

GENERAL CONSIDERATIONS REGARDING THE CIRCULAR ECONOMY

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Abstract. *The European Union promotes the knowledge of the circular economy agenda. The implementation of the circular bioeconomy concept within in each country, requires support policies that support the use and recycling of secondary streams. Effective policy measures are critical in achieving circular economy goals by encouraging innovation and facilitating network synergies among stakeholders. This study presents a comprehensive analysis of recent environmental policies in Europe and the circular economy framework aimed at creating a cleaner and more competitive Europe. In this paper, a comprehensive analysis of the specialized literature was carried out, with an emphasis on the strategies of the circular economy. The analysis exposes a variety of scenarios and opportunities for effective planning, strategy, coordination, implementation and evaluation of circular economy. The historical progression of European policy reveals a series of initiatives and instruments involving significant financial investments, with objectives targeting innovation and climate change mitigation. Additionally, member states, regional governments, and private and public entities have contributed with customized actions and technological advancements in the circular economy field.*

Keywords: circular economy, regulatory framework, implementation

JEL: O13, P26, Q57

UDC: 338

Introduction. The green economy is a concept that precedes the circular economy and the bioeconomy. It was commissioned by the British government, aiming to examine the concept of sustainable development and its impact on

economic progress, being first introduced in the 1989 "Blueprint for a Green Economy" report (Pearce et al., 1989).

The objective of the report was to assess the existence or lack of consensus regarding the concept of sustainable development and to explore ways in which it can be measured in the economic context. From the multiple definitions that the term green economy has acquired, the one from the United Nations Environment Program, presented in 2011, stands out, according to which the green economy is the one that leads to the improvement of human well-being and social equity, significantly reducing the risks for environment and the ecological deficit.

Bioeconomy is a term that appeared after 2005. It describes an economic sector that focuses on the exploitation of renewable biological resources to obtain a variety of items, such as food, animal feed, biological items and energy from bio-sources. This approach involves the sustainable use of resources from biological sources in order to efficiently produce goods and services in an environmentally friendly way.

The bioeconomy represents a significant factor in the transition to a sustainable economy and in achieving the objectives of reducing dependence on exhaustible resources and reducing the impact on the environment, assuming the circular use of biological resources, in order to minimize waste and maximize added value throughout the entire process of production.

In 2012, the European Commission launched a strategy dedicated to the bioeconomy, with the aim of strengthening the interconnections between the economy, society and the environment, and promoting a sustainable bioeconomy in Europe, focused on the responsible use of biological resources and the development of the bioeconomic sector, with the aim of contributing to economic progress, environmental protection and improving the quality of life for European citizens.

The concept of circular economy has gained popularity in recent years and took shape especially after 2012, with the publication of the report "Towards the Circular Economy: Economic and Business Rationale for an Accelerated Transition". This report defines the circular economy as an industrial system that is renewable by intent and design, replaces the concept of "end-of-life" with refurbishing (repair), seeks to transition to the use of renewable energy, eliminate the use of toxic chemicals that affect reuse, and seeks to eliminate waste through superior design of materials, products, systems and thus business models (Ellen MacArthur Foundation, 2012, Ellen MacArthur Foundation & McKinsey report, 2015). Bioeconomy and circular economy are different but complementary concepts, but having common elements, the "intersection" between them representing the circular bioeconomy.

Material and methods. In this paper, a comprehensive, chronological analysis of the specialized literature was carried out, with an emphasis on circular economy strategies systems in the EU and in the Member States.

The White Paper adopted by the European Commission in 1993 emphasized the need for a sustainable approach to economic growth, with the objectives of improving the employment rate and reducing the consumption of energy and natural resources. This emphasized the use of biotechnology in innovation and economic

growth, as well as the promotion of renewable energy and recycling. Thus, the concept of bioeconomy began to develop as a strategic approach to promote sustainable economic development, which harnesses biological resources responsibly and efficiently.

The Lisbon Agenda of 2000, promoted by the European Commission, emphasized the knowledge-based economy (KBE) as a response to the challenges of globalization and demographic aging that the European Union was facing at the time. The strategic objective of the EU, established by the European Council, was to become "the most dynamic and competitive knowledge-based economy in the world by 2010, capable of sustainable economic growth, generating more and better jobs, greater social cohesion and respect for the environment."

In 2002, *"Life Sciences and Biotechnology - a Strategy for Europe"* (Life Sciences and Biotechnology - A Strategy for Europe) highlighted that life sciences and biotechnology can play a significant role in fulfilling the objective of transforming the European Community into an economy based on knowledge, as established at the Lisbon Summit.

In 2005, the European Commission launched the concept of knowledge-based Bioeconomy, seen as a means to combine economic development with environmental protection on a sustainable basis. This concept recognizes the importance of biotechnology in achieving this goal and in addressing the economic and social challenges of the future.

In 2006, the *"Creating an Innovative Europe"* Report was developed to promote the development of innovation in Europe, underlining the importance of creating an innovation-friendly market. The report presents the concept of a Pilot Markets Initiative (LMI) which focuses on identifying and promoting six priority markets that could be engines of innovation and economic development in Europe. This initiative aims to facilitate the introduction of new non-food biological products and materials to the market, thus stimulating innovation and economic development in critical and emerging fields.

The "Cologne Paper" Report, published in 2007 as part of the "En Route to the Knowledge-Based Bio-Economy" conference organized by the German presidency of the European Council, emphasizes that biotechnology will play a key role in the European economy until 2030. The development of biotechnology in Europe it is considered essential for achieving sustainable economic growth, for generating jobs, ensuring the supply of electricity and maintaining the standard of living of European citizens.

According to Birch et al.'s 2010 paper, the knowledge-based Bioeconomy should be seen as a new political-economic strategy that aims to develop sustainable capital. This involves using knowledge and innovation from life sciences and biotechnology to create economic and social value, in accordance with the principles of sustainability and environmental protection.

In 2011, the European Union (EU) launched an extensive public consultation on the bioeconomy in Europe, aiming to gather information and opinions from citizens, companies, organizations and bioeconomy experts. The results of this

consultation provided a valuable perspective for the development of the future strategy in the field of bioeconomy (Report on the European Commission's, 2011a).

In 2012, the European Commission published the document entitled "Innovation for sustainable growth: A bioeconomy for Europe" (European Commission, 2012b). This document represents the strategy and action plan for the development of the bioeconomy in Europe. The public consultation revealed that the majority of respondents were optimistic about the prospects of the European bioeconomy.

The bioeconomy strategy of the European Union strives to accomplish several goals. These encompass diminishing reliance on limited resources, encouraging the uptake of advanced technologies and innovation, creating fresh employment prospects, and nurturing sustainable economic development. Furthermore, the strategy is dedicated to safeguarding the environment and mitigating climate change by enhancing the management of natural resources (Rodino S., 2022).

Overall, the bioeconomy strategy in Europe aligns with these directives and initiatives, given its potential to contribute to sustainable economic development, increase the use of biological resources and promote innovation in different economic sectors (Lupu I. and Vlăduț A., 2018).

Discussion and conclusions. According to the European Directive on waste management, we can define the circular economy as "a model of production and consumption, which involves sharing, renting, reusing, repairing, renovating and recycling existing materials and products as long as possible" with the aim of extending the cycle of life of the products and the minimization of waste production.

According to this definition, the linear economic model based on a simple principle "produce-use/consume-throw" becomes much more complex. When a product reaches the end of its life cycle, it is disassembled and the parts that can be used either for a new product, as spare parts, or recycled are kept. The part that is thrown, in this case being much smaller or non-existent compared to the linear model. This complex economic model creates more added value.

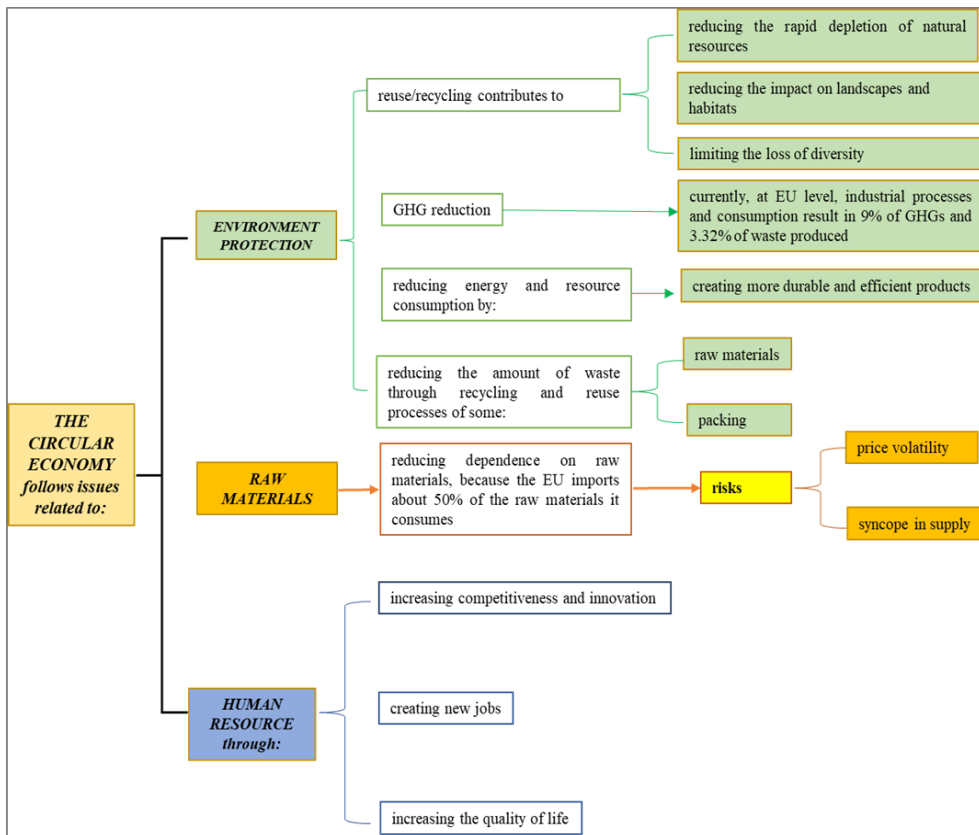


Figure 1. **The advantages of the circular economy**
Source: authors interpretation

In the linear model, the amount of cheap material and energy is large and easily accessible. The products obtained have a limited lifespan, in other words a limited wear and tear, causing consumers to make repeated purchases. The transition to the circular economy pursues multiple aspects primarily related to environmental protection, reducing the consumption of raw materials and energy, reducing dependence on a specific raw material by finding alternative sources, recycling and reuse, and not least related to the factor human (Figure 1).

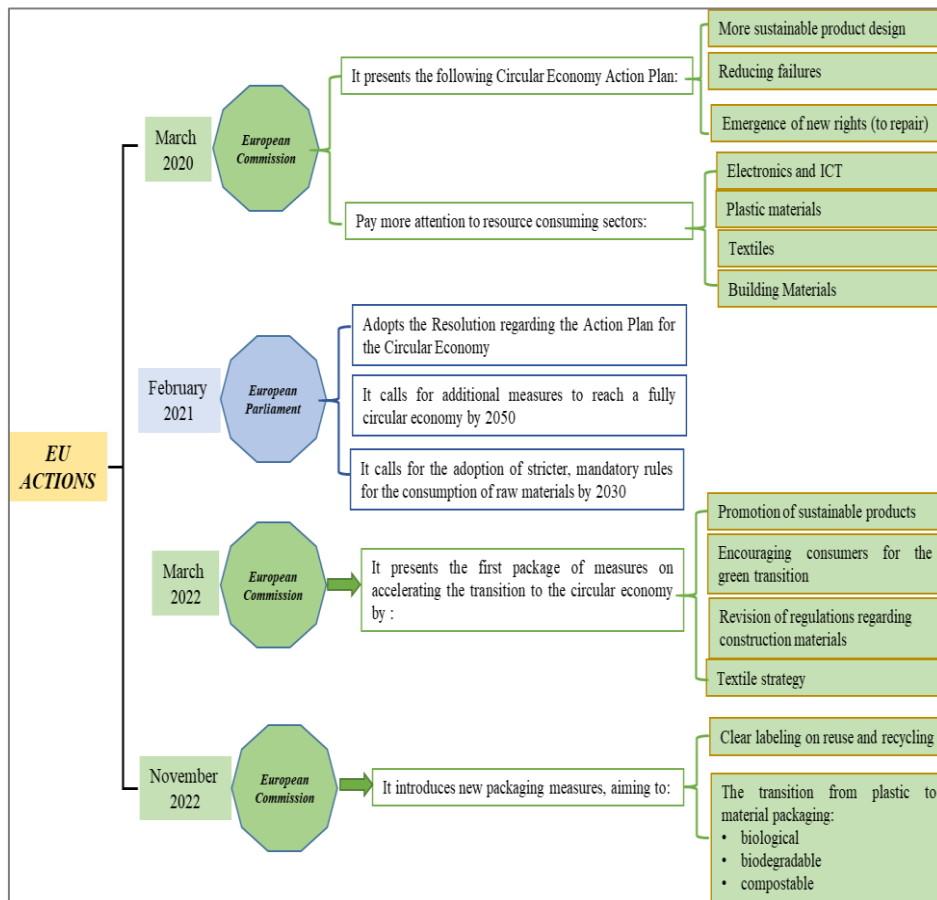


Figure 2. Actions taken by the European Commission and the European Parliament towards a fully circular economy
Source: authors interpretation

In order to fulfill its goal, that by 2050 the economy of the union will be a completely circular one, the European Commission and the European Parliament have taken a series of important steps:

- in March 2020, the European Commission proposed the first package of measures for the transition to a circular economy, in accordance with the EU objective of achieving climate neutrality by 2050. The plan contains proposals on encouraging sustainable products, informing consumers for the green transition, revising regulations on materials of construction and a strategy for sustainable textiles;
- in October 2022 the European Parliament approved the revision of the rules on persistent organic pollutants (POPs). Thus, the reduction of the amount of hazardous chemicals present in waste and production processes, as well as stricter limits/bans on certain chemicals and the exclusion of polluting materials from recycling are foreseen (Figure 2).

The global health crisis of 2021 revealed the need to develop an EU raw materials strategy based on sustainable sources of supply with high environmental

and social standards, reducing the EU's dependence on a few non-EU countries, promoting recycling and recovery of raw materials essential.

In order to achieve the desired implementation of the circular economy by 2050, the EC Action Plan sets out seven vital areas to reach the circular economy: plastics, textiles, electrical and electronic equipment, food, water and nutrients, packaging, batteries and vehicles, buildings and constructions. The EU produces an average of 2.5 billion tonnes of waste per year, of which 32.7 million tonnes are sent to non-EU countries.

Most of the "exported" waste consists of ferrous and non-ferrous metal scrap as well as paper, plastic, textile and glass waste and goes mainly to Turkey, India and Egypt. MEPs urge member states to recycle more and increase the quality of recycling, to abandon open-air storage of waste, to minimize its incineration and to reduce the presence of harmful chemicals in waste.

According to the rules, adopted by the European Parliament in January 2023, waste exported from the EU should be managed in an environmentally friendly way in the countries of destination, and enforcement should be stepped up to combat illegal shipments. Within the EU, MEPs want better information exchange and transparency on transport. EU exports of hazardous waste to non-Organization for Economic Co-operation and Development countries (non-OECD countries) should generally be prohibited. Exports of plastic waste to non-OECD countries should also be banned and those to OECD countries should be phased out within 4 years.

To support the implementation of the Circular Economy Strategy, coordinated actions are needed in several areas.

The investments in research and development in circularity are crucial. Cooperation between the public and private sectors, as well as the involvement of civil society and NGOs, is needed to address the challenges and opportunities associated with the circular economy. Implementing the circular economy requires a holistic and synergistic approach, with complementary actions and sound governance to ensure an efficient and sustainable transition to a more sustainable and circular economic model (National Circular Economy Strategy, 2018). The general objective of the Circular Economy Strategy in Romania is closely related to the Sustainable Development Goals and the global climate goals, as well as the new goals of the European Ecological Pact of the European Union.

Romania's National Recovery and Resilience Plan covers issues related to water management, waste management and building renovation to improve energy efficiency. These components are closely related to the objectives of the circular economy, as they aim to use resources more efficiently and reduce environmental impact. Also, PNRR sets deadlines for the adoption of the Strategy for the circular economy until the third quarter of 2022 and its Action Plan until the third quarter of 2023, which demonstrates Romania's commitment to promoting the circular economy and adopting some concrete measures for sustainable development.

The transition to the circular economy must be carried out in a way that takes into account the needs and characteristics of the business environment in Romania, especially small and medium-sized enterprises and micro-enterprises. The success of

the transition to the circular economy in Romania depends on the appropriate approach to the challenges and needs of the business environment, including SMEs. The successful completion of these initiatives by 2026 will represent a crucial step towards a more responsible and sustainable circular economy in the country, playing an important role in encouraging more responsible waste management and contributing to the achievement of European goals regarding the economy circular and sustainable development (Strategy-Economy-Circular, 2022).

"According to the statistics issued by the Circular Economy Monitoring Framework, Romania is among the European Union (EU) countries with the worst performance in terms of resource productivity, waste generation as a share of the Gross Domestic Product (GDP), waste treatment and the use of recycled materials in the economy". The fact that Romania has "the worst performance in terms of resource productivity" can be translated into "Romania has a significant potential for improvement", and the fact that Romania has among the "worst performances in terms of waste generation" in Europe, we gives hope that there are favorable prospects for the adoption and improvement of Circular Economy practices.

The National Strategy on the Circular Economy in Romania has as its general objective the implementation of the Action Plan on the Circular Economy (PAEC), in accordance with the principles and actions promoted within the EU Green Pact and is closely linked to the Sustainable Development Goals (SDGs) of the UN Agenda 2030 and global climate goals. At the national level, elements of the transition to the circular economy are also provided for in the National Strategy for the Sustainable Development of Romania 2030 and in the National Recovery and Resilience Plan of Romania. Romania should simultaneously follow several directions in order to develop policies aimed at advancing the circular economy. The strategy will be complemented by an Action Plan that will include specific actions for sectors with high potential for circularity, will identify budgetary resources and responsible for carrying out the actions (Figure 3).

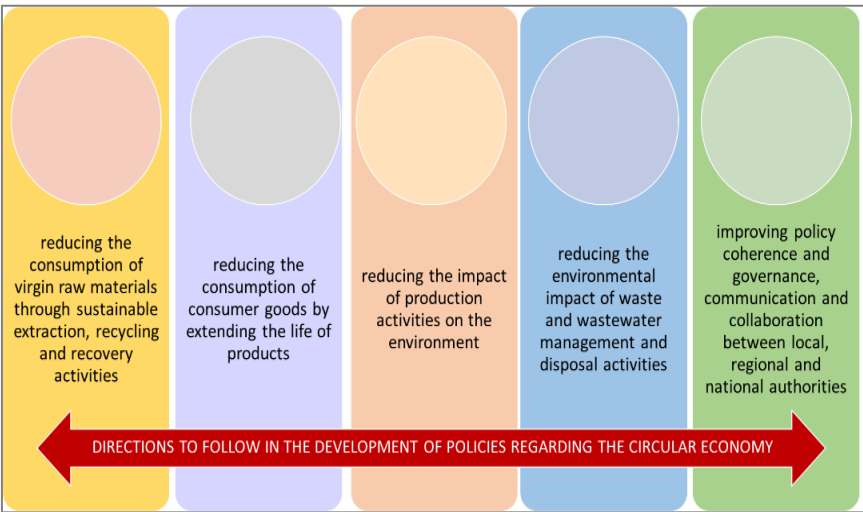


Figure 3. **Directions for the circular economy**
Source: authors interpretation

The concept of the circular economy is a complex one covering topics related to resources, recyclable/renewable resources, production, product life cycle, consumption, waste, replacing dangerous chemicals with less dangerous ones, aspiring to the zero waste - zero pollution system.

The transition to the circular economy challenges all economic actors, from producers to decision-makers and consumers, to rethink production and consumption models, to redefine the term "growth", transforming it into one that encompasses social and environmental benefits beyond economic profit.

A more concrete overview is provided by the 9 so-called R strategies, which start from the refusal to throw away products to recycling and recovery. Circular economy policies are often confused with waste policies. The diagram in Figure 4 sheds some light by realizing that only 2 of the 9 R strategies apply at the end of the products life cycle. Circular economy activities have the greatest environmental economic potential at the beginning of the life cycle, focusing on waste prevention and extending the life of products.

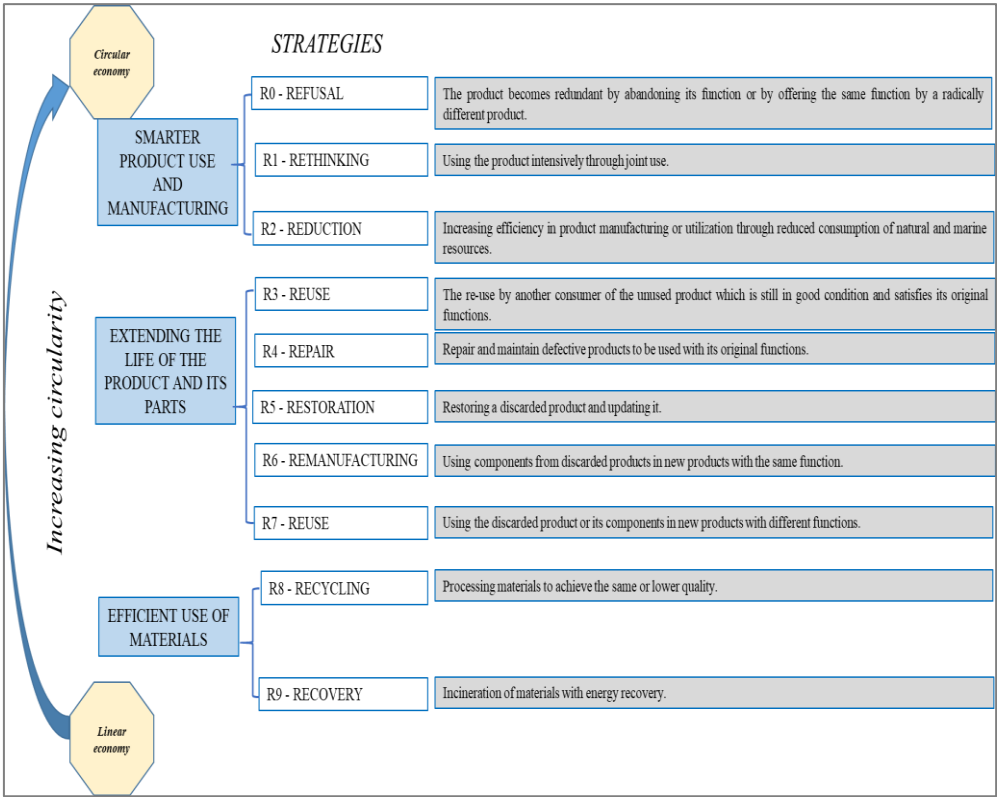


Figure 4. **Strategies to increase circularity**
Source: Potting et al. (2017)

Therefore, the circular economy decouples economic growth from resource use by reducing the input of materials, while maximizing the usability of products and minimizing the generation of waste.

This circular concept of closed loops contributes to solving the problems of resource scarcity, biochemical flows and climate change, while having a regenerative and recuperative benefit for communities.

The transition to a circular economy is an international challenge because globally we are faced with limited natural resources and a growing population, the latter causing greater consumption and implicitly increased production. Demand for raw materials will further increase as a result of global population growth and the development of new technologies that require specific raw materials. This will exacerbate environmental, climate and other sustainability issues.

Romania, and Europe in general, is extremely dependent on raw material imports. This makes them vulnerable to geopolitical tensions that impact commodity prices and supplies in the future. China is the main supplier of 15 of the EU's 25 critical raw materials, meaning that the European Union (EU) is highly dependent on Chinese exports.

According to a report by the Joint Research Center, the trade balance of raw materials in Romania in 2018 was negative, including minerals, metals, stone and glass. In 2019, Romania imported from abroad 92% of metal ore inputs and 54% of fossil energy material inputs. The transition to the circular economy offers numerous opportunities for economic growth and job creation, innovation and emission reduction of greenhouse gases.

According to the new 2021 Circularity Gap Report, circular economy strategies have the potential to reduce global greenhouse gas emissions by 39% and ease pressure on virgin materials by 28%. In a global context, EC principles are closely related to the UN Sustainable Development Goals and can contribute directly to the achievement of 21 of the targets and indirectly to the achievement of a further 28 targets. In 2015, the First Action Plan for the Circular Economy was adopted by the European Commission. It included measures closely related to key EU priorities.

We are fully aware that Romania's transition from a linear economic model to a circular one will be a long-term process, which requires major changes in many areas of activity starting with the legislative framework, production, processing and recycling technologies and ending with mentalities people who have a refractory attitude and a low level of involvement in waste collection and recycling activities.

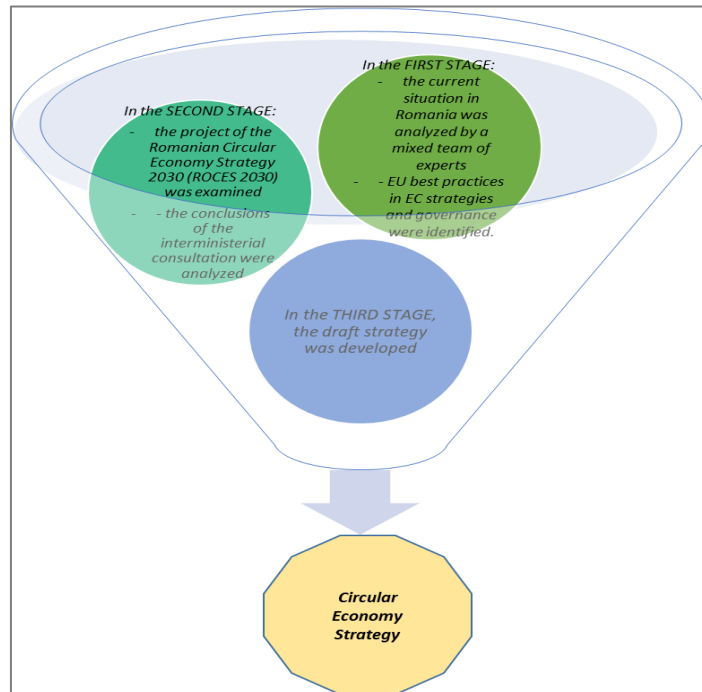


Figure 5. **Stages of the development of the Strategy for the Circular Economy**
Source: authors interpretation

As we have already mentioned, Romania is among the countries of the Union with the worst performances in terms of waste generation, treatment and use of recycled materials in the economy. To be able to move to EC, Romania needs a long-term vision and a strategic direction aimed at:

- provide the necessary tools for the implementation of decisions regarding the reduction of waste, dependence on primary resources and harmful emissions,
- changes the economic model,
- creates the conditions for increasing the number of new jobs (Dobre-Baron & all, 2022).

The transition to EC must be done without affecting the quality, productivity and performance of the Romanian business environment, generally based on SMEs. The Circular Economy Strategy was developed based on a three-stage methodology (Figure 5).



Figure 6. Waste generation, excluding major mineral waste, per unit of GDP (in kg per 1,000 euros), 2004-2018

Source: Eurostat

According to data from the European database, in the period 2010-2020, Romania had high economic growth, accompanied by a sustained reduction in poverty and an increase in household incomes. According to the same source, in 2020, the country's GDP reached 219 billion euros, reaching 9,120 euros/inhabitant, approaching the average standard of living of EU countries. As a result, the World Bank classified Romania for the first time as a high-income country, having a beneficial effect on the investment rating and on the accession negotiations to the Organization for Economic Cooperation and Development. Romania's economic growth is not yet decoupled from waste generation, the trends being rather mixed, always reflecting the GDP and consumption trends (Figure 6).

While household final consumption expenditure has risen steadily over the past 10 years, municipal waste generation per capita fell between 2010 and 2015, but then started to rise slightly, averaging 3% per year until in 2020. However, Romania is among the EU countries with the lowest production of municipal waste per capita. This could be related to the low level of consumption in the country compared to the EU average. Another explanation for the discrepancy between consumption and waste generation is the unreliability of reported waste data, which would require better data management and control policies.

Therefore, the conclusion regarding Romania's ranking in terms of municipal waste should be viewed with caution, as further analysis of data accuracy may be necessary. Similarly, total waste generation fell by more than half between 2004-2014 and only started to rise after 2014, during Romania's economic growth period. In addition, total waste generation per GDP and per domestic material consumption (DIM) decreased every year between 2004 and 2018. As a result, Romania reached the lowest total waste generation per DIM among EU countries in 2018. Despite a significant decrease in the share of total waste production in GDP, its value is still the second highest among EU countries. In addition, waste management in Romania lags significantly behind, as landfilling, and often illegal landfilling, is still the dominant form of waste management.

Like the rest of the world, Romania was deeply affected by the COVID-19 pandemic. In 2020, the economy contracted by 3.7% and the unemployment rate reached 5.5% in July before easing slightly to 5.3% in December. Trade and services fell by 4.7%, while sectors such as tourism and hospitality were hit hard. At the same time, Romania is affected by unfavorable climatic conditions that still lead to a reduction of the gross added value in agriculture.

According to the Global Footprint Network Advancing the Science of Sustainability, Romania's ecological footprint per person was 3.5 global hectares in 2018, exceeding its biocapacity by 0.3 global hectares per person. This leads to a national ecological deficit. However, Romania is among the EU countries with the lowest ecological deficit and has fewer environmental impacts than countries such as Sweden, Greece, Portugal or Austria. Romania has a huge potential in terms of improving waste management. The municipal waste recycling rate is one of the lowest in the EU while landfilling is still the dominant form of waste management. In 2018, the recycling rate for all waste except major mineral waste was just 29%, compared to the EU average of 55%.

Similarly, the municipal waste recycling rate reached only 14% in 2020, compared to the EU average of 48%, placing Romania among the lowest performing countries in the EU. Therefore, the EC identified Romania as being among the countries at risk of not reaching the EU's 2020 and 2025 targets of 50% and 55% respectively.

The recent study on the analysis of Romania's environmental performance, carried out by UNECE50, shows that the level of separate collection of recyclable materials from municipal solid waste remains low, being only 12.9% of the total municipal solid waste generated in 2017. Eurobarometer surveys on the attitude European citizens towards the environment and towards waste management and resource efficiency) shows a low level of involvement of Romanian citizens in circular economy activities. According to this survey (from 2018), 25% of Romanian respondents bought a refurbished product instead of a new one, close to the EU average of 30%. However, only 13% of respondents confirmed that they used a sharing scheme, which is the lowest share among EU countries. Similarly, only 9% of Romanian respondents confirmed that they rented or leased a product instead of buying it, which is the second lowest share after Malta.

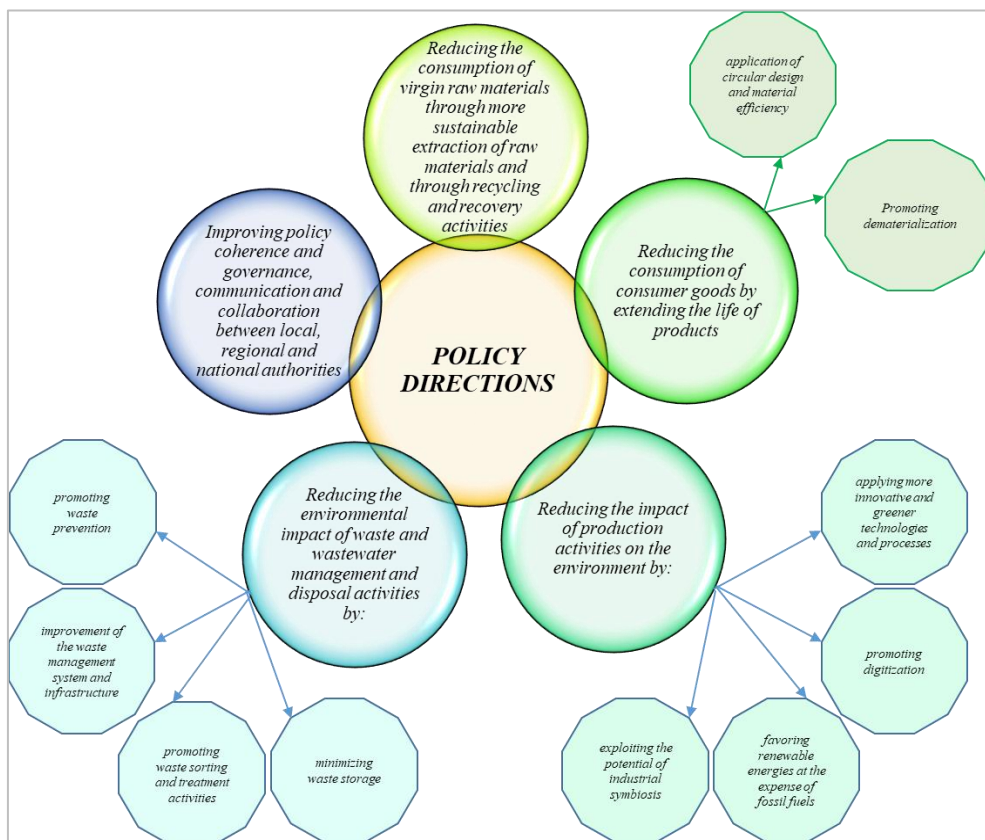


Figure 7. Policy directions to advance the Circular Economy in Romania

Source: authors interpretation

The National Strategy for the Sustainable Development of Romania 2030 (SNDDR) (Romanian Government, 2018) aims to achieve the transition to an EC, in accordance with SDG 12: Responsible consumption and production.

Through Government Decision no. 754/2022, the National Action Plan was approved, a key document that guides the implementation of the SNDDR 2030. The national waste management plan established the following objectives until 2030.

The key objectives of the National EC Strategy provide the framework that guides Romania's EC transition efforts through the implementation of the Action Plan. They also serve to define the most important elements and areas within EC applied in Romania, thus aligning the expectations and visions of all parties involved. EC promises to build a resilient system that will benefit businesses, people and the environment, resistant to the effects of climate change or global supply chain disruptions.

Based on the key objectives, the following directions should be pursued through policy development to advance EC in Romania. These must be addressed through regulations, economic incentives and measures that will be introduced in detail in the Action Plan. The measures will be established based on the legislation in force, at national, community and international level, and will not affect biodiversity or human health.

Conclusions. By means of a specific sectoral analysis, the potential for circularity in the entire economy is identified. To achieve this potential, key objectives are set and policy directions are provided to achieve them. The directions and objectives formulated in this Strategy will constitute the basis for an Action Plan that will be approved by Government Decision. The plan will contain more details and concrete actions to maximize the potential of circularity in key economic sectors. A general approach is used in the Strategy to develop a feasible governance structure and to assign responsibilities for EC implementation. The strategy also introduces a general monitoring and evaluation framework to ensure correct and timely implementation.

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