

BUSINESS MODELS IN THE CIRCULAR ECONOMY

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ABSTRACT

During the recent decades there is an unprecedented growth in the demand for resources which has triggered a vast interest in shifting to a circular model of production. The classic business model, in which the production of new goods and the provision of services is reduced to the continuous use of new material resources, does not correspond to the views and concepts of ecological business. A new business model should be implemented. A circular economy is an economic model that aims to reduce waste and maximize the use of resources. In a circular economy, products and materials are reused, repaired, or recycled rather than being disposed of after use. The goal is to create a closed-loop system where resources are continuously circulated and waste is minimized. This concept is in contrast to the traditional linear economy, where products are made, used, and then discarded as waste. In a circular economy, products are designed with durability and recyclability in mind, and materials are kept in use for as long as possible. The circular economy has the potential to increase the resilience to the physical effects of climate change. Its principles offer businesses opportunities for innovation that will lead to reducing materials costs, increasing asset utilisation, and responding to changing customer demands. By addressing both the causes and effects of climate change, the circular economy can help meet The UN Sustainable Development Goals and lead to improved air quality, reduced water contamination, and better protected biodiversity.

Keywords: *circular economy, circular business models, sustainable development, EU.*

INTRODUCTION

Natural resources and the materials derived from them represent the physical basis for the whole economic system (OECD, 2019). During the recent decades there is an unprecedented growth in the demand for resources, so this has triggered a vast interest in shifting to a more resource efficient and circular model of production. In order for the environmental benefits to be achieved, the policy frameworks need to create the conditions for a wider implementation of circular business models and to put efforts to stop occupying only small economic niches, but to be introduced to and integrated in all economic activities.

The current prevailing economic design has its roots in the historically unequal distribution of wealth by geographic region (Ellen MacArthur Foundation, 2013). Resource users were largely concentrated in the most developed regions, and industrial nations possessed abundant material resources and energy. With this distribution, materials were cheaper than human labor and so, the implemented business models relied on extensive use of materials and saved on human labor. As a result is the neglect of recycling and reuse and an increase in waste, and, as well, a huge waste of resources and inefficiency. But in the new millennium the linear economy models are no longer successful as the depletion of resources, the cost of materials and the increasing prices of products are some of the main reasons for the companies to lose their competitive advantages and to be compelled to shift to more sustainable models.

There are a vast number of definitions of circular economy (CE) (Kirchherr et. al., 2017) and yet it is most often related to sustainable development, economic prosperity and environmental quality, while its impact on social equity and future generations is not fully taken into account. The CE is usually represented as a combination of activities related to reducing, reusing and recycling models but the need of overall and systematic transition towards it, as well as the need of introducing new business models or relating the consumers with it, are neglected. CE systems (COM (2014) 398 final 2) preserve added value in products for longer and eliminate waste by keeping resources within the economy. The transition to a more CE requires changes all along the value chains and a complete systemic change and innovation not only in technology, but also in organization, society, funding methods and policies. Even in a highly CE, some element of linearity will remain as fresh resources are needed and residual waste is disposed of.

Adaptation is a leading component of the global response to climate change (COM(2021) 82 final). But the EU and the global community are still underprepared for the increasing intensity, frequency and pervasiveness of climate change impacts, especially as emissions continue to rise. As a response to climate change, the new EU Adaptation Strategy paves the way for achieving climate neutrality in 2050. But in order to do so (COM (2020) 98 final), the process of shifting towards circular models and reduction of greenhouse gas emissions should be speeded up. The main efforts to manage climate change have been focused on a transition to renewable energy (Ellen MacArthur Foundation, 2021). Though crucial and in line with the CE principles, these measures can only address 55% of emissions. So it is of great importance the remaining 45% to be addressed as well. Systemic change of energy and industrial systems, land management, buildings, and infrastructure will be needed to reach net-zero emissions by 2050 and limit global warming to 1.5°C. By addressing both the causes and effects of climate change, the CE can help meet The UN Sustainable Development Goals and lead to improved air quality, reduced water contamination, and better protected biodiversity.

In the New Circular Economy Action Plan (COM (2020) 98 final) seven sectors with a huge potential and expected great effect on establishing a well working CE

model are defined - electronics and ICT, batteries and vehicles, packaging, plastics, textiles, construction and buildings, food, water and nutrients.

The main objective of this paper is to outline the so far introduced CE models and the impact and benefits arising from their implementation.

MATERIALS AND METHODS

The paper is based on a comprehensive review of research papers, reports, action plans, programs and data related to CE, its implementation and the introduction of circular business models that are to support the transition towards a CE and sustainable growth at EU level.

Different scholars (Kirchherr, 2021; Lahti et al., 2018; Lieder and Rashid, 2016; etc.) identify following key elements that contribute to the effectiveness of the circular economy: **(1) Design for durability and recyclability:** Products are designed to be long-lasting, easy to repair, and made from materials that can be recycled or reused at the end of their life cycle. This promotes resource efficiency and reduces waste; **(2) Resource efficiency:** The CE emphasizes the efficient use of resources by reducing waste and maximizing the value extracted from materials. This includes strategies such as reusing and repurposing materials, implementing recycling programs, and optimizing production processes; **(3) Closing the loop:** In a CE, materials and products are kept in circulation for as long as possible. This involves strategies such as recycling, remanufacturing, and refurbishing to extend the lifespan of products and prevent them from becoming waste; **(4) Collaboration and innovation:** The CE requires collaboration between different stakeholders, including businesses, governments, and consumers. It also encourages innovation in areas such as product design, recycling technologies, and business models to drive the transition towards a CE; **(5) Sustainable consumption and production:** The CE promotes a shift towards more sustainable consumption patterns, such as sharing and collaborative consumption, as well as responsible production practices that minimize environmental impact; and **(6) Economic incentives and policy support:** Governments can play a crucial role in facilitating the transition to a CE by implementing policies and regulations that incentivize sustainable practices. This can include measures such as tax incentives for recycling, support for research and development of CE technologies, and promoting sustainable procurement practices. By incorporating these elements, the CE aims to create a more sustainable and resilient economic system that minimizes waste, reduces environmental impact, and maximizes resource efficiency.

In the Impact Assessment Report of The new EU Strategy on Adaptation to Climate Change (SWD (2021) 25 final) the policy options, and the corresponding actions and measures, considered for inclusion in the new Strategy are represented. The first option is based on the 2013 Strategy and its eight actions while the second includes six additional actions. The assessment points out that the second option is more preferable because it adds greater ambition to the Union's actions on climate change adaptation, in particular with regard to international actions. Thus,

additional and more extensive measures are needed for better adaptation to climate change.

Politics at the international level must become the main driver for achieving the goals of the CE (C. F. A. Arranz et al., 2023), as their successful implementation requires a new vision and rethinking of existing models. These changes cannot be introduced by business itself, and therefore substantial support is needed at the level of policy making and strategy development to overcome the obstacles to achieving a CE in existing economic and industrial systems.

RESULTS AND DISCUSSION

The CE has the potential to increase the resilience to the physical effects of climate change (Ellen MacArthur Foundation, 2021). Its principles offer businesses opportunities for innovation that will lead to reducing materials costs, increasing asset utilisation, and responding to changing customer demands. Together, these characteristics make a clear point that the CE is not just one option to consider in the quest to meet climate targets, but it is the framework that will largely contribute to introducing the needed long-term solutions.

For better understanding of the concept of the CE (Kirchherr et al., 2017) the researchers offer „R“-frames beyond the basic „4R“ frame (reduce, reuse, repair, recycle), where the hues are most distinguishable (fig. 1).

Circular economy	Smarter use and production	R-0 Refuse	This could be achieved by making the product redundant by making its function redundant, or by offering the same function with a fundamentally different product
		R-1 Rethink	This could be achieved by making the use of the product more intensive
		R-2 Reduce	This could be achieved by increasing the efficiency of production or the use of the product by using less natural resources and materials
	Extending the lifespan of products and their parts	R-3 Reuse	This could be achieved by re-using a discarded product that is still in good condition and performs its original function by another user
		R-4 Repair	This could be achieved by repairing and maintaining a defective product so that it can be used according to its original function
Linear economy	Extending the lifespan of products and their parts	R-5 Refurbish	This could be achieved by restoring and updating an outdated product
		R-6 Remanufacture	This could be achieved by using parts of discarded products for a new product with the same function
		R-7 Repurpose	This could be achieved by using a discarded product or its parts for a new product with a different function
	Useful application of materials	R-8 Recycle	This could be achieved by processing materials to achieve the same or lower quality
		R-9 Recover	This could be achieved by burning the materials to recover energy

Figure 1. 9R frame

*Source: Adapted from Kirchherr et al., 2017

While the basic idea of the CE (P. Planing, 2015) emerged in the 1980s, there are still no clearly defined business models aimed at the transition to a CE at microeconomic level. Establishing such a model requires a fundamental change in consumer behavior. The starting point in most of the research is the more efficient and extended use of existing products, recovery of the product or its components and materials, and energy recovery in order to prevent the landfilling of waste products. Also some models include using of components that last longer, paying for performance instead of a product, upgrading, reusing with or without treatment of the product, renting, leasing, paying for access instead for a product, conservation, recycling, maintenance, systems for products offered as services and sale after the end of the useful life of a product.

According to OECD (2019) the 5 key business models that could facilitate a transition towards a more CE are circular supply, resource recovery, product life extension, sharing and product service system. In the Circular supply model traditional materials should be replaced with renewable, bio-based or recovered ones while in the resource recovery model secondary raw materials from waste should be produced. Both the models should close the material loops. In product life extension models material loops are slowed by measures for extending the life of products. The sharing models and the product services systems models are narrowing the resource flow, respectively by increasing the utilization of existing products and assets and by providing services rather than products while the product ownership remains with the supplier.

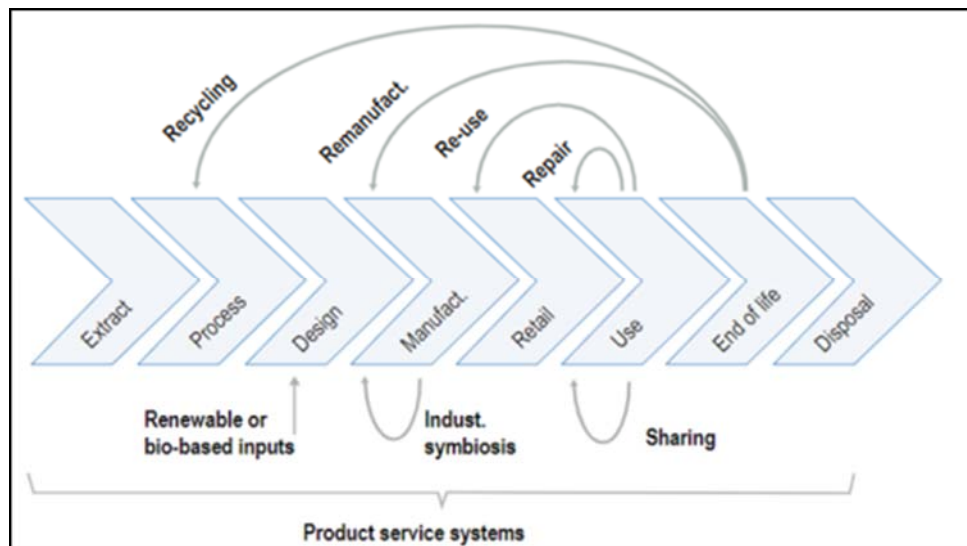


Figure 2: Impact of circular business models on different parts of the value chain of the linear economy

*Source: OECD, 2019, Business Models for the Circular Economy

In practice the distinction between these types of business models is not that clear as it is in theory but the main idea is the adoption of production and consumption methods that could contribute to lowering the pressure on the environment and have a great impact on the value chain of the linear “take–make–dispose” model (Fig.2).

Aguilar-Hernandez et. al. (2021) evaluate the potential impact on gross domestic product (GDP), employment, and CO₂ emissions by a review of more than 300 CE scenarios for the 2020-2050 time frame and reach to the conclusion that both in 2030 and in 2050 the implementation of ambitious CE scenarios could lead to an increase in GDP and employment levels, while substantially reducing CO₂ emissions. By implementing moderate CE scenarios the impacts on GDP and employment levels are negligible, while the CO₂ emissions would still decrease but with lower levels.

According to Arranz et. al. (2023) different consumption policies have a positive impact on the development of CE business models. Regulations on consumption modify consumers’ behaviour and demand for products that comply with the CE while information raises the environmental consciousness and could be a driver for demand for circular products. At the same time, the impact of consumption policies is diminishing with the intensity of the policies so their continuous strengthening might lead to a decrease in the demand of circular products and the adoption of CE business models.

A research of Ellen MacArthur Foundation (2021) points out that 45% of the CO₂ emissions are related to production and by applying the CE models in five key areas - cement, aluminium, steel, plastics, and food - almost half of them or 9.3 billion tonnes of CO₂ in 2050 can be eliminated. Key in achieving this opportunity are business models that keep assets, products, and components in use, and make productive and efficient use of resources.

A recent study by Neves et. al. (2022) analyses the drivers and barriers in the transition from a linear to a CE by evaluating the role of economic, social, and environmental factors and confirms the importance for the transition to a CE. It is estimated that education and young-age are a precondition for increasing the use of circular materials, as well as the environmental awareness and environmental regulation, while old-age and income increases are a barrier. So for an effective transition to a CE, it is important for policies to target older and less educated people. Some other barriers for shifting to a circular model of production and consumption (P. Planing, 2015) are the customers’ irrationality, the misaligned profit-share along the supply chain, the conflict of interests within companies and the geographic dispersion. The main reasons are that customers only evaluate the purchase price and prefer ownership, the imperfect product design result of the possibility that the profits from a better design would only occur at the end-of-use phase, the need of additional investments for changing the existing design and the low potential impact of national initiatives.

CONCLUSION

The CE is a response to the inefficient management of resources in the traditional linear model and it has the potential to increase the resilience to the effects of climate change by implementing its main principles of eliminating waste and pollution, guaranteeing circulation of products and materials and regenerating nature. Implementing an ambitious CE scenario leads to an increase in GDP and employment levels and reducing CO₂ emissions while in a moderate CE scenario the impacts on GDP and employment levels are minor, but the CO₂ emissions would still decrease. Some of the key business models that could contribute to a transition towards CE are related to ensuring circular supply, resource recovery, extension of the life of products, as well as sharing, offering a service instead of a product. In a circular system both the producers and the users have benefits as such a system could provide cost effective solutions on each level of the value chain. But while the basic idea of the CE emerged about 40 years ago, there are still no clearly defined business models to ensure the transition as they require a fundamental change in consumer behavior. Some barriers for shifting to a CE are the customers' irrationality, the misaligned profit-share along the supply chain, the conflict of interests within companies and the geographic dispersion, as well as old-age and income increases. On the other hand, the higher level of education, environmental awareness, environmental regulation and young-age are a precondition for increasing the use of circular materials. Along with the importance of developing appropriate business models to support the transition towards a CE, additional measures will be needed to help the transition to zero emissions and achieving climate neutrality.

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