Guest editorial

Circular economy and entrepreneurial ecosystems: a missing link?

Guest editorial

1

Theoretical background

Over the last 60 years, governments in advanced countries have adopted a range of environmental, industrial, and business policies (e.g. OECD, 2014; Warwick, 2013; Dabić *et al.*, 2016; Švarc *et al.*, 2020, 2021). In the last 20 years, we have witnessed an escalation in both the number of political initiatives and the degrees of funding committed to these activities in process of development (Block, 2008). In the circular economy (CE) action plan (COM, 2015, p. 614), a CE is defined as an economy in which “*the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste minimized*”.

The European resource efficiency platform’s manifesto and policy recommendations present a foundation for a resource-efficient Europe, providing potential avenues towards a resource-efficient CE (EC, 2012). The European Commission has carried out studies to identify new opportunities to approach CE in different ways. The 2016 report – “*Circular economy in Europe; Developing the knowledge base*” – gathered and classified all of the information that we must better understand in order to facilitate an action plan for the transition to CE. CE supports an economic model that removes resource inputs and wastage through a holistic approach to the system (Ellen MacArthur Foundation, 2016).

Consequently, policymakers are now beginning to recognise the value of a more systems-based way of supporting the CE from an entrepreneurial perspective. This embodies a change away from enterprise-specific involvements towards more holistic activities which focus on “*developing networks, aligning priorities, building new institutional capabilities and fostering synergies between different stakeholders*” (OECD, 2014, p. 5). This holistic approach enables the systemic consideration of the implications of the paradigm shift, which includes interactions between different domains of the human being (economic, social, and environmental), different geographic regions (spatial dimension), and different groups (temporal/dynamic dimension).

On 16th of January 2018, the European Commission issued a communication concerning “*a monitoring framework for the circular economy*”, containing ten indicators to identify the main elements of a CE. Within some different perspectives, one recent approach focuses on “entrepreneurial ecosystems” (Acs *et al.*, 2018; Audretsch *et al.*, 2019; Ferreira and Teixeira, 2019; Fernandes and Ferreira, 2021; Isenberg, 2014; Stam, 2015). This approach has only emerged during the last five years and, because of this, there is not yet a broadly common definition (Stam, 2015).

According to Isenberg (2014), the predominant comparison for fostering entrepreneurship as an economic development strategy is the “entrepreneurship ecosystem”. The term “ecosystem”, in this respect, was originally used by James Moore in a seminal article in the Harvard Business Review, published during the 1990s. Moore (1993) claims that businesses do not advance in a “vacuum”, highlighting the relationally embedded nature of how

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enterprises interact with stakeholders. Furthermore, some researchers argue that, in dynamic ecosystems, new enterprises have more opportunities to grow and create employment in comparison to firms that are formed in other locations (Audretsch *et al.*, 2019; Rosted, 2012).

Despite many studies on entrepreneurial ecosystems, little research has touched upon their links with CE. Knowledge on the relationship between entrepreneurship and CE is in its infancy. Nevertheless, some studies discuss entrepreneurship and sustainable development as a broad social goal (Edler and James, 2015; Hall *et al.*, 2010; Khan *et al.*, 2020; Cullen and Angelis, 2021). For instance, Parker (2012) offers a comprehensive survey of entrepreneurship, innovation, and business cycle theories, whereas Köhler (2012) compares the neo-Schumpeterian theory of Kondratiev waves and the multi-level perspective on environmental innovation and societal transitions. Parida *et al.* (2019) investigated the transition to a CE, pointing out that, for an ecosystem transformation toward a CE paradigm, ecosystem-wide orchestration is compulsory. They discovered that ecosystem orchestrators transitioned towards a CE in two phases: ecosystem readiness assessment and ecosystem transformation.

Other studies have used indicators to estimate cleaner production barriers that add value to guidelines that facilitate entrepreneurship and adapt to the CE's implementation (Shi *et al.*, 2008). As a result of globalisation, entrepreneurial activities have been an essential source of social and ecological sustainability, and entrepreneurial ecosystems are seen as a dynamic force of change contributing to sustainable development.

Furthermore, entrepreneurship does not only pertain to the system's output; entrepreneurs are important players themselves in cultivating the ecosystem and keeping it sustainable and healthy (Stam, 2015; DiVito and Ingen-Housz, 2019; Konietzko *et al.*, 2020). Prosperous entrepreneurial systems are likely to have some initial and existing economic advantages. These involve governments supporting locations that are already favoured by this environment. Silicon Valley shows that thriving entrepreneurial ecosystems generate internal dissimilarities (OECD, 2014). What is done to the spatial "losers" produced by this policy is not clear. Environmental management and entrepreneurial ecosystems are becoming an increasingly relevant theme from a development perspective but are still largely under-researched.

In the context of the COVID-19 pandemic, these effects are multiple and are differentiated across the economy, exacerbating the vulnerability of already burdened social groups and ecosystems. Negative effects have encouraged policymakers and scientists to emphasize the urgent need to move towards a more sustainable CE in an attempt to inspire the adoption of sustainable practices (Singh, 2019). This would combat urgent environmental degradation and resource scarcity problems.

Based on prior literature, it is clear that further research is needed to shed light on the relevance of the CE and entrepreneurial ecosystems. This recognized need is one of the factors that inspired us to champion this special edition. This editorial attempts to fill this gap in research. It offers a set of articles that seek to expand our current understanding by integrating new and different perspectives, assisting organizations and other stakeholders in creating entrepreneurial, innovative, sustainable, and resilient strategies for a more open world.

Overview of papers

The articles included in this special editorial are summarized in Table 1. These studies employ a variety of approaches and methodologies, illustrating the deviations in the scope of the topic and the different dimensions and levels of analysis.

The first paper reviews the literature from entrepreneurship, the circular economy, and reverse logistics to explore the implications of artificial intelligence for reverse logistic functions. This paper, entitled "*The circular economy meets artificial intelligence (AI)*:"

Authors	Research questions/Objectives	Theoretical background	Data	Methods	Findings and conclusions
Wilson <i>et al.</i> (2021)	To explore the emerging technology of artificial intelligence and its implications for reverse logistics within the circular economy	Reverse logistics Circular economy Digital entrepreneurial ecosystem Artificial intelligence	Literature review	Conceptual	<ul style="list-style-type: none"> Artificial intelligence provides significant benefits across all functions and tasks in the reverse logistics process Artificial intelligence as a critical force in the digital entrepreneurial ecosystem Intuitive artificial intelligence adds value to the reverse logistics process
Pizzi <i>et al.</i> (2021)	To evaluate how specific evolutionary paths followed by a digital platform foster the development of an entrepreneurial ecosystem inspired by circular economy behaviors	Circular economy Digital platforms Sustainable business models	Case study (primary data) and archival data	Qualitative (interviews)	<ul style="list-style-type: none"> The central role played by digital platforms in representing innovative organizations characterized by a high degree of flexibility Circularity showed that a startup favors the adoption of paradigms inspired by the principles of circular economy through the exchange of information between organizations
Dal Bello <i>et al.</i> (2021)	To study the role of neo-rural entrepreneurs in developing the entrepreneurial ecosystem and fostering the sustainability of the local economy	Entrepreneurship Neo-rural entrepreneurial ecosystem Networks Triple Helix Low-density territories	Multiple case studies (primary data)	Qualitative (NVivo software)	<ul style="list-style-type: none"> Entrepreneurship as a vector of territorial development Relevance of neo-rural entrepreneurs as drivers of territorial development Institutional supports as drivers of circular entrepreneurship

(continued)

Table 1.
Synopsis of papers in
this special issue

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Authors	Research questions/Objectives	Theoretical background	Data	Methods	Findings and conclusions
Ofori and Opoku Mensah (2021)	To investigate the factors that promote pro-environmental intentions and sustainable electronic waste management among households in a developing country context	Sustainable e-waste management Sustainable development Pro-environmental intentions Planned behaviour theory Circular economy Co-operation university-industry Sustainability Entrepreneurial ecosystems	Quantitative (questionnaires)	Structural equation modelling (PLS-SEM)	<ul style="list-style-type: none">• The sustainable management of e-waste is a collective responsibility• E-waste generation and management have implications for environmental quality, social welfare, and economic development• The government must promote and encourage sustainable e-waste management in households• The relationship between entrepreneurial ecosystems and sustainability• Co-operation with suppliers, clients and co- universities positively impact upon sustainability• Entrepreneurship as a system for sustainability• Waste management compliance has a positive impact on innovation• Larger firms are more innovative and invest more in innovation and (proportionally) less in fixed assets than smaller companies• A positive and significant change in the number of patents with the waste management regulation
Raposo et al. (2021)	What is the impact of entrepreneurial ecosystems on sustainability?		Community Innovation Survey (CIS) (secondary data)	Econometric methods	
Castro Oliveira et al. (2021)	To investigate entrepreneurship from the perspective of circular economy and waste collection	Entrepreneurial ecosystems Circular economy Triple bottom line Triple helix Innovation	WEEE SABI database Bureau van Dijk's (Secondary data)	Regression models	

understanding the opportunities of AI for reverse logistics”, is authored by [Wilson et al. \(2021\)](#). The authors provide an innovative model that explains the factors that define the entrepreneurial university, offering guidelines with which universities can move forward into further developmental stages. The study emphasizes the importance of technology – particularly artificial intelligence – as a key force in the digital entrepreneurial ecosystem.

The second paper uses an in-depth case study to investigate the evolutionary pathway adapted by a digital platform as an enabler of entrepreneurial ecosystem development. The paper, entitled “*The enablers in the relationship between entrepreneurial ecosystems and the circular economy: the case of circularity.com*”, by [Pizzi et al. \(2021\)](#), shows how digital platforms can transition towards circular business models, particularly for small and medium enterprises.

The third paper investigates the role of neo-rural entrepreneurs in developing the entrepreneurial ecosystem and fostering sustainability in low-density territories. The paper, entitled “*Entrepreneurial ecosystems and local economy sustainability: institutional actors’ views on neo-rural entrepreneurship in low-density Portuguese territories*” is authored by [Dal Bello et al. \(2021\)](#). It examines institutional factors that stimulate territorial development and circular entrepreneurship.

The fourth sought to explore the factors that promote pro-environmental intentions and sustainable electronic waste management among households in developing countries. The paper, entitled “*Sustainable electronic waste management among households: a circular economy perspective from a developing economy*” by [Ofori and Opoku Mensah \(2021\)](#), reveals that environmental values are the major influencer of pro-environmental intentions. Pro-environmental intention was assumed to be a key predictor of sustainable waste management behaviours. The authors recommend that producers of electronic equipment reconsider their role in sustainable waste management, considering physical aspects and their economic responsibility for the environmental costs of their products. They also suggest that governments should promote sustainable e-waste management, encouraging a culture of environmental conservation in households.

The fifth paper, entitled “*We dreamed a dream that entrepreneurial ecosystems can promote sustainability*”, by [Raposo et al. \(2021\)](#), attempts to contribute to our current knowledge of the effects of entrepreneurial ecosystems on the sustainability of countries. The authors demonstrate the relevance of measuring entrepreneurship as a systemic phenomenon, showcasing the cooperation between different players, as suppliers, universities, and customers all positively impact upon national sustainability. The authors uncover a need for the social integration of sustainable businesses, vigorously encouraging the formation of bi-directional relationships between networks of stakeholders and sustainable businesses.

Finally, the sixth paper seeks to help resolve how universities possessing strategic entrepreneurship manage to advance significantly in their global ranking positions, while most of their competitors fail. This paper, entitled “*Orchestrating entrepreneurial ecosystems in circular economy: the new paradigm of sustainable competitiveness*”, authored by [Castro Oliveira et al. \(2021\)](#), shows that regulatory compliance has a positive impact on innovation, with a significant and positive change in the number of patents and the value of intangibles occurring when companies comply with waste management regulations. The authors argue that implementing circular business models enables the development of business networks that help create local jobs in the regions they operate in.

Conclusion and future agenda

This special edition hopes to shed light on recent advances and methodological approaches within the field of CE and entrepreneurial ecosystems, providing different perspectives and

contributing to a better understanding of this theme, thereby offering some crucial topics for the future agenda.

The papers covered by this issue suggest some specific topics as potential lines of future research. These are summarised as follows:

- (1) What are the effects of circular practices and artificial intelligence on entrepreneurial ecosystems?
- (2) What are the facilitating attributes for a symbiotic reaction between entrepreneurial ecosystems and the circular economy? What role do digital platforms play?
- (3) What relationship exists between entrepreneurial ecosystems and the sustainability of the local economy? What role do institutions play?
- (4) What would be the best collective approach with which to develop a sustainable e-waste management system?
- (5) How can entrepreneurial ecosystems promote sustainable business models and competitiveness?
- (6) What role do businesses play in shaping and adapting more sustainable, ecological, and greener ecosystems?
- (7) How does the operations of a business ecosystem impact upon the environment (and global sustainability)?

This special edition provides relevant findings and highlights the broader implications for the development of CE and entrepreneurial ecosystems. These findings will prove useful for policymakers, businesses, institutions, and scholars. We believe that this special issue will pave the way for more research on this subject, as there are several challenges and questions not included here which are deserving of further attention.

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