A review of micro level indicators for a circular economy - moving away from the three dimensions of sustainability?

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Abstract

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The circular economy is receiving increasing attention as having the potential to break with the current linear economy of unsustainable production and consumption. A circular economy promotes system innovations that aim to design out waste, increase resource-efficiency, and achieve a better balance between economy, environment and society. Ensuring a successful transition to a circular economy requires the ability to measure and report on progress. Currently, there are three levels of indicators for measuring circular economy: macro (global, national, regional, city), meso (industrial symbiosis, eco-industrial parks), and micro (single firm, product). A detailed understanding of how to measure and document progress towards a circular economy is lacking, especially on a micro level. This is a barrier for both producers who want to provide circular products and services, and for the consumers who want to know how to compare products. This paper helps to open the black box, not by developing a method for measurement, but by categorizing and assessing what is already being done. This paper reviews 30 indicators of a circular economy at the micro level, where the majority of indicators focused on recycling, end-of-life management or remanufacturing, while fewer indicators consider disassembly, lifetime extension, waste management, resource-efficiency or reuse, and the majority of the papers are published in the last few years. There is no commonly accepted way of measuring circular economy in general at the micro level, nor within the different circular economy principles of recycling, remanufacturing etc. As circular economy often is presented as a means to a sustainable development, the alignment between the three dimensions of sustainability and the reviewed indicators is analyzed, which showed that the majority of indicators focus on economic aspects, with environmental and especially social aspects included to a lesser extent. This biased approach to circular economy that favors economic aspects over environmental and social impacts can lead to sub-optimizations when companies apply circular economy and may lead to a narrower approach to sustainability than what has previously been the case. For future research it can be interesting to explore if the same bias exists on meso and macro level, but also to analyze how a more coherent approach can be standardized on micro level.

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Fingerprint

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