



## Review

## The Circular Economy – A new sustainability paradigm?

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## ABSTRACT

While the terms Circular Economy and sustainability are increasingly gaining traction with academia, industry, and policymakers, the similarities and differences between both concepts remain ambiguous. The relationship between the concepts is not made explicit in literature, which is blurring their conceptual contours and constrains the efficacy of using the approaches in research and practice. This research addresses this gap and aims to provide conceptual clarity by distinguishing the terms and synthesising the different types of relationships between them. We conducted an extensive literature review, employing bibliometric analysis and snowballing techniques to investigate the state of the art in the field and synthesise the similarities, differences and relationships between both terms. We identified eight different relationship types in the literature and illustrated the most evident similarities and differences between both concepts.

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## 1. Introduction

There is a pressing need to transition to more sustainable socio-technical systems (Meadows et al., 2004; WBCSD, 2010; Seiffert and Loch, 2005; Markard et al., 2012). Environmental problems, such as biodiversity loss, water, air, and soil pollution, resource

depletion, and excessive land use are increasingly jeopardising the earth's life-support systems (Rockström et al., 2009; Jackson, 2009; Meadows et al., 2004; WWF, 2014). Societal expectations are not met due to issues such as high unemployment, poor working conditions, social vulnerability, the poverty trap, inter- and intra-generational equity, and widening inequalities (Banerjee and Duflo, 2011; Sen, 2001; Prahalad, 2004). Economic challenges, such as supply risk, problematic ownership structures, deregulated markets, and flawed incentive structures lead to increasingly frequent financial and economic instabilities for individual companies and entire economies (Sachs, 2015; Jackson, 2009).

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To address these and other sustainability issues, the concept of the Circular Economy – while not entirely new – has recently gained importance on the agendas of policymakers (Brennan et al., 2015). This becomes evident, for instance, in the comprehensive European Circular Economy package (European Commission, 2015) and the Chinese Circular Economy Promotion Law (Lieder and Rashid, 2016). The Circular Economy has also become an important field of academic research with a steep increase in the number of articles and journals covering this topic during the last decade. Companies are also increasingly aware of the opportunities promised by the Circular Economy and have started to realise its value potential for themselves and their stakeholders (EMF, 2013b).

Despite the concept's importance for academia, policymakers, and companies, the conceptual relationship between the Circular Economy and sustainability is not clear. This has potential detrimental implications for the advancement of sustainability science and the diffusion of practices based on these concepts. Therefore, this research aims to contribute to conceptual clarity by investigating the similarities, differences, and relationships between both concepts in theory.

The paper is structured as follows. Section 2 covers a brief literature review that is introducing sustainability and the Circular Economy by presenting their origins, synthesising their conceptual definition, and illustrating their relevance for research and practice. The subsequent section describes the research design by presenting the research questions and the methods employed, including the implemented snowballing and the outcomes of a bibliometric research that helped to determine the sample of articles that would initially be investigated. Section 4 presents the results of the research, first illustrating the identified relationships between sustainability and the Circular Economy, before similarities and differences are contrasted. This is followed by a discussion of our findings. The paper concludes with final remarks on the contributions of this research, its limitations, and interesting fields for further research.

## 2. Background

This section provides a short introduction to the two main concepts addressed in this research, sustainability and the Circular Economy. Starting with the former and concluding with the latter, this chapter briefly introduces the historical origins of the concepts, compares and synthesises the selected definitions, and discusses the notions' relevance.

### 2.1. Sustainability

Sustainability concerns are increasingly incorporated into both the agendas of policymakers and the strategies of companies. The term *sustainability* itself originates in the French verb *soutenir*, “to hold up or support” (Brown et al., 1987) and its modern conception has its origins in forestry. It is based on the silvicultural principle that the amount of wood harvested should not exceed the volume that grows again. This conceptualisation was written down already in the early 18th century in “*Sylvicultura oeconomica*” (von Carlowitz, 1713), and there seem to be even older sources that follow the underlying principles in face of shortages in wood supply and the husbandry of cooperative systems (Mantel, 1990). Later, it was transferred to the context of ecology, as a principle of respecting the ability of nature to regenerate itself (Duden, 2015), from where the modern definition of being “able to be maintained at a certain rate or level” (Dictionary, 2010) developed.

Johnston et al. (2007) estimated that there are around 300 definitions of sustainability. To cite but a few, sustainability can be defined as a situation in which human activity is conducted in a

way that conserves the functions of the earth's ecosystems (ISO 15392, 2008), a transformation of human lifestyle that optimises the likelihood that living conditions will continuously support security, well-being, and health, particularly by maintaining the supply of non-replaceable goods and services (McMichael et al., 2003), or an indefinite perpetuation of all life forms (Ehrenfeld, 2010).

The concept's uptake can be traced back to the increasing evidence on global-scale environmental risks, such as ozone depletion, climate change, biodiversity loss or the alteration of the nitrogen cycle. These risks have been systematically investigated since the 1960s, raising questions about whether present prosperity trends can be maintained in the future (Clark and Crutzen, 2005; Rockström et al., 2009) and, consequently, revealing many sources of tensions. This includes, for example, the limited store of resources, its uneven geographical distribution and appropriation (e.g. Georgescu-Roegen, 1977), and the implications of the assimilative capacities of ecosystems over economic growth (e.g. Daly and Townsend, 1993).

These sources of tensions were condensed by the environmentalists Ehrlich and Commoner in their equation “ $I = P \times A \times T$ ”. Environmental impact (I) is a function of three factors: population (P); affluence, which is a proxy to represent consumption (A); and technologies (T) (Chertow, 2001; Commoner, 1971; Holdren and Ehrlich, 1974). The emphasis given to population, consumption, and technologies, as well as the interrelation between these variables, has varied considerably among scholars. Some emphasise demographic control (e.g. Hardin, 1968), others would rather advocate for reduction in consumption levels (e.g. Woollard and Ostry, 2000), and an increasing number of scholars highlight the role of science, technology, and innovation in fuelling social inclusion and environmental resilience (e.g. Hart and Milstein, 2003; Kemp and Pearson, 2007; Cohen, 2006).

The emergence of such tensions fuelled a series of international discussions on the complex and dynamically interconnected nature of the environment, society and the economy (Kates et al., 2005). These discussions challenged oversimplified development frameworks and their assumptions about economic growth. The Stockholm Conference in 1972 and the report *Limits to Growth* had wide repercussions due to their interpretation of “development” and “environment” as contradictory elements of an intrinsic trade-off (Sachs, 2015; Jackson, 2009). Nevertheless, the most prominent understanding of sustainable development arose with the Brundtland Report (1987), which came not as a reformulation of the terms of such trade-offs, but rather as an answer to its apparent conflicts (Nobre and Amazonas, 2002): “The concept of sustainable development does imply limits – not absolute limits but limitations imposed by the present state of technology and social organization on environmental resources and by the ability of the biosphere to absorb the effects of human activities” (Brundtland, 1987:8).

The Brundtland Commission also provided the most commonly accepted definition of sustainability as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland, 1987). Despite being initially driven by environmental concerns, the term *sustainable development* has since then accommodated a variety of expectations for desirable progress: “the concrete challenges of sustainable development are at least as heterogeneous and complex as the diversity of human societies and natural ecosystems around the world” (Kates et al., 2005:8). The broad colloquial meaning of the verb “to sustain” refers to maintaining unspecified features over time, while “development” can comprise multiple interpretations, varying according to values, interests and disciplinary conventions. Nevertheless, all perceptions of sustainable development seem to invoke feelings of desirability and goodness

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