, as well as preserve the characteristics necessary for indicators of production efficiency. The conducted research confirmed that the agricultural sector is one of the most dynamic industries with the potential to transition to “green” development. The industry is undergoing constant transformation under the influence of growing demand from the European market, which is one of Ukraine’s most important trade partners.

The principles of transformation of the agricultural sector to a “green” economy should be considered in the context of the implementation of the following strategic priorities: development with the use of new resource-saving technologies, taking into account climate change and the implementation of climate protection measures, the use of eco-production of food products; GHG emissions in the agricultural sector; provision of State support for the “green” economy; development of financing mechanisms with the participation of the State and other investment funds; implementation of monitoring and Methodology for assessing the prospects of investment and innovation projects in the agricultural sector in order to control their implementation, reduce the scale of environmental damage caused by military aggression in the agricultural sector. The specified strategic directions should become the basis for the rationalization and adoption of a unified strategy for the development of the Ukrainian agricultural sector and the economy as a whole, based on the principles of the “green” economy.

For the further development of such a model, it is necessary to resolve the contradictions of production, strengthen the stimulating role of the country in “green” investments and innovations, create conditions for increasing the competitiveness of Ukrainian producers of organic products, and form new ideas among the public in relation to the environment. This is the perspective of development and the basis for further research and implementation of the international experience of the “green” economy, the application of its concepts and principles in Ukraine.

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CONFLICT OF INTEREST

None.

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Перспективний аналіз впровадження «зеленої» економіки в аграрний сектор України

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Анотація. Реалії сучасного розвитку економіки вимагають суттєвих змін існуючої економічної системи та переходу на принципову нову модель, в основі якої буде реалізовано основні підходи сталого розвитку. Одним із найкращих варіантів забезпечення цієї зміни вважається концепція «зеленої» економіки. Актуальність теми розвитку «зеленої» економіки заснована на її потенціалі у вирішенні нагальних екологічних проблем та сприянні сталому розвитку, що відповідає потребам суспільства та міжнародного співтовариства. Мета статті – це оцінка перспективності аграрного сектору економіки України в рамках стратегії трансформації, що сформована за принципами «зеленої» економіки. При цьому враховується цілий спектр факторів, в яких існують та розвиваються агропідприємства, а також ті умови що склались у зв'язку із військовою агресією в країні. Для досягнення визначеної мети були використані наступні методи: системно-структурного аналізу, метод аналізу, синтезу, метод узагальнення, методи дедукції та індукції, та методологія видозміненого, удосконаленого SWOT-аналізу. Визначено ряд факторів впливу на інвестиційно-інноваційні процеси на підприємствах агросектору з так званих зовнішніх загроз та Можливостей і внутрішніх Сильних та Слабких сторін. В процесі дослідження проводиться також узагальнення аспектів переходу від концепцій «сталого» розвитку до концепції «озеленення» економіки, врахування міжнародного досвіду, та включення України до переліку країн що забезпечують боротьбу із змінами клімату, шкідливими викидами. Отримані висновки про перспективність проектів інвестування в агросектор, а саме інвестиційно-інноваційні проекти підприємств сільського господарства, що характеризуються високим рівнем привабливості для інвесторів за показником спрямованого вектору розвитку, підтверджують актуальність реалізації концепції «зеленої» економіки в аграрну сферу України. Використання такої методики оцінки на практиці дасть змогу проводити відбір та аналіз перспективних напрямів фінансування та інвестування проектів, а також коригування стратегій розвитку українських агропідприємств

Ключові слова: екологізація; глобалізація; стратегії розвитку; цільові орієнтири; сталий розвиток