

RURAL DEVELOPMENT OPPORTUNITIES IN THE ROMANIAN BIOECONOMY

AVRĂMESCU TIBERIU CRISTIAN*¹

¹University of Pitești, Romania

*Corresponding author's e-mail: tiberiu.avramescu@upit.ro

Abstract: *The development of sustainable rural bioeconomy generates multiple opportunities for rural areas. These benefits (economic, social and environmental) are crucial. The bioeconomy sector can sustainably and intelligently support the economic and social development of rural areas in Romania. The bioeconomy sector development can be crucial to improve the performance and to revitalize rural areas, to create jobs and manage sustainably the natural resources. In Romania, a large part of the bioeconomy sector in GDP is obtained in rural areas, so this paper identifies the development opportunities of this sector and the benefits it can bring to rural areas. To highlight the importance of the bioeconomy for the development of rural areas in Romania, we used mainly the indirect research technique, but also the statistical analysis. The analysis allowed me to conclude that the main activity specific to the bioeconomy in rural areas is agriculture, the other economic activities having minor contributions. Therefore, it is necessary to involve all local stakeholders in order to capitalize on local resources and develop other activities.*

Key words: *rural development, bioeconomy, economic development*

INTRODUCTION

Bioeconomy is very important for rural areas development. The bioeconomy largely uses biological resources (animals, plants, microorganisms, biomass) that come from rural areas. Thus, rural areas can become very attractive to investors, because the processing of these resources is more efficient at source, which shows the potential of the bioeconomy for rural areas [7, 8].

The bioeconomy has capacity to support the EU Common Agricultural Policy and the cohesion policy objectives of increasing agricultural production, sustainable management of natural resources, ensuring a fair income for the inhabitants of rural areas and reducing regional disparities. Due to these benefits, the Common Agricultural Policy supports this sector. The financing of rural areas aims at improving the infrastructure, supporting agricultural activities, but also the development of non-agricultural activities based on biological resources. Achieving these objectives requires major changes: taking into account not only economic aspects, but also social and environmental needs. Efficient resources, environmentally friendly and climate sensitive practices are needed, as well as innovative products [1].

Many countries developed strategies and policies in the biotechnology sector or other bio-based products. More and more countries are integrating all these sectors of the economy into a single strategy: an integrated strategy for the development of the bioeconomy [16]. Such an approach can have important effects on the economy, society and the environment and can also include a strategy for the development of the bioeconomy in rural areas and for the diversification of bioeconomy economic activities. This paper identifies the activities that support for increase the potential of the bioeconomy and the strategic directions for the development of this sector in rural areas.

MATERIALS AND METHODS

In preparing this paper, we consulted a rich literature, from which we selected the most interesting ideas and practices. We studied the official documents of the European institutions or of the Romanian public authorities. We conducted a systematic search to

identify the most relevant information for Romania, conducting an analysis based on a comparative assessment, in order to identify the current state of the bioeconomy sector in Romania and the possibilities to develop this sector in rural communities.

From a methodological point of view, we used the indirect research techniques, using papers and studies published so far.

I realised a systematic research to identify the most relevant information for Romania rural areas, an analysis based on comparative assessments, in order to identify the current state of bioeconomy in Romania and the possibilities to develop it.

RESEARCH RESULTS

In 2018, the EU Commission relaunched its Bioeconomy Strategy and Action Plan. The new updated strategy includes the progress of bioeconomy sector from 2012 (first EU Bioeconomy Strategy) to 2018. In those strategies, bioeconomy is the sector of the economy that “use renewable biological resources from land and sea to produce food, materials and energy” [3, 5].

European bioeconomy encompasses the agricultural, forestry, fisheries, food, bio-energy and bio-based product sectors. It generates every year a turnover of 2000 billions euros and 22 million jobs (approximately 9 % of EU’s employed population), the most in rural areas [7].

The bioeconomy sector is significantly important for the rural communities. The bioeconomy is based on biological resources (plants, animals, microorganisms, biomass, organic waste), most of which coming from rural areas, a fact creating opportunities for producers, consumers and traders in rural areas. The bioeconomy sector creates jobs, contributes to reducing pollution and dependence on fossil resources, restoring ecosystems and increasing biodiversity [2].

Regarding the rural development, the bioeconomy can cover a wide range of sectors: agriculture and forestry, food processing, feed production, bioenergy. The primary products are processed at source, with the associated cost reductions, proving the potential of the bioeconomy for the rural areas [6].

These objectives are supported by the Common Agricultural Policy. The EAFRD finances some key investments to transform the bioeconomy sector in the rural areas. These investments could generate additional opportunities for the rural areas, such as:

- increasing the attractiveness and the quality of life in rural areas, as a support for non-agricultural economic activities, such as agritourism or ecotourism, which generate income for the local community;
- supporting the green entrepreneurship, promoting organic farming and organic products as a way to improve the quality of life and the health of the population;
- recycling the organic waste at the farm and reducing the polluting emissions for the environment;
- supporting the supply chains for the producers engaged in organic farming; rewarding the farmers who make organic products;
- increasing the attractiveness of jobs for the professionals in the fields of agriculture, forestry, food processing services, medical services, by providing facilities for establishment in rural areas.

In Romania, the importance of the bioeconomy is highlighted in the various strategies implemented so far at national level. The Romanian Government establishes the bioeconomy as a national field of smart specialization for 2014–2020. For Romania, the bioeconomy is considered as one of the "smart" fields of specialization. This field benefits from the huge potential of Romanian agriculture, in the context of an increasingly active and growing local food industry, of successful applied research in the field and in the

pharmaceutical industry, as well as in the context of global trends such as high food demand. Food safety and optimization, the development of the horticultural, forestry, animal husbandry and fisheries sectors or the exploitation of biomass and biofuels are subdomains with obvious potential.

The bioeconomy is one of the strategic priorities of the Strategy for research-development-innovation in the field of agri-food in the medium and long term (2014 - 2020; 2020 - 2030). The purpose of this strategy is to establish the conditions and priorities for research and development and innovation necessary to achieve the objectives and development targets of the agri-food sector, by accumulating the highest scientific and technological knowledge and experiences, in order to support the sector's competitiveness at national and European level [10]. According to this document, the strategic objectives of the bioeconomy are taking into account the national bioeconomic potential assessment to produce and capitalize the non-food bioresources, converting agricultural residues into biofuels, developing the knowledge base and introducing technical progress specific to the field, scientific support for policy decisions and implementing a strategy in the field of bioeconomy and the long-term reduction of greenhouse gas emissions.

The Competitiveness Operational Program (COP) 2014-2020 includes the bioeconomy among the supported areas of smart specialization. This program establishes 10 sectors in which Romania can make a significant contribution worldwide. Some of them aim at developing the bioeconomy in rural areas: tourism, textiles and leather, wood and furniture, food and beverage processing, energy and environmental management, respectively agriculture, forestry, fishing and aquaculture. For the rural areas, the program aims to support an entrepreneurial mechanism, able to develop on its own, as well as to increase competitiveness [9, 11].

Table 1.

Areas of smart specialization in rural areas

<i>Sectors of activity</i>	<i>Production specialization directions</i>	<i>Regional impact</i>
<i>Agriculture</i>	Agri-food sector, bio-technology, beekeeping, animal husbandry, fish farming, raw materials for the textile industry	South
<i>Food processing, beverages, tobacco</i>	Functional food, wine, organic food	South
<i>Textiles, clothing, leather products</i>	Industry-agriculture sector connections, complete value chain, added value through design	Northeast, Southeast, Bucharest, Ilfov
<i>Wood and wood products, furniture</i>	Value-added furniture by design	Center, Northeast, North-West
<i>Energy and environment</i>	Renewable energy, wind energy, solar energy, green buildings, biomass, ecological services, geothermal energy	South, Bucharest, Ilfov, West, Northwest
<i>Tourism</i>	Ecotourism, agritourism	South, Northwest, Center, Northeast

Source: adapted from the Competitiveness Operational Program 2014-2020

There are activities that can contribute to bioeconomy development in the European and Romanian rural areas. In Romania, the National Rural Development Program 2014 - 2020 supports the increase of the potential of the bioeconomy in rural areas [10].

In Romania, the main sectors of the bioeconomy are represented by agriculture, food industry, beverages and tobacco products (especially food), textile industry (biotextiles), wood industry and other industries included in the bioeconomy.

The latest statistical bioeconomy data were published by the European Commission in 2016. Although at the time of the study, specialists promised a periodicity in the appearance of statistical data, this was not done.

The most important activities in the bioeconomy sector for rural areas are agriculture, forestry, fishing and aquaculture. For these activities, I analyzed two indicators: number of employees and turnover.

Between 2008 and 2015, the number of employees in the bioeconomy sector decreased significantly, especially due to the significant decrease in the population employed in agriculture. A significant part of the workforce migrated to other sectors in the country or to other countries in the EU. Population aging also contributed to this phenomenon. This reduction of the population employed in agriculture is a normal phenomenon and will continue in the next period. In the other two sectors analyzed, the situation is as follows: slight increase for forestry, respectively significant reduction for fishing and aquaculture.

Table 2.

The evolution of the number of employees in the bioeconomy sector, for the period 2008 - 2015

	2008	2009	2010	2011	2012	2013	2014	2015
TOTAL	3229433	3152176	3143144	2950960	3009571	2950486	2888087	2625538
Agriculture	2635700	2633300	2650700	2446800	2498100	2445100	2391600	2129600
Forestry	49100	53300	47900	46100	56600	53900	47300	51600
Fishing and Aquaculture	3544	2958	4377	3123	3439	2655	2872	2894

Source: <https://datam.jrc.ec.europa.eu/datam/mashup/BIOECONOMICS/index.html>

According to the European Commission, in 2015, last year with available data, 81.1% of the labor force employed in the bioeconomy worked in agriculture, respectively 2,129,600 employees. The remaining almost 19% of employees were engaged in activities in other areas of the bioeconomy. The labor force employed in forestry has a share of 1.96%, and the one employed in fishing and aquaculture of 0.1%.

The turnover of the Romanian bioeconomy remained relatively constant between 2008 and 2015, though registering slight fluctuations. The economic crisis of 2009 also had a negative impact on the bioeconomy, the sector recording its lowest value (29,211 million Euros, compared to 37,197 million Euros in 2008, the decrease being about 21%). There have been declines in other years as well, due to some conjunctural factors, such as the falling prices of some products on the world market (agricultural products, for example).

Table 3.

The evolution of turnover in the bioeconomy sector, for the period 2008 - 2015

	2008	2009	2010	2011	2012	2013	2014	2015
TOTAL	37197	29211	31787	36625	33329	37303	36832	36972
Agriculture	16683	12658	13960	16670	13001	16092	15007	13822
Forestry	760	656	898	1294	1355	1523	1753	1930
Fishing and Aquaculture	15	14	32	18	19	22	22	23

Source: <https://datam.jrc.ec.europa.eu/datam/mashup/BIOECONOMICS/index.html>

The analysis of the turnover of the Romanian bioeconomy by activity sectors indicates a much lower contribution of agriculture (37.4%), compared to the contribution of this sector to the employment in the bioeconomy sector (81%). The situation in

Romania, where agriculture has the largest share, is different from that existing in the European Union, where, in terms of turnover, agriculture has a share of 17%.

The other analyzed sectors had the lowest contributions to the turnover of the bioeconomy sector: forestry (5,22%), fishing and aquaculture (0,06%).

At the European Union level, the concerns in the field of bioeconomy are more than 20 years old. The same cannot be said about Romania. In Romania, the development potential of the bioeconomy is high. However, it is necessary to achieve national and regional strategies, strategies that, implicitly, also target rural areas. Given the important share of agriculture in achieving GDP, it is inconceivable the development of this sector without taking into account rural area. Some directions are presented below.

Food and feed

The EU Bioeconomy Strategy puts sustainability and circularity at its heart [7]. Food production and agriculture are the main activities of the bioeconomy in terms of employment, turnover and added value [13]. The EAFRD supports farmers, processors and entrepreneurs in rural regions to improve the way agri-food products are grown and processed, by stimulating innovation, investment, identifying new business models and high value-added products [18]. In Romania, the areas of interest financed by the European Rural Development Fund and provided in the National Rural Development Program 2014-2020 are:

- encouraging innovation, cooperation, knowledge transfer and exchange of good practices in rural areas;
- strengthening relations between agriculture, forestry and food industry, on the one hand, and research and innovation, on the other, including a better environmental management and improved environmental performance;
- increasing economic efficiency of all agricultural holdings and facilitating the modernization of holdings, to increase market share and market orientation, as well as to diversify agricultural activities;
- increasing the competitiveness of producers in rural areas through their participation in quality schemes, their integration in agri-food producer chains, increasing the added value of agricultural products, promoting them on local and regional markets;
- the restoration, conservation and development of biodiversity, including in Natura 2000 areas and areas facing environmental problems, agricultural activities of high natural value;
- supporting risk prevention and management at farm level;
- facilitating the diversification, establishment and development of small businesses, that creates jobs in rural areas and incomes for local community.

Energy

Reducing the dependence on non-renewable energy sources is essential for the European Union's energy policy. Bioenergy is an important source of renewable energy and it is expected to become an important component of the energy mix in the coming years [14]. The European Agricultural Fund for Rural Development supports farmers and foresters in capitalizing the biomass production, enabling the circular economy to become a reality in the rural areas. Therefore, the areas of interest financed by the European Rural Development Fund and provided in the National Rural Development Program 2014 - 2020 are:

- efficient use of energy in agri-food sector;
- support for use of renewable energy resources, waste, residues and other non-food raw materials for achieving bioeconomy goals;
- investments for biomass fuel production, modernizing electricity and heat production capacities in biomass and biogas plants.

Enhanced bio-based product

The transition to a carbon-free society involves replacing fossil fuels with bio-based materials. This involves the transformation of organic waste, agri-food and forestry production residues into biological products valuable both for the environment and for national economies [7].

The agricultural and forestry sectors have been and are important to the European economy. But today, beside their traditional role of supplying agri-food and forestry products, the European farmers have to support the bioeconomy sector. They supply high quantities of biological resources that are, in whole or in part, converted into innovative products, replacing non-renewable resources and energy sources. At European level, there is research focused on the development of alternative products for different sectors (textiles, construction, etc.). The increasing demand for these products provides increased opportunities for the farmers, foresters and entrepreneurs to diversify their sources of income.

In the National Rural Development Program 2014 - 2020, the development of alternative biological products is not provided as an area of independent interest, but those interested can receive funding, because the activity can be associated with other agri-food or forestry products or grants can be accessed for setting up or developing businesses in rural areas [12].

Bioeconomy and environmental sustainability

The European Union's policy on the bioeconomy for rural areas aims at offering sustainable economic opportunities, contributing in improving the quality of the environment. The sustainable management of national resources became very important in the context of growing pressure on the environment and threats to biodiversity.

Although efficiency has increased in agriculture by replacing nitrogen-based fertilizers and reducing greenhouse gas emissions, this sector remains an important source of environmental pollution [15]. Therefore, the bioeconomy development aims at enhancing the natural resources, reducing pressure on the environment, increasing the use of renewable products, and improving the ecosystem functions and biodiversity [17].

To support the bioeconomy sector in rural areas, the National Rural Development Program 2014-2020 aims at achieving a balance between the development of the agricultural and forestry sectors and environmental sustainability by:

- regenerating, preserving and developing biodiversity, including in Nature 2000 areas and in areas with environmental constraints, innovating high nature value products, and improving European landscapes;
- improving water management, including fertilizer and pesticide management;
- reducing the greenhouse gas emissions in agriculture;
- promoting carbon conservation in agriculture and forestry.

It is important for the rural communities to understand the potential of the bioeconomy for rural development. Increasing the importance of the bioeconomy in the development of the local economy implies the involvement of all relevant actors. The objectives should be the following:

- involving central authorities in developing strategies to develop regional and local bioeconomy;
- awareness of the importance of the bioeconomy and the favorable impact it can have on the rural economy;
- involving all stakeholders in developing bioeconomy development strategies at regional and local level;
- increasing the capacity of local stakeholders to carry out innovative projects and providing financial support for the implementation of these projects;

- identifying the most suitable business models for the development of the bioeconomy sector in rural areas;
- facilitating the exchange of good practice between different areas and regions, including successful models from other Member States of the European Union.

CONCLUSIONS

Romania has a high potential to develop an economy based on bio-products. We may conclude that the bioeconomy can support the development of rural areas, by creating high value-added products and local supply chains and by concentrating production activities at the local level. The bioeconomy can help increase investment in rural areas, including local infrastructure, create sustainable jobs and increase the quality of life. The contribution of the bioeconomy to the protection of the environment should not be neglected either.

Currently, in Romania, the economy of rural areas depends very much on agriculture, the other economic activities having a marginal role. But the transition to the bioeconomy, through more efficient use of resources, must be taken into account, especially as the European Union offers high funding opportunities for this sector.

Rural areas may benefit from the bioeconomy, but all local stakeholders should be involved: public authorities, farmers, entrepreneurs. Development programs with clear objectives are also needed, integrating existing strategies at local, regional and national levels. Carrying out local programs for the development of rural areas is essential to stimulate and support business models that make the most of local resources.

The bioeconomy is the core of rural development, because the local communities need economic, social and environmental changes and a different approach to resource use.

The development of the bioeconomy sector involves to maximize the potential by creating appropriate strategies at national and regional level. These strategies must also integrate rural areas. The paper presents some ideas and solutions about the aspects that rural development strategies should include. Currently, agriculture is the most important sector, but it is also necessary to develop non-agricultural activities, with high added value, which will generate a multiplier effect, and which will capitalize locally the resources available in the rural areas. Identifying the elements of a strategy for the development of the bioeconomy sector, in the context of integrating all existing aspects in the different national programs, could be a research direction for the next period.

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