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EMPLOYMENT AND ADDED VALUE IN EUROPEN UNION BIOECONOMY – A SUSTAINABLE DEVELOPMENT PERSPECTIVE

Key word: added value, bioeconomy, sustainable development, employment, bioeconomy sectors

ABSTRACT. The purpose of this paper is to assess the development of bioeconomy taking two basic socioeconomic indicators into account, namely the contribution to employment and increase in prosperity. In 2018, the European Union adopted an updated strategy regarding bioeconomy. The purpose of this strategy is to substitute fossil fuel (coal) with biomass-based materials in industry and energy production, at the same time preserving the natural environment. As a result of this, the need arises to analyse the development of bioeconomy with regard to sustainable development principles. For this purpose, it is required to define the criteria and indicators allowing to evaluate the direction and rate of changes. However, monitoring the importance of bioeconomy is impeded due to a lack of statistics that covering the just evolving sectors partially based on biomass. Available statistical data provided the grounds for analysing changes in employment and added value in bioeconomy in the EU, in total and in its individual sectors. The obtained results indicate a dropping share of bioeconomy in employment and an increasing level of added value of bioeconomy in the years 2008-2017. individual sectors showed a different share in employment and added value of bioeconomy, as well as diverse dynamics of changes.

INTRODUCTION

Present challenges connected with climate changes, limited natural resources, soil and ecosystem degradation combined with the growing human population force mankind to search for new production and consumption methods, without having an adverse effect on the environment. At the same time, the paradigm of sustainable development is a stimulus for business and politic circles to modernise the economy and strengthen its position in a competitive environment, as well as ensure an increase in prosperity. In order to cope with these challenges, it is required to improve methods of food production and consumption, as well as biological products and materials within bioeconomy. The objective of the concept of bioeconomy is to meet global challenges by way of stimulating innovations

and progress in biological sciences. Some studies seek a new path of development in this sector, optional for the current model of economic growth, based on non-renewable resources [Biotalous 2014]. The transition from using fossil fuels in production processes to production models based on biological resources, when making such materials as: plastics, textiles and chemicals, is viewed as more ecological [Sillanpää, Ncibi 2017].

Bioeconomy is seen as a new sector, which can be analysed on either a local, regional, national, international, and/or global level [Adamowicz 2017]. It includes all business activities and production systems based on biological resources (animals, plants and microorganisms). It consists of basic production sectors where biological resources are used and produced (agriculture, forestry, fishery and aquaculture), and sectors of industry using biological resources and processes for the production of food, animal feed, bio-products and energy, and provide services [Gołębiewski 2015].

There are two approaches applied to define bioeconomy, the first oriented towards biotechnology and the second identified as sustainable bioeconomy. The first approach was reflected in the EU strategy for bioeconomy adopted in 2012, focusing around three pillars: "investing in research, innovations and skills; intensified political interaction and involvement of stakeholders; and strengthening markets and competitiveness" [EC 2012]. However, it is emphasised, in the reference materials, that the approach oriented towards biotechnology and the development of biological resource-related business activities does not fully fit in with the concept of sustainable development [Staffas et al. 2013]. The tensions occurring because of increasing competition for land between food crops and energy plants, the use of marginal areas, which is adverse for biodiversity, greenhouse gas emissions resulting from biomass production, the pressure exerted on natural ecosystems due to increased water consumption and deteriorated soil quality indicate the discrepancy between the development of bioeconomy and the principles of sustainable development [Pfau et al. 2014]. As a result of this, it is pointed out in many scientific studies that bioeconomy development should take all aspects of economic growth (environmental, business and social) into account. This approach is referred to by the renewed EU strategy of 2018 [EC 2018, Koukios et al. 2018].

Therefore, defining the criteria and assessment of bioeconomy in terms of sustainable development becomes the key issue. From the report of the World Commission on the Environment [WCED 1987], the concept of sustainable development is systematically gaining importance. In the current millennium, it is becoming particularly important to establish the criteria and indicators for sustainable development. Purely economic measures, as GDP, are more and more often seen as insufficient for the assessment of sustainable social development [Stiglitz et al. 2009]. Therefore, there were many studies focusing on identifying the indicators measuring the sustainable development of bioeconomy [Jander et al. 2020]. Among many measures used in this regard, the indicators considered important are those which represent bioeconomy's contribution to the creation of new jobs and the welfare of society. The purpose of this study is to assess bioeconomy development on the example of two basic socioeconomic indexes: contribution to employment and increase in prosperity. This contribution will be assessed with reference to EU countries.

INDICATOR FOR ASSESSING THE SUSTAINABILITY OF BIOECONOMY

Bioeconomy sustainability assessment is a complex and many-sided process. From the very moment the concept of sustainable development came to light, there were efforts made to develop a set of methods and sustainability indicators to monitor progress in implementing this concept all over the world and in individual countries. Sustainability indicators are parameters or values that characterise the condition of economic, social and environmental phenomena that make up the concept of sustainable development. They enable an interpretation of this condition, and also, through analysis in time, determine the trends of changes for individual parameters [Majewski 2008].

Territorial size is the basic profile for bioeconomy sustainability assessment. Within this approach, it is possible to build sustainable development indicators for bioeconomy at a national level. Many sets of measures have also been developed at an international level by international institutions and organisations [FAO 2018b]. It is possible to show projects distinguishing sets of individual indicators [Karvonen et al. 2017, Egenolf, Bringezu 2019] and studies that take complex indexes into account [Hildebrandt et al. 2014].

Bioeconomy strategies have been developed in many countries all over the world [Besi, McCormick 2015, EC 2017, Meyer 2017]. As a rule, they assume contribution to sustainable development, including the implementation of economic, social and environmental objectives [Wesseler, Braun 2017]. However, the majority of countries lack a clear framework for monitoring progress regarding the sustainable development of bioeconomy. The FAO report of 2016 shows that the monitoring and assessment methods are unsatisfactory and there are no standards or guidelines at an international level [FAO 2016]. Other studies indicate that, today, most countries have no framework to monitor progress in reaching bioeconomy-related objectives. Some countries (e.g. Argentina) measure their bioeconomy contribution in terms of economic factors (e.g. added value and employment), while social and environmental criteria are taken into account to a limited extent only [FAO 2018a]. An example of an approach based on a complex indicator is the Bioeconomy Contribution Index (BCI), developed in Malaysia. This index is a combination of five economic parameters concerning bioeconomy: added value bioeconomy, bioeconomy export, investment projects in bioeconomy, employment in bioeconomy and productivity. At the moment, it only measures economic aspects, however social and environmental parameters can be included in it as well [Bracco et al. 2018].

The concept of bioeconomy growth monitoring is also of interest to the European Commission. The project "Bioeconomy Knowledge Centre" managed by the Joint Research Centre (JRC) and the nova-Institute for Ecology and Innovation involves the assessment of socioeconomic indicators (number of persons employed, turnover, added value, productivity of work) specified for various bioeconomy sectors and evaluated for individual member states [Ronzon, M'Barek 2018].

The search for a set of sustainable development indicators is also of interest to some international organisations. One of them is Global Bioenergy Partnership (GBEP). In December 2011, GBEP established a set of 24 sustainable development indicators for bioenergy. These indicators concern the production and use of all bioenergy forms and are expected to serve as the basis for all analyses carried out at a national level in order to

facilitate the sustainable development of bioenergy [GBEP 2019]. The UNO Partnership for Action on Green Economy (PAGE) is another example of an international organisation establishing a methodological basis for the assessment of sustainable development. The framework to measure green economy has been developed by this organisation, which will allow individual countries assessing their progress towards green economy and facilitate comparing progress among countries [PAGE 2017].

The set of indicators proposed by FAO in 2018 plays an important role in monitoring sustainable bioeconomy. The FAO methodology takes all crucial aspects of sustainable bioeconomy into account: social, economic and environmental. At the same time, it determines a limited set of basic measures to ensure monitoring and assessment feasibility [FAO 2018b]. The starting point of the FAO methodology is defining sustainable bioeconomy principles and criteria. Eight (8) criteria have been determined for each pillar of sustainable development. In fact, each criterion may take the economic, social and environmental impact into account.

EMPLOYMENT AND ADDED VALUE AS ELEMENTS OF SUSTAINABLE BIOECONOMY ASSESSMENT

An important objective of the bioeconomy strategy is to create new jobs. The implementation of sustainable European bioeconomy should lead to the creation of new jobs, especially in coastal and rural areas [EC 2018]. The most important role for the achievement of this objective, according to the European Commission strategy, will be played by a strong and quickly growing ecosystem of start-up businesses in the biotechnology sector. Increased employment is of considerable political importance since it shows bioeconomy's contribution to the achievement of the overall objective of full employment. This indicator allows to monitor the political measures intended to secure or create employment opportunities, and measure the impact of various activities on the labour market, as e.g. technological innovations.

Gross added value "is calculated as the difference between global production and indirect consumption (production side), or as the sum of employment-related costs, depreciation of fixed assets, gross operating surplus/gross mixed income, and other taxes minus production-related subsidies (income side)" [GUS 2020]. It constitutes the total monetary value of commodities and services obtained in the production process (production value) reduced by the value of expenditures used. At a macroeconomic level, it is included in the gross national product as the sum of all goods and services produced for final demand within a year. As regards individual sectors of the economy as e.g. bioeconomy, it shows their general economic importance. This indicator is applicable when formulating and giving direction to policies and other measures aimed at maximising economic growth. In order to measure the contribution of bioeconomy in economic growth, it is required to have knowledge on its share in the overall economy. This share can be determined while identifying and summing up the added value of sectors and subsectors within bioeconomy, and changes in time deliver information on bioeconomy growth. The problem is that different sectors and subsectors making up bioeconomy are not easy to identify. There is

general consensus that the agriculture, forestry and fishery sectors are part of bioeconomy. It is also not disputed that paper, cellulose and food industries will be included as well. Accounting treatments differ with regard to the inclusion of chemical and pharmaceutical sectors in bioeconomy.

RESEARCH MATERIAL AND METHODS

Bioeconomy definition used in this study complies with the official definition published in the European Commission communication of 2018 [EC 2018]. According to this communication, bioeconomy includes all economic activities related to biomass production. It should be emphasised that the NACE classification does not distinguish activities based on bio-products and those not based on bio-products. It is often the case that both biomass and synthetic products (textiles) are used as raw materials in many business activities. These are called hybrid activities and it is required to determine the share of bioeconomy for them.

The source material for the study was the JRC database – Bioeconomy [JRC 2020]. Data concerning the following issues was derived from it: employment and added value for the following bioeconomy sectors: agriculture, forestry, fishery, the production of food, beverages and tobacco, the production of bio-textiles, the production of wood and wood products, paper production, the production of bio-based chemicals, the production of bio-based pharmaceuticals, the production of bioplastics, the production of liquid biofuels and bioelectricity production. The geographical range of studies covered the EU-27 countries.

RESEARCH RESULTS

Bioeconomy is a significant sector of the EU economy, employing 17.5 million people in 2017. This sector employed 8.9% of the EU-27 workforce, and generated over EUR 613 billion in added value (Table 1).

In 2017, agriculture and the production of food, beverages and tobacco brought ca. 66% added value (Table 2) and represented more than 75% of jobs in the bioeconomy of the EU-27 (Table 3).

Agriculture generated more than EUR 188 billion in added value, and the food industry, the production of beverages and tobacco – more than EUR 2,015 billion. Although these two sectors prevail in bioeconomy, when measured with two indicators – employment and added value, their contribution to bioeconomy is different. Agriculture, as a sector characterised by low workforce productivity, employs 53% of all people working in bioeconomy, but it only generates 30% added value. Other sectors tend to increase their contribution to bioeconomy regarding rather added value than employment. For example, the food, beverage and tobacco production sectors only employ 25% of people working in bioeconomy, but generate 35% of added value. Less than 3% of employees work in the production of bio-products, pharmaceuticals, plastics and rubber (excluding biofuels), yet they generate almost 10% of added value in bioeconomy.

Table 1. Changes in the employment and added value in the EU-27 bioeconomy in the years 2008-2017

Specification	The changes in the employment and added value									
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Number of persons employed in bioeconomy [mln]	20.1	19.3	19.1	18.7	18.4	18.1	18.0	17.7	17.4	17.5
Number of persons employed in total sectors [mln]	193.2	189.7	186.9	186.9	186.2	185.5	187.7	189.7	192.6	195.6
Value added at factor cost bioeconomy [bln]	508.7	471.9	508.0	528.9	523.3	532.9	543.7	552.9	572.3	613.6
Gross value added per person employed [thousand EUR]	25.3	24.5	26.6	28.2	28.4	29.5	30.2	31.3	32.9	35.1
Share of bioeconomy in employed [%]	10.4	10.2	10.2	10.0	9.9	9.8	9.6	9.3	9.0	8.9

Source: own study based on [JRC 2020]

Table 2. Added value at factor cost in the EU-27 bioeconomy

Specification	Value added at factor cost in years				
	2008		2017		2017/2008
	bln EUR	%	bln EUR	%	%
Bioeconomy	508.7	100	613.6	100	120.6
Agriculture	158.7	31.2	188.5	30.7	118.8
Bio-based chemicals, pharmaceuticals, plastics and rubber (excl. biofuels)	42.1	8.3	60.3	9.8	143.3
Bio-based electricity	1.8	0.3	4.2	0.7	240.1
Bio-based textiles	21.8	4.3	21.1	3.4	96.6
Fishing and Aquaculture	5.3	1.0	6.7	1.1	126.7
Food, beverage and tobacco	174.6	34.3	215.3	35.1	123.3
Forestry	20.1	4.0	25.3	4.1	125.6
Liquid biofuels	2.3	0.5	3.2	0.5	137.7
Paper	35.3	6.9	41.7	6.8	118.3
Wood products and furniture	46.7	9.2	47.3	7.7	101.3

Source: own study based on [JRC 2020]

Table 3. The number of persons employed in the bioeconomy of the EU-27

Specification	Number of persons employed in years				
	2008		2017		2017/2008
	thousand	%	thousand	%	%
Bioeconomy	20,121.3	100.0	17,504.0	100.0	87.0
Agriculture	11,382.7	56.6	9,273.5	53.0	81.5
Bio-based chemicals, pharmaceuticals, plastics and rubber (excl. biofuels)	368.2	1.8	396.7	2.3	107.7
Bio-based electricity	6.8	0.0	22.5	0.1	332.5
Bio-based textiles	1,017.3	5.1	692.9	4.0	68.1
Fishing and Aquaculture	181.4	0.9	166.6	1.0	91.8
Food, beverage and tobacco	4,308.2	21.4	4,398.8	25.1	102.1
Forestry	488.0	2.4	517.5	3.0	106.0
Liquid biofuels	25.7	0.1	20.5	0.1	79.8
Paper	618.6	3.1	590.5	3.4	95.4
Wood products and furniture	1,724.3	8.6	1,424.5	8.1	82.6

Source: own study based on [JRC 2020]

When analysing the changes of employment and added value in time, it can be observed that employment drops and added value increases. There were over 2.6 million fewer people working in bioeconomy in 2017 than in 2008, mainly due to the ongoing restructuring of the agricultural sector, in which employment dropped by more than 2.1 million people. On the other hand, added value generated in bioeconomy increased by EUR 104 billion, and productivity of work increased from EUR 25,300 of added value per one employee in 2008 to EUR 35,100 in 2017.

CONCLUSIONS

The strategy adopted in 2012 by the European Commission "Innovations for sustainable growth: a bioeconomy for Europe" brought attention to the importance of bioeconomy in current economic growth. Biotechnological development started to be seen as an opportunity for solving many problems faced by communities at the beginning of the 21st century. The revised bioeconomy strategy developed in the EU in 2018 proved the need to develop bioeconomy taking sustainable growth principles into account. The assessment of bioeconomy development in view of economic, social and environmental aspects is being undertaken by scientific circles as well as various national and international organisations and institutions. Completed studies indicate that, among many bioeconomy assessment indicators, employment and gross added value are often used in terms of the economy.

Studies on the EU-27 bioeconomy carried out taking its main sectors into account have proven that, in the years 2008-2017, employment distinctly dropped and added value increased. The share of all persons working in bioeconomy in total EU employment decreased from 10.4 to 8.9%. Agriculture and food, beverage and tobacco production prevailed in terms of employment and added value in EU bioeconomy.

Studies have shown that the share of food, beverage and tobacco production in added value of bioeconomy is much higher than in employment. The opposite was true in agriculture, for which the share in employment was much higher than in added value. The use of added value has some constraints, however, as one of few indicators describing the economic, social and environmental condition of the economy, it delivers key information on economic growth compared to the rest of the economy. The scale and changes in employment are of much the same importance.

BIBLIOGRAPHY

Adamowicz Mieczysław. 2017. Biogospodarka: koncepcja, zastosowanie i perspektywy (Bioeconomy: concept, application and perspectives). *Zagadnienia Ekonomiki Rolnej* 350 (1): 29-49. DOI: 10.5604/00441600.1232987.

Besi de Matteo, Kes McCormick. 2015. Towards a bioeconomy in Europe: national, regional and industrial strategies. *Sustainability* 7 (8): 10461-10478. DOI: 10.3390/su70810461.

Biotalous. 2014. *Sustainable growth from bioeconomy The Finnish Bioeconomy Strategy.* Biotalous: Prima Ltd, http://biotalous.fi/wp-content/uploads/2014/08/The_Finnish_Bioeconomy_Strategy_110620141.pdf.

Bracco Stefania, Ozgul Calicioglu, Marta Gomez San Juan, Alessandro Flammini. 2018. Assessing the Contribution of bioeconomy to the total economy: A Review of National Frameworks. *Sustainability* 10 (6): 1698. DOI: 10.3390/su10061698.

EC (European Commission). 2012. *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Innovating for Sustainable Growth: A bioeconomy for Europ*e. Brussels, Belgium: European Commission.

EC (European Commission). 2017. *Review of the 2012 European Bioeconomy Strategy.* European Commission. Publication Office in Luxembourg.

EC (European Commission). 2018. *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A sustainable Bioeconomy for Europe: Strengthening the connection between economy, society and the environment.* (COM(2018) 673 final).

Egenolf Vincent, Stefan Bringezu. 2019. Conceptualization of an indicator system for assessing the sustainability of the bioeconomy. *Sustainability* 11 (2): 433. DOI: 10.3390/su11020443.

FAO. 2016. *How sustainability is addressed in official bioeconomy strategies at international, national and regional levels. An overview*, http://www.fao.org/3/a-i5998e.pdf.

FAO. 2018a. *Assessing the contribution of bioeconomy to countries' economy. A brief review of national frameworks,* http://www.fao.org/3/I9580EN/i9580en.pdf.

FAO. 2018b. *Indicators to monitor and evaluate the sustainability of bioeconomy overview and a proposed way forward,* http://www.fao.org/3/ca6048en/ca6048en.pdf.

GBEP. 2019. *GBEP Report to the G20 Summit 2019*. Global Bioenergy Partnership (GBEP), http://www.globalbioenergy.org/fileadmin/user_upload/gbep/docs/G8_G20_declarations_GBEP/GBEP_Report_to_the_G20_Summit_2019.pdf.

Gołębiewski Jarosław. 2015. Zrównoważona biogospodarka – potencjał i czynniki rozwoju. [In] *Problemy rozwoju rolnictwa i gospodarki żywnościowej w pierwszej dekadzie członkostwa Polski w Unii Europejskiej* (Sustainable bioeconomy – potential and development factors. [In] Problems of agriculture and food economy development in the first decade of Poland's membership in the European Union), ed. Andrzej Czyżewski, Bogdan Klepacki, 344-362. Warszawa: Polskie Towarzystwo Ekonomiczne.

GUS (Statistics Poland). 2020. *Pojęcia stosowane w statystyce publicznej. Wartość dodana brutto* (Terms used in official statistics. Gross value added). https://stat.gov.pl/metainformacje/slownik-pojec/pojecia-stosowane-w-statystyce-publicznej/563,pojecie.html.

Hildebrandt Jakob, Alberto Bezama, Daniela Thrän. 2014. *Establishing a robust sustainability index for the assessment of bioeconomy regions*. [In] 2014 International Conference and Utility Exhibition on Green Energy for Sustainable Development (ICUE), 19-21 March 2014.

Jander Wiebke, Sven Wydra, Johann Wackerbauer, Philipp Grundmann, Stephan Piotrowski. 2020. Monitoring bioeconomy transitions with economic – environmental and innovation indicators: Addressing data gaps in the short term. *Sustainability* 12 (11): 4683. DOI: 10.3390/su12114683.

JRC. 2020. Data portal of agro-economics modelling – DataM, https://datam.jrc.ec.europa.eu/datam/public/pages/index.xhtml.

Karvonen Jaakko, Pradipta Halder, Jyrki Kangas, Pekka Leskinen. 2017. Indicators and tools for assessing sustainability impacts of the forest bioeconomy. *Forest Ecosystems* 4 (1): 2. DOI: 10.1186/s40663-017-0089-8.

Koukios Emmanuel, Massimo Monteleone, Manuel Jose Texeira Carrondo, Anthi Charalambous, Francisco Girio, Eva López Hernández, Sofia Mannelli, Juan Carlos Parajó, Polycarpos Polycarpou, Anastasia Zabaniotou. 2018. Targeting sustainable bioeconomy: A new development strategy for Southern European countries. The Manifesto of the European Mezzogiorno. *Journal of Cleaner Production* 172: 3931-3941. DOI: 10.1016/j.jclepro.2017.05.020.

Majewski Edward. 2008. *Trwały rozwój i trwałe rolnictwo: teoria a praktyka gospodarstw rolniczych* (Sustainable development and sustainable agriculture: theory and practice of farms). Warszawa: Wydawnictwo SGGW.

Meyer Rolf. 2017. Bioeconomy strategies: contexts, visions, guiding implementation principles and resulting debates. *Sustainability 9* (6): 1031. DOI: 10.3390/su9061031.

PAGE. 2017. *The Green Economy Progress Measurement Framework Application*. Partnership for Action on Green Economy (PAGE), https://www.un-page.org/files/public/general/green_economy_progress_measurement_framework_application.pdf.

Pfau Swinda F., Janneke E. Hagens, Ben Dankbaar, Antoine J. M. Smits. 2014. Visions of sustainability in bioeconomy research. *Sustainability* 6 (3): 1222-1249. DOI: 10.3390/su6031222.

Ronzon Tévécia, Robert M'Barek. 2018. Socioeconomic Indicators to monitor the EU's bioeconomy in transition. *Sustainability 10* (6): 1745. DOI: 10.3390/su10061745.

Sillanpää Mika, Chaker Ncibi. 2017. *A Sustainable bioeconomy the green industrial revolution*. Springer International Publishing AG.

Staffas Louise, Mathias Gustavsson, Kes McCormick. 2013. Strategies and policies for the bioeconomy and bio-based economy: An analysis of official national approaches. *Sustainability* 5 (6): 2751-2769. DOI: 10.3390/su5062751.

Stiglitz Joseph, Amartya Sen, Jean Fitoussi. 2009. *Report of the Commission on the Measurement of Economic Performance and Social Progress (CMEPSP),* https://www.economie.gouv.fr/files/finances/presse/dossiers_de_presse/090914mesure_perf_eco_progres_social/synthese_ang.pdf.

WCED (World Commission on Environment and Development). 1987. Report of the World Commission on Environment and Development: *Our common future*. United Nations.

Wesseler Justus, Joachim von Braun. 2017. Measuring the Bioeconomy: Economics and Policies. *Annual Review of Resource Economics* 9 (1): 275-298. DOI: 10.1146/annurev-resource-100516-053701.

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ZATRUDNIENIE I WARTOŚĆ DODANA W BIOGOSPODARCE UNII EUROPEJSKIEJ – PERSPEKTYWA ROZWOJU ZRÓWNOWAŻONEGO

Key word: wartość dodana, biogospodarka, rozwój zrównoważony, zatrudnienie, sektory biogospodarki

ABSTRAKT

Celem artykułu jest ocena rozwoju biogospodarki z uwzględnieniem dwóch podstawowych wskaźników socjoekonomicznych, tj. wkładu w zatrudnienie i w powiększenie dobrobytu. W 2018 roku Unia Europejska przyjęła zaktualizowaną strategię dotyczącą biogospodarki. Celem tej strategii jest zastępowanie węgla kopalnego surowcami z biomasy w przemyśle i produkcji energii, przy jednoczesnym zachowaniu środowiska naturalnego. W związku z tym pojawia się potrzeba analizowania rozwoju biogospodarki z uwzględnieniem zasad zrównoważonego rozwoju. Wymaga to zdefiniowania kryteriów i wskaźników pozwalających na ocenę kierunku i tempa zmian. Monitorowanie znaczenia biogospodarki jest jednak utrudnione z powodu braku statystyk, które obejmowałyby sektory dopiero rozwijające się i częściowo oparte na biomasie. Na podstawie danych statystycznych dokonano analizy zmian w zatrudnieniu i wartości dodanej w biogospodarce ogółem UE i jej poszczególnych sektorów. Wyniki wskazują na zmniejszenie udziału biogospodarki w zatrudnieniu i wzrost poziomu wartości dodanej biogospodarki w latach 2008-2017. Poszczególne sektory charakteryzowały się zróżnicowanym udziałem w zatrudnieniu i wartości dodanej biogospodarki oraz zróżnicowaną dynamiką zmian.

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