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Application of environmental, social and governance practices in agriculture

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Abstract. The purpose of the study was to conduct a comparative analysis of the features of applying Environmental, Social, Governance practices to ensure sustainable development of the agricultural sector in Sweden, the Netherlands, Germany, and the Kyrgyz Republic. The comparison was conducted using the metrics of the International Financial Reporting Standards and the Sustainability Accounting Standards Board. It was found that Sweden has the highest standards in the European Union for the use of renewable energy and social equity, the Netherlands leads the sector in the use of circular economy, and Germany is a model of efficient use of renewable energy in various sectors of the economy. These achievements have been made possible by the countries' engagement in cross-border cooperation aimed at equitable and fair distribution of funds, attracting young professionals and promoting innovation in the agricultural sector. These initiatives contribute to the gradual transition to organic agriculture, the share of which in the member countries of the Union will be increased to 30% by 2030. In contrast to the above countries, the Kyrgyz Republic is at the very beginning of the path to managing the agricultural sector taking into account Environmental, Social, Governance-standards. The country's development on this path is hampered by insufficient economic, human, and information resources necessary for the transition from extensive to intensive agriculture. Development will be facilitated by the country's participation in international projects aimed at introducing Environmental, Social and Governance practices in the agricultural sector, attracting young specialists and supporting innovation processes at the national and regional levels. Wide implementation of Environmental, Social, Governance-principles can be used for the development of the agricultural sector of the Kyrgyz Republic, which is the subject of this study

Keywords: sustainable development; economic development; social development; environmental development; transboundary cooperation; innovations

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INTRODUCTION

As the world population increases and consumption grows, there is a need for sustainable development of the agricultural industry. The definition of “sustainable” is used to describe development that takes into account the needs of present and future generations. In other words, sustainable development implies a shift from extensive to intensive farming. Transition to a new stage of industry management means the introduction of innovative approaches, including the principles of ESG practices. This concept implies that the following components are considered when planning and implementing agricultural activities: economic, environmental and social. Implementing ESG practices is not an easy process, involving a change in philosophy and key approaches to farming. It also requires significant financial, economic and time resources, making the implementation of ESG practices a challenge in countries around the world, especially those in developing or transitional phases of development (Chen & Li, 2024). The academic literature tends to focus on isolated cases of ESG-philosophy implementation in the agricultural sector; however, comparative analyses that include economically developed countries and countries in transition are not well covered.

ESG practices emerged from the paradigm of sustainable development, which has received wide coverage in academic research (Shumka *et al.*, 2021). According to S. Soretz *et al.* (2023), one of the difficulties in implementing the principles of sustainable development is the lack of a unified interpretation of such development. Supporting this assertion is a study by M. Ogryzek (2022), in which five most commonly used theoretical models of sustainable development were proposed. In order to avoid controversy, I. Ziaul and W. Shuwei (2023) suggested that the term sustainable should be applied to define development aimed at improving and maintaining a healthy economic, environmental and social system of human development. Thus, in this study, the concepts of sustainable development and ESG practices are interchangeable. D.M. Hossain (2023) defined ESG practices as a wide range of environmental, social and governance factors that can be used to assess how companies manage their sustainability performance. Using a partial least squares structural equation modelling framework, F.E. Hazbi and Y. Mounir (2023) concluded that the use of ESG criteria allows companies to highlight and implement sustainability strategies. The researchers particularly observed that technological innovation is significant in creating environmentally friendly products and processes, improving energy efficiency and improving waste management practices. The research confirms that the implementation of ESG criteria and practices is key to effective management in different sectors of the economy, including agriculture.

Analysing the benefits of implementing ESG practices is also one of the frequently researched topics in the academic literature. G. Lew *et al.* (2024) concluded that the short- and long-term benefits of ESG practices include increasing the value of the business to its owners, helping to improve the image of the business, and reducing operational and financial risks. Similar conclusions were drawn by W. Shen (2024), who used a big data index system in his work to assess the benefits of implementing ESG practices in Chinese companies. According to the researcher, investing in such practices is beneficial because it improves the efficiency and competitiveness of companies.

Experts do not deny the fact that implementing ESG practices involves overcoming various barriers. According to R.R. Bezerra *et al.* (2024), who studied the implementation of ESG practices in the construction sector, the main barriers are lack of standardized performance indicators; insufficient regulatory guidelines related to ESG practices; lack of transparency of non-financial indicators and organizational resistance. Lack of support from the management body and resulting organizational resistance were also identified among the main barriers to the adoption of ESG practices by J. J.H. Liou *et al.* (2023) and I. Shabir *et al.* (2023). According to the researchers, those responsible for strategic planning may hinder the implementation of ESG practices by being insufficiently aware of their benefits.

This resistance may be particularly evident in developing or transition economies whose resources are insufficient to implement ESG practices. The studies analysed above do not provide sufficient understanding of how practices based on the principles of economic, environmental and social development can be introduced into the agricultural sector of developing and transition economies. The answer to this question can be obtained through a comparative analysis of the development characteristics of the agricultural sector of countries around the world. Thus, the aim of this study was to analyse the use of ESG practices in agriculture in Sweden, the Netherlands, Germany, and the Kyrgyz Republic. The objectives of the study were to examine the barriers to the implementation of ESG practices in the management of the agricultural sector in developing and transition economies, and to develop strategies to effectively overcome the existing barriers. The fulfilment of these objectives will contribute to the sustainable development of the agricultural sector in order to meet the growing needs of the current generation without harming future generations.

MATERIALS AND METHODS

The agricultural sector of the sample countries was analysed in terms of the implementation, or inability to implement ESG strategies in the period from 2020 to 2024. The conclusions were drawn based on data

collected through a SWOT analysis, which aimed to identify internal and external factors affecting the effectiveness of ESG practices in agriculture in the sample countries. The analysis examined the strengths and weaknesses of ESG strategies in each country of the world and explored opportunities and threats for further expansion of these practices. The analysis was also based on benchmarking results, i.e., comparisons based on benchmarks proposed in the European Commission reports, which use a uniform method of statistics in the EU member states, including the sample countries. Such a method, however, could not be applied to the Kyrgyz Republic, which is at the beginning of its journey to implement sustainable development practices in the agricultural sector and has limited involvement in cross-border co-operation on this issue. The comparative analysis of ESG practices in the sample countries was based on the following criteria: the share of arable land used for organic farming; the amount of sectoral support, including that aimed at the development of the rural sector; and funding for initiatives aimed at attracting young professionals and introducing innovative methods of agricultural sector management.

The analysis also takes into account the fact that the countries included in the sample may have scored high on one aspect of their ESG strategy and lower on others. According to the European Commission (Germany – CAP strategic plan, 2024; Netherlands – CAP strategic plan, 2024; Sweden – CAP strategic plan, 2024), Sweden was included in the sample as having the highest renewable energy and social equity standards in Europe. The Netherlands was added to the sample as a European Union (EU) leader country in utilizing the circular economy. Germany was selected as a country with record investments in farming and green energy. The Kyrgyz Republic was analysed as a country declaring readiness to introduce ESG practices in the agricultural sector, but still at the beginning of the road to achieving this goal.

The comparative analysis took into account the challenges faced by the sample countries regardless of their level of economic development: the share of arable land in the total land area, geographical and climatic conditions for farming, urbanization and the outflow of young professionals from rural areas, the gap between the average income of farmers and other professions, the monopoly of agricultural holdings and the sustainable development of small and medium-sized farms in the face of growing competition. The approaches used by countries to find solutions to these challenges at the national, regional and international levels were also analysed. The large-scale initiatives applied in the EU member states, including the LEADER programme, the European initiative aimed at creating Local Action Groups (LAGs) to attract young professionals to the agricultural sector, the introduction of innovative solutions and sustainable development

planning, were reviewed. To analyse the dependence of the transition to organic farming on the geographical location of the German states, we used data from the work by H. Kuhnert (2024), reflecting the share of organic agriculture in different federal states as of 2023. The analyses were based on sectoral reports, including the following sectoral reports from the European Commission (Germany – CAP strategic plan, 2024; Netherlands – CAP strategic plan, 2024; Sweden – CAP strategic plan, 2024), OECD Environmental Performance Reviews (2023) and Eurostat (2024). The study also used academic sources published no later than 2020, including K. Hakelius and J. Nilsson (2020), Global Finance (2024) and T.S. Sonu *et al.* (2024).

RESULTS

ESG practices in agriculture in the selected EU countries. Using the SWOT analysis method, it can be argued that the development of Sweden's agricultural sector takes place in a northern climate, which influences the choice of priority activities. According to the European Commission report (Sweden – CAP strategic plan, 2024), about 70% of Sweden is covered by forests and less than 10% of its territory is suitable for agriculture. There are also significant differences in the geographical, climatic and other conditions for farming in the north and south of the country. Agricultural products grown in the south contribute no more than 1% of the total national budget. Another difficulty is the long logistical chains due to the uneven distribution of the population. European Commission experts note that 60% of the country's population lives in rural or semi-rural areas. Based on these statistics, it can be said that farming in Sweden is not an easy task, but one that involves finding answers to many challenges. One of these challenges is the fact that agricultural activities are a source of environmental pollution. The data presented by I. Fetzer and M. Hall (2024) indicate that 22.7% of the carbon dioxide produced in the country, one of the main air pollutants, is emitted from agricultural activities. Increasing consumption of dairy and meat products, expansion of agricultural land and drainage of peatlands are factors that determine farming strategies and lead to pollution. Thus, Sweden's geographical and climatic conditions are among the factors that have a potentially negative impact on the development of the agricultural sector according to ESG standards. The country's involvement in regional and cross-border cooperation can minimize the impact of these factors, thus meeting the growing demand of the population and increasing agricultural imports.

The use of SWOT analysis to assess the development of the agricultural sector in the Netherlands suggests that the country has one of the most developed and innovative export-oriented agricultural sectors in the world. In conformity with a European Commission report (Netherlands – CAP strategic plan, 2024),

agricultural exports generate around 100 billion in annual profits for the country. There are 51,000 farms in the Netherlands, with an average size of 32 hectares. About 2% of the country's working population work on 66% of the land used for agriculture. These figures indicate not only the dynamics of Dutch agriculture, but also the potential of the sector for sustainable development. The Dutch strategy for the agricultural sector is based on the Global Reporting Initiative, which endeavours to cover all the main elements of the ESG strategy. Within this initiative, transformation is taking place at all levels of planning, conducting and evaluating agricultural activities.

Using the SWOT approach to analyse the development of the German agricultural sector, it can be argued that the country has better conditions for the development of the agricultural sector than Sweden or the Netherlands. For example, unlike Sweden, where only 10% of the territory is used for agriculture, Germany is a predominantly flat country with 57% of its territory suitable for agriculture. The latter takes many forms,

ranging from family farms in the mountainous parts of the country to highly specialized farms and agricultural holdings. According to the European Commission (Sweden – CAP strategic plan, 2024), there are 276,000 farms in the country, which is significantly larger than in Sweden or the Netherlands. Thus, the average farm size in Germany is comparable to that of Sweden and significantly larger than the average farm size in the Netherlands. Despite these differences, the German agricultural sector faces similar challenges to those documented in Sweden and the Netherlands, including economic difficulties, difficulties in attracting and retaining young professionals and the transition to organic farming. The sector management model adopted in the country is similar to the model used in the Netherlands and Sweden, and implies equal attention to key components of the ESG philosophy. Based on this analysis, it is possible to identify universal factors that influence the development of the agricultural sector and the adoption of ESG practices by individual EU member states. These universal factors are summarized in Table 1.

Table 1. Factors influencing the adoption of ESG practices in the agricultural sector in Sweden, the Netherlands, and Germany

Strengths	Weaknesses
<ul style="list-style-type: none"> ■ State policy of social justice aimed at equal distribution of income in support of small and medium-sized farms ■ Regional and cross-border co-operation, including economic co-operation ■ Various initiatives aimed at attracting young professionals and promoting innovation in the agricultural sector ■ A system of guarantees has been developed to ensure sustainable development of farms 	<ul style="list-style-type: none"> ■ In the sample countries, on average, only 2% of the working-age population is employed in agriculture ■ Outflow of able-bodied population due to lower incomes in the agricultural sector compared to the national average income ■ Transitioning to ESG practices is costly and not fully funded
Opportunities	Threats
<ul style="list-style-type: none"> ■ Attracting young professionals contributes to the development of the agricultural sector and enhances its prestige ■ Growing consumption of products produced by the agricultural sector ■ Increasing public support for sustainable development practices, including those in the agricultural sector ■ Cross-border co-operation that promotes ESG practices and supports sustainable development 	<ul style="list-style-type: none"> ■ Transition to a less costly, extensive way of managing the agricultural sector ■ Winding down of individual funding programmes for ESG initiatives ■ Declining profitability and stagnation of the agricultural sector ■ Natural disasters causing losses in the agricultural sector

Source: created by the authors

The Table 1 shows that despite the weaknesses and threats, the sample countries have developed a number of strategies that help to capitalize on the adoption of ESG philosophy in the management of the agricultural sector. One such practice is to increase the share of arable land used for organic farming. The most tangible results in this direction have been achieved by Sweden, which, according to Eurostat data from January 2024, ranks third among EU countries in terms of the total area of land partially or fully used for organic farming. According to Eurostat (2024), about 20% of the country's arable land is devoted to organic farming. In the Netherlands and Germany, the

share of land partially or fully converted to organic is significantly lower, as can be seen in Figure 1.

It is important, however, to interpret the data presented in the figure above in light of the unique realities of the individual countries in the sample. In the Netherlands, which ranks last in the ranking presented, there has been a steady increase in arable land: as of 2023, land used for organic farming represented 4.4% of all agricultural land (585 additional organic farms since 2015, 2022). In Germany, the transition to organic farming is highly dependent on the geographical location of the individual lands, as can be seen in Figure 2.

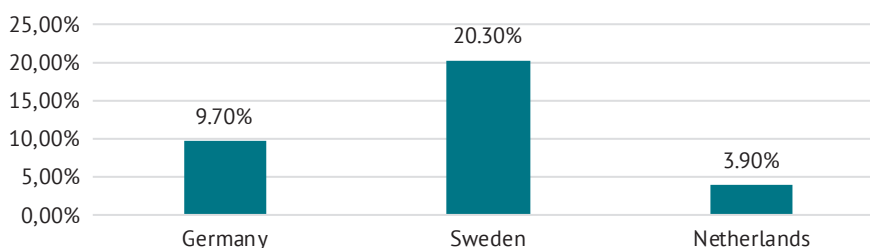


Figure 1. Share of agricultural land partially or fully converted to organic farming in Sweden, the Netherlands, and Germany as of 2023

Source: created by the authors based on Eurostat (2024)

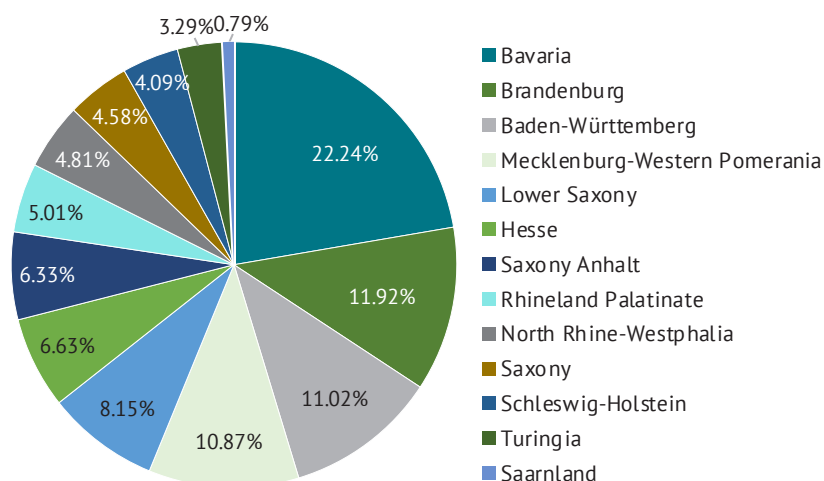


Figure 2. Proportion of organic farming in different German states as of 2023

Source: created by the authors based on H. Kuhnert (2024)

In Sweden, in turn, the transition to organic farming has a lot to do with the functioning of co-operatives, which provide their members with more opportunities and tools for sustainable development. Research conducted by K. Hakelius and J. Nilsson (2020), J. Nilsson (2020) indicates that state support motivates farms to join cooperatives that embody not only the economic but also the social aspect of the ESG strategy, as farmers' associations promote interdisciplinary co-operation and are a source of innovation processes in the agricultural sector. As part of the development of such cooperation, 9,000 farmers participated in an initiative of the European Commission (Sweden – CAP strategic plan, 2024) aimed at selecting and implementing digital tools to help calculate the exact dose of nutrients for crops, thus reducing chemical spillage and groundwater pollution by up to 1.4 million hectares annually. This example illustrates the social aspect of the ESG

strategy through the lens of supporting the farming community to ensure the sustainable development of the agricultural sector.

In addition to the environmental component, the sample countries pay attention to the social aspect, including the outflow of the working population from the sector, the lack of young professionals and the resulting stagnation of the agricultural sector. In the Netherlands, for example, the income in the agricultural sector is 40% below the national average, which significantly reduces the motivation of professionals, leads to a shortage of human resources and discourages innovation (Netherlands – CAP strategic plan, 2024). At EU level, the LEADER initiative has been developed with the aim of involving young professionals in decision-making and developing strategies for sustainable development of the country's agricultural sector. The table below provides data on the funding of this programme in the sample countries.

Table 2. Funding of the LEADER programme in Germany, the Netherlands, and Sweden

	Annual funding (€)	% of total sector funding
Germany	1,246,106,365	15
Netherlands	54,150,012	5
Sweden	92,204,301	9

Source: created by the authors

The Table 2 shows that the countries in the sample pay uneven attention to the development of the LEADER initiative: as a percentage of total funding for the sector, the largest contribution is made in Sweden and the smallest in the Netherlands. Management decisions in planning and implementing the transition to ESG strategies in the agricultural sector are also important.

The governance component in particular manifests itself in the amount of funding for individual components of the agricultural sector allocated by the national government as well as funding agreed with international partners. A comparative analysis of the amount of funding for the agricultural sector of the sample countries is presented in Table 3.

Table 3. Financing of selected components of the agricultural sector with ESG-philosophy of Germany, the Netherlands, and Sweden as of 2023

	Germany			Netherlands			Sweden		
	EU budget (€)	National funding (€)	Total (€)	EU budget (€)	National funding (€)	Total (€)	EU budget (€)	National funding (€)	Total (€)
Direct payments	22,194,364,998	-	22,194,364,998	2,977,971,465	-	2,977,971,465	432,713,183	-	3,432,713,183
Sectoral support	294,064,735	10,857,950	304,922,685	633,350,860	1,350,860	634,701,720	28,803,098	2,942,725	31,745,823
Rural development	8,239,166,987	3,634,979,151	11,874,146,138	1,082,970,984	414,381,162	1,497,352,146	1,059,448,705	1,541,365,536	2,600,814,241
Total	30,727,596,720	3,645,837,101	34,373,433,821	4,694,293,309	415,732,022	5,110,025,331	4,520,964,986	1,544,308,261	6,065,273,247

Source: created by the authors

The Table 3 shows that the largest amount of funding, both at the national and cross-border level, is allocated to the German agricultural sector, indicating the government's involvement in improving liquidity and sustainable development of the agricultural sector. In addition to pan-European ESG strategies, the EU countries in the sample have developed their own strategies for sustainable development of the agricultural sector. A distinctive feature of Germany's ESG strategy is a gradual shift towards alternative energy sources that reduce carbon emissions and increase the sustainability of the agricultural sector. As of 2024, 54% of the energy produced in the country is "clean", i.e., derived from renewable sources (Germany – CAP strategic plan, 2024). One of Sweden's priority strategies, which can be effectively adapted by other countries, is to improve groundwater quality by reducing the amount of chemicals used in agriculture. As of 2024, the country has established a network of 9,000 farmers using digital tools to accurately calculate the nutrients needed for crops. Such counting facilitates the transition to organic farming, which reduces emissions and improves water quality. Data from the European Commission (Netherlands – CAP strategic plan, 2024) confirms that preserving natural water bodies and improving their water quality is a priority environmental issue also for the Dutch government, which together with the EU has allocated EUR 174 million to address this issue. The funding supports the conservation of biodiversity, including several species of grassland birds, which will be attracted by 36,000 hectares of new grassland to reduce ammonia deposition and improve water availability. The Dutch government plans to increase the quality of the latter by 58% in the medium term. An important component of the ESG strategy, which distinguishes the Netherlands from other EU countries, is the care for animal welfare,

including the provision of appropriate conditions for animal welfare. The initiative, developed in co-operation with European Union experts, involves phasing out antimicrobials in animal breeding and care. According to a European Commission report (Netherlands – CAP strategic plan, 2024), Dutch farmers will also be given funding to improve animal welfare, which will initially affect 3% of all livestock raised in the country.

Implementation of ESG-strategies in agriculture of the Kyrgyz Republic taking into account the experience of the EU member states. A significant difference between agriculture in the Kyrgyz Republic and agriculture in the EU member states is the unpreparedness of state bodies and national infrastructure to implement ESG-philosophy. Pursuant to the World Bank (2024), agriculture is one of the most important sectors of the economy, given its 15% share of gross domestic product (GDP) and 30% of all jobs in the country. It is also a positive factor that about 54% of the country's total land is suitable for agriculture. According to the assessment of experts from the World Bank Group, Climate Change, Agriculture and Food Security, CIAT (2018), the Kyrgyz Republic has prerequisites for the introduction of climate-smart agriculture, which is one of the indicators of effective implementation of the ESG strategy. The process of implementation of this way of farming, however, is slowed down by a number of internal and external factors.

The unstable economic environment in the country and the region is one of the reasons hampering the sustainable development of agriculture in the Kyrgyz Republic (Kadyraliev *et al.*, 2024). According to Global Finance: Kyrgyz Republic (2024), the country experienced a severe economic crisis in 2020 due to the coronavirus pandemic and related constraints. After a minor recovery, the country experienced a new round of recession from 2023, and 2024 growth was relatively small.

GDP growth is currently at 4.28%, which is insufficient to overcome the country's financial difficulties. The economic recession is closely related to inflation and growing unemployment, which also have a negative impact on the economic development of the Kyrgyz Republic. The economic downturn implies a decrease in state funding for the agricultural sector, as well as the withdrawal of capital from the country, i.e., the inability to receive support for the development of projects in the field of sustainable agriculture. According to Global Finance: Kyrgyz Republic, a record capital outflow from the country was recorded in 2024. Unlike their German, Dutch and Swedish counterparts, Kyrgyz farmers cannot count on comprehensive state support, and the risk insurance system is not well-developed. As a result, the implementation of ESG strategies slows down or stops altogether. An example illustrating this statement is the statistics on agricultural land in the country, partially or fully converted to organic. According to M. Sagynaliev (2024), the share of land

used for organic farming does not exceed 0.21% of all irrigated land.

Without sufficient support from the state and international partners, stakeholders are forced to choose extensive agricultural practices that lead to various environmental problems. World Bank Group data (2024) indicate a gradual decline in the share of arable land as a result of intensive use of pesticides and other pollutants. Overgrazing is also a factor in the decline in the proportion of land suitable for agriculture. According to data provided by World Bank Group, Climate Change, Agriculture and Food Security, CIAT (2018), 70% of the country's winter pastures have been destroyed by overgrazing. The declining share of arable land and its declining quality are also affecting the country's natural diversity and the extinction of many plant and animal species. Based on the above data, a comparative analysis of the features of ESG practices adoption in the agricultural sector of the sample countries was carried out, presented in Table 4.

Table 4. Comparative analysis of ESG practices in the agricultural sector of the sample countries

Country	ESG strategy element		
	Environmental	Social	Managerial
Sweden	Restoration of arable land; transition to organic agriculture; care for biodiversity	Support of young specialists and beginning farmers; reduction of the gap between the level of farmers' income and the average income level in the country; insurance of farming activities; cross-border cooperation in the introduction of LEADER and other programmes aimed at raising the prestige of farming activities	The state seeks social justice by redistributing income from agrohholdings to support medium and small farms; cross-border co-operation is encouraged, including at EU level; the state encourages the establishment of co-operatives without interfering in their activities
Netherlands	The majority of land is used for agriculture; restoration of natural biodiversity, including by increasing the area of grasslands; gradual transition to organic farming	Reducing the gap between farmers' income level and the average income level in the country; attracting young specialists and developing innovative farming; participating in the European LEADER initiative; creating new jobs and raising the prestige of working in the agricultural sector.	The state provides grants for the development of innovative projects in agriculture, green energy and conservation of natural biodiversity; supports cross-border cooperation, including the European LEADER initiative; provides loans and other support to farmers, especially start-ups; and seeks to liberalize the agricultural sector.
Germany	Increasing the amount of agricultural land allocated for organic farming; preserving and multiplying natural biodiversity, increasing grasslands, avoiding synthetic fertilizers and so on; developing green energy.	Financial support of farmers, especially beginners; insurance of farms against unfavourable weather conditions; creation of equal competitive conditions for farms, regardless of their size.	Encouraging participation in regional and international initiatives, including LEADER, aimed at developing the agricultural sector; respecting the principle of social justice by redistributing income from agrohholdings to small and medium-sized farms; liberalizing the agricultural sector.
Kyrgyz Republic	An extensive approach to agriculture, leading to a decrease in arable land; a decline in biodiversity, including due to overgrazing; contamination of soil and water bodies with chemicals; and the lack of a clear strategy for transitioning to sustainable development practices in the sector.	The majority of farmers are middle-aged or elderly, there is an outflow of young specialists to the city or abroad; there is an obvious gap between the income level in the agricultural sector and the average income level in the country; there are few examples of farmers coming together to plan sustainable development of the sector and the community.	The state declares its aspiration to transition to sustainable development and readiness for cross-border co-operation to achieve this goal; state support of farms in the form of grants and affordable loans is insignificant; participation in international projects is hampered by insufficient awareness of the target audience.

Source: created by the authors

The Table 4 above shows that the challenges facing the EU member states and the Kyrgyz Republic are universal and include environmental problems, such as the decline in natural biodiversity; the reduction of areas suitable for agriculture and the pollution of soil and water bodies. Regardless of the level of economic development, the countries also face social challenges such as low involvement of young professionals, urbanization, and the gap between incomes in the agricultural sector and the national average. A significant difference between the EU member states and the Kyrgyz Republic is the level of government involvement in addressing these challenges (Omurgazieva *et al.*, 2024). In contrast to the Kyrgyz Republic government, the governments of Sweden, the Netherlands, and Germany have developed extensive support systems for farms, making them more resilient to various types of crises, including environmental, economic and social crises. In their strategic planning, the governments of the EU member states also adhere to the principle of social justice, which provides for redistribution of income to support small and medium-sized farms. Compliance with this principle is less evident in the Kyrgyz Republic, where the chances of development are much higher for large agricultural holdings seeking to monopolize the market. This monopoly is made possible, in particular, because the Kyrgyz government has not initiated programmes to increase farmer involvement in community and sectoral issues, such as the LEADER initiative operating in the EU. It follows from the above comparison that the Kyrgyz Republic can benefit from the positive experience of the EU member states to implement ESG-philosophy and support sustainable development of the national agricultural sector.

Part of the environmental problems of the Kyrgyz Republic can be solved by focusing on the social aspect of the ESG strategy, e.g., creating new jobs in the industry, attracting young specialists and training stakeholders. Data collected by G. Saparova *et al.* (2024), supports the idea that the vast majority of farmers in the country are middle-aged and elderly, which makes them less receptive to innovations that contribute to the sustainable development of the agricultural sector. In turn, the attraction of young professionals is possible due to comprehensive support from the state, involvement in international projects and promotion of the idea of sustainable development among the local population. Thus, the comparative analysis shows that despite the declared national and regional commitment to sustainable agricultural development, the Kyrgyz Republic is far from implementing ESG-strategy norms. The existing discrepancy can be explained by the unstable economic situation of the country, which entails environmental and social challenges. An effective ESG solution to these challenges is possible by analysing ESG practices of other countries, including EU members.

DISCUSSION

This study suggests that in the 21st century, there is a growing global demand for sustainable agriculture. Support for this idea was found in an article by G.M. Robinson (2024) analysing the results of the International Geographical Union (IGU) congress held in Paris in 2022. According to the authors of the study, the result of this congress was the emergence and validation of the concept of Agriculture 4.0, emphasising the importance of innovations such as precision farming, digital technologies and genetic modifications to increase agricultural production per unit area. According to experts, including M.H. Islam *et al.* (2024) and E.M. Pechlivani *et al.* (2023) who studied Agriculture 4.0, this concept implies a gradual shift from extensive to intensive farming method. A.K. Sahoo *et al.* (2021) attributed this transition to the emergence of the idea of sustainable development, i.e., the belief that the needs of the present generation should not be met by sacrificing the needs of future generations. Thus, Agriculture 4.0 implies the sustainable use of natural resources, including arable land, water bodies and natural diversity, with a medium- and long-term perspective.

The growing popularity of the concept of Agriculture 4.0 motivates experts to analyse emerging trends. According to A.A. Koç *et al.* (2024) and S. Zaika *et al.* (2023), such trends include the introduction of advanced technologies and improvement of production processes. A similar opinion was also expressed by J. Xu *et al.* (2024), who concluded that in the 21st century, effective agricultural development depends largely on geospatial analysis and the use of digital strategies in planning management strategies. Thus, the accumulated evidence points to the need to rethink conventional approaches to the management of the agricultural sector and move towards innovative technologies that facilitate more efficient allocation and utilization of available resources.

The study also presented the idea that the introduction of ESG practices as a way of transition to sustainable agriculture is not an easy task, the implementation of which is hindered by various barriers. In the Kyrgyz Republic, the transition to ESG practices has been slowed down by the economic crisis, implying a lack of necessary resources. In countries with more favourable economic conditions, such as Sweden, the Netherlands, and Germany, the full transition to sustainable agriculture may be hindered by the outflow of population from rural areas and the reluctance of young professionals to stay in the sector due to relatively low incomes. In other words, the integration of ESG practices can be a challenge for any country in the world, regardless of its geographical location, climatic conditions, arable land area or level of economic development (De La Llave *et al.*, 2022).

Support for this thought was found in earlier studies, particularly the work of J. Cao & Y.A. Solangi (2023), who used Analytical Hierarchical Process (AHP) and

Simple Additive Weighting (SAW) methodologies to identify the main obstacles to the adoption of ESG practices in China's agricultural sector. The researchers concluded that the main obstacle is financial constraints; and this idea is confirmed in the presented work, highlighting that no country in the sample has been able to implement a completely equitable resource allocation that supports sustainable development of farms, regardless of their size. Financial constraints limit access to the resources needed to make the transition to sustainable agriculture, including tools and technologies (Mukambaeva *et al.*, 2024). The impact of this constraint is most evident in countries with low levels of economic development, including countries in Africa and Pakistan, studied by M. Bilal and J.T. Tinoush (2024). For the Kyrgyz Republic the experience of these countries is particularly important, as they are in similar economic, political and socio-cultural conditions, and therefore face similar barriers to the introduction of ESG-philosophy in the agricultural sector.

The comparative analysis of the development of the agricultural sector in Kyrgyzstan and selected EU countries suggested that the most effective strategy in overcoming the analysed barriers is thematic cooperation not only at the national, but also at the regional and international levels. The analysis of the experience of Sweden, the Netherlands, and Germany confirmed the importance of cross-border cooperation, which resulted in the implementation of LEADER and other projects aimed at transition to agricultural activities in accordance with ESG criteria. Being at the very beginning of this journey, the Kyrgyz Republic can learn valuable lessons from regional and international co-operation, the effectiveness of which has been confirmed by academic studies, including S. Kalogiannidis *et al.* (2024) and R. Khoerunnisa and Z. Maulana (2023). According to the statement of S. Kalogiannidis *et al.* (2024) who interviewed 400 farmers and agricultural experts in Greece, the best results in the transition to sustainable agriculture were achieved by farms that joined a co-operative, i.e., became part of the professional community and had access to its resources. Thus, the results of this study confirm the previously presented idea that the co-operative system is one of the factors of sustainable development of the Swedish agricultural sector. The importance of international co-operation was also confirmed by R. Khoerunnisa and Z. Maulana (2023), who studied the impact of transnational arrangements for food security. Thus, the conclusions drawn by the authors of the earlier studies are in line with the results of the analysis and emphasize the importance of cooperation in overcoming barriers to the implementation of ESG standards.

Cross-border cooperation should be considered not only as a source of financial resources necessary for farming in accordance with ESG requirements, but also as a source of innovative ideas, the implementation

of which contributes to the sustainable development of the analysed sector. The confirmation of this idea can be found in the works of A.G. Malau *et al.* (2024), P. Vrabcova and H. Urbancova (2023). The former in their study relied on qualitative analyses of interviews and focus groups conducted with farmers and agricultural experts. According to A.G. Malau *et al.* (2023), the interviewees showed interest in technological innovations, which they perceived as a prerequisite for effective agribusiness management. Such innovations were viewed by participants through the lens of interdisciplinary collaboration, emphasizing the importance of interaction between stakeholders at national, transboundary and international levels. According to P. Vrabcova and H. Urbancova (2023), information and knowledge underpinning innovation processes are as important for sustainable agriculture as financial resources. On this basis, the researchers proposed an extensive system of protection of such information and knowledge, including through patenting, trademarks and copyright.

Thus, there were no significant contradictions between the data of the presented comparative analysis and the conclusions proposed in earlier studies. Striving for sustainable development, the countries of the world are planning the transition of their agricultural sector to development in the ESG-paradigm. Implementation of such a transition is a long and resource-intensive process, especially in countries with unsustainable economic development. Analyses of the experience of EU member states, as well as African and Asian countries, suggest that the key to sustainable development of the agricultural sector is regional and cross-border co-operation aimed, *inter alia*, at information exchange and innovation development.

CONCLUSIONS

A comparative analysis of the capacity of individual EU countries (Germany, the Netherlands, Sweden) and the Kyrgyz Republic for sustainable development of the agricultural sector, taking into account environmental, economic and governance aspects, was carried out. As EU member states, Sweden, the Netherlands, and Germany can benefit from cross-border cooperation in the development of their agricultural sector: access to favourable loans and support programmes for beginning farmers, insurance of farms against the effects of adverse climatic conditions and the creation of a common professional network to access innovative technologies, share experience and jointly solve emerging problems. From the point of view of SWOT-analysis, the long and resource-intensive transition to ESG-standards can be compensated by the benefits of sustainable development of the agricultural sector: environmental management, development of innovative technologies, creation of a professional network and increased competitiveness of farms. Further comparison of the agricultural sector of the EU member states with the

agricultural sector of the Kyrgyz Republic revealed that the introduction of ESG practices is hampered by the existence of economic, technological and other barriers. The national agricultural sector in its current form is unattractive for young professionals who could become the driving force of innovation processes. There is a direct link between the outflow of young professionals, lack of innovation and stagnation of the agricultural sector. The country's participation in regional and cross-border projects aimed at equitable distribution of resources and equal access to information and knowledge that would contribute to the development of the sector could help attract such specialists.

The results obtained can be used in the development of national strategies in transition countries, in-

cluding the adaptation of successful EU practices in the Kyrgyz Republic. A promising direction for further research could be a comparative analysis of strategies for the introduction of ESG-philosophy in the development of the agricultural sector in Kazakhstan, Tajikistan, Uzbekistan, Turkmenistan and other countries in the region that have similar geographical, climatic, economic and socio-cultural conditions of development with the Kyrgyz Republic.

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CONFLICT OF INTEREST

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Застосування екологічних, соціальних та управлінських практик у сільському господарстві

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Анотація. Метою дослідження було проведення порівняльного аналізу особливостей застосування Environmental, Social, Governance-практики для забезпечення сталого розвитку сільськогосподарського сектора Швеції, Нідерландів, Німеччини та Киргизької Республіки. Порівняння було проведено з використанням метрик Міжнародних стандартів фінансової звітності та Ради зі стандартів обліку в галузі сталого розвитку. Було виявлено, що Швеція має найвищі в Європейському Союзі стандарти з використання відновлюваної енергії та забезпечення соціальної справедливості, Нідерланди лідирують у секторі використання кругової економіки, а Німеччина є зразком ефективного використання відновлюваної енергії в різних секторах економіки. Перелічені досягнення країн стали можливими завдяки їхній залученості до транскордонного співробітництва, спрямованого на рівномірний і справедливий розподіл коштів, залучення молодих фахівців і розвиток інновацій у сільськогосподарському секторі. Зазначені ініціативи сприяють поступовому переходу до органічного сільського господарства, частка якого в країнах-членах союзу буде збільшена до 30 % до 2030 року. На відміну від перерахованих країн, Киргизька Республіка перебуває на самому початку шляху до управління сільськогосподарським сектором з урахуванням Environmental, Social, Governance-стандартів. Розвиток країни на цьому шляху гальмується недостатністю економічних, людських та інформаційних ресурсів, необхідних для переходу від екстенсивного методу ведення сільського господарства до інтенсивного. Розвитку ж сприятиме участь країни в міжнародних проєктах, спрямованих на впровадження Environmental, Social, Governance-практик у сільськогосподарському секторі, залучення молодих спеціалістів та підтримка інноваційних процесів на національному та регіональному рівнях. Широке впровадження Environmental, Social, Governance-принципів може бути використане для розвитку сільськогосподарського сектору Киргизької Республіки, що є предметом цього дослідження

Ключові слова: сталий розвиток; економічний розвиток; соціальний розвиток; екологічний розвиток; транскордонне співробітництво; інновації; екологічний розвиток; інновації