Assessing the contribution of Circular Economy to Urban Sustainability: an analysis based on the use of indicators

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Introduction
- Cities play a major role in the transition towards a sustainable society: hosting approximately 50% of the world population and producing 80% of the worldwide GDP, but also consuming 75% of worldwide resources and producing 80% of CO2 emissions.
- Circular Economy (CE) has been proposed as a key concept to reduce resource consumption, thus lowering the impact of urban systems. Although the concept of the CE is not new, its potential contribution to Urban Sustainability (US) still needs to be elicited.

Research Question
How does the Circular Economy conceptually integrate and contribute to Urban Sustainability?

Methodology
- **Collection** of sets of indicators currently used to assess CE in urban systems (n=20) and US (n=41).
  Total indicators extracted: 2229.
- Identification of indicators that are only used to assess a CE in urban systems and NOT US. Identification of indicators that represent the core of CE in urban systems (i.e. used by >50% of sets aimed at assessing CE in urban systems).
- Linkage of each indicator to the 17 SDGs and the 5 STEEP categories. Analysis of the different profiles of indicators of CE in urban systems and indicators of US (Fig. 1).
- **Cluster analysis** of the sets of CE in urban systems and US, based on the absence/presence of indicators (Fig. 2).

Results

Conclusions
- **Core topics** covered by indicator sets measuring CE in urban systems: Waste, Resource consumption, Sustainable projects/businesses, GDP and added value, GHG, Water for human needs, Energy. The concept of a CE in urban systems does not cover additional topics, in comparison to the concept of US. Nevertheless, it offers a deeper analysis of some specific topics (from our sample, 44 indicators are only used by the sets measuring CE in urban systems, mainly assessing waste management).
- A shared approach to measure CE in urban systems is still missing and highly needed. Different actors use different indicators, making the comparison across cities a challenging task. Additionally, some indicator sets aimed at measuring CE in urban systems are more similar to those aimed at measuring US (in terms of topics that they cover). CE in urban systems has clearly a different focus with respect to US in terms of STEEP categories covered. However, the SDGs are covered in a similar way by the two concepts (except for SDG3, SDG4 and SDG12).
- Further research should be aimed at comparing US and CE in urban systems at a more detailed level of analysis (i.e. analyzing the type of indicator used, for example input or output indicators), in order to elicit additional similarities or differences.

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