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Circular economy spiral: integrating social dimensions for sustainability

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Abstract

There is growing recognition that while current Circular Economy frameworks often succeed in prioritising economic growth and incorporating some environmental concerns, they tend to overlook critical social dimensions such as equity, inclusion, and wellbeing. To address this gap, this article introduces the Circular Economy Spiral—a conceptual model that highlights the interconnected nature of circular processes while explicitly integrating social considerations into Circular Economy. The Spiral functions as a heuristic tool to realign circular economy discourse with the core principles of sustainable development. By placing corporate responsibility, environmental protection, and social development at the forefront, the model promotes circular transitions that are not only efficient and regenerative but also inclusive and socially fair. This approach draws attention to the imbalance in many existing circular strategies and underscores the need to strengthen both environmental and social pillars for a truly sustainable future.

Keywords: circular economy, sustainable development, society, environment, climate change.

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Espiral da economia circular: integrando dimensões sociais para a sustentabilidade

Resumo

Há um reconhecimento crescente de que, embora os atuais modelos de Economia Circular frequentemente priorizem o crescimento econômico e incorporem algumas preocupações ambientais, eles tendem a negligenciar dimensões sociais críticas, como equidade, inclusão e bem-estar. Para dar conta dessa lacuna, este artigo apresenta a Espiral da Economia Circular — um modelo conceitual que destaca a natureza interconectada dos processos circulares, ao mesmo tempo em que integra explicitamente considerações sociais essenciais na Economia Circular. O Espiral funciona como uma ferramenta heurística para realinhar o discurso da Economia Circular com os princípios fundamentais do desenvolvimento sustentável. Ao colocar a responsabilidade corporativa, a proteção ambiental e o desenvolvimento social em primeiro plano, o modelo promove transições circulares que não são apenas eficientes e regenerativas, mas também inclusivas e socialmente justas. Essa abordagem chama a atenção para o desequilíbrio presente em muitas estratégias circulares atuais e reforça a necessidade de fortalecer tanto os pilares ambientais quanto os sociais, rumo a um futuro verdadeiramente sustentável.

Palavras-chave: economia circular, desenvolvimento sustentável, sociedade, meio ambiente, mudanças climáticas.

1. Introduction

Climate change has emerged as a pressing global concern. Yet, approaches to mitigate or reverse its effects remain, quite literally, a hot subject. There is an increasing urgency to address the destructive impacts of climate change. Pursuing effective solutions that balance the benefits, drawbacks, and trade-offs inherent in sustainable development paths—across local, regional, and global scales—remains an ongoing effort. One reason may be the deeply entrenched complexities of economic growth, which often lead to governmental agendas neglecting to address their impact on development efficiently, thereby placing human survival at risk.

Gaining unprecedented prominence as a development path, Circular Economy models have presented meaningful alternatives for sustainable economic growth in a way that safeguards the environment. Innovation is in the interest of industries, and they may require new models to achieve a sustainable economic path effectively (Ferasso et al., 2018). To effectively mitigate the effects of climate change, it is essential to have a comprehensive understanding of how global politics and businesses have been operating (and will likely continue to operate), as they impact various levels of society. Addressing the social dimension remains necessary (Hofmann, 2019). One key critique of the adoption of the Circular Economy has been its failure to fully incorporate the societal dimensions of sustainability (Ranta; *et al*., 2018).

The Circular Economy has become increasingly prominent in the everyday discourse and research agendas of academics, corporations, and governments (Alnajem et al., 2021). Amongst the various definitions found in the existing literature, this article adopts the concept as "an economic system that employs a systemic approach to maintain a circular flow of resources by regenerating, retaining, or adding to their value, while simultaneously contributing to sustainable development" Canelas-Santiesteban et al. (2020 p. 19).

The Circular Economy concept has been grounded in the concept of Sustainable Development. Thus, the Circular Economy principles are not coincidentally closely related to the Sustainable Development Goals (SDGs) underpinning the United Nations' 2030 Agenda for Sustainable Development. Nine of the 17 SGDs were directly linked to society (Ashby et al., 2019). In 2022, the 27th United Nations Climate Change Conference (commonly referred to as COP27), held in Egypt, aimed to impose ambitious environmental policies on countries to combat climate change (Laureti et al., 2023, p. 2). In 2025, the 30th United Nations Climate Change Conference (COP30), in Brazil, was planned to focus on a new global goal for climate finance and advancing climate action. Despite such attempts to protect the environment, it remains unclear whether implementing Circular Economy models will effectively address growing social inequality in a manner that justifies the continuation of unequal economic growth (Schroeder et al., 2018). The prevailing focus has been on mitigating the environmental impacts to allow economic development, without placing equal emphasis on the significance of social matters.

Since the early stages of its evolution, the emphasis of the Circular Economy has been on generating profits, with limited attention given to achieving social benefits (Ashby et al., 2019). Therefore, making sense of genuine Circular Economy models remains problematic. To validate the Circular Economy as an efficient development path, its implementation and outcomes must consider the social benefits and resilience necessary to prevent, mitigate, and recover from severe crises. For instance, the Ukraine-Russian conflict has profoundly impacted the organisation of global economic, environmental, and social activities. Due to the world's unbalanced political and economic power, the consequences have proven more damaging to some countries than others. For example, the UK banned oil purchases from Russia by the end of 2022 and petroleum products in 2023. However, UK buyers have indirectly acquired Russian oil from Indian refineries (Canton, 2023, Ozili, 2024). The suspension of oil and natural gas supply from Russia to European countries has highlighted how the global majority relies on fossil fuels.

Considering the Circular Economy's importance as a sustainable development path, this theoretical article focuses on discussing how its implementation remains fragile in terms of the social dimension (Inigo; Blok, 2019, Mies; Gold, 2021). This paper highlights how the three pillars of sustainability in the conceptual framework of a Circular Economy have received unequal attention, proposing a heuristic approach by unveiling the Circular Economy Spiral concept. A Circular Economy cannot exist unless societal needs are clearly defined and systematically integrated into its formulation (Murray; Skene; Haynes, 2017). While Circular Economy concepts may implicitly or explicitly reduce the excessive emphasis on economics, for instance, considering the current climate change *status quo*, it is possible to notice how unequal power relations have mostly affected low-income countries pursuing sustainable development paths (Schroeder et al., 2018). Failing to recognise the worldwide economic disparities and unequal power distribution among countries may derail the journey toward a Circular Economy.

The Circular Economy Spiral concept is a visual tool that links economic growth with environmental protection and the creation of lasting social benefits. The Circular Economy Spiral is a heuristic concept that highlights the world's development *status quo*, focusing on "economic sustainability" while addressing the unequal and peripheral treatment of "environmental sustainability" and, in particular, "social sustainability". The underlying argument is that sustainable development becomes unattainable unless environmental and societal concerns are addressed to align with economic growth. The spiral illustrates how the three pillars—social, economic, and environmental—can develop in tandem without jeopardising each other. That is, the Circular Economy Spiral model illustrates how continuous parallel developments can coexist, as in a spiral with three branches.

To demonstrate how the Circular Economy Spiral concept can help us equally weigh its three pillars, first, the current conceptualisations of the Circular Economy are reviewed. Subsequently, the Circular Economy Spiral

concept is explained and illustrated, and it is presented how economics is a "lap ahead" of environmental and social development. This is followed by a discussion on how incorporating socio-environmental dimensions is equally essential for sustainable global development.

2. Overview and perspectives of circular economy

Warnings about how economic development is occurring at a rapid rate, surpassing the world's capacity, stimulated by technological advances, have been observed for over half a century. In the 1970s, the UN warned the international community to reconsider its previously oversimplified assumptions regarding the global pursuit of limitless growth. The publication of the Limits to Growth (1971) report and the UN Conference on the Human Environment, held in Stockholm in 1972, were landmark events that called for decisive action to address environmental damage. Although concerns regarding environmental degradation may have started much earlier, the Stockholm Conference was the first-ever international call to emphasise the protection of the environment as a pressing global issue, focusing on the human environment. Until then, the notions of "development" and "environment" had been perceived as inherently "contradictory of intrinsic trade-offs" (Corvellec; Stowell; Johansson, 2022, Geissdoerfer et al., 2017, Sachs, 2015).

The various definitions of a Circular Economy share similar features grounded in the three pillars of Sustainable Development: economy, environment, and society (Stankevičienė; Nikanorova, 2020). They recognise a need to establish stability and resilience. Circular Economy definitions have been deeply grounded in the 3Rs principle: Reduce, Reuse, and Recycle (Manickam; Duraisamy, 2019). Over time, some authors have also presented 4Rs: reduction, repair, remanufacturing, and recycling (Barreiro-Gen; Lozano, 2020), 6Rs: Recover, Reuse, Remanufacture, Recycle, Redesign, Reduce (Manavalan; Jayakrishna, 2019), or even 9Rs:

refuse, rethink, reduce, reuse, repair, refurbish, remanufacture, repurpose, and recycle (Khaw-Ngern et al., 2021, Potting et al., 2017). In common, they advocate for further economic development and emphasise the need to adopt frameworks that facilitate an efficient transition from a linear production model to a Circular Economy (Neves; Marques, 2022).

By the 1980s, achieving a sustainable development path had become a global concern, driven by discussions about the interplay between the economy, the environment, and society. However, a watershed moment was the publication of the Brundtland Report, presenting a widely used definition of sustainable development as a way that "meets the needs of the present, without compromising the ability of future generations to meet their own needs" (United Nations, 1987). Later, reflecting the international repercussions and achievements of environmental initiatives that began in the 1970s and 1980s, agreements concerning how to safeguard the environment were consolidated in Brazil at the 1992 United Nations Earth Summit (Chertow, 2007). As a result, the concept of a Circular Economy is attracting increasing interest from various global actors. Consequently, scholars, policymakers, and practitioners have developed various Circular Economy models.

Over the years, tensions have emerged regarding the generalisation of the Circular Economy concept, suggesting the need to reformulate its notion (Geissdoerfer et al., 2017). The oversimplification of the Circular Economy can be resolved by (re)defining its ontological criteria (Van Bueren et al., 2022). Although efforts to achieve a more sustainable society have gained attention, society and the environment have seemingly not received equal attention as economic development. As a central pillar through which the Circular Economy has developed, societal depreciation may have impacted its implementation.

Over time, more than 100 definitions of a Circular Economy have been created (Kirchherr; Reike; Hekkert, 2017). Considering the multifaceted dimensions of a Circular Economy, we should not be surprised if other

definitions are also created. For example, sustainability has approximately 300 definitions (Johnston et al., 2007). Studies on Circular economy business models have presented the prevalent relationships among areas such as supply and demand, and, very importantly, contextual considerations (Ferasso et al., 2020). Having a broad range of Circular Economy definitions may indicate that the concept is still evolving, as it needs to be adapted to address the rapidly changing effects of climate change. Thus, it is fair to argue that the development of Circular Economy models remains fragmented (Korhonen; Honkasalo; Seppälä, 2018). One explanation for the creation of multiple definitions may pertain to the diverse socioeconomic and environmental disparities within countries and globally. Although different understandings may blur the concept at various levels in other places, it is essential to address the specific challenges faced by a myriad of sectors in different countries.

The complex and deeply interconnected aspects of Circular Economy models require actions such as ensuring: a) environmental preservation, including raw material shortages and waste management; b) business operating conditions such that economies can grow globally; and c) social development, including social inclusion and equity that have often been overlooked (Corvellec; Stowell; Johansson, 2022, Inigo; Blok, 2019, Niskanen; Anshelm; Mclaren, 2020). In fact, prior research has already highlighted the concept's notable neglect of social equity (Moreau et al., 2017, Murray; Skene; Haynes, 2017, Sauvé; Bernard; Sloan, 2016).

Several studies have revealed that Circular Economy models have bypassed sociocultural and political issues (Zwiers; Jaeger-Erben; Hofmann, 2020). Despite concerns about environmental protection, studies show that the Circular Economy has often neglected social considerations while focusing on economic prosperity (Kirchherr; Reike; Hekkert, 2017). According to Kirchherr, Reike and Hekkert (2017), in their coding of 114 definitions, only 18%–20% have considered social equity; "those who propose the Circular Economy may be well-advised to state social equity as

one of its design variables while starting to research its social equity impacts" (p. 227–228).

Seeking alternatives to ensure that economic growth is not interrupted, Circular Economy models may have failed to address societal sustainability factors (Wijkman; Skånberg, 2015). As addressing societal matters is vital for economic growth and environmental preservation, it may be questioned whether Circular Economy initiatives have disregarded or failed to achieve part of their proposed objectives. The link between environmental sustainability and economic potential has generated worldwide interest in the Circular Economy (Ranta et al., 2018). Unsurprisingly, policymakers and practitioners (i.e., businesses, companies, and industries) have commonly sought Circular Economy models that reduce their costs, which consequently increase revenue (Ellen Macarthur Foundation, 2020).

Addressing environmental degradation to ensure the continuation of economic activities appears to be the core objective of a Circular Economy, while social development seems to be perceived as a marginal concern rather than a pursuit. Hence, making sense of Circular Economy concepts remains problematic (Kirchherr; Reike; Hekkert, 2017). Groups such as politicians, companies, and policymakers may embrace a Circular Economy as a business strategy to avoid environmental degradation and its social repercussions. As countries hold dissimilar powers over their resources, a vital social concern is how a Circular Economy may open opportunities for some countries to continue developing their economies at the expense of poorer countries, for example, leading poorer countries to relax their environmental regulations. An overview of the adoption of the Circular Economy suggests the parts benefiting the most are industrialised countries (Ghisellini; Cialani; Ulgiati, 2016). Adopting an effective development path is a worldwide endeavour that, while presenting unforeseen challenges, unveils areas that require further attention and opportunities at the global level.

3. Circular economy as a global model

As concerns about mitigating the effects of climate change are global, the concept of the Circular Economy is being discussed and refined in various parts of the world. International actors have presented initiatives that have had a significant impact on other regions. Companies have invested heavily in transitioning to a more sustainable mode of production; they seek a Circular Economy framework that portrays them as responsible businesses while ensuring competitiveness (Bocken et al., 2014). Yet, the ultimate goal of companies remains to generate profits: the more, the better. There is the argument that the Circular Economy as a development model needs to be deeply linked to neo-classical economics in which the "free market" brings the most efficient allocation of resources (Bimpizas-Pinis et al., 2021, Corvellec; Stowell; Johansson, 2022). It may explain why operationalising the Circular Economy in a manner that addresses social issues has been challenging. Companies are not altruistic; their ultimate goal is to produce at the lowest possible cost to maximise profits.

Therefore, unsurprisingly, the definitions of the Circular Economy concept have often been scrutinised (Blomsma; Brennan, 2017). The Circular Economy has become part of the public debate, often under the general agreement that shifting from a linear model to a more sustainable mode of production with a lower impact is essential. Adopting a Circular Economy is not only related to protecting the environment—for example, by seeking to increase resource efficiency and reduce waste—but it has also revealed previously unexplored economic opportunities that contribute to economic growth (Ranta et al., 2018). In an increasingly globalised world, the quality and production costs of goods are heavily influenced by several factors, including resource availability, to ensure that competitive prices are achieved. It does not imply passing on to other countries' outsourcing activities, which may have environmental impacts.

In the past, it was common for businesses in rich countries to produce in other countries and even ship their waste to be reused or refurbished in different parts of the world (Reike; Vermeulen; Witjes, 2018). As Mavropoulos and Nilsen (2020) remind us, "the future waste is already here, so a genuine Circular Economy approach should take into consideration how we deal with massive stocks and the involved secondary materials" (p. 90). However, the "exportation of waste" as goods or materials from wealthy countries to be recycled in poorer countries is still a common practise. In an increasingly globalised world, products are not always disposed of in the places of production or consumption. A significant amount of materials continues to be transferred across the globe (Corvellec; Stowell; Johansson, 2022, Skene, 2018).

Considering the global dimension of production, transportation, and disposal of goods at the end of their lifecycle, Circular Economy models must effectively close loops (Fischer; Pascucci, 2017, Guo et al., 2017). It is essential not to neglect the extent of waste embedded in the lifetime of products, and that countries have different regulations and laws to regulate the use, disposal, or reuse of what is considered waste (Ghisellini; Cialani; Ulgiati, 2016, Velenturf; Purnell, 2021). Thus, it is also necessary to consider the environmental and social impacts of recycling activities in receiving countries, even when practised legally.

Scholars are increasingly concerned that Circular Economy initiatives may lead to a centre-peripheral arrangement. As a result, the Global South may exercise limited agency, including not engaging with the informal sectors of the economy that play critical socio-environmental and economic roles outside the Global North (Pansera; Genovese, 2020). The concern of a centre-peripheral (re)arrangement is grounded on "Westernised environmental discourses" that may have recreated "anthropocentric and ethnocentric ideas" in the Global South, including places that were or have been historically marked by colonisation and exploitation under the pretence of development (Corvellec; Stowell; Johansson, 2022, Friant;

Vermeulen; Salomone, 2020). Academic institutions and organisations in the Global South have increasingly promoted Circular Economy models grounded in regional research and context-specific approaches.

Whether the Circular Economy has the potential to balance or even reverse environmental damage in the Global South, the social dimension in developing economies remains neglected (Oliveira, 2021). As a global production model, the Circular Economy should consider economic and political asymmetries. However, the political implications remain largely absent from this discussion (Oliveira, 2021, Winans; Kendall; Deng, 2017). Circular Economy frameworks should be grounded in the notion that the world has limitations. Yet, poorer countries may obtain limited benefits, advancing mainly to richer countries; the same could be said about the poorer segments of societies within both developed and developing countries. The distinct Circular Economy approaches have implications for the creation of localised policies and frameworks. For example, dissimilar approaches, implementations, and applications of the Circular Economy have been observed across China, the European Union, and countries in Latin America.

China pioneered the development of Circular Economy initiatives (Anaruma et al., 2022) by identifying initiatives within the ecological economics framework to address resource scarcity issues (Ghisellini; Cialani; Ulgiati, 2016). China has adopted a top-down approach to implementing a Circular Economy. China has a vertically structured Circular Economy as part of its national political strategy (Zhijun; Nailing, 2007). Companies in China – not only Chinese companies – have sought resource efficiency to meet international standards, contributing to a complementary vertical circular economy approach. The adoption of Circular Economy models in China, responsible for producing a large variety of goods commercialised worldwide, has long changed its industry operation mode and the country's socioeconomic organisation at all levels (Naustdalslid, 2014).

In contrast to the Chinese Circular Economy model, the EU Circular Economy model appears to have evolved in response to social expectations. The adoption of the Circular Economy in Europe seems to be driven by a horizontal development process that proceeds "bottom-up" rather than a "top-down" approach. In Europe, Circular Economy approaches are found in environmental economics as an interplay between environmental and economic systems (Ghisellini; Cialani; Ulgiati, 2016, Naustdalslid, 2014).

For example, the UK government publicly positions itself as interested in moving toward a more Circular Economy to address climate change. As outlined in the Circular Economy Package (United Kingdom, 2020), the UK government has demonstrated an increased emphasis on fossil fuel production and its reliance on it. However, in response to the geopolitical implications of the Russia-Ukraine conflict, to ensure their energy security, the government rapidly introduced measures such as launching a new licensing round and awarding over 100 licences covering nearly 900 locations in the UK (North Sea Transition Authority, 2022). The UK government's actions raise concerns about its commitment to addressing climate change, suggesting a prioritisation of short-term energy security over long-term sustainability. The involvement of private companies, civil society actors, and governments seeking an adequate framework embracing social, environmental and economic dimensions seems more "market-based" (European Commission, 2015, Ranta et al., 2018).

As a prerequisite for the adoption of the Circular Economy model, promoting sustainable consumption and the role of consumers in society is crucial (Lieder; Rashid, 2016). This does not imply that consumers, rather than companies, are fully responsible for their consumption habits. Consumers often have no information about the source of the material, its environmental impact, or the social conditions under which the goods are produced. Although companies publish information about the origin of their products, this does not mean that the information reaches consumers or that consumers have read it (Corvellec; Stowell; Johansson, 2022,

Vonk, 2018). Additionally, even when aware of the environmental impact of their purchases, many individuals are either unable or unwilling to pay extra for more environmentally friendly options. Therefore, expecting a significant change in consumption patterns is unrealistic; limited consumer knowledge may be a contributing factor to the problem with green offerings (Corvellec; Stowell; Johansson, 2022).

Companies have frequently published information about their practices, claiming to promote circularity (Corvellec; Stowell; Johansson, 2022). For instance, some companies have demonstrated their commitment to acquiring materials and services from suppliers that employ ethical practices to protect the environment and society, while adhering to the laws and regulations of their respective countries. A Circular Economy often encourages the emergence of a new consumption culture. However, the complex socio-spatial relations guiding the means of production and consumption patterns are insufficient to mobilise consumers worldwide (Hobson, 2020).

Many consumers may not be willing or cannot afford to change their consumption habits, especially when a less sustainable option is available at a lower price. The affordability factor influences consumers' choices, often leading them not to question the material or how and where they purchase the items. Using a simple example, many people are unaware of the amount of water or wastewater used in coffee production. For 1,000 kg of coffee production, 125,000 L of water is used (Alemayehu; Asfaw; Terfie, 2021). Thus, approximately 125 L/kg of coffee is consumed.

Additionally, the large volume of water used to process coffee can contaminate rivers and soil. Thus, coffee companies should also consider other environmental impacts (e.g., packaging and transportation to different places worldwide). Despite this awareness, many people continue to drink coffee as they have done in the past. Although the Circular Economy can be regarded as an indicator of the capitalist reconfiguration that will gradually occur over time (Kębłowski; Lambert; Bassens, 2020), the reformulation of consumerism is far from reality.

In Latin America, the Economic Commission for Latin America and the Caribbean (ECLAC) has produced reports examining the intersection of the Circular Economy and international trade. These reports underscore the critical importance of aligning trade policies with circular economy strategies to optimise economic and environmental outcomes (Pimenta, 2022). For instance, it is argued that the circular economy can serve as a central pillar for sustainable development in Latin America and the Caribbean, provided that structural challenges are addressed and a culture of circularity is actively fostered. Similarly, Chafla-Martínez and Lascano-Vaca (2021) examine the circular economy from Ecuadorian and broader Latin American perspectives, highlighting the need to integrate bioeconomics and behavioural economics principles to enhance sustainability in the region. In Brazil, Cosenza et al. (2020) discuss how the circular economy can be a viable pathway for sustainable growth, analysing the National Solid Waste Policy and emphasising the importance of environmental education and reverse logistics in advancing circular practices. More recently, Cruz et al. (2024), examined legal foundations frameworks in Brazil and abroad, with particular attention to the application of these principles in national energy systems, discussing the challenges and contributions of the Circular Economy to sustainability.

The literature on the Circular Economy has consistently highlighted the development and implementation of regionalised theoretical frameworks, emphasising the need for localised strategies. While substantial progress has been made, the focus on the social dimension remains limited. Technological advancements, particularly since the last century, have accelerated economic development. The extent to which environmental challenges and social needs can be effectively addressed remains unclear.

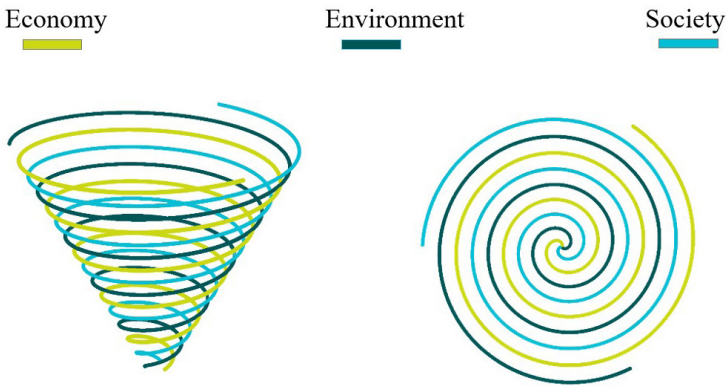
4. The circular economy spiral

To highlight the arguments that the Circular Economy's social aspects are still insufficiently acknowledged, discussed, or integrated and addressed,

to demonstrate the need for a more comprehensive, multidimensional approach, I have conceptualised the Circular Economy Spiral model, represented by a spiral with three branches.

As presented in Figure 1. Circular Economy Spiral: Aligned Model, the Circular Economy Spiral illustrates a progressive conceptual alternative that is continuous and non-conflictive, encompassing social, environmental, and economic aspects. In the Circular Economy spiral model, social, economic, and environmental growth should be mutually supportive, progressing in a way that does not compromise environmental preservation or social benefits. While the Circular Economy Spiral represents how the three key pillars of the Circular Economy can develop in parallel, a remaining challenge is to create meaningful measurement indicators to establish significant units of analysis. As planned, the Circular Economy Spiral allows for an abstract representation of how Circular Economy models can aim to develop the economy by embracing social development and environmental preservation. A key objective of developing the Circular Economy Spiral is to stimulate further development of Circular Economy models.

Figure 1. Circular Economy Spiral: Aligned Model.

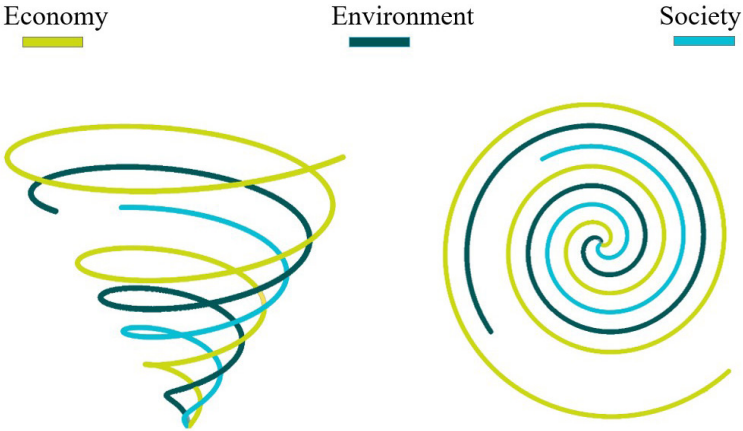


The Circular Economy Spiral implies the possibility of all branches concurrently expanding or retracting at different rates and times. The Circular Economy Spiral illustrates how the economy, environment, and society are constantly moving and extending along the same path toward growth. This spiral was designed to provide a clear and intuitive visual representation of the interrelationships among the various dimensions of the Circular Economy. Along with other models, the Circular Economy Spiral can be integrated into existing and new conceptual frameworks. From an economic growth perspective, preserving the environment and benefiting society simultaneously will enhance opportunities for economic growth.

Ideally, the three pillars of the Circular Economy would develop in a way that maintains a regularity, ensuring they remain continuously balanced. However, given the current status of climate change, if one were to produce a spiral to represent a Circular Economy in our time, the result would likely be a spiral in which the environment and society lag behind economic development. The visual representation of desynchronisation of Circular Economy, which could compromise the advances of different society is illustrated in Figure 2. Circular Economy Spiral: Misaligned Development. A disproportionate distance between economic growth, environmental protection, and social benefits may result in the desynchronisation of the Circular Economy.

Although it can be argued that the Circular Economy concept remains in its nascent stages, its practical implementation requires a transdisciplinary approach that spans all sectors and societal levels (Dewick et al., 2022). By doing so, Circular Economy models will go beyond economic growth to reconfigure a more inclusive development path, generating ever-changing preconditions for sustainability. Innovation is at the core of Circular Economy frameworks; however, it can be unpredictable and nonlinear (Ferasso; Cherobim, 2017).

Figure 2. Circular Economy Spiral: Misaligned Development.



Bridging the gap between various levels of implementation would require a strategic alignment. To date, societal dimensions have been incorporated into the Circular Economy framework in a fragmented and inconsistent manner (Mies; Gold, 2021). This economic-led model may jeopardise long-term needs and the economic conditions required for sustainability. The Circular Economy Spiral is an inclusive approach that reminds us of the need to align different dimensions to achieve meaningful outcomes. Despite some studies demonstrating the lack of importance placed on mitigating social issues, Circular Economy frameworks remain grounded in earlier models; as a result, their implementation may become counterproductive (Oliveira, 2021). Most Circular Economy literature suggests that the social dimension is central to sustainability; yet the focus remains on preserving natural systems (Ashby et al., 2019). Despite subjectivity and potential controversies in measuring economic development over the years, it remains relatively easy to reach a common agreement that a Circular Economy can only achieve lasting, sustainable development outcomes once the environment and society are adequately safeguarded.

Despite early warnings dating back to the 1970s, the world is still seeking an economic development path that neither compromises the environment nor benefits society. Nevertheless, it remains a serious concern because economic growth and social development appear to be misaligned. The Circular Economy Spiral is a straightforward visual illustration of how environmental preservation and social initiatives should develop in parallel with economic growth. In other words, Circular Economy frameworks must address the existing asymmetric economic, environmental, and social disparities to ensure a sustainable development path that does not compromise the ability of future generations.

5. A way forward

There are many success stories to learn from, which position circularity as a universal guiding principle as a way forward. While its central premises are grounded in the efficient and circular use of resources to enable economic growth while reducing environmental degradation, addressing societal needs is often overlooked. The Circular Economy proposes adopting initiatives to shift from a linear mode of production to a circular model. As a concept, the Circular Economy should reinforce the notion that our planet has a resource limit. While the Circular Economy is sometimes described as an environmental/logical reaction to economic growth, it embraces capitalism's "natural" development to ensure uninterrupted production. The Circular Economy Spiral does not entail a rejection of economic growth nor a diminished emphasis on environmental preservation. Reverting the pace of economic growth is unattainable, undesired, and detrimental to society. Instead, it advocates for a more integrated and inclusive approach. The key point is to reinforce the need to pursue a developmental path that emphasises social and environmental issues. As a field, Circular Economy studies still form a fragmented landscape; it is an emergent field that lacks coordinated measures and evaluations that incorporate social factors.

Until now, the Circular Economy has focused on addressing environmental issues by allocating resources to ensure the country's economy continues to grow indefinitely, especially in neoclassical models (Ashby et al., 2019). Thus, it is crucial to question why Circular Models misalign with neoclassical assumptions of sustainability and developmentalism, as well as the role of linear production, which has constrained Circular Economy transitions, especially in the Global South. The neoclassical economic paradigm and linear production models act as barriers to implementing a Circular Economy, which could be a topic of its merit for a research project. It is not surprising that Georgescu-Roegen, Naredo, and Grinevald (1996) foresaw, decades in advance, several critical issues that would eventually shape the conceptual framework of the Circular Economy. Their analysis, rooted in the implications of the entropy law, highlighted the structural constraints embedded within neoclassical economic thought.

In the present context, where natural resources are both finite and unevenly distributed globally, the sustainability of linear economic models has been increasingly questioned. Nevertheless, the Circular Economy remains a complex and multifaceted framework; in fact, there is a debate regarding the integration of its various dimensions, with the social dimension being insufficiently addressed in theory and practise (Geissdoerfer et al., 2017). To advance the implementation of Circular Economy frameworks that are aligned with diverse contexts and activities, researchers, policymakers, and business actors should collaborate to develop policies and schemes that create practical and measurable initiatives.

The Circular Economy Spiral model offers a conceptual and propositional framework for understanding the Circular Economy, facilitating a shift in dominant practices and prevailing approaches. There are Circular Economy case studies where this model could be meaningfully integrated into social practices, thereby underscoring its material relevance and practical plausibility. The Circular Economy Spiral model provides a robust conceptual and propositional framework for reorienting dominant practices

and prevailing interpretations of the Circular Economy. The Spiral Circular Economy model offers a theoretically grounded and actionable framework that can be applied to existing case studies or adopted in future research. Its strength lies in its capacity to present the three core pillars of the Circular Economy, enhancing both analytical depth and practical implementation.

For example, a Brazilian glass packaging company implemented Circular Economy practices by increasing the use of recycled glass in its production, which significantly reduced CO_2 emissions and energy usage (Streit; Guarnieri; Batista, 2020); TECMO, a Colombian company specialising in steel and aluminium structures, integrated Circular Economy principles by reusing and recycling materials in its production processes (Carrillo Cardozo, 2024); In Kalundborg, Denmark, multiple industries collaborate by using each other's by-products as resources, creating a closed-loop system that reduces waste and improves resource efficiency that could be replicated in China (Chertow, 2007); to mention a few. These examples demonstrate the model's practical applicability and underscore its potential to inform more inclusive and sustainable implementation strategies, making a compelling case for its broader adoption.

The focus of Circular Economy frameworks, particularly those developed by companies, is on adopting production modes that extract, use, and recycle natural resources, raw materials, and waste based on cost efficiency and economies of scale (Bimpizas-Pinis et al., 2021). While this may contribute to reducing environmental degradation, it is still a response that delays fully addressing climate and environmental crises that affect society (Millar; Mclaughlin; Börger, 2019). For instance, recycling is essential for sustainability; however, focusing solely on recycling fails to address environmental challenges (Temesgen; Storsletten; Jakobsen, 2021). Along with recycling models that allow for the more prolonged use of materials to preserve the world's resources for extended periods (although not economically viable in some cases), Circular Economy models must also focus on new materials and the broader environmental and social issues associated with recycling.

While Circular Economy can produce environmental and social gains for world sustainability, the Circular Economy is still virtually silent on the social dimension […] it is unclear how the concept of the Circular Economy will lead to greater social equality, in terms of inter- and intra-generational equity, gender, racial and religious equality, and other diversity, financial equality, or equality of social opportunity (Murray; Skene; Haynes, 2017, p. 376).

Society is an essential element that is explicitly indicated in the conceptualisation of Circular Economy and, equally important, in its implementation frameworks.

Since climate change appears to be occurring faster than anticipated, addressing its widely recognised effects is urgently required. Otherwise, strict development measures may be necessary to manage more severe effects and challenges arising from the current lack of action. The challenge in developing a way forward and a long-lasting, sustainable framework is overcoming models that centre economic growth at their core.

6. Conclusion

The Circular Economy Spiral illustrates how economic development, embracing societal benefits and environmental protection, can develop in continuous parallel without interfering with one another. The Circular Economy Spiral highlights how this development spiral has overlooked a social dimension. This advocates better interconnectivity. As long as the elements are not significantly distant from each other, neither economic growth nor environmental preservation will be affected. The Circular Economy Spiral advocates for an inclusive, continuous development approach, and it has both theoretical and practical significance in various areas.

Theoretically, the Circular Economy Spiral can serve as a guideline for developing Circular Economy concepts that incorporate analytical rigour in their analysis and evaluation. The functional significance lies in the call to implement practical frameworks that adopt effective measures, including

actions that benefit society. It is crucial to highlight the asymmetrical focus and development of these three pillars, rooted in a Circular Economy. This circular model spiral may contribute to a further understanding of the asymmetric impact of the Circular Economy on society and the environment globally. Ultimately, utilising the Circular Economy Spiral is a heuristic approach to support the further development of theoretical and empirical case studies. In short, using this spiral can facilitate the entire mantra of a Circular Economy.

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