

THE IMPLICATIONS OF THE CIRCULAR ECONOMY ON SUSTAINABLE ECONOMIC GROWTH

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ABSTRACT: Although the regulatory framework and the conceptualization of the circular economy are still under development, a key role is assigned to the circular economy in the sense of saving resources, minimizing, and managing waste, reducing environmental degradation, while achieving beneficial economic and social results. This paper aims to highlight the impact of the circular economy on sustainable economic growth, by reviewing the specialized literature and impact studies. The transition to a global circular economy has gradually gained political attention, with the aim of promoting the circular economy by exploring synergies by working with other countries to achieve material circularity and, ultimately, decoupling resource use from macroeconomic growth. The result of the research reveals the existence of synergies between the circular economy and sustainable economic growth and the fact that the circular economy can lead to sustainable economic growth or well-being. These estimated positive effects at the global level cannot be generalized to the level of individual economies, due to the specificity of the sectors that support their economy and the degree of harmonization with the practices of the circular economy.

KEY WORDS: circular economy, sustainable development, sustainable economic growth, synergies

1. INTRODUCTION

Human society faces several problems that generate negative effects both in the short term and in the medium and long term. Thus, the acceleration of the consumption of primary resources, environmental and water pollution, global population growth are some examples that demonstrate the need for changes in the way of governing economic activity.

It is now increasingly recognized that the widespread economic model is no longer viable due to inefficient use of resources and negative environmental consequences. The circular economy has become a desideratum for both national governments and companies in the last decade. This type of economic model is a positive and viable alternative to the “take-make-waste” linear economic model that is ubiquitous on a global scale, contributing to economic growth, creating jobs, reducing the consumption of virgin resources and reducing carbon emissions (EMAF 2015).

In recent years, there is an abundance of studies and articles dealing with the circular economy at different stages of existence, conceptualization, practices and the feasibility of this concept, the impact in various fields. The interest of researchers in particular was determined by the superficial and disorganized scientific and research content of the concept of the circular economy (Korhonen et al., 2018).

The European academic approach at macro level to the analysis of the circular economy focuses on circular cities, waste management at country level, but also on the correlation of waste flows between Member States (Merli et al., 2018).

Both companies and national governments recognize the need for a new economic model that relies less on cheap, easily accessible materials and energy and is able to restore and regenerate natural capital. As a result, the circular economy has become a concept currently promoted by more and more national governments, including China, Japan, the United

Kingdom, France, Canada, the Netherlands, Sweden and Finland, as well as by several companies around the world (Korhonen, 2018).

However, although the regulatory framework and the conceptualization of the circular economy are still under development, a key role is assigned to the circular economy in saving resources, minimizing and managing waste, reducing environmental degradation, while achieving beneficial economic and social results. The continued involvement of this concept in academic research and in the policies promoted by governments contributes to the understanding of the role that each community has in transforming a linear economy into a more sustainable circular economy.

Looking for information on the importance of the circular economy in achieving sustainable growth, most studies approach the circular economy as a means of delivering sustainable development goals, identifying strategies or actions by which circular economy applications influence sustainable development goals.

The goal of the research is not to formulate a definition or to contribute to the conceptualization of the circular economy, but aims to improve understanding of the concept, to explore the links and synergies between the circular economy and sustainable growth, the impact of the circular economy on economic growth.

In carrying out the research, we started from the following hypothesis:

H1: The circular economy has a positive influence on economic growth.

The paper is structured as follows: the beginning part provides an introduction to the topic, followed in section 2 by the presentation of the methodology used. Section 3 provides an overview of the most recognized definitions and the regulatory framework, as well as the contributions with a significant role in

conceptualizing the circular economy. Then, in sections 4 and 5, the aim is to answer the questions about the links between the circular economy and sustainable economic growth, the impact of the circular economy on sustainable economic growth. Section 6 concludes on the research results.

2. RESEARCH METHODOLOGY

This article reviews the existing literature on the circular economy and its links to the objectives of sustainable development, in particular with a view to sustainable economic growth. The study has as a starting point the hypothesis stated above. In order to provide an answer that is as clarifying as possible, it was structured in two secondary hypotheses:

H1.1 There are several links between the circular economy and sustainable economic growth.

H1.2 The circular economy influences sustainable economic growth.

The qualitative research method applied for this paper consisted of: literature search and narrative review, evaluation of the links identified between circular economy practices and sustainable economic growth, review of available studies on the impact of circular economy on sustainable economic growth, identification of gaps. The Google and Google Scholar online search engines and the Scopus and Web of Science academic databases were used to search for and collect academic and non-academic literature on the circular economy in relation to the objectives of the paper. The keywords and groups of keywords used in the search for sources were "circular economy", "circular economy sustainable development", "circular economy sustainability", being selected and analyzed a number of 30 articles, over a selected time horizon between the years 2012-2021. The criterion of relevance was established based on the number of citations and the main topic addressed in the article and which results primarily from the abstract.

3. CIRCULAR ECONOMY - THE THEORETICAL AND REGULATORY CONTEXT

The emergence of the concept of circular economy cannot be accurately identified in time or linked to a particular author, but the practical applications of the concept have been widespread since the late 1970s. (EMAF, 2013). The circular economy has its origins in ecological and environmental economics and industrial ecology, economists Pierce and Turner (1989) introducing the notion of circular economic system based on studies by environmental economist Boulding (1966) (Ghisellini et al., 2016).

The conceptualization of the circular economy follows the awareness of the effects of economic activity on the environment, when consequences such as resource depletion and environmental degradation have become increasingly evident and threatening for sustainable development. The need to identify some conditions and changes of the system, which "might lead society to collision with or accommodation to the limits to growth in a finite world", is well highlighted by the organization Club of Rome in the report "Limitele creșterii" (Meadows, 1972).

There is no single accepted definition of the concept. Defining the concept of the circular economy is an excessive topic addressed by researchers and practitioners, but it does not provide a full understanding of the concept and needs further development and consolidation. (Kirchherr et al., 2017,

Korhonen et al., 2018, Merli et al., 2018, Geissdoerfer et al., 2017, Kalmykova et al., 2018).

Starting from the finite nature of the resources, Stahel, theoretically recognized, emphasizes the need for activities to extend the life of the product, namely: Reuse, Repair, Reconditioning and Recycling (Stahel, 1982). But in the literature and in reality, the foundation of the circular economy has spread mainly on the basis of three principles: reduction, reuse, which is the result of repair and reconditioning operations, and recycling. (3R). (Kirchherr et al., 2017)

In addition to theorists and governments, a recent and recognized contribution to the conceptualization of the circular economy belongs to the Ellen MacArthur Foundation (EMAF), which has played an important role in raising awareness of this idea in business and policy makers. This defines the circular economy as "an industrial system that is restorative or regenerative by intention and design. It replaces the 'end-of-life' concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse, and aims for the elimination of waste through the superior design of materials, products, systems, and, within this, business models." (EMAF, 2013).

Another definition, resulting from the analysis of 114 studies on the conceptualization of the circular economy is the following: "A circular economy describes an economic system that is based on business models which replace the 'end-of-life' concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes, [...], with the aim to accomplish sustainable development, which implies creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations." (Kirchherr et al., 2017). This definition of the circular economy encompasses the contribution of the circular economy to achieving sustainable development by reference to the three dimensions of sustainability.

The idea of a circular economy has become prominent in both European and Chinese policymaking. (McDowall et al., 2017). At international level, a series of initiatives and regulations have been introduced. Some states have been pioneers in adopting policies aimed at components or principles of the circular economy, for example Germany, which in 1976 adopted Waste Disposal Act, and then in the year 1994 Closed Substance Cycle Waste Management Act.

China is among the first countries in the world to create a regulatory framework by adopting in 2008 the law for the implementation of the circular economy, which incorporates the 3 principles: reduction, reuse, recycling. In the same year, the G8 group of environment ministers signed the Kobe 3R Action Plan, in which the participating states assumed priority in implementing 3R policies (reducing, reusing and recycling materials), through which economies could reduce the need for virgin materials. and improve resource efficiency. Such notable initiatives have continued, with a major milestone being the inclusion of specific resource efficiency targets in the 2030 Agenda for Sustainable Development.

The functioning of the economy on the circular model is seen by some specialists as a tool for achieving the objectives assumed by governments through the Paris Agreement. In 2015, in response to the need to address the devastating impact of climate change, 195 nations adopted the Paris Agreement, which pledged to reduce greenhouse gas emissions that led to global warming. Meanwhile, as the evidence of the cost of inaction increases and as a result of the need for extraordinary

collaboration, the United Nations builds coalitions with leaders in government, business and communities to accelerate progress on climate action to meet the goals of the Paris Agreement and to keep the global temperature rise well below 2 degrees.

In the same year, the European Commission adopted the Circular Economy Package, which includes an action plan with 54 concrete actions, a timetable and a monitoring section. These actions covered the whole cycle of materials and products - from production and consumption to waste management and the secondary raw materials market. The legislative package has given a clear signal to companies that the European Union is using all available tools to transform the economy, paving the way for new business opportunities and increasing competitiveness.

In the second half of 2020, China is committed to zeroing by 2060 and putting its emissions on a downward trend from 2030; the new Biden administration has promised to bring the US back to the Paris Agreement; The EU continued to make progress towards the adoption of its first European climate law, which will make climate neutrality binding throughout the bloc by 2050; and the British government recently promised to reduce emissions by 68% by 2030 compared to 1990 levels (EMAF, 2020).

4. SYNERGIES BETWEEN THE CIRCULAR ECONOMY AND SUSTAINABLE GROWTH

The concept of sustainable development has been advertised by outlining three dimensions of sustainability, namely: ecological,

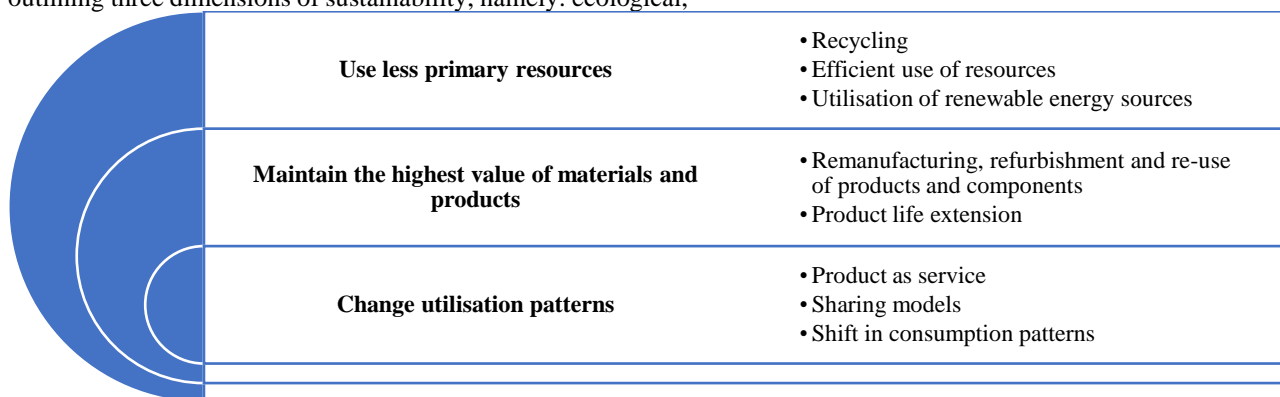


Figure 1. Main circular economy processes

Source: CEPS Research Report, The Circular Economy, A review of definitions, processes and impacts, 2017

However, the implementation of the circular economy principles is in its early stages, with efforts being directed more towards recycling than reuse (Ghisellini et al., 2016), although the reprocessing of goods and materials generates jobs and saves energy, while reducing resource consumption and waste (Stahel, 2016).

At the macro level, where research studies are most abundant, circular economy indicator systems are generally based on 3R principles and only some integrate all components of sustainable development (Banaitè, 2016), the circular economy being a niche discussion between professionals in sustainable development at this stage (Kirchherr et al., 2018). The authors focus on improving the environmental performance of the circular economy, rather than adopting a holistic view of the three dimensions of sustainability (Geissdoerfer et al., 2017).

According to Merli, the study conducted on researchers' approaches to the circular economy shows that the social impact is considered marginal (Merli et al., 2018, Murray et. Al, 2017

social and economic, which were defined in the Brundtland Report (Brundtland, 1987), as strong mutual influences exist between them. With the global adoption of the 17 Sustainable Development Goals of the 2030 Agenda for Sustainable Development in 2015, sustained efforts by states have focused on combating climate change, poverty and social inequality, in order to ensure a sustainable future for present and future generations.

Of the 17 SDGs, the 8th Decent Work and Economic Growth objective is directly aimed at sustainable economic growth. According to Simon Kuznets, sustainable economic growth is a process of increasing the productivity of the national economy that exceeds the population growth for as long as possible. Sustainable economic growth must have the consequences of reducing the negative impact of economic activity on the environment, for example, by streamlining the exploitation of finite resources, limiting pollution, and balancing the economy.

The circular economy is supported by sustainable economic growth. This economic model is based mainly on the 3 principles, also known as the 3R, through actions of waste and pollution design, maintenance of products and materials in use and regeneration of natural systems, with estimated results saving resources and energy, creating jobs.

The literature review identifies 8 processes of the circular economy (Rizos, 2017), classified into 3 categories in Figure 1.

Suarez-Eiroa et al., 2019), references to social issues if there are often aimed at job creation (Geissdoerfer et al., 2017).

However, it is not appropriate and effective to consider the circular economy only in terms of reduction, reuse or recovery options and as an approach to more appropriate waste management and not from the perspective of sustainability (Ghisellini et al, 2016).

Several studies address the link between the circular economy and the goals of sustainable development, many of them starting from the definition of concepts. The circular economy has become an independent topic in academic research, being closer to studies on environmental sustainability. However, most researchers outline the existence of synergies between the principles and objectives of the circular economy and the objectives of sustainable development.

According to a baseline study addressing the conceptualization of the circular economy by analysing 114 definitions, only 12% of the definitions analysed explicitly include notions of

sustainable development and 13% refer to the three dimensions of sustainability: environmental quality, economic prosperity and social equity, given that most understand that only one or two components of sustainable development lead to a circular economy, usually excluding the social component (Kirchherr et al., 2017).

The circular economy is perceived as a way to sustainability (Ghisellini et al., 2016), being identified by Patrick Schroeder and collaborators, through a comprehensive mapping exercise of the 17 Sustainable Development Goals (SDGs) and 169 targets, synergies between the practices of the circular economy and SDG 6 (Clean Water and Sanitation), SDG 7 (Affordable and Clean Energy), SDG 8 (Decent Work and Economic Growth), SDG 12 (Sustainable Consumption and Production) and SDG 15 (Life on Land), with high scores for direct and indirect contributions (Schroeder, 2018).

The circular economy enjoys supportive policies and business due to its many benefits for growth, employment, resources, health and the environment, being considered an essential condition for achieving many of the 17 goals of sustainable development. (EMAF, 2017).

According to a recent EMAF study, the circular economy contributes to at least 12 sustainable development goals, playing a key role in achieving SDG12 (to ensure sustainable consumption and production patterns), while benefiting 11 other goals, including SDG 8 (Decent Work and Economic Growth) (EMAF, 2021). According to the same organization, analyzes of the construction, food and mobility sectors in Europe show annual benefits of circular economy practices of up to EUR 1.8 trillion by 2030, double the linear economic development system, which represents a further increase of GDP by 7 percentage points.

Specialized studies reveal close connections between the circular economy and sustainable economic growth, approached as a sub-objective of SDG 8 (Decent Work and Economic Growth). Circular economy practices are perceived as solutions for economic renewal, innovation and industrial transformation, leading to better growth through the newly created value resulting from the redesign of production and the consumption system. (EMAF, 2021).

The transition to a global circular economy has gradually gained political attention, with the aim of promoting the circular economy by exploring synergies by working with other countries to achieve material circularity and, ultimately, decoupling resource use from macroeconomic growth.

The current economy operates mainly by applying a linear consumption model, which is based on the "take-do-consume-throw" process, in which the consumption of resources is found in sales products made through a series of value-added steps, and responsibility for risks and waste passes from the seller to the buyer.

Pursuing sustainable economic development, through innovation and building a resilient future in the post-pandemic period, the current efforts of policy makers, activists and practitioners are directed towards the circular model, in other words metaphorically, the linear economy is a river and must become a lake (Stahel, 2016).

It can be concluded that there are strong connections between the circular economy and sustainable economic growth, confirming the first secondary research hypothesis.

5. THE IMPACT OF THE CIRCULAR ECONOMY ON SUSTAINABLE ECONOMIC GROWTH

Knowledge about the circular economy is concentrated in large industries and is dispersed in small and medium enterprises (Stahel, 2016). Companies are open to new investment opportunities in innovative technologies for water and resource recovery, while seeking to increase competitiveness, but also to protect themselves from lack of resources and price volatility. On the other hand, governments have an important role to play in creating structural reforms and stimulus measures, while public investment needs to be directed at green assets, which are most productive in climate change mitigation, and innovative technology.

The transition to the circular economy is not well known or quantified by the macroeconomic implications of this economic model, which will generate structural changes involving the growth or development of certain sectors and the decline of others, with a reallocation of capital and labor during the transition (McCarthy et al., 2018). For example, as the circularity of the economy increases, sectors producing virgin materials or durable goods will experience a sharp decline in demand for these products.

Circular economy practices, such as industrial symbiosis, repair, remanufacturing, recycling, are economic activities that require a high degree of technology innovation and job creation. It is often suggested in the literature that these activities of the circular economy led to economic growth.

Sustainable economic growth can lead to progress, create decent jobs for all and help raise living standards. However, while real GDP per capita and labor productivity have increased globally, 731 million people remain below the poverty line of \$ 1.90 (per day) (NL, 2020).

According to a study by WRAP (The UK Waste & Resources Action Plan) (WRAP, 2015), a more circular economy has the potential to generate economic growth by increasing employment and using fewer materials. The results of the study on the potential for the expansion of the circular economy in the European Union by 2030, show that 3 million new jobs can be created, three times more than "business as usual".

Another recent Cambridge Econometrics study estimates a positive result of circular economic growth over GDP, which shows that applying the principles of the circular economy has the potential to increase EU GDP by an additional 0.5% by 2030, creating around 700,000 new jobs (Cambridge, 2018). The estimated results of the study were projected on two scenarios (Table 1), starting from the existing model, and depending on the integration of the circular economy in all EU economies, selecting five key sectors of the circular economy:

- Food
- Construction
- Motor vehicles
- Waste management
- Electronics and electrical equipment

Table 1. Overview of the circular economy scenarios

	Food	Construction	Waste Management	Electronics	Motor Vehicles	All
Baseline	Business as usual (continuation of historical trends; legislation adopted by Member States until December 2014 included in forecasts)					
Moderate	Moderate uptake of the circular economy (measures in Circular Economy package & moderate sectoral transformation)					
Ambitious	Ambitious uptake of the circular economy (moderate + extensive sectoral transformation)					

Source(s): E3ME, Cambridge Econometrics

Figure 2 shows a general positive impact of the growth of the circular economy activity on the EU GDP, as well as different growth rates between the two scenarios. In the ambitious scenario of circular activities, GDP will increase by almost 0.5% by 2030 compared to the baseline. In the moderate scenario, the GDP impact remains positive, but lower, by 0.3% by 2030.

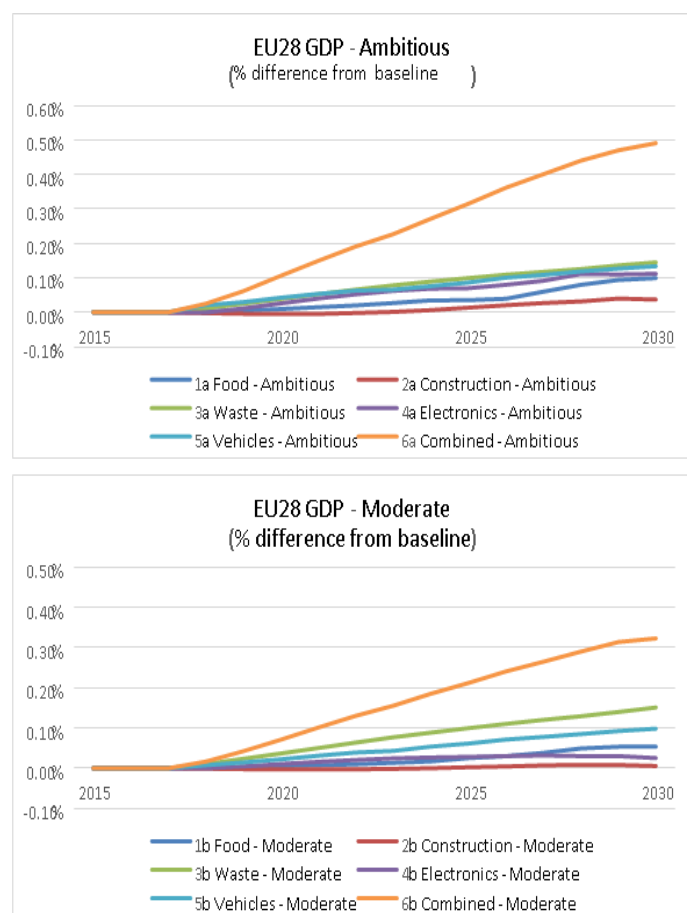


Figure 2. EU GDP impacts in the circular economy scenarios (% from baseline)

Source: E3ME, Cambridge Econometrics

The overall positive impact of GDP and employment cannot guarantee the same effect for all European economies, the study leaders maintain a dose of skepticism as it is important to consider complex interactions that underlie aggregate results.

According to a study conducted for the OECD by McCarthy et al. (2018), although most evaluations highlight positive effects of circular economy policies on aggregate economic outcomes, the macroeconomic impact of the circular economy transition is not fully understood, there is considerable uncertainty given the large number of modeling assumptions and therefore the reliability of these results.

This idea is also found in a comprehensive research paper by Rizos and collaborators for the Center for European Policy

Studies (CEPS), which concludes that there is not enough analysis or data to show how much these will affect certain segments, as the different impact studies available and their different approaches make a comparison quite difficult. (Rizos et al, 2017).

The circular economy provides a transformative framework, making positive contributions to sustainable economic growth, for a resilient future in the environment, ecological and competitive, thus validating the second secondary research hypothesis.

6. CONCLUSIONS

Estimates of the impact of circular economy practices in sectors that are part of the engine of economic growth have some limitations, however it is undeniable the need to change the entrenched linear economic model that has allowed harmful economic growth, ignorant of the planet's capabilities.

Applying circular economy practices can lead to sustainable economic growth or well-being, by increasing the use of green assets and protecting existing space, capitalizing on technological innovation. The activities of the circular economy create economic value with more labor and resource efficiency and provide a clear framework that contributes to achieving the goals of the Paris Agreement and the 17 sustainable development goals that the EU has officially signed by 2015, which create benefits for the society, the environment, companies and future generations.

Based on a review of the literature and recent studies available, this paper argues that these estimated positive effects globally cannot be generalized to individual economies, due to the specificity of the sectors that support their economy and the degree of harmonization with economic practices. Thus, more clarity is needed at the level of the EU economy on the areas and sectors that fall within the scope of the circular economy, in order to avoid confusion and support research that makes important contributions to potential effects. At the same time, it is necessary to involve Member States with immediate and visible effect in analysing the adaptability of each economy to the circular model and to assume the necessary structural changes, preceded by the most rigorous economic and social impact assessment.

The limitations of the paper come from the methodology used to review the literature, but also from the limitation of the geographical area in research at the level of the European Union, the revised articles and studies coming mostly from the EU. A gap identified in the research aims at the lack of a system of indicators that reflect, quantify and monitor the potential overall economic benefits of the transition to a more circular economy, creating the conditions for future research. At EU level, a set of pioneering indicators for monitoring the development of the circular economy was created in 2018, separate from the set of

indicators designed to monitor the objectives of sustainable development.

In the current context of the Covid-19 pandemic, the fragility of the current economic system is visible, being more urgent to accelerate the transition to the circular economy, which can offer a strong economic recovery and increased resistance to shocks. This approach requires significant and immediate efforts from all actors involved, including beneficiaries.

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