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Strategy in a Circular Economy: Discussion of Opportunities and Limitations

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Without Abstract

Synonyms

[Business model perspective](#); [Closed-loop production](#); [Cradle to Cradle](#); [Product-to-service shift](#)

Definition

A closed-loop production, also called Cradle to Cradle or “circular economy,” offers to fundamentally rebuild the current take-make-waste system of production (McDonough and Braungart [2010](#)). The aim of the circular economy is twofold: on the demand side, to eliminate the need for new resources, and on the supply side, to achieve a product-to-service shift through rental and repair rather than ownership. Therefore, business model innovation of inputs, processes, and relationships with end-users is necessary at an organizational level (Bocken et al. [2014](#), [2016](#); Kindström [2010](#)). A business model perspective on organizational strategy is particularly relevant to the circular economy as it focuses on both a strategic and operational level, including designs,

products, processes, values, and wastes as key concepts that might normally be ignored by more corporate strategic management (Bocken et al. [2014](#)). There are at least two critical differences in implementing business model innovation in a circular economy. First is the essential importance of initial design that enables a circular flow (Centobelli et al. [2020](#); Urbinati et al. [2017](#)). Second is the joined-up and inter-dependent nature of supply chains and value networks (Lieder and Rashid [2016](#)), which requires more intense consideration of more diverse, and perhaps initially unwilling, stakeholders, including shareholders, employees, clients, suppliers, society, environment, and government (Geissdoerfer et al. [2018a](#)).

Introduction: Key Concepts and Debates

This Encyclopedia entry discusses the opportunities and limitations of the so-called circular or closed-loop production systems in business.

Sustainability experts within corporate contexts increasingly recognize that environmental problems, from climate change to biodiversity loss and pollution, are caused by social and economic factors, such as an increase in population, production, and consumption (O’Sullivan [2020](#)). A closed-loop production, also called Cradle to Cradle (C2C), or “circular economy” offers to fundamentally rebuild the current take-make-waste system of production (McDonough and Braungart [2010](#)). Reusing materials and increasing the durability of products already in use promise to counter the throw-away culture of planned or built-in obsolescence (Bulow [1986](#)).

Ideally, a circular system aims not just to increase the level of material and energy recovery but to eliminate the continuous need for new and often scarce resources (De Man and Friege [2016](#); Kopnina [2021](#)). This aim is facilitated by the calls to accelerate the “product-to-service shift” (PSS) or dematerialization of product use through rental and repair rather than ownership, which requires the re-organization of business through the transition from selling to leasing or pay-per-use schemes (Savini [2021](#); Stevens et al. [2021](#)). In some conceptions, a circular economy can be seen to criticize the folly of using up our non-renewable resources (“capital” in economist terms), like the “small is beautiful” critique of mass production (Schumacher [1973](#)). Notably, as will be discussed in more detail below, the circular economy is associated with growth, or “large is beautiful.”

C2C, which may be said to be one of the “inspirations or design principles underlying circular economy,” identifies three key principles of alternative production systems: (a) waste equals food, (b) use current solar income, and (c) celebrate diversity. *The waste equals food principle* emphasizes that unproductive waste should be eliminated. A fruit tree’s “waste” provides nutrients for other species or soil when decomposed. *The use of renewables principle* supports the sun and wind energy, which, aside from installation, storage, transmission, and maintenance, are immaterial and relatively infinite. *Celebrate diversity* refers to natural systems that support complex biodiverse communities, or ecosystems, where each member has developed a unique response to its surroundings that works in concert with other organisms. Considering the discussion of limitations of the circular economy, it is worth noting that in the definition of the Convention on Biological Diversity, “Biological diversity” means the variability among living organisms from all sources, including terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems (CBD [2023](#)).

C2C products take nature's diversity as a prototype for tailoring designs to maximize their positive effects and enhance the local landscape (McDonough and Braungart [2010](#)). Biomimicry designs, for example, imitate the complexity of natural forms, as well as their function and reciprocity with other natural elements (Stevens et al. [2021](#)). These principles are translated into the C2C certification, which awards products an achievement distinction in the categories of Material Health, Material Reutilization, Renewable Energy, Water Stewardship, and Social Fairness. The products could achieve a Basic, Bronze, Silver, Gold, or Platinum level, with the lowest achievement level representing the product's overall mark (Cradle to Cradle Certified 2020). Various companies have developed metrics used to define a material based on its properties such as recyclability, scarcity, and toxicity (e.g., <https://www.metabolic.nl/news/the-seven-pillars-of-the-circular-economy/>).

Circular economy evaluations using the 10-R scale and C2C accreditation are aimed to evaluate the inputs of production (raw materials, energy, etc.) associated with all the production outputs, use, and disposal (Kirchherr [2022](#); Ünal and Shao [2019](#)). The 10-R scale starts with the R of Refuse, which implies avoidance of production and consumption in the first place, and is followed by the Rs of Rethink, Reduce, Reuse, Repair, Refurbish, Remanufacture, Repurpose, Recycle, and Recover (Potting et al. [2017](#)).

However, as good as they sound, circular frameworks can be subverted into the business-as-usual growth economy model. The popularity of the idea that recycling and eco-efficiency and, even more so, infinite reuse of products can serve as a “new engine of growth” can be explained by the fact that much of circular economy terminology if not practiced was jumpstarted by the reports of the Ellen MacArthur Foundation. The circular economy continues to be significantly intertwined not necessarily with career academics but with practising academics receiving at least some funding from corporate partners, or “pracademics” and practitioners (Kirchherr [2022](#)). It was noted that the circular economy's success in business and policy circles rests upon the promise that circularity is central to sustainable development promising to marry a growth economy (and corporate profit) with sustainability (Kirchherr [2022](#)). As the section below explains, this can be problematic.

The Challenges of Greenwashing

Precisely because the circular economy promises to support growth and supporting corporate optimism, it also opens the door for greenwashing (Kirchherr [2022](#); Kopnina and Benkert [2022](#)). McDonough and Braungart's book, *The Upcycle* ([2013](#)) illustrates this optimism by suggesting that the production of the “right” products can add value and have a net positive effect on ecosystems. However, using the CBD's definition of biodiversity, it is unclear as to how any human designs, used for utilitarian purposes, can contribute to the functioning of ecosystems, considering that these ecosystems far predate human industry. There is an ethical and pragmatic difference between socio-economic and cultural changes due to biodiversity loss and extinction that terminates not just millions of lives of individuals within the species, but entire species (Kopnina et al. [2018](#)). Thus, the discussion of upcycling and net positive effects may be part of nothing more than marketing, carrying the danger of complacency of both companies and consumers to the easy promises of cleaner production.

A social anthropologist specializing in cultural and social barriers to sustainable/green behavior, Cindy Isenhour ([2010](#)) notes that individual consumers might be either uninformed or unmotivated, or tricked by the supposedly “green” marketing that stimulates the consumption of new products,

causing a rebound effect. Also, consumer responsibility rhetoric can be seen as a strategy of corporate and political leaders to “defend their ability to resist the regulation of resource-intensive, polluting or socially damaging products” (Isenhour [2010](#), p. 456). A distinction between ideal, realistic, and subverted circular practice is helpful (Kirchherr et al. [2017](#)).

The companies that get certified as Cradle to Cradle (C2C) (<https://www.c2ccertified.org/get-certified/product-certification>) or placed on the list of “good practice” of the MacArthur Foundation (https://ellenmacarthurfoundation.org/case_studies) often still focus on merely minimizing damage, not radically eliminating it. The “best case practices” by the Ellen Macarthur Foundation include Coca-Cola and other corporations, which stimulate downcycling, rather than infinite reuse (Kirchherr [2022](#); Kopnina [2021](#)).

While the first R of circular economy is *Refuse*, the use of virgin or downcycled materials and not fully reused existing ones is common with manufacturers that improve their production only marginally, without the needed overhaul of the *entire* supply chain as mode of operation. Also, sustainability specialists have identified opportunities for the so-called “post-growth” circularity that reaches beyond growth fetishism, emphasizing the downscaling of the economy to make it consistent with biophysical boundaries via the application of the R principles (Bauwens [2021](#); Kirchherr [2022](#)). Another concern is dubbed the “circular economy rebound,” meaning that expected savings from the circular economy may be invested unsustainably, thus offsetting any sustainability benefits previously accrued (Kirchherr [2022](#); Zink and Geyer [2017](#)).

As argued by critical assessors, in the circular economy, it is thus crucial to make a distinction between ideals and practice but also underline the limitations of the very concept of circularity (Bauwens [2021](#); Carus and Dammer [2018](#); de Man and Friege [2016](#); Holmes et al. [2021](#); Johansson and Henriksson [2020](#); Kirchherr [2022](#); Kopnina [2021](#); Kopnina and Padfield [2021](#)), distinguishing between biological/organic cycle products. de Man and Friege ([2016](#)) note that waste is rarely “food” as any consumed food literally changes into toilet waste, which is not the same in nutritional value as injected components. Also, both the method of food production and the type of food produced, e.g., the climate-related differences in the locally grown laboratory meat versus soya-based meat substitutes, need to be considered, if the “waste is food” principle is to be followed (Kopnina et al. [2023](#)). Within the technological cycle, where products can be evaluated by the 10-R strategy, different considerations will apply (such as durability and potential for infinite reuse of materials).

There is also a question of whether a circular economy is competitive with a post-growth or degrowth strategy that some of the more forward-looking sustainability specialists bring into doubt (Bauwens [2021](#); Hofmann [2022](#)). As Bauwens ([2021](#), p. 219) states:

While the circular economy is a popular topic on many countries’ political agendas, an expanding body of empirical evidence shows that, thus far, increases in the global gross domestic product (GDP) have been tightly coupled with an increase in the size of the material footprint and associated ecological impacts of the economy (Hickel and Kallis, 2019). Global absolute decoupling of GDP growth and resource consumption (i.e., a decline in the global material footprint in absolute terms while the global GDP continues to increase), a necessary condition for green growth, is still far from a reality.

Yet, while it still has a long way to go in practice, a circular economy can be potentially transformative.

Strategic Ways Forward

Kirchherr ([2022](#)) reflects that some post-growth or degrowth discourses, in combination or independent of circular economy thinking or not, may be unrealistic and undesirable as they would hamper the development of alternative economies (that ironically need to grow to replace linear or unsustainable ones). Kirchherr ([2022](#)) states that while calls for the economy to be “small-scale and localized to primarily serve local communities’ needs” may sound romantic and desirable, harking back to the “small is beautiful” ideals (Schumacher [1973](#)), “this may equate with a detour to the Middle Ages.” This point of critique might be especially relevant as a few billion consumers have been born since Schumacher’s famous volume has first been published. Kirchherr offers both caution and hope as far as the strategy of circular development is concerned:

Once rapid growth of circular businesses has occurred, with these companies driving linear players out of the market, the economy may be, measured in GDP, smaller than its linear predecessor, if dominant products are ultra-durable and/or more resource efficient. This economy may also be larger, though. After all, consumers tend to re-invest savings induced by CE (think of savings occurring because of an ultra-durable smartphone that suddenly lasts 10 years)... However, it is conceivable that these savings are re-invested sustainably (think of a weekend get-away at an eco-farm close-by), setting off a perpetuum mobile towards sustainability. We just do not know. (Kirchherr [2022](#))

Good examples of what type of products can be seen as worth re-invested savings can be found in pre-industrial production systems, for example in vegan diets, or clay containers that used to be used for transportation and storage.

Strategic Action at Multiple Levels

Unlike traditional, market-based strategy which is focused on discrete organizations in a competitive environment, strategy in a circular economy is inter-organizational and multi-level: individuals, small- and medium-sized enterprises, multinational enterprises, industry representative bodies, local government, charities and nongovernmental organizations, and nations and supranational organizations all have roles to play in enabling circularity (de Jesus and Mendonça [2018](#); Geissdoerfer et al. [2020](#); Ghisellini et al. [2016](#); Kalmykova et al. [2018](#); Lieder and Rashid [2016](#)). The following summary will focus on the three levels that have attracted particular attention in the circular economy literature so far: national and supranational policies, circular business models, and intrafirm dynamic capabilities.

At the highest level, much has been written about the contrasting approaches being taken toward the circular economy in China and Europe (Ghisellini et al. [2016](#); McDowall et al. [2017](#)). China’s rapid growth from the 1970s onwards had been built on intense industrialization and urbanization, heavy exploitation of natural resources, production processes with weak environmental oversight, and utilizing inefficient methods, leading ultimately to environmental damage, social problems, and a slowing economy (Su et al. [2013](#)). Building on several preceding initiatives, the Circular Economy Law Promotion that came into force in 2009 produced a comprehensive national approach and mandated action at all levels of government and industry across China (Mathews and Tan [2011](#); McDowall et al. [2017](#)). This is perhaps the most obvious example in a circular economy context of a traditional top-down, deliberate strategy. However, in common with the mainstream academic strategy literature (e.g., Friesl et al. [2021](#); Hrebiniak [2013](#); Weiser et al. [2020](#)), the Circular

Economy Law Promotion has faced barriers to implementation and enforcement at local levels (Ranta et al. [2018](#)). There were policies on resource recycling and reuse, cleaner production, pollution, and waste but perhaps most significantly on place-based planning interventions (McDowall et al. [2017](#); Zhu et al. [2019](#)). Eco-industrial parks, supported by various national government departments and regional and municipality authorities, are a particularly powerful method in China's top-down approach, incentivizing firms to co-locate in planned zones and to innovate their processes to reuse waste resources and use energy efficiently (Homrich et al. [2018](#); Mathews and Tan [2011](#); McDowall et al. [2017](#)).

Europe has taken a different approach from China. It is more focused, in that it concentrates more on minimizing virgin natural resource exploitation and waste minimization while also supporting sustainable economic growth (Domenech and Bahn-Walkowiak [2019](#); Ghisellini et al. [2016](#)). It is more bottom-up, in that it uses policy, regulation, and finance as incentives to nudge organizations toward 10-R activities (and disincentivize linear cradle-to-cradle activities) but has not utilized planning tools to manipulate spatial re-arrangements in supply chains (McDowall et al. [2017](#)). In addition, while China has concentrated on supply issues, European countries are far more focused on changing consumers into users (Lazarevic and Valve [2017](#)). Therefore, while the European Commission ([2015](#)) has developed a high-level policy in this area – *Closing the Loop: An EU Action Plan for the Circular Economy* – this is more catalytic than a deliberate plan. Therefore, most of the European literature on strategy in the circular economy is focused on lower levels of analysis.

A thorough definition is given by Bocken et al. ([2014](#), p. 43): “Business models are concerned with how the firm defines its competitive strategy through the design of the product or service it offers to its market, how it charges for it, what it costs to produce, how it differentiates itself from other firms by the value proposition, and how the firm integrates its own value chain with those of other firm's in a value network.” Therefore, a business model perspective on organizational strategy is particularly relevant to the circular economy as it focuses on both a strategic and operational level, including design, products, processes, and value (and waste) as key concepts that might normally be ignored by more corporate strategic management. Some archetypes of circular business models emphasize the way that value is added (and waste avoided) as a basis for competitive and collaborative advantage: closing (recycling), extending (prolonging usability through repair and reuse), intensifying (gaining more use in a shorter period), narrowing (using fewer resources by being more efficient), and dematerializing (product substitution by service and software solutions) (Bocken et al. [2016](#); Geissdoerfer et al. [2018a](#)).

Other typologies emphasize different relationships: different ownership, manufacturing and maintenance relationships, location of operations, customer use (single sequential, parallel), and payment models (Tukker [2015](#)). Still, others emphasize the technological, social, and organizational dimensions of circular business models (Bocken et al. [2014](#)). But as with most strategies, it is not the vision that is the tricky bit, it is the implementation (e.g., Friesl et al. [2021](#); Hrebiniak [2013](#); Weiser et al. [2020](#)). Therefore, the literature on circular business model innovation is particularly important to a successful transition to a circular economy. Geissdoerfer et al. ([2018b](#)) propose four types: start-up (new business model for a new business), business model transformation (change the existing business model), business model diversification (add a new business model(s) to an existing one), and business model acquisition (purchase another business with a desired business model). Apart from the “born circular” start-up, the other three business model innovation types involve strategy implementation, change management, and integration of new business units, on which there is well-established literature.

There are at least two critical differences in implementing business model innovation in a circular economy. First is the essential importance of initial design that enables a circular flow, characterized as four designs for X practices: a design for recycling (DfR), design for remanufacturing and reuse (DfR), design for disassembly (DfD), and design for environment (DfE) (Centobelli et al. [2020](#); Urbinati et al. [2017](#)). Second is the joined-up and inter-dependent nature of supply chains and value networks (Lieder and Rashid [2016](#)), which requires more intense consideration of more diverse, and perhaps initially unwilling, stakeholders, including shareholders, employees, clients, suppliers, society, environment, and government (Geissdoerfer et al. [2018a](#)). This places special emphasis on multinational enterprises that have powerful positions in long and complex global supply chains, exemplars being members of the Ellen MacArthur CE100 Network (Urbinati et al. [2017](#)), to act as catalysts to circular supplies globally.

At the lowest level of analysis, the emphasis has been on capabilities and, more specifically, on dynamic capabilities. A number of highly cited articles highlight that organizational capabilities are significant (e.g., Bocken et al. [2014](#); Boons and Lüdeke-Freund [2013](#)). However, few studies have attempted to peer inside this black box to analyze these important capabilities in any detail. The work by Sehnem et al. ([2022](#)) is an example of a study that highlights some of the important capabilities that are required, particularly dynamic, relational, absorptive, and (eco)innovation and business model innovation capabilities. Linking back to the previous point that implementing strategy generally and carrying out circular business model innovation specifically are more problematic than formulating a new strategy, several papers have focused on the significance of dynamic capabilities: sensing, seizing, and reconfiguring (e.g., Marrucci et al. [2022](#)). Khan et al. ([2020](#)) list a series of activities linked to each: sensing involves activities such as identification of customer needs, tracking new market trends, and analyzing competitors' actions; seizing involves strategy formulation, finding strategic partners, planning investments, and planning requisite HR, among other activities; while reconfiguring involves activities like mergers and acquisitions, organization redesign, and acquiring plant and know-how. Inigo et al. ([2017](#)) also argue that dynamic capabilities can be split into those which encourage evolutionary or radical business model innovation. Using the sensing dynamic capability to illustrate their point, evolutionary activity might include holding stakeholder dialogs, anticipating and responding to regulations, and creating sustainability-related associations, whereas more radical activities emphasize focusing attention on critical and disruptive stakeholders and technologies. Finally, Wade et al. ([2022](#)) highlight that the activities constituting dynamic capabilities may develop through time. Using the reconfiguring dynamic capability as an example, early on prototype products may be released and new business models may be developed, followed by business model execution, then changing external industry expectations, and finally business model evolution and building credibility.

Summary

A circular economy is a simple, yet bold idea. It aims to minimize – better still, eradicate – the need for new natural resources, by shifting from an exploitative, take-make-waste production system to a closed-loop, cradle-to-cradle industrial ecosystem. This is in part achieved through the design of modular, decomposable products, which use less resources and are more durable and, at the end of their extended use, can be broken up into parts which can themselves be re-utilized. But this technological innovation also needs to go hand in hand with social innovation, involving a product to service shift away from ownership, toward rental and repair. All of this can be summarized by the

10-R activities that individuals and organizations, at many levels and in many places, need to engage in to enable a successful circular economy to emerge: Refuse, Rethink, Reduce, Reuse, Repair, Refurbish, Remanufacture, Repurpose, Recycle, and Recover.

Ideally, a circular economy approach places overcoming environmental problems, such as climate change, biodiversity loss, and pollution, centrally in economic planning and organizational strategy. This involves diverse stakeholders who must act coherently at multiple levels. From a more top-down perspective, supranational, national, regional, and local governments must provide a context in which a circular economy can emerge, through legal frameworks, regulation, planning, incentives, and education. In contrast from a more bottom-up, organic perspective, organizations need to develop the capabilities and circular business models and more importantly the dynamic capabilities to constantly adapt through business model innovation, which can underpin the 10-R activities across complex global supply chains and among rapidly developing societies.

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- . [Life-Cycle Analysis](#)
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