

# CIRCULAR ECONOMY: AN EXPLORATION OF ITS CONCEPT, SCHOOLS OF THOUGHT, DRIVERS AND STRATEGIES

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## **Abstract**

The circular economy is a paradigm shift from the traditional linear model of production and consumption where goods have to be used and dispose. Circular economy (CE) is a system where materials and products are continually reused, recycled, and refurbished to minimize the waste and to lesser the negative environmental impact. In recent times, business and government and the society at large have started recognizing the need to deviate from the take-make-dispose approach of production and consumption because the circular economy offer a promising framework for achieving economic prospect while reducing the environment challenges of the 21<sup>st</sup> century. Thus, the study tried to explore the concept of circular economy, its schools of thought, drivers and strategies. The study made use of the library research method. From our exploration of circular economy, we observed that CE is a pragmatic and economic viable strategy and it has the potential to drive innovation, redefine business model, and create new economic opportunity. Nevertheless the transition to circular economy has some challenges which require concerted effort from the government, individual, industries, and collaboration on a global scale to overcome.

**Keywords:** Circular Economy (CE), Cradle To Cradle, Industrial Ecology, Performance Economy

**JEL Classification:** M20; M31; M40

## **1. INTRODUCTION**

The concept of circular economy has gained an unprecedented attention in recent years as societies try to resolve the daunting challenges of resource scarcity, environmental degradation, climate change, pollution and mounting waste posed by the linear economy. The circular economy is a departure from the old-fashioned cradle to grave approach to production and consumption where good is produce

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after use they are thrown away (European Economic Commission, 2015). Rather it is a regenerative and restorative economic system where waste is minimized, resources are conserved and products are design with a focus of longevity, reparability and recyclability.

Currently, the rate at which materials are extracted outweighs the rate at which materials are recovered, recycle or replenish. According to circularity report (2022) the volume of virgin material consumed globally is 70% more than what can safely be replenished by the earth, this shows how linear the world is. Currently, the world can only recycle about 8.6% of what it uses; this leaves us with a massive circularity gap of over 90%. Living beyond the planetary means is a threat to both the planet and the inhabitants of the planet. For us to live within our planetary means we need to transit from the current ‘take-make-use-dispose’ (linear) way of production and consumption to a more sustainable circular way of producing and consuming. In light of the above, the study seeks to explore the concept of circular economy, the various schools of thought, circular economy strategies, and the drivers of circular economy practices.

### **1.1. METHODOLOGY**

The paper employed a qualitative research design. The qualitative research design was chosen because it is appropriate to synthesize existing knowledge and identify gaps within the circular economy domain. The data for the study were obtained from databases such as Google Scholar and the Social Science Research Network (SSRN). These databases were used to obtain relevant peer-reviewed articles, books, and conference papers using key words such as circular economy, cradle to cradle, industrial ecology, and performance economy. The study was anchored on the interpretivist research philosophy, the choice of the interpretivist research philosophy is based on the fact that the concept of circular economy is implemented and interpreted differently across regions, cultures, contexts, and industries.

### **1.2. CIRCULAR ECONOMY**

The negative effect of industrial waste on the planet has been on the rise. The rise of the negative effect of industrial waste on the planet can be attributed to the linear nature of our economy system. A linear economy is an open economy where natural resources are converted into products and after usage; the product is discarded without it being recycled, refurbish or reuse (Sariatli, 2017). Thus linear economy does not consider the environmental impact of a product on the ecosystem. The continual increase in the world population coupled with the volatility of prices of natural resources (Sun et al., 2022), the depletion of the natural resources and reserves, and also the rise of the cost of production due to waste management has led to the interrogation of the efficiency of the linear method of production which has dominated the world. In recent times, there has been increasing global awareness of the need for us to preserve our planet (rappooli et al., 2023). This global yearning has led to the re-awakening of the circular economy. A circular economy is an economy where the value of resources and products are retained in the economy for as long as possible (European

Commission, 2015). According to Ellen MacArthur Foundation (2013), circular economy is an “industrial system that is restorative or regenerative by intention and design”. This definition is adjudged to be one of the most notable definitions of circular economy

The major aim of the circular economy is to reduce the over-reliance on the use of raw material by companies in production, this could be done by extending the life span of a product, producing a product that can be recycled at the end of its life span and also reducing industrial waste among others. The circular economy is premised on the assertion that there is nothing like waste. In another word, every residual of a product can be used to make another product thereby making better use of resources and preventing the over use of natural resources. In a circular economy, the industrial system is adduced to be similar to the ecosystem where there is no waste.

### **1.3. SCHOOLS OF THOUGHT OF CIRCULAR ECONOMY**

A school of thought is a particular way of thinking. It is an idea or opinion about a phenomenon that is shared by a group of people. Various concepts have been used to explain the term circular economy but the most common ones are: industrial ecology, cradle to cradle and performance economy (Kopnina, 2019). These concept are briefly explain below.

### **1.4. INDUSTRIAL ECOLOGY**

It is important for us to first understand the term ecosystem in other for us to make better sense of the word industrial ecology. An ecosystem is a community or groups of living organisms that live and interact with each other. Ecology is a branch of biology that studies the relationship between a living organism and its environment (Begon et al., 2006). In a biological system, there is a symbiotic relationship between organisms (holling, 1992). A good example is the relationship between the ecosystem, plants, humans, and animals. The plant need sunlight, minerals from the soil, water, and carbon dioxide produced by human for their growth. The leave from the plant fall on the ground and decomposed to form minerals that serve as fertilizer for the planet. Similarly human and animals feed on plant for growth, both the dumps and remains of both human and animals go back to the soil to form mineral resources that plant need for growth. Therefore, nature does not produce any waste the waste of one organism is nutrient to another organism (Braungart et al., 2007).

The idea behind the concept of industrial ecology is for industries to mimic the circular flow of resources in the natural environment by ensuring that the byproduct of one company is used as input by another company and also to improve on the product design by considering the negative impact of a product on the environment (Orourke et al., 1996). Industrial ecology is the study of material and energy flow and their transformation into products. It is a multidisciplinary framework to design and operate industries as if they were living entities that interact with the environment (lowe, 2002). Some of the benefits that may be obtained by companies that applied the industrial ecology concept are but not limited to: reduction in production cost as a result of decrease in the cost of treating

waste. If the waste of one company is used by another company both companies and the environment will gain from the process. The first company will save some cost that might be used to treat its waste while the second company will gain from the purchase of waste from the company selling the waste because the price of the waste will be lesser than the cost of purchasing raw materials and finally, the environment will gain in form of pollution reduction (lifset & Graedel, 2003).

### **1.5. CRADLE TO CRADLE**

The term cradle to cradle was coined by Water Stahel and later developed by McDonough and Braungart. According to McDonough and Braungart (2002), companies should rethink the way they design their product by going beyond the eco-efficiency strategies which only focus on reducing the negative impact of a product on the environment rather companies should adopt eco-effective strategies by producing products that enhance the environment. A good example of eco-efficient strategy is when a car manufacturing company tries to reduce carbon dioxide emission why an eco-effective strategy is when a car manufacturing company tries to produce a car that emits substances that is friendly to the environment. The concept of cradle-to-cradle is hinged on three main principles, these principles are: firstly waste equals food, what this connote is that there is nothing like waste in nature. Thus all products should be designed in such a way that they can either return to their biological cycle or technical cycle. Secondly, company should strive to use renewable sources of energy such as solar and finally, company should strive to use locally available resources (McDonough & Braungart, 2002)

### **1.6. PERFORMANCE ECONOMY**

The idea of a performance economy was first conceived by Stahel and Reday in their book on “the potential of substituting manpower for energy. Stahel and Reday (1976) opined that at macroeconomic level about three-quarter of energy is used in mining and production of raw materials while about one-quarter of energy is used in manufacturing products from basic materials. On the contrary, about one-quarter of labour is used in mining activities and basic material production while three-quarter of labour is used in manufacturing goods from basic material. He suggests that we can substitute manpower for energy by extending the life circle of products and by reusing recycling and remanufacturing products. He opined that by so doing the energy that would have been used to mine basic resources would be substituted for labour.

According to Stahel (2013), the concept of a performance economy is based on some principles. first, the economy is a closed loop, this connotes that a product that can be repaired should not be remanufactured. Secondly, the loops in the economy have no beginning and end. This means that the value of a product should be preserved throughout its life. Thirdly, the company should continually own the product. This can be done by producing product as service. Fourthly, a performance economy needs a functioning market, they need to be supply and demand for the product. Finally, the efficiency of the circular economy decreases with an increase in the flow speed.

## 2. CIRCULAR ECONOMY DRIVERS

Circular economy drivers are factors that propel or motivate a company to adopt a circular economy business model. Different companies are motivated by diverse reasons for adopting a circular business model, these reasons may be as a result of business opportunity, response to stakeholder pressure, quest to address environmental issues, and quest to improve firm performance among others (Keulen & Kircheur, 2021). Authors like Hina et al., (2022) classify drivers of circular economy practices into two categories namely internal and external drivers. Internal drivers of circular economy are factors within the company that motivate a company to adopt circular economy strategy. Examples of these internal factors are good leadership (Moktadir et al., 2020), innovation, research, and development, financial driver (Agyemang et al., 2019), design strategy (Sumter et al., 2018), resource availability (Hagejard et al, 2020) among others. The external drivers are factors outside the company that motivates a company to adopt a circular economy business strategy. These factors are not limited to government legislation (Ting et al 2024), pressure from stakeholders (Russel et al., 2020), supply chain drivers (Urbinati et al., 2021), social and environmental drivers (jakher et al., 2019). Other classifies the driver of circular economy practices into social, regulatory, and economic drivers (Hina et al., 2021).

### 2.1. REGULATOR DRIVERS

Regulation is one of the crucial drivers of circular economy practices; the government can spur circular economy practices by either punishing or incentivizing companies to adopt circular economy practices in the business model. Government support to companies in different ways can serve as a motivation for a company to adopt circular economy practices. For example, the government can decide to provide interest-free loans to companies that had adopt circular economic practices in their business model. Government can also decide to punish companies that are not circular by imposing a tax on the waste (De Jesus & Mendonca, 2018).

### 2.2. ECONOMIC DRIVERS

The continuous rise in population has led to increasing demand for natural resources which has led to the continual rise in the price of raw materials. On the contrary, improvement in technology has led to a reduction in the cost of recycling and reuse of material (Hina et al., 2021). The reduction in the cost of recycled material as against the rise of virgin material has led to a paradigm shift from the linear way of production and consumption to a circular way of producing and consuming (European Investment Bank, 2020).

### 2.3. SOCIAL AND ENVIRONMENTAL DRIVERS

Climate change is one of the major drivers of the circular business model. The rapid environmental degradation caused by the way we produce and consume is one of the major reasons why companies are switching to a circular way of producing and consuming (Kurita Kurita, 2023). Customer awareness of the concept of circularity has awakened their consciousness of the company on the

need to produce an environmentally friendly product (Ellen MacArthur Foundation, 2015).

#### **2.4. TECHNOLOGICAL DRIVERS**

Improvement in technological development is another factor that has also encouraged the adoption of circular business practices (European Investment Bank, 2020). The development of new technology such as the internet of things and big data analytics has now made it easy for a company to track its product throughout its life cycle. More so, the improvement in technology has led to new ways of designing and manufacturing products a good example is the development of a car that uses solar energy and electricity instead of fuel.

### **3. CIRCULAR ECONOMY STRATEGY**

Strategy is an action that a company takes to attain its goal. In this regard, circular strategies are actions or plans that companies adopt to create and deliver higher value through circularity (Ellen McArthur Foundation, 2013). Different strategies have been canvassed by researchers (European Investment Bank, 2020). The European Investment Bank (2020) highlighted nine strategies that a company can adopt to achieve its circular objectives. These strategies are; rethink, reduce, reuse, repair, refurbish, remanufacture, repurpose and recycle. Similarly, Ellen McArthur Foundation (2013) identifies five circular business strategies that can be used by businesses to achieve their circular objective. According to them, these strategies are: maintaining and prolonging the life of the product; reuse and redistribution (redistribution involves the transfer of a product to a new user instead of discarding the product before the end of its life); refurbishing and remanufacturing (this strategy aims at restoring the value of a product); recycling (this is when a product is disassembly and the material gain is used to make a new part), and cascade (this strategy involved the production of a product that its residual can serve as a natural nutrient).

Circular economy business strategy according to Rizos et al. (2017) falls under three basic categories. The first category relates to strategies to use fewer primary materials, the second relates to strategies to maintain the highest value of material and product and the last strategy relates to strategies to change the utilization pattern. The strategies to use less primary material are recycling. According to the United Nations Environmental Programme (2014) recycling is the re-introduction of residual materials back to the production process. When material are recycled it reduces the demand for virgin raw material), efficient use of resources, and the utilization of renewable resources. Fossil fuel is the most consumed energy source in the world and fossil fuel is not renewable hence a more a better energy source such as solar energy should be used in production due to its restorative power.

Rizos et al. (2017) propose two strategies that can be used to maintain the highest value of material and product. The first strategy is remanufacturing, refurbishing, and reuse of products and components while the second strategy under the strategies to maintain the highest value of a material is product life

extension. Product refurbishing, remanufacturing, or reuse is strategies employed by firms firm to recover a product in other to give it a new life. Unlike product refurbishing remanufacturing and reuses involve the restoration of product, product life extension involves the designing of a product that can stand the test of time (Bocken & Short, 2016).

The last category of the circular strategy proposed by Rizos et al. (2017) is the strategy to change the utilization of resources. They went further to suggest three circular strategies that can be used by a company to change the utilization of resources. These strategies involve the offering of a product as a service, sharing model, and a shift in consumption patterns. The offering of a product as a service is a circular strategy where a company will sell a product to a customer but the ownership of the company is retained by the company selling the product. The offering of a product as a service is mostly applied by the aero industry.

Sharing model which is sometimes termed collaborative consumption is a circular strategy that helps to reduce the underutilization of products; it also enhances the efficient use of resources Bocken & Short, 2016). Technology advancement has led to a shift in the demand pattern, in recent times, people prefer to purchase eBooks than purchasing the hardcopy similarly people tend to purchase their movies and songs online than purchasing CDs.

#### **4. CONCLUSION**

Circular economy stand as a beacon of hope as the world tries to resolve the challenges of resource scarcity, environmental degradation, climate change, pollution and mounting waste posed by the linear economy. Circular economic model is not just a mere theoretical concept rather it hold the promise of more sustainable future. It allows us to think in a new way, act meticulously and envisage a future were the well-being of the people, the planet and the economy can coexist harmoniously. From our exploration of circular economy, we observed that it is a pragmatic and economic viable strategy and it has the potential to drive innovation, redefine business model, and create new economic opportunity. Nevertheless the transition to circular economy has some challenges which require concerted effort from the government, individual, industries, collaboration on a global scale to overcome.



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