

THE BIOECONOMY STRATEGIES IN EUROPE: AN OVERVIEW

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Abstract: *In general, bioeconomy can be defined as an economy where the basic building blocks for materials, chemicals and energy are derived from renewable biological resources. This paper provides an overview of the bioeconomy in Europe, considering it from a policy framework and concept perspective. Several strategies have been produced in Europe from different perspectives that outline visions, intentions, and recommendations for the transition to a bioeconomy. The analysis shows that a common direction for the bioeconomy, based on research and technological innovation in the various applications of biotechnology, is developing in Europe. Also, the definitions of the bioeconomy are evolving and vary depending on the actor, but display similarities. While there is great optimism about the benefits and opportunities associated with developing an advanced bioeconomy in Europe, significant risks are also expressed. To gain a sustainable and competitive bioeconomy, the present paper wants to reach two major themes: engaging the key stakeholders and general public in an open and informed dialogue as well as a responsibility of government and industry towards innovation that drives collaborative efforts on sustainable development of the bioeconomy.*

Key words: *Bioeconomy, Europe, policy strategy, visions*

JEL CLASSIFICATION: Q28, Q38, Q57

1. INTRODUCTION

The present research involved the identification and study of bibliographic sources for theoretical understanding of the issues to be analysed, clarification of basic concepts and their links, but also analysis of documents identified in the European Union (EU) on strategies and initiatives in the field of bioeconomy. Thus, the bibliography found in the Science Direct - Elsevier database, official documents and various studies of the European Commission and other international institutions, articles published in scientific journals, etc. were used for documentation.

Changes around the world have led to major challenges that require institutional support, collaboration and international coordination. Population growth, limitation of natural resources, increasing pollution are elements that have led to the emergence of several strategies and initiatives adopted at local, regional or global level, as well as the promotion of new concepts such as the bioeconomy. In a broad sense, the term bioeconomy generally refers to those parts of the economy that use renewable biological resources to obtain food, materials and energy. In the last 10 years, at the level of the European Union and not only, there has been a radical change in the economy both in the terminology used and in the approach.

In addition to the term bioeconomy, new concepts have emerged - green economy, circular economy, circular bioeconomy, partially similar, but which want to respond to the same social challenges, globally aware: food security, natural resource shortage, high dependence on fossil resources and climate change. In recent years, strategies and policies that promote the bioeconomy have been developed at the national level, but also at the level of international institutions, both as a result of new research and innovation, and as a necessity for changes in society. At the level of each country there are certain features, preliminary initiatives and development and research needs. Often, in these strategies, the main focus is on developing the

economy and creating new jobs, by identifying new business opportunities, while the sustainability of resources remains secondary. Strategies and initiatives published and adopted by institutions and countries are difficult to compare, as they have different structures and purposes, often with different definitions and meanings for specific terms. However, a presentation of the main components contained in these strategies and initiatives is very useful, providing an overview of the evolution and reality of the bioeconomy. At the level of the European Union, the acceptance and promotion of this term came as a natural continuation of previous policies. Since 1982, the European Commission (EC) has been in charge of preparing, managing and implementing the EU Framework Programs in Biotechnology and Life Sciences. Over the years, research has been involved in the emergence of new innovations and concepts through funded programs. After much work and experience gained on the basis of various funded programs, the Life Sciences and Biotechnology - A Strategy for Europe (2002) and En Route to the Knowledge-Based Bio-Economy (2007) initiative was born.

Over the next decade, the EU has based its actions on the Europe 2020 Strategy, a strategy based on smart growth, with a strong green and inclusive orientation. This Strategy has resulted in several flagship initiatives, one of which very clearly stipulates the development of the bioeconomy at EU level by 2020. In 2012, the European Commission (EC) launched its bioeconomy initiative - "Innovating for Sustainable Growth: A Bioeconomy for Europe" and the Action Plan, accompanied by a working document in which more details are presented. Unlike developed, less developed countries, the bioeconomy is used mainly in primary sectors such as agriculture, forestry and fisheries. Even these sectors have significant potential for promoting sustainable economic growth through the transfer of knowledge and technology. All these documents started from common ideas, being mainly focused on the need to increase employment and, implicitly, social inclusion. The importance of research in achieving the proposed objectives is another aspect found in all documents, as well as the need to increase investment in research-development-innovation. Since 2002, the strategic importance of SMEs in developing biotechnology applications initially and then in the bioeconomy has also been emphasized, by encouraging and facilitating the adoption of new ideas and their transformation into marketable products and services. After in a first stage of research were approached the clarification of the basic concepts in the field of bioeconomy and the links between them, the analysis of strategies and initiatives identified at the level of the European Union and some Member States, but also at the level of other international institutions in the field of bioeconomy. , in the second stage the aim was to present models of good practices as well as proposals for actions or initiatives that can be adapted to the economic conditions in Romania. The development of the bioeconomy is currently one of the EU's priorities, along with the implementation of policies aimed at the circular economy.

2. LITERATURE REVIEW

Globally, there is a very broad terminology and multiple definitions given to the same concept by different actors, depending on the sphere of interest. Thus, terms such as biotechnology - biotechnology (BT), bioeconomy - bio-based economy (BBE) or bioeconomy (BE), knowledge-based bio-economy (KBBE) are used. Along with them appeared other terms such as bioeconomics, biocapital, bio-value or biovalue etc., bioproducts or bio-based products, bioindustry – bio-industry etc., which Birch and Tyfield (2013) generically call bioconcepts. As a result of the research that has been carried out in recent years and the results obtained from them, the use of terms such as bioeconomy or bio-based economy has evolved. Although the difference between these terms is not obvious, it does exist and they are used to represent different meanings. When used in general, the term bioeconomy encompasses economics based on the concept of bio. Most of the time differences appear in scientific articles, the concepts used

in strategies and initiatives being interchangeable. Another term used very often in the scientific literature is the term circular economy. At the academic level, the use of these concepts has increased greatly in recent years.

Using the Science Direct database owned by Elsevier, considered by the author to be one of the leading international publishers of scientific journals, all citations were chosen for the words (a) "bioeconomy", (b) "biobased economy" and (c) "circular economy", from all fields of study. The results are presented in Figure no. 1.

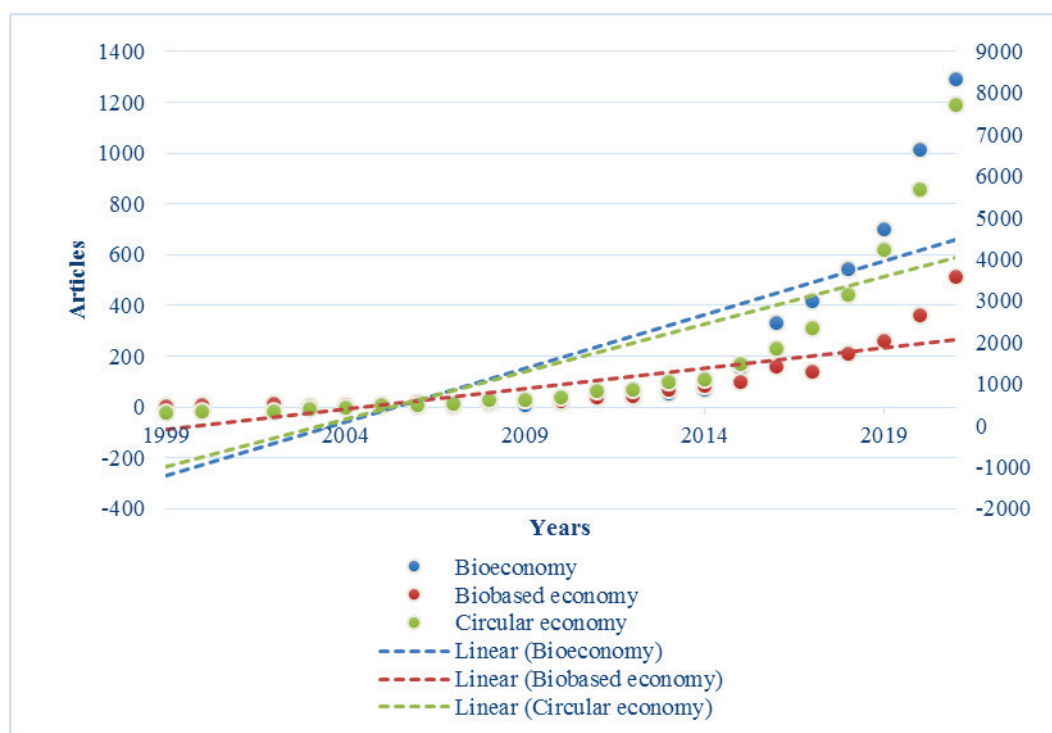


Figure 1. Number of citations in Scopus for "bioeconomy", "biobased economy" and "circular economy"

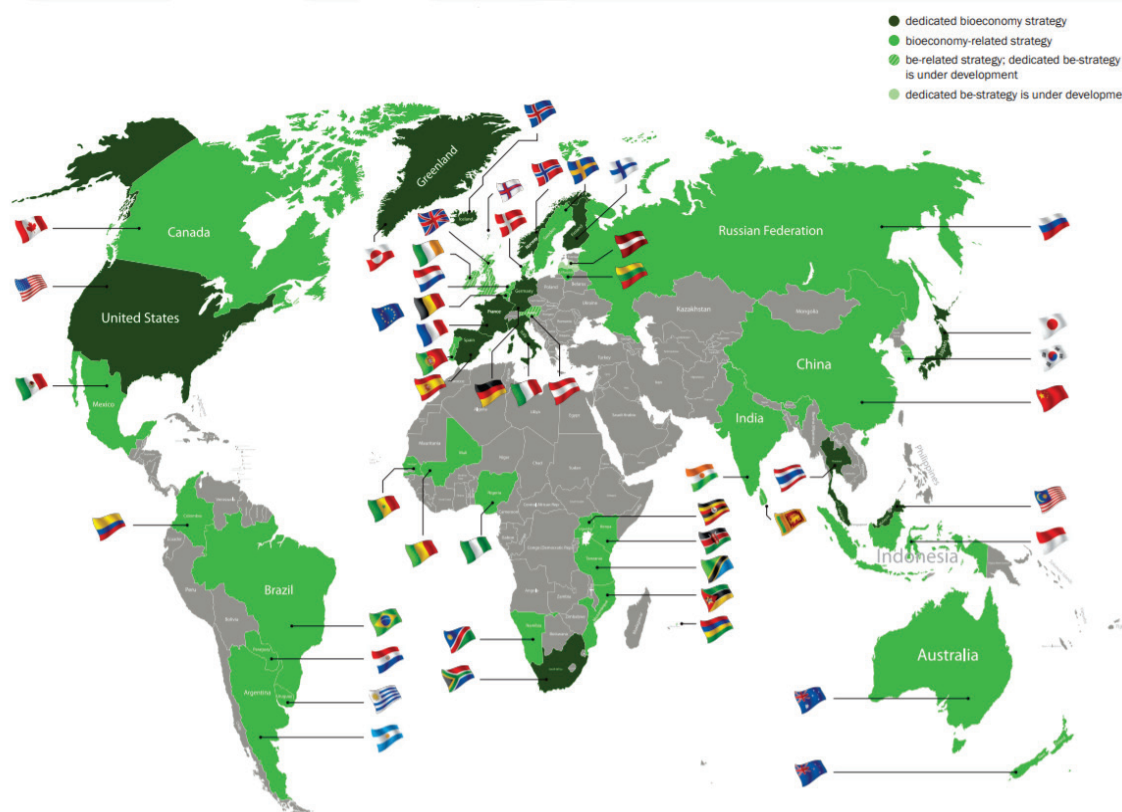
Source: Science Direct database, Elsevier, accessed on September 15, 2021

One can notice a constant trend in the period 1999-2010, slightly increasing in the period 2011-2014 and a very accelerated growth rate in the period 2015-2021. If by 2014 the citation of the terms (a) "bioeconomy", (b) "biobased economy" was balanced, after this year the bioeconomy is obviously advancing among the scientific interest and is very popular after 2015 (if in 2014 there were 67 citations for "bioeconomy", in 2015 there were 153 citations, and in 2020 they reached 1014). The term "biobased economy" is growing slightly slower, and in the last year analysed (2021) records a number of citations of 512. In other words, the term circular economy ("circular economy") is popularized among scientific interests just before the bioeconomy. It has seen a steady increase from 1999 (when there were 299 citations) to 2021 (when 7718 citations were recorded on the Science Direct platform). (Figure 1)

3. RESULTS AND DISCUSSIONS

The research process involved identifying bibliographic sources to study and understand how the subject of the bioeconomy can be measured. In recent years, the field of bioeconomy has gained increasing interest worldwide, leading to the desire to improve and develop many strategies and initiatives. The report "Synopsis of National Strategies around the World",

prepared by the German Bioeconomy Council, identified the existence of 4 major categories of states involved in the bioeconomy, in terms of existing strategies and policies, namely: (1) states with dedicated bioeconomy strategies, (2) states with bioeconomy related strategies, (3) states with be-related strategies: dedicated be-strategy is under development, respectively (4) dedicated be strategy is under development. (Figure 2)



*Figure 2. Bioeconomy policies around the world
 Source: The German Bioeconomy Council, 2018*

At the time of the report of the German Council for the Bioeconomy, there were strategies dedicated specifically to the bioeconomy (for example, in Finland, Germany, Japan, Malaysia, the United States), noting that in many other countries there was interest in this field by publishing to publish in the future) of some initial versions of the strategies or policies developed for the bioeconomy. Organizing important events such as the "Global Bioeconomy Summit" in Berlin in November 2015, 2018, as well as the virtual one in November 2020 - which brought together personalities from several fields (politics, science, business, etc.) to discuss global strategic elements on the future of the bioeconomy shows the importance of this topic. The summits drew important conclusions, emphasizing that a sustainable bioeconomy can contribute to the achievement of the "United Nations Sustainable Development Goals" (Global Bioeconomy Summit 2015) or that "we need to start making bold moves to new economic thinking and paradigms that include shifting towards metrics to better measure people and planet" (Global Bioeconomy Summit 2020).

In the European Union, several states have developed bioeconomic strategies over time, and others are in the process of writing a strategy. The following table shows the situation of the EU states in November 2019 with the bioeconomy strategy, being divided into 3 categories: there is already a bioeconomy strategy; are in the process of writing a bioeconomy strategy; they want to develop a bioeconomy strategy based on the Bioeast initiative. (Table 1)

Table 1. Overview of the available information on bioeconomy policy developments as of November 2019

No.	Country	Dedicated BS at national level	Dedicated BS at national level under development	Other policy initiatives dedicated to the bioeconomy	Other related strategies at national level	BS
1	Austria	√				Austria's Bioeconomy Strategy
2	Belgium			√		
3	Bulgaria			√		
4	Croatia		√			
5	Cyprus				√	
6	Czech Republic		√			
7	Denmark			√		
8	Estonia			√		
9	Finland	√				The Finnish Bioeconomy Strategy
10	France	√				A Bioeconomy Strategy for France
11	Germany	√				National Bioeconomy Strategy
12	Greece				√	
13	Hungary			√		
14	Ireland	√				National Policy Statement on the Bioeconomy
15	Italy	√				BIT II – Bioeconomy in Italy
16	Latvia	√				Latvian Bioeconomy Strategy 2030
17	Lithuania		√			
18	Luxembourg				√	
19	Malta				√	
20	Netherlands	√				The position of the bioeconomy in the Netherlands
21	Poland		√			
22	Portugal		√			
23	Romania			√		
24	Slovakia		√			
25	Slovenia			√		
26	Spain	√				Spanish Bioeconomy Strategy
27	Sweden			√		

Source: Own elaboration based on „The bioeconomy in different countries”:
https://knowledge4policy.ec.europa.eu/visualisation/bioeconomy-different-countries_en

Of the 27 MS, in 2019, nine already have a national bioeconomy strategy (Austria, Finland, France, Germany, Ireland, Italy, Latvia, the Netherlands and Spain). Most of the other Member States are in the process of drawing up a bioeconomy strategy (such as Croatia, the Czech Republic, Lithuania, Poland, Portugal and Slovakia), and the rest have set out to develop a national strategy through the Bioeast initiative. as is the case of Romania - which currently has other strategies associated with the field of bioeconomy.

4. CONCLUSION

The purpose of the research was to conduct a study on documents representing strategies and initiatives developed and adopted in the European Union, relevant to the field of bioeconomy. The analysis of documents on EU bioeconomic initiatives revealed a number of positive aspects, as well as a number of shortcomings that need to be addressed so that the bioeconomy can strike a balance between economic growth, social development and environmental protection, as key components of development. durable.

The role of the bioeconomy, in response to major social challenges, is increasingly better understood at the national level. Thus, at the level of 2019, nine states have already developed national strategies, which emphasize the resources they have and their ability to turn these resources into high value-added products. However, there is a need for a more coherent vision in other states to be translated into appropriate policies supported by appropriate instruments, especially as the bioeconomy can contribute to the development of less developed regions such as rural, mountain or coastal areas, reducing - thus the economic gaps at both regional and national level. States need to facilitate access to finance not only for the production of biological resources but also for their transformation into high value-added products.

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