CIRCULAR ECONOMY AND SUSTAINABLE DEVELOPMENT: A REVIEW OF LITERATURE

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Abstract
The need for a business model that is compactable with sustainable development is very crucial at this time when climate risk is alarming. Circular economy is a sustainable tool that is suitable for achieving sustainable development since the linear economy is revealed unsustainable. The objective of this paper is to examine the place of circular economy in sustainable development. The study was an exploratory study where literatures were reviewed in order to establish the relationship between circular economy and sustainable development. In order to achieve this, the study revealed circular economy as a cost reduction tool in its material efficiency strategy and how it can affect sustainable development. The study revealed that to achieve sustainable development the 3 pillars (social, economic and environmental) of sustainability must be integrated and this integration should be for the well-being of the present and future generation however, sustainability was revealed to be categorised as strong, moderate and weak sustainability while circular economy was revealed to be strong sustainability tool. The study revealed that circular economy is a sustainable tool for achieving sustainable development.
Keywords: *circular economy, linear, sustainability,development*

Introduction

The risk posed on the environment by man's economic activities has nuanced the need for the protection of the environment from pollution and depletion of resources which are the focus of sustainable development. Sustainable developments are specific targets used to achieve sustainability. Sustainability is concerned about economic development that takes cognisance of the social, economic and environmental issues around human and planet. As a result, the United Nations revealed the need for the government, private and public organisations, civil societies and the general populace in looking at various ways of creating value in order to achieve sustainability (United Nations [UN], 2018).

Therefore, sustainable development can be achieved when there is transition from the linear economy to circular economy that is in line with responsible consumption and production. This would involve the use of innovations in the current production and consumption pattern in order to safeguard the people and planet in terms of emissions that pollutes the environment and depletion of natural resources. In addition, the process of achieving sustainable development is concerned about the Diffusion of Innovation (DOI) which forms the theoretical bedrock of this study (Ball & Craig, 2010). The theory which is concerned with introduction of the use of new technology and other advancements in ideas and practices would help to achieve sustainable development. Practices such as waste and resource management, closed loop, R-strategy and material efficiency are all measures of circular economy. The

management of waste in any production component has been revealed to help minimise pollution in our planet while material efficiency is concerned with its ability to reduce cost of production. Circular economy is a closed loop whereby the environmental pressure is reduced encouraging cradle to cradle unlike the linear economy that is cradle to grave. Lastly, the R-strategy is characterised with recycling, reduce, remanufacturing, reuse, rethink are all strategies in the circular economy which are revealed to help achieve sustainable development which is gear towards shaping our planet in order to achieve peace, prosperity, eradicate poverty through partnership.

In this regard, circular economy is an innovation in industrial economy with the notion and design targeted towards the restoration and regeneration of resources which was lacking in the linear economy (Bohmecke-Schwafert et al., 2022). The restoration and regeneration of resources is traceable to its intent of having the capacity to reduce waste, reuse resources and recycle products/materials (Kirchherr et al., 2017). Firstly, reduce ability of circular economy is to reduce waste, energy and emission which are detrimental to people and planet which makes it a tool for achieving sustainable development goals (Valverde & Aviles-Palacios, 2021). In addition, circular economy as a business model takes cognisance of the people and planet in order to correct the production of waste and depletion caused by the linear economy. Secondly, the reuse ability enables constant changes of material for same use or for a different use thereby using a resource over and over. Lastly, its ability to recycle products/ materials at the very design stage of products puts less pressure on natural resources which makes the economy from cradle to cradle unlike the linear economy that is characterised with from cradle to grave since it lacks recycling (Korhonen et al., 2018). Therefore, several literatures originated from the nexus between circular economy and sustainable development revealing positive association (Okafor et al., 2020) mixed result (Korhonen et al., 2018) and negative association (Allwood, 2014; Schoggl et al., 2020). For instance, Schoggl et al. (2020) revealed that circular economy cannot be view as a sustainable development tool since it lacks social aspect of sustainable development. While Allwood (2014) argued that circular economy is a time-bomb waiting to explode. Based on the gap mentioned above, the study is carried out to reveal whether circular economy covers the three dimensions of sustainability (social, environmental and economy) and how it can be used to address the linear economy which is characterised by incessant increase in the use of natural resources by increased population which has resulted in making demand higher than supply thereby posing threat to planet and people in the form of pollution, depletion and degradation of natural resources and GreenHouse Gas (GHG) emission which poses threats to sustainable development (Panta, 2019).
The remaining part of this paper has been structured as follows: in section two, we discussed the concept of sustainable development and categories of sustainability.

We also discussed the concept of circular economy and its measures. We went further to review the empirical literature on the nexus that exist in circular economy and sustainable development. We concluded in section three and gave our recommendation.

Review of Related Literature

Sustainable Development

The World Commission on Economic Development (WCED, 1987) refers to sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs**.** Whereby there is harmony between social, economic and environmental issues which are the three dimensions of sustainability (Haffer & Searcy, 2017). Sustainability is an holistic multi dimensions of goals and having a long term view of the effect of business (economic) activities on people (social) and the ecosystem (Alshehhi et al., 2018). First, the economic dimension of sustainability is premised on businesses looking for ways to sustain profit and to have a competitive hedge not at the detriment of people and society but by embracing the theory of value creation where social and environmental risk is minimised. Second, the social sustainability is a focus on the total well-being of people in terms of improved living standard, human development, equity and social justice etc. Lastly, environmental sustainability is concerned with the ecosystem being protected against waste, depletion of natural resources, pollution and emissions and safe guarding planetary boundaries.

To support this view, Ekins et al. (2019) revealed that sustainability is categorised into social sustainability, which is concerned with the maintenance of social unity; environmental sustainability which is associated with the maintenance of environmental aspects; and economic sustainability which is the maintenance of the capital stock, sound money and corporate profitability. While, sustainable development is streamlined into objectives, targets and indicators which are Sustainable Development Goals (SDGs) and is concerned with the integration and achievement of all the three pillars of sustainability (Ekins et al., 2019). Having established what sustainable development is we examine the categories of sustainability.

Categories of Sustainability

The move has been on the principles that economic growth should not be achieved at the detriment of the environment. To this end, there should be a healthy relationship between the three pillars of sustainability (World Business Council for Sustainable Development [WBCSD], 1987). Therefore, to achieve sustainability the activities in the ecosystem should be tailored to balance the 3 dimensions by taking the well-being of the planet and people into cognisance for both now and the future generation (Di Vaio et al., 2021; Feil & Schreiber, 2017; Morton et al., 2017; Valverde et al., 2021**)**.

However, the definition of sustainable development by the United Nations has been questioned in the light of balancing the three pillars. According to Valverde and Aviles-Palacios (2021) sustainable development could also be policy objectives used by government, organisations and civil societies to achieve Sustainable Development Goals (SDGs). Moreso, UN (2018) puts that the ultimate objective of sustainability is for the alignment of society, economy and environment in order to regenerate the ecosystem. This according to Mensah and Enukwesi (2018) must be cross generational equity. Looking at this view of meeting socio-economic activities alongside environmental sustainability several studies have revealed the ambiguity associated with it showing that there cannot be a balance (Barbosa et al., 2014; Feil & Schreiber, 2017; Panta, 2019). Furthermore, Mensah (2019) documented it centers around inter and intragenerational equity anchored on environmental, economic and social pillars which are distinct and interrelated, hence, a trade-off is imperative.

Therefore, from the various viewpoints there is no straight way to define the concept of sustainable development. To this end, Panta (2019) categorised the sustainable development into strong, moderate and weak sustainability. In addition, the conceptual relations between circular economy and sustainable development can be characterised along a continuum from a more integrated and positive connection to a disaggregated and potentially adverse interaction (Geissdoerfer et al., 2017; Schroeder et al., 2018). It is on this note that the work of Panta (2019) and Sala et al. (2015) grouped sustainability as strong, moderate and weak hence, circular economy can be said to be a strong sustainability tool. On the positive node lies the strong sustainability which is rooted in the domain of ecology. Whereby emphasis is placed on reduction of pressure on our planet by decreasing the exploitation of what we consume that generate waste (Malik, 2012). This concept according to Klarin (2018) views a symbiotic relationship between economic activities and its environment. Followed immediately is the moderate sustainability which is at the mid-way between strong and weak sustainability, people desire high standard of living while population is increasing which implies that high standard of living cannot be achieved with high population and lastly weak sustainability is one rooted in the economics domain where aggregate capital is emphasised. Furthermore, circular economy in its form of recycling will lead to less use of resources and waste will be eradicated whereby leading to waste reduction. The achievement of waste, energy and emission elimination is key to the tackling of climate risk SDG 13 which is part of Agenda 2030.

In furtherance, Millar et al. (2019) argued that the attainment of a dimension of sustainability should not cause harm to the other, thus, the overall emphasis of the Brundtland report is to put a balance between people and environment while economic gains is being achieved. The implication will be to eradicate poverty which translates into peace. Similarly, Schroder et al. (2019) argued that the problem of

economic growth that is predominant in the linear economy is associated with environmental pollution and depletion of resources and to correct this linear economy the circular economy is being nuanced. In addition, circular economy borders on the issues of maintaining economic growth that will not be detrimental to the environment by enhancing living standard and protecting the planet (Morton et al., 2017; Organisation for Economic Co-operation and Development [OECD], 2020; Smol, 2021).To support this view, we posit that circular economy has an indirect role in the social dimension of sustainability. This therefore leads to our next discussion on circular economy.

Circular Economy

Okafor et al. (2020) describe circular economy as waste management which can be used to mitigate environmental risk such as pollution, carbon emission and indiscriminate dumping of waste. The study examined the challenges of implementing circular economy in waste management of end of life tyres in Nigeria and recommended formation of a producer responsibility organisation nationwide.
In addition, the OECD (2020) documents that circular economy is linked with climate, green and sustainable strategies which assist in rethinking production and consumption patterns, improve environmental quality, create new business models, favour behavioural change and boost innovation. Towards this end, it is used as a policy to reduce waste and for resource management whereby there is overall reduction in cost of production component.

Furthermore, Berg et al. (2018) revealed that circular economy is linked with these sustainable development goals which include no poverty (SDG1), responsible consumption and production (SDG12), sustainable cities and communities (SDG11), and the promotion of inclusive and sustainable industrialisation and innovation (SDG9). To support this view, Ghisellini et al. (2016) describe circular economy as the 3Rs (reduce, reuse and recycle). In the same vein, Murray et al. (2017) describe circular economy as a recovering tool as against the linear economy. Furthermore, EMF (2021) describes circular economy as an economy that restores and regenerates the environment. Again, Kirchherr et al. (2017) describe circular economy as waste minimisation and also minimises exploitation of resources in the light of environmental risk caused by depletion and pollution.

However, Schoggl et al. (2020) explains that circular economy is an economy where there is resource efficiency, waste management and recycling. The study was a mixed-methods approach which combines a longitudinal bibliographic network analysis. They found that circular economy is of two folds the management and technically-oriented studies either using end of life or beginning of life and the study concluded that circular economy has no sufficient correlation with the social aspect of sustainability. This study is in line with the work of Velenturf and Purnell (2021)

describing circular economy as resources utilisation, conservation of resources and recycling of products thereby reducing environmental risk. They revealed that circular economy help to boost economic profit while reducing environmental risk. However, concluded that circular economy does not promote sustainable development. The study was a revisit of the system ecology literature to buttress their points. To this end, we argued that studies have revealed that circular economy supports SDG1: no poverty, (Berg et al., 2018) falls under the social aspect of sustainable development hence; we posit that circular economy covers all three dimensions of sustainability. We therefore examined the measures or operations of circular economy in terms of waste and resource management, R-strategy, material efficiency and closed loop these are discussed below.

Operationalisation of Circular Economy

Waste and Resource Management

Circular economy is revealed to be anchored around waste and resource management by several researchers (Haas et al., 2015; Kalmykova et al., 2018; Lieder & Rashid, 2016) where waste is viewed as a new resource within the economy which help to reduce cost. There is no room for waste disposal rather the waste are recycled (Elgie et al., 2021).Circular economy help to reduce waste generation by prevention, reduction, recycling and reuse (Elgie et al., 2021). Therefore, for sustainable development waste management is imperative; hence, any action on managing waste is gear towards circular economy.

Material efficiency

Circular economy can be measured as material flows within the economy. Using material flow as circular economy measure is seen as a meso level measurement where materials are distinguished not only in categories of materials, but also industries or branches of production and categories of consumption (Kalmykova et al., 2018). Moraga et al. (2019) documented that the preservation of material is achieve through Life Cycle Thinking (LCT) approach which has to do with recycling. This is revealed to minimise the use of resources and waste generation. Toward this end, Kalmykova et al. (2018) documented that the macro level of circular economy measurement is centered around using Material Flow Analysis (MFA), energy analysis, and Input-Output analysis. In the same vein, Pauliuk (2018) proposed the dashboard measurement to assess five characteristics promoted by the British Standard Institute (BSI) with the aim for the implementation of circular economy in businesses, organisations and production systems which are restore, regenerate, maintain utility, maintain financial value, and maintain nonfinancial value and existing indicators for complementary characteristics (resource efficiency, climate, energy, and sufficiency).

R-strategy (Rs)

These are innovations in circular economy to mean the 10Rs they include repurpose, recover, restore, recycle, remanufacture, repair, refurbish, reduce, rethink and refuse (Potting et al., 2017). Similarly, Moraga et al. (2019) opined that these R-strategies can be stratified according to their attempt to preserve functions, products, components, materials, or embodied energy. In Rs the functions, products, material and energy are key to circular economy.

Reduce strategy is concerned with reducing input and use of natural resources; reducing emission levels; reducing valuable materials losses; increase share of renewable and recyclable resources; and increasing the value durability of products (Potting et al., 2017). They further document that down cycling strategies may also promote innovative business models that go beyond product preservation. Strategies for redundancy, multifunctionality, or use intensification of products to promote circular economy by preventing the consumption of new products or creating new consumption patterns. For example, consumers may refuse to buy new products if services or multifunctional products create redundancy in the expected function (Potting et al., 2017).

Closed Loop and R Strategy

The circular economy concept is a shift from end-of-life in current production and consumption practices by reducing, reusing, and recycling (R- srategy) products and materials in production, distribution and consumption processes (Velenturf & Purnell, 2021). As a result, efforts are put in place to correct the linear economy. To support this, the European Union (2015) introduced measures to encourage recycling of certain categories such as electronic waste. Closing resource loops is used as a reference to prevent waste generation, as far as possible in the post-use phase. Therefore, it is imperative to look at the view that supports a closed loop to be the panacea for environmental challenges caused by production and consumption in the linear economy that has to do with end of life (Bowcott et al., 2021). We have examined the measures of circular economy, our next examination is to reveal the empirics of circular economy and sustainable development.

Review of Empirical Literature

Sustainable development is a way forward looking concept that seeks to know the fairness of current development in the society and if such can be maintained in the future, while putting environment, economy and social justice into consideration (Verbruggen & Kuik, n.d). The current linear economy has been revealed to be unsustainable to development (Berg et al., 2018).

In this regard, molinoari et al. (2019) argued that the principles of sustainable development are conservation of the ecosystem, population management and the development of human resources. Based on this, it is the people that have the responsibility to protect the environment by engaging in sustainable activities

through the application of innovative design. The participation of people in achieving sustainable development has birth the use of circular economy, which according to this study fell in the categorisation of strong sustainability (Panta, 2019, Sala et al., 2015).The aim of circular economy is to provide positive environmental outcomes during the production and consumption of goods and services, reduce the use of natural resources and in doing so, we can preserve resources for the next generation, reuse goods, and recycle the used products and therefore addressing SDGs: 12 responsible consumption and production and 13 climate action (McKinsey&Company & EMF, 2016). To this end, it means that healthy economy can coexist with healthy environment by taking a proactive step at the design stage of a product and keep resources at loop thereby conserving natural resources.

Sustainable development attainment are tied to the SDGs and Agenda 2030 studies have revealed that circular economy is linked with SDGs: 1, 9, 11, 12 (Berg et al., 2018). In respect to SDG 1: No poverty, the circular economy is revealed to boost economic growth by cost reduction in area of recycling. This help to reduce poverty in the society by increasing GDP and creating employment (Berg et al., 2018; EMF, 2021). Additionally, SDG 9: Industry, Innovation and Infrastructure, with circular economy which is an innovation will benefit companies and cities as a result of its agenda on waste, hence, there will be a reduction if not total elimination in waste, resource efficiency gains and reductions in environmental hazards such as pollution, emission and depletion (Ghisellini et al. 2016).

EMF (2021) introduced the circular economy as an industrial economy that is restorative or regenerative by intention and design. The foundation took out time to identify what companies use to analyse and classify waste materials. All these are evidences of how circular economy has brought peace to the planet and people. On the contary, Schoggl et al. (2020) found that circular economy has a subset relationship with sustainability; however, most studies reviewed revealed relationship with waste, CO_2 emission and resource use and sustainability. The study employed a mixed method, they concluded that it is the integration of material, consumer and strategy into circularity that will make it sustainable. They further found circular economy to help in addressing the environmental aspect and leaving the social aspect with little effect. However, Okafor et al. (2020) documented that the environment also benefit through less resource depletion and pollution while society benefits from the environmental improvements. Similarly, DiVaio et al. (2021) documented that circular economy can be used to achieve the Agenda 2030 on waste management. The study revealed that to harness the full potentials of circular economy, production and consumption must be redesigned under the circular economic business model development processes. In the same vein, Valverde and Aviles-Palacios (2021) viewed circular economy as a new business production model for achieving SDGs. The study examined the role of circular economy in progress

towards achieving sustainable developments goals using a heuristic methodology, review the relationship between circular economy and sustainable development goals. They found a positive relationship between implementation of circular economy and SDGs: 6, 8, 12 and 15.

However, Allwood (2014) argued that it is only with the use of advance technology that the achievement of breaking down waste to some other use can be optimised, hence, secondary production cannot completely displace primary production. Given that it is not possible to break down some wastes or to purify certain liquids. Moreso, Korhonen et al. (2018) argued that for circular economy to be a sustainable tool consumption patterns must be changed, hence, improving productivity will not reduce consumption.When production is reduced and consumption is changed then and only then negative environmental impacts will be reduced however, with the use of technological advancement. Similarly, Murray et al. (2017) found that circularity measures (reduce) have adverse impact on the biomaterials sector. For example the production of palm oil for biofuel is perceived as reducing dependence on fossil fuels, reducing primary resource consumption and supposedly net carbon emissions and has contributed to accelerated deforestation. This study revealed that the circularity strategies do not lead to sustainable development.

Similarly, Kircherr et al. (2017) found that circular economy has so far paid very little attention to both intra and inter-generational equity which is a core of sustainable development for sustainability, hence, does not meet the sustainable development criteria.

Conclusion and Recommendation

The study examined the literature on circular economy and sustainable development. The study revealed that for circular economy to be sustainable it must balance the 3 dimensions of sustainable development. While sustainable development was revealed to focus on people, planet, prosperity and the peace and partnership of all a sundries. The study further revealed that circular economy have links with achieving sustainable development, however, some studies revealed that it does not tackle the social aspect of sustainable development, hence, cannot be said to be sustainable. We further examined the grouping of sustainability to include strong, moderate and weak sustainability; hence, we conclude that circular economy is a strong sustainable development tool. We recommend the enforcement by government to make recycling compulsory in production and should be revealed in reports.

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