



Policies for supporting the regional circular economy and sustainability

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Abstract

The Circular Economy and Sustainability are among the greatest challenges faced by policymakers, producers, and consumers. Circular Economy processes demand less from the environment since they can minimize waste generation and, hence, can be powerful tools to combat the negative effects of climate change. Additionally, following subsidiarity principles, public policies supporting the Circular Economy should be designed at the lowest levels of public administrations—this provides huge opportunities for regional governments to design, implement and monitor these policies. This editorial of the special issue explores and discusses implications for those policies before introducing the five papers published in the special issue dedicated to policies for regional economy and sustainability. While some of the papers attempt to conceptualize sustainable development through a microeconomic perspective, others have a clear macroeconomic empirical focus. In consequence, this special issue provides a rich body of work for further Circularity and Sustainability nexus studies.

Keywords Circular economy · Public policies · Regional economics · Sustainability

JEL Classification P25 · Q56 · Q58 · R11 · R58

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1 Circular economy and sustainability

Over the course of the twenty-first century, anthropogenic intervention extended environmental damage and so substantially altering consuming and producing patterns to address the depletion of resources has become a priority (Bourdin et al. 2021). Growth in the global population will result in increases in natural resources demand and will pose unprecedented challenges (Ellen MacArthur Foundation 2015; UN 2015). The recent Paris Agreement and the 26th UN Climate Change Conference (COP26) endeavour to reverse this situation. However, to achieve climate targets, the world needs a fundamental shift in economic values and procedures by policymakers, businesses, and consumers. This shift implies the gradual alteration of linear and circular economic models.

Although the term *circular economy* seems new, in fact it is just reversion to both the way in which economic activities were traditionally organized (Boulding 1966), and in which nature is (already) self-organized (D'Amato et al. 2019). It is rooted in diverse theoretical backgrounds including environmental and ecological economics, and industrial ecology (Ghisellini et al. 2016). The full transition from the (current) linear to the (future) circular economy implies huge economic transformations in the way firms behave and interact with markets (Di Maio et al. 2017; Santa-Maria et al. 2021) and relevant stakeholders (Bertassini et al. 2021), as the difference between these two strategies is substantial (Dokter et al. 2021). Concretely, a linear system means taking whatever inputs are required, making new products, and generating waste that we simply dispose of into the environment. In a circular system, we reform the way in which we design our production system, reducing economic activities reliance on conventional and intensive emissions flows (Korhonen et al. 2018a) to minimize inputs, reuse materials, and recycle waste (Accorsi et al. 2020).

The Circular Economy is becoming increasingly popular because, in the long-term, it is more efficient and more sustainable than the current linear model of take-make-dispose (Nikolaou and Tsagarakis 2021). On the contrary, the Circular Economy requires us to transform current organizational structures (Franco et al. 2021), which is a constraint in the short-term (Korhonen et al. 2018b). The transformations required to move from linear to circular also require new regional and urban governance (Obersteg et al. 2019) to balance firms' expectations with the public interest (Calzolari et al. 2021).

In this sense, regional issues are a key dimension of the Circular Economy (Silvestri et al. 2020) since, for instance, the circle structure of reusing, remaking, and recycling implies a close spatial connection among all these stages (Tantau et al. 2018). It would make no sense to try to achieve sustainable goals by recycling while wastes and intermediate inputs travel long distances (i.e., a strategy involving awkward environmental externalities). So spatial proximity is required, and this implies coordination and common governance (Mhatre et al. 2021). Consequently, regions and their policy institutions must play a key role in the circular economy (Ferreira and Matias 2021).

As the circular economy is related to sustainability, specific policy actions are needed to engage economic drivers of production with social and technical ones

in order to reconsider energy management for supporting circular principles (Van der Velden 2021; Farooq et al. 2021). In order to boost circular activities, current energy policies need to be revisited all the way from the microlevel (Kosmadakis et al. 2021) to the macrolevel (D'Adamo, et al. 2021), in order to improve efficiency (Yildizbasi 2021) and recovery (Bezirgiannidis et al. 2020), by re-designing all stages of production (Diamantis et al. 2021), from resource harvesting to disposal (Al-Mawali et al. 2021; Medeiros et al. 2021) and end-of-life practices (Jensen et al. 2020). Furthermore, policy interventions should be considered involving the effective energy interdependence of individual industries within the industrial ecology/symbiosis concept (Al-Thani and Al-Ansari 2021; Ipsakis et al. 2021). Fortunately, a growing awareness of climate change has promoted the way in which economic activities are organized worldwide (Henrion et al. 2021), moving from traditional linear economy models, passing through more efficient reduce, recycling, reuse, renew economy models (Montag et al. 2021) to current moves towards circular economy practices (where the final target is a zero-waste scenario).

Circular Economy and Sustainability targets must be supported by public policies which have a regional dimension, which accord to a subsidiarity principle and which better match the externalities of economic activities by including environmental regional management and activities supporting entrepreneurship (Polverini and Miretti 2019; Johansson and Henriksson 2020). Unfortunately, most current Circular Economy policies lack this regional dimension. A clear example is that of transporting recycled materials around the globe to be transformed and reintroduced again into production processes and new products. Although this strategy may superficially seem acceptable and in accord with Circular Economy principles, it is not at all sustainable because of the carbon footprint generated (Dermine-Brullot and Torre 2020). Therefore, location matters and, consequently, there is room for Regional Circular Economy and Sustainability policies.

It is difficult to imagine a Circular Economy structure which uses the current asymmetrically distributed manufacturing production and whose spatial value chain requires globally sourced components (Calzolari et al. 2021; Iacovidou et al. 2021). How, then, to reuse, remake and recycle if that implies huge movements of components and products produced in distant locations (Christensen 2021)? But if a more balanced spatial distribution of manufacturing activity is achieved, then it is much easier to implement Circular Economy principles thanks to the closer availability of manufacturing services (Di Foggia and Beccarello 2021). An analysis of firm location patterns in recent years shows a trend towards a more balanced distribution of manufacturing activity across countries and regions. This trend has been accelerated by the disruption generated by Covid-19 and lockdowns in many countries, which have shown vulnerabilities of certain strategic products (e.g., some medicines, masks and medical devices) and have highlighted the urgent need for more resilient value chains (Nandi et al. 2021). This has, of course, created several business opportunities (Corrêa and Corrêa 2021). Despite the economic downturn caused by the pandemic, the current situation also provides a challenge for the implementation of Circular Economy principles as key guidelines for (regional) public administrations, in view of the huge transformations that have been conducted worldwide. In

this regard, public opinion has become aware of the environmental weakness of pre-pandemic economic strategies, and of the urgent need to redesign them in the light of Circular Economy and Sustainability goals designed from a spatial point of view.

2 An overview of the contributions of the special issue

The contributions of this special issue highlight different facets of the sustainability and circularity nexus. The wide range of papers included in this special issue and their use of different methodologies, data sources, and theoretical approaches reflects the heterogeneity of topics dealing with circular economy and sustainability. While some papers attempt to conceptualize sustainable development from a micro-economic perspective, others have a macroeconomic empirical focus.

Brusselaers et al. (2022), employing a computable general equilibrium (CGE) model, investigate the impact of fiscal policies in support of lifetime extension through repair activities of household appliances for the small open economy of Belgium. The authors argue that expansionary rather than restrictive fiscal policies can be more effective in promoting circular activities. On the other hand, restrictive fiscal policies are more effective in reducing existing linear activities. Furthermore, the uptake of circular activities decreases dioxide carbon emissions from a consumer perspective while increasing them from a production (or territorial) perspective.

The analyses of Jambou et al. (2022) focus on industrial and territorial ecology. In particular, the authors evaluate the possibility of creating virtuous inter-firm cooperation in terms of synergies. Their results show that several methodological devices allow the creation of new relations between firms. In addition, while these mechanisms are effective in bringing actors together from their territories and especially companies, they are not very suitable for maintaining effective cooperation over time. Lastly, the methodological devices studied suggest that the creation of relations between firms during workshops is sufficient for them to reappropriate the synergies. The support through an intermediary actor remains necessary to make the firms cooperate, by helping to create a climate of trust between them, but also by supporting their cooperative relations and helping to sustain them over time.

Kostakis and Tsagarakis (2022) deal with the role of socioeconomic characteristics of the circular economy within the European Union. Employing panel data analysis, the authors argue that factors such as economic wealth, fertility rate, the level of environmental taxes and R&D expenditures positively affect recycling and circularity rates. Urbanization also seems to have a positive, but nonlinear effect on recycling and circularity rates.

The importance of effectiveness of smart sustainable cities (SSC) initiatives in terms of sustainable outcomes and/or the factors driving such initiatives is highlighted by Manjon and Crutzen (2022) in their analyses for the Wallonian municipalities of Belgium. Empirical results reveal a complex relation between air quality and SSCs. Interestingly, the authors report that smart city initiatives can have a positive effect on the air quality. Moreover, past air quality is clearly associated with smart city initiatives, regardless of their orientation. In particular, the authors state

that, while the role of technology cannot be underestimated, air quality is an important driver of smart and sustainable initiatives.

Zhang and Liu (2022) address the association of eco-friendly smart home services (ESHS) and environmental protection. In particular, the authors aim to investigate consumer intention of adopting ESHS. Utilizing cross section analysis from 643 respondents from China and through a self-administered questionnaire survey, authors confirm that perceived ease of use, perceived usefulness, knowledge, and environmental consciousness positively affect consumers' intention to adopt ESHS. On the contrary, consumers' perceived risks reduce their intention to adopt ESHS.

3 Concluding remarks

The circular economy and sustainability are two key interrelated pillars of current public policies as the majority of public administrations and institutions try to implement measures to implement their main principles. Although there is a wide consensus on both the circular economy and sustainability principles as guidelines for consumers, firms, and institutions, at the same time it is clear that these are very complex issues that require a broad approach in terms of policy measures, strategies, territories and implementations, in order to fully account for all their dimensions. In this regard, the circular economy and sustainability require the involvement of regional governments, in order to facilitate firms' positively interactions.

Additionally, in view of particular actions to be implemented depending on activities, technologies and establishments size, such measures have strong industrial and regional dimensions. Finally, sustainability principles require minimization of waste transportation and intermediate spatial consumption, which provides a significant role for local and regional stakeholders in the design and implementation of these policies.

To sum up, the varied contributions to the present special issue demonstrate the range of possibilities for defining and approaching the interlinkages between sustainability and circularity issues. This special issue is a valuable resource for researchers and policymakers in the fields of environmental and ecological economics. It presents important updates to the state of the art in multiple domains which include consumption behaviour, industrial ecology, socioeconomic and macroeconomic factors of sustainability and/or circularity and smart sustainable cities. A common interest evolves around government, consumer and producer behaviour that can be considered key factors in the successful pathway towards a more sustainable and circular world. Case studies presented in this special issue describe alternative methodological approaches and provide evidence of sustainability between different countries. We hope that these studies will generate intense discussion on circularity and sustainability issues towards the achievement of Sustainable Development Goals.

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