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STATE FINANCIAL SUPPORT FOR THE GREEN BIOECONOMY VECTOR OF DEVELOPMENT OF THE AGRICULTURAL SECTOR OF THE EU AND SLOVAKIA IN THE HALF-CRISIS PERIOD

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In the article, a theoretical study of the legislative framework, and various strategic directions in the field of agricultural policy, based on bioeconomics, is carried out. The world crises of recent years, the negative consequences of COVID-19 and the war in Ukraine in terms of the state of food markets have clearly demonstrated the importance of state support for the agricultural sector. The negative impact on the agricultural sector was manifested in price dynamics. The COVID-19 pandemic has led to fluctuations in food prices. However, after the first shock, prices jumped sharply between May 2020 and May 2021 as restrictions on the supply of food products were introduced. The market fundamentals of supply and demand, as well as the dynamics of the exchange rate, determine the evolution of world prices. In 2022, the increase in prices for agricultural products reflects several problems that have arisen at the current stage of world development in connection with the war in Ukraine. Violation of export deliveries from Ukraine led to a fluctuation of prices, and the rise in the cost of fuel and fertilizers serves as additional factors for rising food prices. The rebalancing of the markets continues throughout 2023 and possibly will continue in 2024. To overcome the negative phenomena in the agricultural sector, it is necessary to strengthen state support and revise approaches to financing the "green economy" as part of the agrarian policy reform. The article aims to analyse the plans for state financial support for the green direction of the development of the agrarian sphere in the EU countries and Slovakia.

Keywords: agrarian sphere, bioeconomy, common agricultural policy, green economy, financial state support

Introduction

The COVID-19 crisis may reveal deeper structural imbalances in the economic market. On 11th February 2021, the European Council adopted a Regulation establishing a Mechanism to promote recovery and resilience. This € 672.5 billion mechanism is a central element of the EU's extraordinary reconstruction efforts under the EU's Next Generation Instrument (NGEU): the € 750 billion plan agreed upon by EU leaders in July 2020. These funds will help Member States to address the economic and social impact of the COVID-19 pandemic while ensuring that their economies undergo a green and digital transformation and become more sustainable and resilient (European Council, 2021).

The agricultural sector is one of the central areas of allocation of funds to support the economy. The Common Agricultural Policy (CAP) is the basis for state support measures for the sustainable, balanced development of European agriculture. CAP is focused on increasing agricultural productivity in the EU and ensuring food availability, protecting European producers' competitiveness from cheaper goods from outside of the EU. Differences in agricultural productivity in individual countries are caused by modern technical means, human capital, agricultural technologies, and infrastructure (Mundlak and Hellinghausen, 1982; Lau and Yotopolus, 1989). At the same time, increasing agricultural productivity is the basis for its sustainable and balanced development (Urgessa, 2015). The empirical literature has documented a significant impact of agricultural productivity on rural well-being (Irz et al., 2001; de Janvry and Sadoulet, 2010; Birner and Resnick, 2010). Increasing agricultural productivity increases the real wages of farmers and ensures the supply of food at reasonable prices (Otchia, 2014). The degree to which agricultural productivity growth contributes to rural well-being varies widely across countries, depending on how they develop and use new technologies (de Janvry and Sadoulet, 2010). Technological change in agriculture has been identified as the main driver of productivity growth (OECD, 2012).

To stimulate technological changes in the agricultural sector, the state uses direct payments (per hectare), which play an important role not only as a security factor but also to stabilize the cash flows of agricultural enterprises, facilitating their access to financing. However, a few scholars point to the need for new targets to maintain a high level of funding (Erjavec and Erjavec, 2015). This is the Green Strategy, which has been successful because subsidies can be seen as a reward to farmers for protecting the environment and biodiversity (Navarro and López-Bao, 2019). However, due to the lack of mandatory requirements, greening tools have not achieved their original goals (Pe'er et al., 2019) and have not been effective enough to change agricultural production (Heinemann and Weiss, 2018; Pe'er et al., 2019).

It should be noted that the EU subsidy system took significant funds from the budget, and not only supported farmers but also increased their inequality (Giannakis and Bruggeman, 2015). CAP direct payments are distorted, meaning that large industrial farms receive significantly more financial support than medium or small farms that need it (Niemi and Kola, 2005). An evidence-based review of the effectiveness of CAP revealed several inconsistencies (Pe'er et al., 2019). It was concluded that the CAP positively impacted supporting farm incomes, but direct payments created a dependency on subsidies and reduced efficiency. The study showed that the distribution of direct payments is very inefficient and insufficiently substantiated, in addition, there is no clear link between goals and instruments. Therefore, the EU agricultural policy, on the one hand, increases the overall level of economic sustainability of the agricultural sector but is not always a tool to maintain the balance of farmers' incomes and does not meet the goals of green development (Guth et al., 2020). Therefore, the objective of this article

is to analyse the plans for state financial support for the green direction of the development of the agrarian sphere in the EU countries and Slovakia.

Material and methods

The choice of the research methodology is based on the need to analyse the interdependence associated with the formation of the green direction of the agricultural economy in Slovakia. To realize the set goal, a complex of general scientific and special methods was used, namely: historical and terminological analysis, specification, generalization, observation, comparison, and system-structural analysis. Comparative and structural analysis was used when comparing different bioeconomy development programs and the structure of expenditure items and tools provided for them. The analytical method was applied to analyse the budget of bioeconomy development programs and identify risks that prevent investment in the bioeconomy. The generalization method was used to form research conclusions and identify positive and negative features of bioeconomy development programs in Slovakia.

Results and discussion

The central direction of the updated CAP is the green economy development strategy which has a huge economic potential and environmental significance. Among the EU strategies that implement the principles of a green economy, the following are of particular interest: Plan for the transition to a resource-efficient Europe by 2050; Plan for the transition to a low-carbon economy until 2050; Energy Development Plan until 2050; a competitiveness and innovation framework; the EU Horizon 2020 initiative; Strategy and action plan for the development of a sustainable bioeconomy until 2020; Integrated industrial policy in the era of globalization; Transport Technology Strategic Plan.

For the period 2023–2027, CAP policy includes 9 goals: ensuring a fair income, increasing competitiveness, equalizing power in the food chain, climate change action, and ecology. care, protection, landscapes and biodiversity, support for generational renewal, rural living, protection, food quality and health. They will be funded under the Multiannual financial framework (MFF) 2021–2027.

The Horizon 2020 strategy provides for the intensification of research and development in the field of biotechnology. It includes almost all four parts of the research and innovation framework (2014–2020). Under Horizon 2020 (2014–2020), the EU has invested 3.85 billion €, and under Horizon Europe (2021–2027), a proposed amount of 250 billion € will be invested in innovative circular agriculture projects in agriculture, aquaculture and fisheries, forestry. economics, biochemistry and biomaterials (European Commission, 2020).

One of the main directions of the European strategy "Europe 2020" has become the "European Bioeconomy towards 2030", which focuses on three key aspects:

- development of new technologies and processes for the bioeconomy;
- market development and competitiveness in the bioeconomy sectors;
- intensive collaboration between policymakers and stakeholders (European Commission, 2018).

An important task of state support is to stimulate an increase in investment in agriculture. Thus, 10 billion € will be allocated from the Horizon Europe program. Part of the funds will be pooled in the European Agricultural Partnership for Innovation (EIP-AGRI). The purpose of the partnership is to finance measures to increase the competitiveness of agriculture and forestry. The CAP has been developed for each country, which includes financial incentives for knowledge sharing and innovation (such as advisory services, training, research, rural networks, pilot projects, and EIP-AGRI task forces):

- Encouraging Member States to use big data and new technologies for verification and monitoring (e.g., verification of compliance with crop rotation requirements or verification of farm sizes for direct payment applications).
- Supporting the digitization of rural life on farms (e.g., through precision farming techniques) and in wider communities (e.g., through improved so-called last mile broadband).
- Development of a pan-European risk management platform to help farmers manage their businesses more effectively.

The goal of increased funding for the bioeconomy is to support agriculture, rural development, and high-quality food production in the EU (European Commission, 2018; Kengyel, 2022).

An analysis of the world's experience of financial support for the development of a green economy in different countries has shown that this is an important item of public spending. So, in Germany, significant state subsidies are allocated for biological agriculture without pesticides and chemical fertilizers. In Japan since the early 1980s biotechnologies are intensively introduced. This island state, with a lack of acreage, fully provides the country's needs with all types of food. At the same time, it reduces the sown area by 1.7% to eliminate overproduction. In Saudi Arabia, where desert soils predominate, European-imported compost and biotechnology have made it possible to export wheat and fresh cow's milk. In China, biotech research and development investments account for an average of 2.5% of a company's sales. At the same time, a third of the investments are provided by the Chinese government.

Countries rich in biomass (Argentina, Brazil, Finland, New Zealand, and Norway) are focusing on creating higher value-added in primary sectors (agriculture, forestry and fisheries). Other countries, such as Australia, France, Germany, the Netherlands, and the UK, are working to develop high-tech industries and stimulate the development of new industries. The strategies of the US and Sweden are only concerned with the contribution of agriculture to the bioeconomy. In Belgium, the bioeconomy includes traditional and more technological sectors, as well as consumer and logistics sectors (Staffas et al., 2013). The strategies of Finland, Norway and Sweden are more focused on forestry (using woody biomass) and marine resources, which are abundant in Scandinavia. The Finnish strategy only addresses the benefits of the bioeconomy for the food industry and is not directly related to its benefits for agriculture (Staffas et al., 2013). Agriculture and food are the dominant sectors of the European bioeconomy, so the European Union bioeconomy strategies and support measures focus on these two sectors. As stated in the European Union's strategy for agriculture, its goal is to provide knowledge and tools for the productive, sustainable development of resource-efficient systems to produce food, feed and raw materials based on biological resources, in combination with their financing (European Commission, 2018). In EU countries, the share of public funds is on average 50%. Some countries' strategies cover both the agricultural and food sectors. Several countries (Germany, Italy, and Spain) are considering the contribution of the bioeconomy to the agri-food system as a whole and are developing the idea of bioeconomic "value chains". Spanish strategy aims to stimulate the positive impact of the primary sector on biological innovation in other sectors. Italy's strategy aims to maintain the sustainability and competitiveness of the agri-

food sector (Laineza et al., 2018). Australia, France, and the Netherlands are working to increase competitiveness and innovation in their food industries. In Estonia, Ireland, Latvia and Lithuania, the ministries of agriculture, forestry, fisheries, and rural development or the ministries of economy and innovation often manage the bioeconomy.

In Slovakia, agricultural development is financed at the national level through a single Rural Development Program (RDP) funded by the European Agricultural Fund for Rural Development (EAFRD) and national contributions. The RDP establishes priority approaches and actions to meet the needs of its specific geographic area. Rural Development Financing through the European regional development fund (ERDF) is part of the wider European Structural and Investment Funds (ESI Funds), including the Regional Development Fund, the Social Fund, the Cohesion Fund, and the Fisheries Fund. They are managed at the national level by each EU Member State based on partnership agreements, and strategic plans that define the country's goals and investment priorities.

Currently, state assistance in the agro-industrial complex of Slovakia is provided to enterprises of primary agricultural production, food production, forestry and fisheries. The forms of assistance are as follows:

- State aid – any aid in any form provided by a supplier directly or indirectly from the state budget for business.
- Minimum assistance (de minimis assistance) – does not exceed € 15,000 per enterprise operating in the agricultural production sector, € 200,000 in the processing, marketing and forestry sectors and € 30,000 during any period of three financial years in fisheries. sector.

Slovakia has several instruments to stimulate the green economy: special feed-in tariffs, subsidies, tax regulation mechanisms, and Subsidy II – biofuel quota, tax regulation mechanism. Slovak farmers can annually apply for direct support (direct payments and certain measures of the rural development program), which is paid from the state budget of the Slovak Republic and reimbursed from the EU budget, transitional national payments are paid from the state budget of the Slovak Republic.

With funds from the Recovery and Sustainable Development Plan to support the production of electricity from renewable energy sources (RES), a State Assistance Scheme was developed, which was developed by the declaration of certain categories of assistance compatible with the internal market by Articles 107 and 108 of the Amended Treaty. The subject of this scheme is the provision of state assistance for investments in the construction of new capacities for the production of electricity from renewable energy sources and in the modernization of existing capacities for the production of electricity to increase the share of RES in the gross final energy consumption in the Slovak Republic, as well as the fulfilment of the goals and requirements established by Directive (EU) 2018/2001 of the European Parliament and of the Council on the promotion of the use of energy from RES.

The subject of the scheme is to assist with investments in the construction of energy reservoirs to integrate a greater share of variable renewable energy into the electricity system. The support provided under this scheme is subject to the support provided by Regulation (EU) 2021/241 of the European Parliament and of the Council of 12 February 2021 establishing a recovery and resilience support mechanism. The details of the application of this rule in the conditions of the Slovak Republic are regulated by Law no. 368/2021 Coll. on the recovery and resilience support mechanism, as amended, and the Council's executive decision of July 13, 2021, approving the Recovery and Resilience Plan of Slovakia.

The purpose of the financial state aid is to support investments in renewable energy generation facilities, investments in the modernization of existing renewable energy generation facilities and construction of renewable energy storage facilities. RES by Art. 41 Regulations on group exemptions to increase the share of RES in the gross final energy consumption of the Slovak Republic and increase the use of RES in enterprises, which will help reduce greenhouse gas emissions and reduce dependence on energy imports, especially fossil fuels. Based on the payment request, assistance may be provided in the form of a grant, pre-financing or cost-reimbursement system, or a combination of both.

Among the mechanisms of state financial assistance that support the development of bioenergy, it should be noted the support to produce electricity from renewable energy sources by connecting electricity generation equipment to the distribution system and access to the electricity transmission system, distribution, and supply of electricity, as well as the purchase of electricity at a price with a surcharge. (§ 3a Service method and service conditions for biomethane Act. 309/2009 on the support of renewable energy sources and highly efficient combined production and amendments and additions to certain laws). Support to produce biomethane is carried out through its preferential distribution with the issuance of confirmation of the amount of biomethane. Such support extends for a period of 15 years from the date of commissioning of the biomethane plant (§ 3a Service method and service conditions for biomethane Act. 309/2009 on the support of renewable energy sources and highly efficient combined production and amendments and additions to certain laws).

The following facts testify the possible effectiveness of state support. The bioeconomy in the EU generates an annual turnover of more than 2 trillion € and employs about 20 million people, which is 9% of the total employment in the EU, and 76% of the employed (agriculture, food, and beverage production). The added value of 621 billion € represents 4.2% of the EU's total GDP. Every euro invested in bioeconomy research and innovation should generate 10 € of added value by 2025 (European Commission, 2018). The Organization for Economic Co-operation and Development (OECD) predicts that in 2030 the innovative bioeconomy will account for about 3% of GDP in developed countries and much more in developing countries.

It is planned to spend 365 billion € on the development of the bioeconomy in 2021–2027. This is almost a third of the entire EU budget (Table 1).

There are two areas of budget financing: direct support to farmers/market measures and rural development. States are allowed to independently redistribute up to 15% of their CAP allocations between direct payments and rural development. Member States will also be able to transfer an additional 15% of funds from Pillar 1 to Pillar 2 of the CAP for the environment and climate action without co-financing.

The proportions of allocation of funds from the budget are such that 35% of Horizon Europe's budget will be aimed at achieving climate goals; there will be a significant increase in spending on basic digital research and innovation compared to Horizon 2020. 70% of the budget will be allocated to small and medium-sized enterprises. 7.5% of annual MFF spending on biodiversity targets in 2024 and 10% of annual MFF spending on biodiversity targets in 2026 and 2027. At least 3.3% of the budget will be allocated to widening participation and spreading excellence. Investments in space should also be consistent with those under Horizon 2020.

As part of Horizon Europe, 10 billion € will be used to fund research and innovation in the fields of food, agriculture, rural development, and the bioeconomy (European Commission, 2018). The Commission also proposes

Table 1 Multiannual financial framework 2021–2027 (2018 prices)

Indexes	2021	2022	2023	2024	2025	2026	2027	2021–2027
Natural resources and environment	55,242	52,214	51,489	50,617	49,719	48,932	48,161	356,374
Agriculture and Maritime Policy	53,371	50,344	49,568	48,686	47,773	46,965	46,169	342,876
European Agricultural Guarantee Fund (EAGF)	38,564	38,115	37,604	36,983	36,737	35,772	35,183	258,594
European Agricultural Fund for Rural Development (EAFRD)	13,935	11,187	10,967	10,752	10,542	10,335	10,132	77,850
In addition, allocation under NGEU	2,250	5,250	–	–	–	–	–	7,500
European Maritime, Fisheries and Aquaculture Fund	717	902	855	809	717	717	713	5,430
Other	140	125	125	125	125	125	125	890
Decentralised agencies	16	16	16	16	16	16	16	112
Environment and Climate Action	1,776	1,776	1,827	1,836	1,852	1,873	1,897	12,838
Programme for Environment and Climate Action (LIFE)	660	661	667	677	693	715	740	4,812
Just Transition Fund	1,071	1,071	10,71	10,71	10,71	10,71	10,71	7,500
In addition, allocation under NGEU	2,000	4,000	4,000	–	–	–	–	10,000
Other	–	–	45	44	44	43	42	218
Decentralised agencies	45	44	44	43	44	44	44	308

Source: European Commission (2021)

a payment reduction of up to 60,000 € and a mandatory payment limit above 100,000 € per farm. Labour costs will be considered in full. The purpose of these changes is to ensure a more equitable distribution of payments between farms. At least 2% of allocated direct public support payments in each Member State will be used to help young farmers, which may include an increase in the "settlement allowance" to 100,000 €.

To support the green direction of the EU, in addition to the 322 billion € that will be allocated to combat climate change, a stimulus package of 750 billion € has been adopted to combat the effects of the pandemic. To finance long-term investments, Emergency Funds have been created and are available to states through the Next Generation EU. Thus, sufficient infrastructure development has been created to improve the efficiency of EU climate financing. Based on Member States' economic recovery and environmental sustainability financing plans, fund programming and cohesion programs will begin to function. Member States will have to explain to the European Commission their strategy and investment priorities, as well as submit a list of operational programs indicating the objectives of financing.

While the new EU budget is focused on climate and environmental targets, it is important to monitor and control the targeted and transparent use of funds so that the new EU funds create a sense of responsibility and acceptance by citizens of the goal of switching to renewable energy sources.

The transition to renewable energy includes phasing out subsidies for electricity from local coal, which was approved in 2018 and will no longer be funded by the Recovery and Sustainability Fund. Financing of renewable energy sources and energy infrastructure will be carried out in the process of transposing the Clean Energy for All Europeans package into Slovak law.

The number of funds from the Recovery and Sustainability Plan of the Slovak Republic to support the production of electricity from renewable sources, the modernization of hydroelectric and biogas plants, and the construction of energy storage from renewable sources are 227.02 million €. The approximate distribution of funds for appeals by year is as follows: 2022 – 137 million €, 2023 – 90 million € (ME SR, 2022 year). An important goal is a biodiversification, the amount of funding for which for the south-eastern EU countries is shown in Table 2.

In Slovakia, 159 million € have been allocated for biodiversity conservation, which is not enough. The strategy until 2030 is planned to allocate 20 billion € per year for biodiversity and environmental solutions for nature conservation. From this perspective, € 159 million – which is less

Table 2 Biodiversity spending in the recovery plans of eight CEE countries

	Total investments contributing to biodiversity (€, million)	Investments contributing to biodiversity as % of the total recovery plan	Total recovery plan allocation (€, million)
Bulgaria	16	0.27%	6 000
Croatia	32.65	0.52%	6 300
Estonia	0	0.00%	900
Hungary	18.4	0.26%	7 000
Latvia	0	0.00%	1 820
Poland	0	0.00%	57 000
Slovakia	159	2.58%	6 155
Slovenia	0	0.00%	1 600
Total	226.05	0.26%	86 775

Source: Bozekova et al. (2021)

than 2.5% of the total budget of the Recovery Plan for Slovakia will not give significant results (Table 3). Moreover, most of the budget will be spent on private land consolidation, while land management measures are excluded from the plan (Bozekova et al., 2021). According to the Plan, almost 3 billion € will be directed to green, climate-friendly investments, but funding is not enough to decarbonize and reduce greenhouse gas emissions in Slovakia.

Table 3 Components of the Slovak national recovery and resilience plan

Name of the Component	RRP (mil. €)	Green
Green Economy	2,170	2,161
Renewable energy sources and energy infrastructure	220	220
Renovation of buildings	700	700
Sustainable transport	750	741
Decarbonisation of industry	350	350
Climate change adaptation	150	150
Education	798	97
Science, Research and Innovation	700	50
Healthcare	1,450	545
Efficient public administration	1,037	92
Total sum	6,155	2,945
Minimum	–	2,277

Source: Melichar (2021)

The problem of the ineffectiveness of the Slovak Recovery Plan is due to the use of old carbon-neutral decarbonization data, which is in line with the EU climate goals for 2030 and 2050, as well as distorted data in household reports on shares of renewable energy sources. In 2020, a government program was adopted, which is planned to revise the NECP and the Low Carbon strategy, although there are no specific recommendations to support capacity building in regional centres.

An investment package (€50 million) has been created to improve the energy efficiency of 40,000 private houses. This money will be used to buy fossil gas boilers. Although there are doubts that low-income households will use fossil gas boilers, due to the price of fuels such as wood and waste. Therefore, Slovakia has the worst energy cost-to-income ratio in the EU. It is supposed to use examples from world experience, including support for home renovation. Solar systems and heat pumps are not yet widespread (Melichar, 2021).

Optimization of control and improvement of integrated solutions for the industry is another reform that is attracting attention in terms of environmental protection and control over the use of funds. Economic efficiency is the main principle for investment. The Ministry of Economy should add sustainability criteria for renewable energy sources and designate municipalities, energy communities and consumers as eligible recipients of state financial support for the construction of new RES, and not just to support entrepreneurs (Gabriel, 2021). In addition, it is necessary to ensure the transparency of the Commission's activities in the process of planning costs and the use of funds. Thus, it makes sense to reduce the importance of the goal of reaching, the average level of EU GDP, and to pay more attention to financing decarbonization and resilience, which will allow Slovakia to reduce CO2 emissions by 55% by 2030.

While under Slovakia's Renewal Plan, public funding, and the sectoral investments it uses may continue to stimulate the development of the bio-agro-economy sector, it is also vital to attracting outside investors. The new EIC Accelerator program within Horizon Europe (Pillar 3 Innovative Europe) targets innovative businesses, including start-ups. In addition, the European Circular Bioeconomy Fund (€250 million) was established to generate capital and innovation to harness the potential of the circular bioeconomy. This fund will attract private investors to the bioeconomy (Bioeconomy for change, 2021).

To actively attract foreign investors and invest in biorefineries, it is necessary to reduce risks (Bioeconomy for change, 2021). First, it is the risk associated with access to biological raw materials (food/feed, textiles, paper, wood, and energy). Secondly, it is a technological risk that accompanies the change in raw materials, processes, and technologies. Therefore, biotechnology requires a radical update. Third, the risks associated with the markets. The competition requires bioproducts to be highly competitive both in terms of price and competitiveness issues.

Based on these risks, investors in the biosector carefully evaluate the prospects before investing in infrastructure, commercial and biorefineries. To address the lack of investment in biotechnology, public co-financing will remain a necessary approach to address these risks. Such funding can be critical to reducing investment risk while attracting additional funding and resource mobilization from the private sector, as already exemplified by the BBI JU public-private partnership that was active during the Horizon 2020 period.

Conclusions

Since the publication of the EU Bioeconomy Strategy, there has been a noticeable surge in public funding for research and development in innovative technologies under EU programs. However, despite this, cross-sectoral activities linking the best research scientists with agricultural production that would be able to transform scientific development into commercial results often failed. This is primarily due to the high risks associated with investing in the bioeconomy. To overcome these risks, state financial support is needed for the main direction of the development of the green economy.

The instruments of state financial support for the bioeconomy, which are provided in the new CAP, as well as other programs for the development of the bioeconomy and included in the budget for financing the development of the agrarian sphere until 2027, will bring significant additional benefits to farmers and society. The focus will shift from compliance with the rules to results and performance, so countries will be given more freedom to adjust the goals and choose the tools to achieve them. State financial assistance will be focused on the widespread use of modern technologies and innovations. Higher aims, especially about the environment and climate, will be complemented by a series of restrictions and tools to ensure that both farmers and government organizations meet their obligations. To control the rational use of funds, a transparent process of public participation through the principle of partnership is essential.

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