

**The circular economy: conceptual and theoretical framework**

## الاقتصاد الدائري: الإطار المفاهيمي والنظري

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**Résumé :**

In the world of limited resources, there is an urgent need to develop new economic models, among them is the circular economic model, an economy that has no place for waste and does not produce pollution. Therefore, we have tried through this paper to identify the origin and concept of the circular economy, its principles and objectives of transition to it, in addition to mentioning the obstacles to its application on the one hand, on the other hand, we made a strategic diagnosis of the circular economy through the SWOT matrix and in the end, we concluded that the circular economy aims is to use resources in different and more effective ways, through recycling, reduction and reuse of material resources and the use of waste as a resource.

**Mots-clés :** linear economy, circular economy, environment, waste, waste recycling**Codes de classification JEL :** Q53**الملخص:**

في عالم محدود الموارد هناك حاجة ماسة إلى تطوير نماذج اقتصادية جديدة، من بينها نموذج الاقتصاد الدائري، ذلك الاقتصاد الذي لا مكان فيه للنفايات ولا ينتج تلوث. لذلك حاولنا من خلال هذه الورقة البحثية التعرف على أصل ومفهوم الاقتصاد الدائري، ومبادئه وأهداف الانتقال إليه، بالإضافة إلى ذكر معوقات تطبيقه من جهة ومن جهة أخرى قمنا بتشخيص استراتيجي للاقتصاد الدائري عبر مصفوفة SWOT واستخلصنا في الأخير أن الاقتصاد الدائري يهدف إلى استخدام الموارد بطرق مختلفة وأكثر فعالية، عن طريق إعادة التدوير، وتخفيض وإعادة استخدام الموارد المادية واستخدام النفايات كمورد.

**الكلمات المفتاحية:** الاقتصاد الخطي، الاقتصاد الدائري، البيئة، النفايات، إعادة تدوير النفايات.

التصنيف JEL : Q53

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## **Introduction :**

The current economy, the so-called linear economy, based on extraction, production, consumption and throwing, has contributed greatly to the rapid depletion of the natural resource base, and the degradation of natural ecosystems such as water, air and land. Also, the persistence of productive and consumption behaviors and trends that transcend natural boundaries, and the negative effects of industrial activities, will threaten the future of the whole of humanity, thus the need to search for eco-friendly economic systems.

The scientists have worked to develop alternatives and seek solutions that balance industrial necessity with the need to keep the rest of the environment healthy, by developing a recycling economy system, also known as the circular economy, called Walter Stahel, a swiss architect and environmentalist, was one of the developers of this system and the creator of the cradle-to-cradle rule in 1976, which mean to benefit as much as possible from the industrial product through recycling and re-production in new forms and uses, so that the economy and the environment win. It is presented as a new economic model that is concerned with changing all unsustainable production methods and consumption patterns. This economy aims to conserve the value of products, materials and resources in the economy for the longest possible period of use and reduce waste significantly, as it contributes to enhancing efficiency and reducing electric energy consumption and carbon dioxide emissions.

The circular economy contributes significantly to the reduction of environmental degradation, depletion of natural resources, the preservation of biological diversity, the utilization of waste by converting it to giant production projects, and reducing the risks of climate change. According to the european commission's report, Co<sub>2</sub> emissions will be reduced by approximately 450 million tons per year and the EU's circular economy will reach 14 trillion euros by 2030. The 2015 report by the world economic forum and the allenkimther foundation it will save the world \$ 1 trillion by 2025 and create more than 100,000 new jobs. Accordingly, it is clear that the circular economy can contribute to preserving the environment, maximizing its positive effects on the environment, reducing its negative effects, and preserving its natural resources. Through this can be posed the following problem: **Can a circular economy approach be an ideal model for inclusive development?**

## **The importance of the study**

The importance of the study in presenting and analyzing the importance of the application of circular economy in the preservation of the environment, and reduce the depletion of wealth, which may motivate officials and institutions to speed up the transition to the circular economy as well as the presentation of the most important requirements of the application of the circular economy, and the obstacles facing the application of this study may contribute to stimulate officials In the Arab world in general, and Algeria in particular to shift towards the application of the circular economy, and the need to implement efficient strategies in the use of natural resources and waste recycling and preservation of the environment by economic actors, which still prefer to improve the model current ineffective.

### Objectives of the study

The purpose of this study is to introduce the concept, features and approaches of the circular economy, highlighting the principles, requirements and objectives of the circular economy and to identify the obstacles facing the application of the circular economy in addition to a strategic diagnosis of the circular economy through the SWOT matrix to clarify the most important procedures that help to preserve natural resources and the environment through transformation from linear to circular economy.

### 1- The concept of circular economy:

The term circular economics appeared in 1989 with the emergence of a book entitled economics of natural resources and the environment, published by Johns Hopkins University Press, by David Pierce and R. Kerry Termes. This book shows the relationship between the economy, natural resources and the environment, the nature of the integration between the ecosystem and the economy and the most important phenomena of deviation in the ecosystem and its economic effects. The authors distinguish between the so-called linear economy, where resource consumption is open, and the circular economy, where it seeks to rebuild capital, whether financial, industrial, human, social or natural, and improve the revenue of resources through the recycling of products, components and raw materials used at all times this ensures the continuous flow of technical and biological materials.

Circular economy can be defined :

The CE has been defined 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 return to the biosphere, and aims for the elimination of waste through the superior design of materials, products, systems and business models. (Hobson, 2015, p. 01)

A ‘circular economy’ (CE) is an approach that would transform the function of resources in the economy. Waste from factories would become a valuable input to another process – and products could be repaired, reused or upgraded instead of thrown away. (Preston, 2012, p. 01).

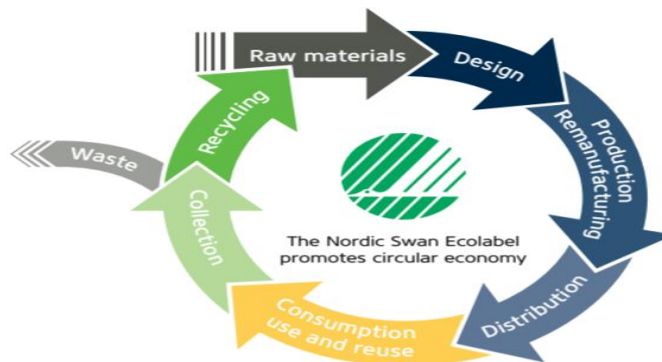
According to the Ellen MacArthur “a circular economy is an industrial system that is restorative and regenerative by design. It aims to enable effective flows of materials, energy, labor and information so that natural and social capital can be rebuilt. It seeks to reduce energy use per unit of output and accelerate the shift to renewable energy by design, treating everything in the economy as a valuable resource.” (Report of the Ellen MacArthur foundation, 2015, p. 19)

Also depending on Ellen MacArthur foundation report which was published on 2013, “The circular economy is considered as a new industrial model which is opposed to the linear model of resource consumption based on the “take, make, dispose” triptych. Its objective is to eliminate waste that is harmful to the environment. It promotes the use of goods with natural components called “nutriments” which can be reabsorbed into the biosphere without damage,

as well as the repurposing (via reuse, repair and recycling) of technical components not suited for the biosphere. The final consumption of goods must, in a circular economy, be based on a “functional service economy”; that is, the rental of goods and no longer on the sale of goods which generates waste. (Gallaud, Blandine, 2016, p. 03)

A circular economy is an economic and industrial system based on the reuse of products and raw materials, and the restorative capacity of natural resources. It attempts to minimize value destruction in the overall system and to maximize value creation in each link in the system. (Bastein & others, 2013, p. 04)

**Figure (01) : circular economy scheme**



**Source :** Circular Economy | Nordic Ecolabel see on : [www.nordic-ecolabel.org/why-choose-ecolabelling/circular-economy](http://www.nordic-ecolabel.org/why-choose-ecolabelling/circular-economy).

## 2. Principles of circular economy

While linear industrial economics is based on “take, make, dispose” and the lifestyles that feed on it, depleting limited reserves of ores to create products that end up in landfills or in incinerators, circular economics is based on five principles: (Hout, 2017, pp. 53-56)

### 3.1. Organise reverse cycles

In a circular economy, resources should be used in circular flows. This is one of the most essential principles of the concept and presents an obvious contrast compared with the contemporary economic system. In order to close the loop, so to speak, collection and treatment systems should be organised to recover and restore value from end-of-life products. These treatment systems include processes like refurbishment and recycling that return resources back to the value chain. These are the missing links that transform the current linear economy into a circular one. Then, the output (waste) of one process becomes the input (food) for another process.

### 3.2. Be resource effective

The circular economy aims to increase the effectivity with which resources are used in the economy. This includes, but exceeds using resources in closed loops, as covered by the preceding principle. The essence of resource effectiveness is to use resources to their full potential to create a positive impact. This suggests a focus on a desirable outcome instead of pursuing less undesirable results. By example, from this perspective the ideal would be to use

resources in a way that repairs damage to the ecosystem instead of causing less additional damage.

### **2.3. Think in systems**

Systems are constructed from many interrelated parts whose actions influence the overall system's behaviour. Systems thinking is an approach that aids in understanding how parts of a system interact and how they relate to the system as a whole. In terms of circular economy, the global system, and the circular economy aims to optimise the total system performance rather than that of a single component. In order to do so, it is essential to recognise the existence of complex dependencies and to adopt a holistic perspective to assessing and optimising the impact of corporate activity.

### **2.4. Priorities the future**

In the economy any company or business works for staying alive as more as possible. So to achieve this objective they need to be adapted with environment variables, then they should evaluate and predict risks which is an equally relevant driver for change from the problems of linear economy to the circular economy that offers an approach fundamentally different from the contemporary status quo in economy and industry. These changes need time to bear fruit. So the CE work for designing a product to increase its end-of-life value, only starts to repay when the product becomes obsolete, commonly after several years. However, in order to realise and benefit from the circular economy, opportunities and consequences of actions should be considered from a more longterm perspective

### **2.5. Create mutual benefit**

Like a linear economy, a circular economy exists to meet society's needs for goods and development. The fundamental principles of supply and demand and the free market mechanism remain unchanged. Only the methods for using resources and the ways to create benefit change. When changing these methods, it is essential to organise every activity to create mutual benefit for different stakeholders. It is vital to a healthy economic system that there is no conflict of interest. Increasing resource effectivity by extending a product lifespan, but increasing revenue by selling more products could present a conflict. Business model innovation can offer new value propositions and revenue models that align the principles of the circular economy with an organisation's profit-oriented strategies. In essence, all company processes should be organised to benefit from the transition to the circular economy.

These five principles are highly interrelated. If an organization wants to take the circular approach in its production system, it needs to adopt these principles and see how they relate to each other.

## **3. Objectives of the application of circular economy:**

The circular economy has been the focus of many countries in the world, especially in europe, where it supports the processes of economic growth by creating new jobs, providing job opportunities, reducing material costs, reducing price fluctuations, enhancing supply safety, minimizing the negative impacts of environmental pressure, Conservation of the ecosystem, and substantially reducing greenhouse gas emissions (Kalmykova, Sadagopan, &

Rosado, 2018, p. 190). Circular systems help reuse and recycle in order to conserve resources, conserve raw materials, protect nature, and thus achieve sustainability (Kalverkamp & Raabe, 2018, p. 112). The circular economy aims to use old materials or products as raw materials (by-products) or a common product, and is thus an effective tool to support sustainability objectives by enhancing the availability of raw materials, reducing the negative impacts on the environment, as well as increasing economic progress (Simon, 2019, p. 299), as well as applying industrial ecology, Industrial sustainability (Urbinati, Chiaroni & Chiesa, 2017, p. 492) and the circular economy is a framework that defines the relationship in different ways to create and maintain value through reuse, regeneration, recycling or recycling (Velte, Scheller & Steinhilper, 2018, p. 775). The entrance to the circular economy depends on reducing the dependence of society on scarce natural resources by maximizing the use of available resources, reusing them, and reducing losses. (Kunz, Mayers & Van Wassenhove, 2018, p. 01)

#### **4. Expected benefits of moving to a circular economy**

There are many benefits to be derived from the transition to a circular economy, both for the environment and for economic growth or even for society as a social value. This move to the circular economy is a process of innovation and transformation in business models, which, although it will have a very positive impact, nothing is 100% ideal for the benefit of stakeholders, so that there can be some disadvantages as we can find Beneficiaries and affected by this alternative economic trend, especially among companies whose value chain will be affected. (report of institute Montaigne, 2016, pp. 19-37)

##### **4.1. For the Earth and humanity:**

Environmental benefits, protection of natural resources and reduction of the risk of depletion: the circular economy offers an effective use of material value where large demand can be met through a smaller amount of resources through the reuse of waste as resources. The risk of depleting natural resource reserves is thus addressed. It also contributes to reduced supply risks, natural resource price fluctuations and reduced greenhouse gas (CO<sub>2</sub>) emissions due to increased resource efficiency.

##### **4.2. For countries and regions:**

Creating economic value and providing employment, improving trade balance, and securing access to strategic resources: each country and region should naturally benefit from the overall effects of transition to a circular economy, moreover, more advanced countries take the lead in transition. To the circular economy being an advantage from an environmental point of view. Countries are also supposed to benefit from ensuring the provision of strategic resources, improving the trade balance (while avoiding some imports), and creating jobs and growth.

### 4.3. For companies:

Improved access to resources, new opportunities to create value: for companies, the shift towards the principles of circular economy allows for protection against risks and is an opportunity to build a competitive advantage as well as a better relationship with customers.

### 4.4. For consumers:

Innovative services at low prices, new sources of revenue, and a total reduction in the cost of owning certain goods: From a consumer point of view, a circular economy will bring new opportunities, which directly benefit producers of goods and services, ultimately leading to new offers at low prices. We can say that the development of circular economy is an opportunity to achieve additional value for the consumer, either to provide the same quality or service at a lower price or additional functions.

## 5. Barriers to the circular economy

There are a number of obstacles facing the transition to a circular economy, including: (Kirchherr & others, 2018, p. 268)

### 5.1. Cultural Barriers

- Lacking consumer interest and awareness
- Hesitant company
- Operating in a linear system
- Limited willingness to collaborate in the value chain

### 5.2. Market Barriers

- Low virgin material prices
- High upfront investment costs
- Limited funding for circular business models
- Limited standardization

### 5.3. Regulatory Barriers

- Obstructing laws and regulations
- Lack of global consensus
- Limited circular procurement

### 5.4. Technological Barriers

- Limited circular design
- Too few large-scale demonstration
- Lack of data, e.g. on impacts
- Ability to deliver high quality remanufactured products

## 6. SWOT analysis of circular versus linear economics

We have already mentioned the advantages and opportunities of a circular economy. A circular economy involves more manageable waste, recyclable resources, profitable institutions, and a more sustainable environment, but awareness of this approach remains controversial, and the tendencies of economic sectors and governments towards the circular economy is still not up to the required level, so we will make a strategic diagnosis of the circular economy through the SWOT matrix in order to identify strengths and weaknesses as

well as identify opportunities and threats related to the circular economy as follows:( the figure: 02) (Sariatli, 2017,pp. 33-34)

### **6.1. Strengths:**

- The restoration of wastes by a proficient way is a potential competitive edge.
- Elimination of waste from the value chain has the quantifiable benefit of reducing systemic and direct material cost and diminishing resource dependence.
- Incorporating the attributes of CE in the R & D phase of operation yields spurs progress in material sciences and yields the development of higher quality and more durable components.
- Due to the closed-loop processes, the economy grows less exposed to price fluctuations of the materials and the flattened cost curve ultimately results in more efficient use of resources in terms of both value and volume.
- Externalities are associated with the use and flow of material, lower material consumption evidently decreases the exposure to externalities.

### **6.2. Weaknesses**

- Circular economy still requires amalgamation of the entire product life cycle from raw material provision to annihilation.
- No specific guidelines to sectors on how to implement circular economy.
- There is still no internationally recognized standards institution to regulate the sector.
- Circular Economy may omit the feature of semi-recyclability when choosing a raw material for production process.
- Public opinion about CE is yet inefficient and social marketing campaigns lack to access sectoral people.
- There is still no special legal regulation about circular economy and its application.
- Investments about circular economy to introduce the system to sector are not enough.

### **6.3. Opportunities**

- By reducing the level of material input needed, the economy may save billions of dollars. The EU may save up to 600 billion USD in material costs annually.
- Deploying circular design in technological products, results in securing access to better and cheaper materials.
- Developing expertise in legal, mechanical, operational or cross-sectoral challenges in circular solutions opens business opportunity for the enablers.
- Developing expertise in sectoral or cross-sectoral challenges in circular solutions opens business opportunity for the enablers.

### **6.4. Threats**

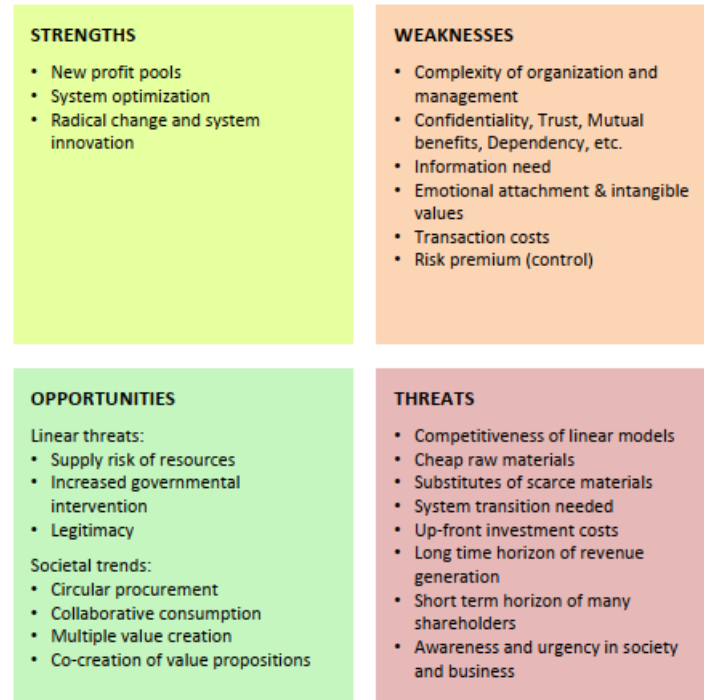
- If companies can control entire life cycle, they can easily cross-subsidize different activities and that can cause high prices and incapable products.
- If producers could direct their own product-waste, it may be more difficult to benefit from waste management for those in scale economy.
- Managing whole life cycle of product and strong collaboration can cause cartel structures



## The circular economy: conceptual and theoretical framework

- A gradual or sequencing financial disruptions in the system can cause unpleasant outcomes for the interdependent sector due to complex and interlinked sector.
- Generally we can summarize the SWOT analysis of the circular economy in figure 02

**Figure (02) : SWOT of CE for business**



**Source :** Mentink, Bas. "**Circular business model innovation: a process framework and a tool for business model innovation in a circular economy.**" thesis For the degree of Master of Science in Industrial Ecology, Faculty of Industrial Design Engineering, Delft University of Technology, Netherlands, 2014, p. 26.

### Conclusion

The adoption of the linear economy model based on the tripartite "take, make, and dispose" has resulted in a high proportion of waste, pollution and depletion of resources, which led many specialists to find appropriate solutions to protect the environment, the most important of which is the circular economy, which is it is a vital economy that aims to change the way we live by utilizing as much as possible of products through recycling and re-production in new forms and uses to serve both the economy and the environment.

Through this study we have reached a number of results including:

- The model of linear economy known as "cradle to grave" "contributed to the damage of the environment through the huge amount of waste left behind and the depletion of natural resources and was condemned to failure.
- The circular economy model came not only because of the need to change the course of the current linear model, but also because of the enormous opportunities to protect both the environment and natural resources, as well as new investment opportunities;

- A circular economy is essentially an economic model aimed at using resources in different and more effective ways;
- Circular economy is a general term for an industrial economy that does not produce waste or pollute, from the beginning of its design and from the intention of its creation;
- The circular economy is a realistic way to provide the global economy with the required raw materials. Circular economy involves increased reuse, repair and recycling of manufactured goods and utilization of waste streams;
- The circular economy focuses on recycling, reduction and reuse of material resources and the use of waste as a resource to achieve the overall objective of separating economic growth from resource use and associated environmental impacts;
- contributes to saving costs, attract new sources of income, create new jobs, reduce energy consumption and protect non-renewable resources, this is economically, but from an environmental point of view the circular economy contributes significantly to the protection of the environment from pollution (accumulation of carbon dioxide and eliminate On the ozone layer), preserving natural resources such as water, air, land and biodiversity, as well as raw materials, many of which have become scarce, and preserving the health of individuals.

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