# PROMOTING THE USE OF THE CIRCULAR MODEL AND ITS RELEVANCE TO BUSINESS

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***Abstract:*** *The purpose of the article is to identify and evaluate a circular economic model for economic agents within a sustainable development paradigm. Understanding the concept of circular economy, its different dimensions, and the difficulties economic agents experience in implementing specific activities can facilitate a major transformation of current production and consumption patterns that will have a significant impact on the economy, environment and society. Understanding these effects is important for decision-makers involved in future policy making in the field. Promoting the use of the concept of enterprise circular economy and policy-making requires an analysis of the potential opportunities and benefits that a circular economy approach could bring to businesses and economies.*

***Key words:*** *circular economy, business model; resource efficiency, main process.*
***JEL Classification:*** *Q01, Q20, Q50 .*

## 1. Introduction

The term "circular economy" was used for the first time in an economic model by Pearce and Turner (1990). Relying on the principle that "everything is a contribution to anything else," the authors analyzed the traditional traditional economic critical system and developed a new economic model called the circular economy that applies the laws of the Second Principle of Thermodynamics.

The relationship between the economy and the environment is predominant in this model that includes three environmental economic functions: resource provider, waste assimilater and source utility.

In defining the concept of circular economy, Pearce and Turner relied on Kenneth Boulding's work and other economists who pursued the biophysical limits of the current economic system built on consumption and a growing ecological deficit.

Boulding (1966) introduced the concept of closure systems and a foreseeable future economy that would work by reproducing the limited supply of inputs and recycling waste production. Such a "closed" economy maintains total capital and is in stark contrast to the "open" industrial economy of linear model materials.

The transition to a sustainable industrial economy requires structural and technological changes combined with economic and cultural evolution to achieve energy and material optimization.

In this context, Frosch and Gallopoulos (1989, p.149) argued that the optimization of the whole system requires improved manufacturing processes "that minimize the generation of non-recyclable waste and the permanent reduction of the consumption of limited material and energy resources".

In their view, innovation is necessary in the process of manufacturing and designing products and processes to effectively direct materials to the production process, which were formerly considered waste.

Industrial symbiosis applies the principles of industrial ecology at company level and provides for the development of collaboration between companies involving the exchange of resources and by-products. The concept involves collaboration between producers in order to use the by-products of the production activity. In practice, addictive addiction is created to eliminate waste but also contributes to the sustainable development of producers.

This collaboration is not necessarily limited by geographical proximity and can lead to the development of networks that share knowledge and promote eco-innovation (Lombardi and Laybourn, 2012).

"Cradle-to-cradle" design is an adjacent systematic approach to transforming industrial material flows. Unlike traditional concepts of sustainability that focus on reducing or eliminating the negative environmental impact of human activity, Cradle-to-cradle aims to maintain and even enhance the value, quality and productivity of material resources .

The use of the knowledge flow of information flows among actors in the value chain is a key factor in maintaining or increasing the value and productivity of these material.

Apart from the material aspects, the additional principles of the Cradle-to-Cradle concept are the use of renewable energy sources and the promotion of biodiversity as well as cultural and social diversity (McDonough and Braungart, 2002).

## 2. Defining the concept of circular economy

Since the first official use of the term circular economy, there have been many attempts to define this concept. A number of authors have provided resource and / or interpretation-oriented definitions, highlighting the need to create closed loops of material flows and reduce the consumption of virgin resources and its harmful impact on the environment.

For example, it consider that the circular economy refers to "the production and consumption of goods by streams of closed loop materials that internalize the environmental externalities related to the extraction of virgin resources and the generation of waste pollution.

In the same sense, the EEA (2014, p.11) argues that the circular economy "mainly refers to material resources of the economy and focuses on recycling, limitation, reuse and the use of waste as a resource that reduces the consumption of primary resources."

Mitchell (2015) emphasizes that the importance of a circular economy is to keep resources in use for as long as possible and to extract the maximum value of products and materials by using and then recovering and reusing them.

In the literature there are also some interpretations of the concept of circular economy that incorporates additional dimensions beyond the notion of material resource management.

One of the most used definitions incorporating elements from various disciplines is: "an industrial system that is renewable by intent and design. "This replaces the concept of "end of life" with restoration, the shift to the use of renewable energy, and aims at eliminating waste through the superior design of materials, products, systems and within this business model".

This interpretation of the concept involves the distinction between two different types of materials: biological materials returning to the biosphere as raw materials (eg forest products) and technical materials that biodegrade and enter the biosphere (eg plastics and metals). In this framework, the circular economy aims to maintain both types of material to the greatest benefit and value at all times, through careful design, management and technological innovation.

The overall objective of the circular economy is to enable effective flows of materials, energy, labor and information to contribute to the reconstruction of natural and social capital.

At EU level, the European Commission (2015, p.2) included a description of the concept in its Communication "Closure of the loop - an EU action plan for the circular economy", which is part of the Circular Economic Package. Specifically, the circular

economy is described as an economy "in which the value of products, materials and resources is maintained in the economy for as long as possible and waste generation is minimized".

The move to a circular economy is "an essential contribution to the EU's efforts to develop a sustainable, low-carbon, resource-efficient and economically efficient carbon system." In this context, the EU Action Plan includes a a series of measures addressing the whole cycle of production and consumption to waste management and the secondary raw material market The measures included in the Action Plan reflect a change in EU waste policy that has traditionally focused on end-of- life and material management.

However, comparing this description of the circular economy with existing literature, one might argue that some elements are missing or not very explicit. An example is the notion of keeping products and materials at the highest value and utility. Although the Action Plan mentions that the circular economy can create local jobs at all levels of skills, integration and social cohesion opportunities, at present, no particular attention is paid to improving social welfare

Similarly, despite the use of the term "resources", which may also refer to energy resources, the importance of using sustainable energy sources in the system as well as the link between the circular economy and the energy challenge should be better emphasized as regards their description.

The circular economy introduces a new segment into the product lifecycle, namely the recovery of materials from dismantling, recycling and re-use as secondary raw materials in other early-life products.

### 3. Comparisons between the linear economy and the circular economy

The current economy relies heavily on a linear economic approach based on resource extraction, goods and services production, and waste disposal. Non-renewable resources previously considered to be inexhaustible reach the limits of affordable supply, and the negative environmental impacts such as climate change and biodiversity loss are accelerating and regulated at local, national and international levels.

Moreover, new technological disruptions, emerging markets and business models change the way of thinking about the production and consumption of goods and services. Linear business models depend on short life cycles of products and maximize sales. Improving sustainability focuses on eco-efficiency: maximizing economic gain with minimal impact on the environment. These models are market conditions that are threatened by technology-based service models and changing consumer demand for more tailored and sustainable products.

As a result, companies that continue to operate in the old linear paradigm risk losing customers and access to markets, increased costs, and so on. In a circular economy, the use of resources is decoupled from economic growth, which means that economic development no longer requires similar consumption of resources. Resources are used more efficiently and the economy becomes less dependent on unprofitable resources.

Circular economy is based on an emerging economic model that covers both techniques and business models to keep the materials and resources used as much as possible and ideally for all time in a closed extended use cycle , reuse and recycling. The critical elements of the circular economy are industrial symbiosis, renewable materials, shared economy, product as a service, close relationship between producer and consumer, proximity economy, reuse, recycling and recycling, urban mining, detoxification of material cycles and sustainability of consumption and production.

Unlike circular economy, they are disposable, programmed wear, downcycling, inherited substances, or value loss.

**Table 1. Comparative analysis of the linear economy model and circular economy model**

| Linear Economy | The Circular Economy |
|---|---|
| Dependence on Primary Resources of Raw Materials | Reduction of inputs of primary resources and energy<br>The necessary initial investments can damage the profit of companies in the short term<br>The cost of the transition - |
| volatility of primary resource prices radical changes in the consumer | products or service relationship in the circular economy, in the sense that we may become users rather than consumers |
| Limited opportunities for expansion to new markets | |
| Increasing the number of legislative acts related to environmental protection, impacting on the prices of products | Reduction of value losses<br>Reducing waste management costs |
| Growth in population and financial wealth with positive effects on consumer demand but with negative effects on the environment<br><br>Effects on climate change | The unknown residual value of many products due to the narrow market for recycling, reuse, reprocessing or repairers<br><br>Products / businesses that become useless in old linear business practices |
| | Market demand for products is dependent on collaboration on the value chain c |

*Source:* data processed by the author

**4. Transition to the circular economy**

In the last decades, there has been an unprecedented increase in resource demand, driven by the rapid industrialization of emerging economies and a high level of material consumption in developed countries. There are also considerable variations between regions; consumption of materials in developed countries tends to be several times higher than in developing countries. By 2050, the world population is forecast to grow from about 7 billion to more than 9 billion, and the per capita income of the world's population about three times. This will substantially increase the demand for natural resources and probably lead to increased production costs for some resources, and an increased risk of supply shortages.

The transition to the circular economy tends to involve low demand for certain natural resources and materials derived from them.

The creation of material loops implies the replacement of secondary materials (ie those already used in production processes and from the recycling of industrial or household wastes) and second-hand, repaired or redesigned products for their virgin products or new equivalents. Delay in material flows implies the appearance of products that remain in the economy for longer, usually due to the more durable design of the product.

Reducing material flows implies a more efficient use of natural resources, materials and products, either by developing and disseminating new production technologies, by increasing the use of existing assets, or by changing the consumption behavior outside of intensive consumption goods and services.

In conclusion, a "transition to a circular economy" could be considered as involving any process that could lead to a lower rate of extraction and use of natural resources.

An improvement in resource efficiency describes a situation where there is a higher economic value with a certain amount of resources or one where fewer resources are used to produce a certain level of economic value. Decoupling is used to describe an improvement in resource efficiency, typically at the aggregate of the economy.

Absolute decoupling refers to a situation where the value of economic output is increasing, while the amount of resources used is decreasing.

Increased efficiency of resources is considered:

- increasing the production of secondary materials on the domestic market in order to reduce imports and production of virgin material resources can reduce the supply risks;
- Activities that will lead to a circular economic transition could also become important engines of restructuring, job creation and growth;
- Opportunities will arise in various sectors, including the secondary production of materials, repair and repair of the reconstruction, the services sector and the divestment economy.

Given the natural nature of many natural resources, it is often concluded that the future resource deficit could become an obstacle to long-term economic growth.

In this context, the decoupling of the economic production of the use of natural resources is considered vital.

Natural resources and materials derived from them are the physical basis for economic growth. Reduced mining, processing and disposal of natural resources can have significant environmental effects and more efficient use of resources could be an important tool for achieving climate goals and other environmental objectives.

Also, low dependence on critical resources and materials, as well as improved security of access to materials resulting from the provision of extensive internal secondary materials; the supply risks associated with future geopolitical shocks could be mitigated in importing countries.

Thirdly, the activities that will lead to any circular economic transition could also become significant factors for job creation and economic growth. New opportunities will emerge in various sectors, including secondary material production, repair and reconstruction, service sector and sharing economy.

Given that different sectors may expand and contract to varying degrees during the transition to a circular economy and that individual sectors have different material intensities, these economic flows must also be linked to their physical equivalents .

Any such transition will involve more interactions across sectors and countries and will take place alongside other trends such as digitization and automation.

These cyclical economic processes can be adopted by companies and countries and may involve economic, environmental and social impacts.

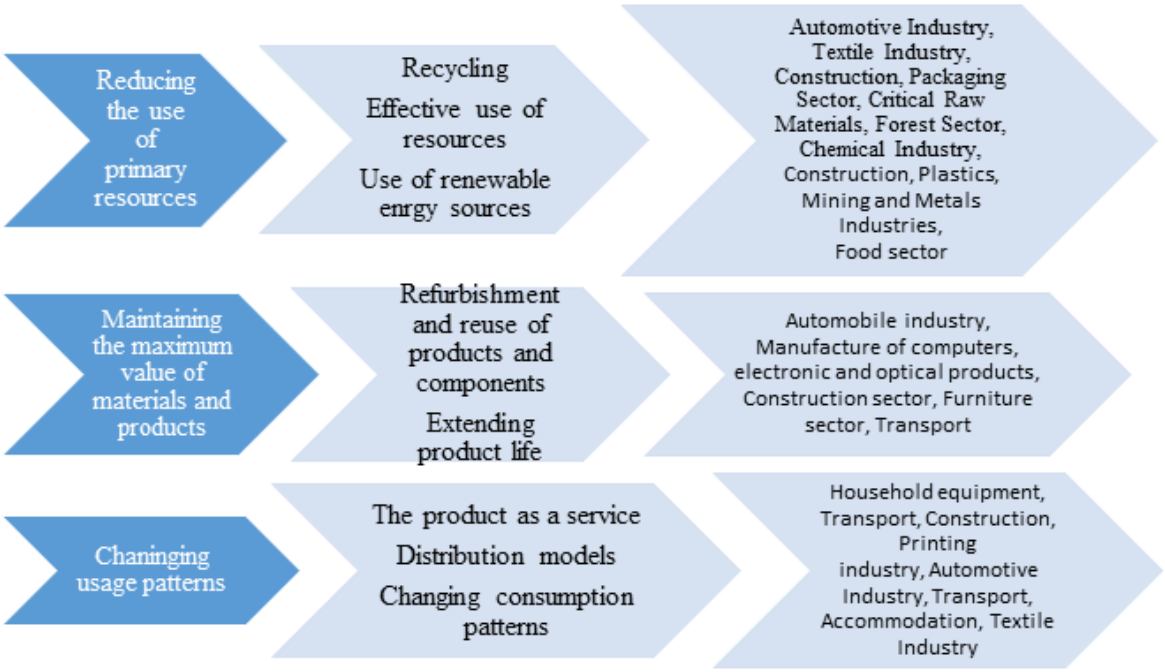
At business level, these processes can be understood as representing the different circular practices that an economic agents uses to move from a linear to circular business model by providing a circular product or service.

Understanding Circular Economy processes aims to understand how economic agentscan implement the circular economy in practice.

Identifying the main processes of the circular economy from the literature, the following eight processes have been identified: recycling, efficient use of resources, use of renewable energy sources, refurbishment, prolongation of product lifetime, renovation and reuse of products and components, product as a service, distribution models, changing patterns of consumption, which can be further classified into three different categories, namely:

a) reducing the use of primary resources;
b) maintaining the highest value of materials and products;
c) changing usage patterns (Figure 1).

**Figure 1. The main processes of the circular economy**




*Source:* data processed by the author based on the study: *Implementation of circular economy business models by small and medium-sized enterprises (SMEs): Barriers and enablers*, Rizos et al, 2016

Categories of circular processes are not mutually exclusive. Many of their elements are often interconnected, while in some cases economic agents can adopt a strategy involving more circular processes.

Recycling is the reintroduction of residual materials into production processes so that they can be reused in new products. This is not a mere recovery of materials, but a redirection of recovered materials to their next life cycle. The issue of quality is important for this purpose, because high quality recycling is a prerequisite for the effective reintroduction of materials into the production process.

Recycling is the most traditional way of applying the principles of circular economy by capturing the value of existing products and materials and reducing the use of primary materials. Reducing the extraction of primary resources through recycling is an advantage and may also contribute to reducing GHG emissions associated with the use of material resources.

Increased recycling can be cost-effective for industries, and for industries that depend on raw materials, the use of secondary materials may reduce the need to acquire or extract primary materials.

Using recycled materials can reduce the price volatility associated with primary raw materials and dependence on material imports. An example of this is recycling from critical raw materials (CRMs) often imported from third countries.

Removing waste from the industrial chain by reusing the materials to the greatest possible extent promises savings in production costs and lower resource dependence. The

benefits of a circular economy are not only operational but strategic, not only for industry but also for customers, and serve as a source of efficiency and innovation.

Economies will benefit from substantial substantial savings, mitigating volatility and supply risks, innovation factors and job creation, improving soil productivity and soil health, and the long-term sustainability of the economy.

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**5. Changing Usage Models**

*The product as a service*

The product as a service can be implemented through leasing, rental, pay-per-use or performance-based business models.

The following product-service model categories have been identified:

- Payment per service unit where the consumer pays for product production in line with the level of use (eg pay-per-print services offered by copiers). The business that sells the service is responsible for costs over the lifetime of the product.
- Hire or share a product if consumers purchase access to the product through an agreement for a period of time.
- Leasing the product if the consumer has permanent access to the product.
- Sharing products where many customers use the same product at the same time. This subcategory is closely related to distribution patterns (for example, car sharing).
- In all the above mentioned cases, the company retains its ownership of the product and provides its customers with access to it. In this way, the company maintains the material resources at its disposal.

This practice brings environmental benefits because the model motivates the company to repair and keep the product in use for a longer period of time.

Through recycling and refurbishment practices, waste generated during product life may decrease.

Other environmental benefits may also arise from the product as service models; for example, it is estimated that customers who choose their product as a service model can reduce their associated energy by up to 40%.

Since leasing models sell the product to the producer, the energy savings achieved depend on the optimal replacement rate for each product and on how the changes in the substitution behavior between the circular and the linear model.

"Product as a service practice" is often closely related to the "product lifecycle" process. Such economic processes have also been adopted in the consumer electronics and consumer electronics sectors, for example in the form of pay-per-use models (in the use of washing machines).

These traditional products as service models have recently been complemented by elements enriched by digital technologies. For example, new business models connect washing machines to the internet, allowing laundry customers to check the availability of washing.

- *Distribution models*

Distribution models are inextricably linked to the concept of circular economy because they aim to reduce the under-utilization of products and thus support the more efficient use of resources.

In addition to the exchange of products and services between people, this circular process can also take the form of technology and infrastructure exchange between industry partners.

Although these models have the potential to radically transform patterns of consumption into the environment, it can be argued that more research is needed to better assess the extent of environmental benefits.

Distribution models have been used in vehicle sharing and accommodation and are facilitated by the benefits of digital technology. These are sometimes referred to as "collaborative consumption" as they are often implemented through social platforms.

The distribution patterns, as well as the idea of extending the life of the product, are also related to the idea of sufficiency as a business model.

Sufficiency is based on the principle of general resource resource moderation, focusing on reducing demand by changing consumer behavior through education. In order for the product to work and the exchange of economic models to develop, a change of consumer's mentality is necessary.

- *Changing consumption patterns*

Technological advances as well as improved information for consumers may result in a change in demand patterns.

For example, many consumers choose products / services that offer practical utility instead of materials such as digital books, smart phones, music and online stores.

At the same time, businesses can deliver products using virtual channels and communicate more with customers through emails and social networks.

These exchanges can also lead to resource savings and increased productivity.

## 6. Conclusions

Based on the review of the literature, the study provides a reflection on the concept of circular economy, an overview of the main circular economic processes, and their applications in different sectors.

The multitude of interpretations of the concept of circular economy and the wide range of issues and priorities it embodies is reflected in the diversity of definitions presented. While some definitions and interpretations focus on physical and material aspects, others envisage a major transformation of the economic system that involves different sectors and issues that go beyond material resources and waste.

Circular economy is a complex concept and it is unlikely that in the short term there will be an international consensus on its meaning. However, at the level of EU policies, more clarity is needed with regard to the areas and sectors that can enter the circular economy. This can help to avoid confusion and to produce impact assessments that will provide consistent messages on the potential effects of the circular economy. Circular processes presented in the study can be implemented by businesses and have significant potential to provide economic, environmental and social benefits. In each case where a circular economic process is applied to a sector, careful consideration must be given to all parameters that may play a role in the overall sustainability of the circular process that replaces a linear one. It is also necessary to understand the indirect effects on the economy (eg impact on the value chain and / or changes in consumption patterns) to estimate the overall impact at EU or national level.

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