

RESEARCH ARTICLE OPEN ACCESS

Growth Strategy of Circular Startups

Gustavo Dalmarco¹  | Ana Inês^{1,2}  | Carolina de Sousa Resende³ | Ricardo Zimmermann¹¹INESC TEC, Porto, Portugal | ²DEGEIT—Department of Economics, Management, Industrial Engineering and Tourism, University of Aveiro, Aveiro, Portugal | ³FEP, Porto, Portugal**Correspondence:** Gustavo Dalmarco (gustavo.dalmarco@inesctec.pt)**Received:** 31 May 2025 | **Revised:** 29 December 2025 | **Accepted:** 6 January 2026**Keywords:** circular business models | circular economy | circular startups | entrepreneurship | scalability strategies

ABSTRACT

Circular startups (CSUs) play a crucial role in the circular transition by developing circular business models (CBMs) that minimise resource use and narrow material and energy loops. However, empirical research on how CBMs shape growth strategies and how ecosystems enable or constrain scaling remains limited. This study aims to fill this gap by analysing the growth strategy of CSUs, addressing their circularity, business model and scalability strategies. It analysed 44 CSUs operating in packaging and plastics, textiles and food, water and nutrients value chains, using a qualitative multiple-case design. Results show that CSUs predominantly adopt Commercial and ecosystem scalability strategies, linking replication and geographical expansion with access to partners, resources and markets, and implementing platform- or waste-based CBMs. The study expands existing frameworks by conceptualising Ecosystem Strategy as a core scalability approach and clarifying its mechanisms, offering guidance for entrepreneurs and policymakers seeking to foster circular transformation.

1 | Introduction

The circular economy (CE) is seen as an alternative to the linear make-use-dispose system, being described as a system that minimises resource input and waste by slowing, closing and narrowing material and energy loops (Bocken et al. 2016; Geissdoerfer et al. 2017; Kirchherr et al. 2017). When implementing circular strategies, startups have an advantage over established companies, as they can create innovative business models without being hindered by existing organisational dynamics, which allows them to align with CE principles from the beginning (Awana et al. 2023; Zucchella and Urban 2019).

Circular startups (CSUs) are emerging ventures established from the outset and explicitly oriented towards business models based on circular principles (Henry et al. 2020; Zucchella and Urban 2019). Their flexibility in responding to changing market conditions, combined with a strong propensity to adopt disruptive circular business models (CBMs), enables them to drive the transition from a linear to a CE (Awana et al. 2023;

Henry et al. 2020; Rizos et al. 2016) and to advance sustainability across value chains (VCs) (Van Opstal and Borms 2023). CBMs are increasingly challenging and displacing linear business models to achieve a systemic circular transition (Pal and Gander 2018). Nevertheless, this transition remains slow, as the scalability of CBMs is often constrained by the complexity inherent in shifting from linear to circular business initiatives (Khan et al. 2020).

When viewed through an ecosystem lens, scaling CSUs requires the coordination of complementary actors beyond individual organisations, including producers, suppliers, users and regulators, who together enable the delivery of a collective outcome. This coordination challenge fits the characteristics of business ecosystems, which are designed to address such challenges through ‘rules’ of engagement among interdependent yet autonomous participants (Konietzko et al. 2019). In practice, circular ecosystem innovation is driven by collaboration, experimentation and platformisation, allowing firms to move beyond dyadic ties and orchestrate multi-actor value creation that underpins

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial-NoDerivs](https://creativecommons.org/licenses/by-nc-nd/4.0/) License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2026 The Author(s). *Business Strategy and the Environment* published by ERP Environment and John Wiley & Sons Ltd.

loop-slowness, closing and narrowing (Konietzko et al. 2019). This perspective shifts growth from an internal endeavour to a process of value co-creation with customers, suppliers and partners (e.g., co-design, joint communication, reverse logistics), thereby enabling circular projects that no single company could deliver alone (Re and Magnani 2022).

Recent studies on CSU have identified and analysed growth/scalability drivers (Hultberg and Pal 2021; Han et al. 2023; Font-Cot et al. 2025), characteristics of CBM (Henry et al. 2020; Cullen and De Angelis 2021; von Kolpinski et al. 2022; Re and Magnani 2022; Alcalde-Calonge et al. 2024) and the role of business ecosystems towards the adoption of circular practices (Averina et al. 2022; Alka et al. 2024; Martín-Peña et al. 2024). Nevertheless, despite these contributions, some authors argue that empirical research on the adoption and implementation of CBMs by startups, and on their scalability strategies, remains limited (Han et al. 2023; Van Opstal and Borms 2023; Provensi and Sehnem 2025). In particular, the role of business ecosystems towards the development and growth of CSUs should be further explored (Han et al. 2023; Alka et al. 2024; Martín-Peña et al. 2024; Font-Cot et al. 2025). Consequently, there is a research gap in studies of circular firms and startups that requires further exploration (Suchek et al. 2022), adding to how CBMs shape scalability strategies—particularly how ecosystems enable or constrain this process.

In this context, the following research questions arise: ‘How do Circular Business Models shape the growth strategies of Circular Startups?’ and ‘How relevant is the company’s ecosystem to implementing such growth strategies?’ Drawing on stakeholder (Parmar et al. 2010) and the resource-based view (RBV) (Lockett et al. 2009) theories, this study considers that the growth of CSU depends not only on their internal capabilities and resources embedded in CBMs but also on their ability to engage and co-create value with multiple stakeholders across their ecosystems. Accordingly, this research aims to analyse the growth strategies adopted by CSU, considering the role of CBMs. This research will also analyse the role of business ecosystems in companies’ scalability, based on CSU from different EU countries across various industrial sectors. Complementing previous studies, we analyse growth strategies focusing on the needs of CSU, including the role of their ecosystem to grow (Han et al. 2023). This study was conducted with 44 companies from different European regions, all supported by a Horizon Europe Project, which allows for a broader geographical scope. Through a qualitative multiple case study methodology, we seek to provide valuable insights to the field of CE and entrepreneurship, and the results may be used by researchers and practitioners to study and implement growth strategies for CSU.

This study contributes to the literature by providing empirical evidence on how CBMs shape the growth strategies of CSU across distinct VCs, an area still underexplored. Theoretically, it expands existing frameworks by presenting ecosystem strategy as a core scalability approach, underscoring the relevance of stakeholder collaboration and value co-creation in enabling growth. Practically, the findings offer guidance for entrepreneurs and policymakers by clarifying how different CBMs influence scalability and by identifying ecosystem conditions that facilitate or hinder circular expansion.

2 | Literature Review

This theoretical review connects the literature on CE and circular entrepreneurship with work on CSUs, CBMs and scalability strategies. This analysis will use two main theoretical lenses: RBV (Lockett et al. 2009) and stakeholder theory (Parmar et al. 2010).

2.1 | CSUs and CBMs

The prominence of the CE as an alternative to the linear model lies in its potential to tackle resource limitations and mitigate negative environmental impacts, thereby contributing to sustainable development (Geissdoerfer et al. 2017; Kirchherr et al. 2017; Korhonen et al. 2018). This potential is particularly relevant for entrepreneurship as it opens new opportunities for innovation and business model transformation through the application of circular principles (Zucchella and Urban 2019; Henry et al. 2020; Awana et al. 2023). Circular entrepreneurship, an emergent type of sustainable entrepreneurship, specifically applies R-imperatives to close, slow and narrow resource and energy loops, aligning commercial principles and environmental concerns (Zucchella and Urban 2019; Terán-Yépez et al. 2020; Crecente et al. 2021; Suchek et al. 2022):

As shifting towards a CE entails significant changes in business operations, startups play a key role due to their flexibility, adaptability to market dynamics and ability to design innovative business models (Rizos et al. 2016; Zucchella and Urban 2019; Awana et al. 2023). In this context, CSU accelerate the transition by adopting disruptive innovations and pursuing higher levels of circularity, especially when compared to established companies (Potting et al. 2017; Awana et al. 2023; Provensi and Sehnem 2025). From a strategic management perspective, the RBV offers a useful lens to analyse how CSU develop and leverage distinctive tangible and intangible resources—such as circular design expertise, collaborative networks and sustainability-driven culture—to achieve and sustain competitive advantage (Lockett et al. 2009). This perspective highlights that these unique, path-dependent capabilities are key enablers of CBM innovation and long-term value creation within the CE.

This study defines CSU as ventures that incorporate at least one circular strategy, known as R-imperative, into their business models (Awana et al. 2023; Bauwens et al. 2020; Kirchherr et al. 2017). Startups that integrate CE principles from inception are referred to as born circular ventures (Todeschini et al. 2017; Zucchella and Urban 2019; Han et al. 2023). Since their founding, these young ventures tend to build strong connections with diverse stakeholders who are likely to adopt circular practices, making them facilitators of circular ecosystems (Aarikka-Stenroos et al. 2021). From an RBV perspective, born CSUs have a unique set of internal resources and capabilities that can constitute a key source of competitive advantage (Lockett et al. 2009). In contrast, established firms that subsequently transition to CE principles are classified as growing circular firms (Han et al. 2023; Zucchella and Urban 2019). In both cases, the adoption of CBMs requires the development and reconfiguration of capabilities (Coppola et al. 2023), making the distinction between born and growing circular firms particularly relevant

for understanding how CSUs design their CBMs and pursue scalability strategies.

Overall, CSU are actively engaged in implementing CBMs that encompass a set of circular R-imperatives, thus fostering sustainability and promoting circularity (Bocken et al. 2016; Henry et al. 2020). CBMs facilitate economically feasible approaches for the reuse of products and materials, incorporating renewable resources (Bocken et al. 2016). This study adopts the 10 R-framework proposed by Potting et al. (2017) and applied in recent studies (e.g., Morsetto 2020; Zimmermann et al. 2024), encompassing refuse, rethink, reduce, reuse, repair, refurbish, remanufacture, repurpose, recycle and recover. These R-strategies are hierarchically ordered from high to low circularity level and aim to minimise resource usage and promote waste valorization (Kirchherr et al. 2017; Potting et al. 2017; Campbell-Johnston et al. 2020). These imperatives can be grouped into three categories: (1) smarter product use and manufacture, that comprises refuse, rethink and reduce, applied mainly before production begins, during product conception, design and development; (2) lifespan of product and its parts extension, including reuse, repair, refurbish, remanufacture and repurpose, extends the lifecycle and the value of goods and their components but poses significant innovation and implementation challenges; and (3) useful application of materials, encompassing recycle and recover, which focus on end-of-life products, extracting energy or materials from waste, and have a limited impact on the overall production and consumption system (Potting et al. 2017; Morsetto 2020).

Building on this 10-R framework, Henry et al. (2020) present a typology of CBMs of CSU based on R-strategies that lie at the core of their business models and on their type of innovation, identifying the following five types:

- The **design-based** archetype prioritises core technology innovation in the pre-market stage to increase efficiency and optimise raw material use, especially by adopting reuse, reduce or both strategies (Henry et al. 2020; Ghisellini et al. 2023). Design-based CBM concentrates on circular design to reduce the use of resources (including raw materials) and/or extend product lifecycles, for instance, by developing innovative materials or by innovating product design (Henry et al. 2020; Ghisellini et al. 2023; von Kolpinski et al. 2024). As such, this archetype applies R-strategies within *smarter product use and manufacture* and *lifespan of product and its parts extension*. For design-based CSU, which usually revolve around improving product functionality, product development is crucial to allow a successful scaling (Han et al. 2023). Also, these ventures usually hold significant influence over their upstream VC partners, enabling them to drive changes in industry practices (Han et al. 2023).
- **Waste-based** CMB, often operating in the agri-food or fashion sector, relies mainly on *useful application of materials* R-strategy to capture value from previously unexplored waste materials or by-products, such as discarded clothing or food surplus (Henry et al. 2020; von Kolpinski et al. 2024). This typology implies the application of innovative processes or industrial symbiosis solutions,

seeking to upcycle waste streams generated by consumers or producers (Henry et al. 2020). As such, waste-based ventures rely on supply chain networks to navigate regulatory challenges arising from unclear legislation (Henry et al. 2020).

- **Platform-based** CBM combine *smarter product use and manufacture* and *lifespan of product and its parts* R-strategies (e.g., reduce and reuse). The business models revolve around B2B, B2C or C2C online marketplaces, enabling consumers to buy, sell or share products, services or knowledge (Henry et al. 2020; von Kolpinski et al. 2024). Here startups transform products into services (von Kolpinski et al. 2024), for instance, by offering a car-sharing platform or a second-hand marketplace (Han et al. 2023). For platform-based startups, such as Airbnb, Uber and Vinted, developing an ecosystem is crucial to foster interaction and collaboration between the different users and producers that they connect (Korhonen et al. 2017).
- The **service-based** CBM combines multiple approaches within *lifespan of products and its parts* R-strategy, as it focuses on offering product-service systems (PSS), wherein the customer does not usually have product ownership, thus increasing product usage (Henry et al. 2020; von Kolpinski et al. 2024). These CSU, operating mainly in manufacturing, rely on product reuse, repair or even remanufacture, as in the case of bike rentals or washing machine services (Yang and Evans 2019; Henry et al. 2020; Han et al. 2023).
- Finally, **nature-based** CBM rely on regenerative strategies to offer services or products through systemic solutions that aim to replicate biological cycles and systems, thus reducing the reliance on non-renewable natural resources (Henry et al. 2020; Maes and Jacobs 2017). These startups often operate in agri-food or construction sectors, seeking to reduce the reliance on non-renewable natural resources by mimicking natural processes (Henry et al. 2020; Maes and Jacobs 2017). As such, *smarter product use and manufacture* R-strategies are required, especially to rethink and reduce. There is a dearth of research regarding this type of startup, as they are often not represented in studies analysing CSU (e.g., Han et al. 2023).

Although R-strategies and their relationship with CBMs have been broadly studied in the literature, analyses of CSU growth based on CBMs and R-strategies remain scarce (Han et al. 2023). Thereby, this research aims to address this gap by examining the growth strategies of CSU, focusing on their circularity, business models and scalability strategies.

Overall, these CBM archetypes show that CSUs rely on distinct configurations of R-strategies to create and capture value within the CE (Bocken et al. 2016; Potting et al. 2017; Henry et al. 2020). Yet, despite growing clarity on how CSUs design their business models, less attention has been paid to how these circular configurations shape their growth trajectories and capacity to scale (Han et al. 2023). The following section therefore examines scalability strategies, clarifying how CSUs seek to grow, replicate and diffuse their CBMs while pursuing higher levels of circularity.

2.2 | Scalability Strategies

The concept of scalability implies a system's capacity to handle a rising number of elements or objects, manage increasing workloads with ease and be receptive to expansion (Bondi 2000). Thus, scalability involves a firm's ability to grow, replicate and adapt (Dobson et al. 2018; Lund and Nielsen 2018). Unlike the linear business approach, CBMs attempt to pursue not only financial growth but also impact (Bauwens et al. 2020; Sandberg and Hultberg 2021; Han et al. 2023). CSUs are thus a specific type of startups that seek to scale both commercial and non-commercial dimensions, aiming to achieve a balance between economic growth and social and environmental impact, instead of merely prioritising rapid growth or revenue increases (Hultberg and Pal 2021; Han et al. 2023). When adopting CBMs, CSUs face distinct scalability challenges compared to linear business models, as their innovative offerings and distinctive management approaches may result in limited scalability (Pal and Gander 2018; Hultberg and Pal 2023). In this way, understanding how CSUs can scale is crucial, especially to foster a shift towards CE.

Several studies propose different types of categorisations to scalability strategies of CSU. Differently from regular startups, CSU also develop their scaling strategies with non-commercial objectives, focusing on generating positive social and environmental impacts, fostering broader market effects and driving systemic change (Han et al. 2023; Hultberg and Pal 2023). Building on this idea, one type of scalability strategy is the *impact scaling*, which entails a continuous effort to increase the extent of positive changes in society, addressing urgent social and environmental issues at individual or systemic levels (Islam 2020; Niessen et al. 2023). By its turn, the *commercial* strategy focuses on directing initiatives and allocating resources to expand the company with the aim of maximising profits and organisational growth (Han et al. 2023; Islam 2022; Picken 2017). This strategy thus involves initiatives such as product/service development or geographic expansion to reach a broader audience and increase turnover, corresponding to a scaling-out approach via replication and diffusion (Westley et al. 2014; Moore et al. 2015; Sandberg and Hultberg 2021; Islam 2022). When CSU strive to achieve commercial growth and expand their impact at the same time, ensuring that one does not hinder the other, they follow a *synced* strategy (Han et al. 2023). This strategy is usually adopted by born circular firms with platform, waste, service or design-based CBM (Han et al. 2023). Conversely, if CSU initially scale on the commercial dimension before expanding their circular impact, they follow a *phased* strategy (Han et al. 2023). This is particularly the case of grown circulars that adopt either a service or design-based CBM (Han et al. 2023).

In addition to the previous scalability strategies for CSU, this study introduces **Ecosystem Strategy**, which is widely discussed in the social impact literature but has not yet been explicitly framed as a scaling strategy for CSUs. It comprises scaling activities that drive broader systemic change and effects that extend beyond the organisation's boundaries (Han et al. 2023; Islam 2022). These include advocacy, aimed at influencing other organisations to adopt specific products or services, and coalition-building, which involves establishing collaborative networks of organisations, being particularly relevant in a CE setting where firms leverage shared knowledge, expertise and resources (Islam 2022). Ecosystem alignment

that integrates partners' and customers' sustainability preferences from the outset and involves diverse internal and external stakeholders enhances the identification of sustainable opportunities and enables effective CBM implementation (Averina et al. 2022). From a stakeholder theory (Parmar et al. 2010) perspective, the ecosystem strategy relies on building local relationships with a diverse set of stakeholders, which would allow a company to replicate its business model in a different location with the same value-creation system. Although the role of entrepreneurial ecosystems in the growth of CSUs is mentioned by Han et al. (2023), Alka et al. (2024) and Provensi and Sehnem (2025), it has not been analysed as a distinct scalability strategy. In this study, ecosystem strategy captures how CSUs rely on collaborative partnerships with a diverse set of stakeholders such as customers, established companies, suppliers, universities, governments, acceleration and incubation programmes, and investors to ensure the viability of CBMs and to foster circular innovations that support systemic sustainable development (Provensi and Sehnem 2025; Alka et al. 2024).

Within the context of CBMs, Hultberg and Pal (2021) identify other strategic approaches for scalability, namely, *divide the labour* and *create together*, both seeking to expand the organisation's scope. *Divide the labour* seeks efficiency through the establishment of strategic partnerships and by leveraging the work of both partners and customers to establish strong collaborative ties (Lund and Nielsen 2018; Hultberg and Pal 2021). *Create together* explores possibilities beyond the organisation's boundaries, using collaborations to experiment, foster new connections and uncover opportunities, thus promoting co-creation and collaborative platforms with partners, customers and competitors (Hultberg and Pal 2021). It thus requires an active engagement and a sense of community (Acquier et al. 2019). CSU can achieve both scale and impact through collaboration with VC partners and by joining sustainable alliances or networks (Han et al. 2023). As such, in this study both *create together* and *divide the labour* are classified under the ecosystem scalability strategy, as they emphasise collaboration and interaction with external stakeholders.

Other scalability strategies include *scaling up* and *scaling deep* (Sandberg and Hultberg 2021). Scaling up goes beyond the performance of a single business model by influencing policy and regulations (Moore et al. 2015; Sandberg and Hultberg 2021). It seeks to impact a larger number of individuals, whether through social innovation or by addressing the roots of a broader institutional issue, using strategies such as lobbying, advocacy or education (Westley et al. 2014; André and Pache 2016; Bloom and Chatterji 2009). Scaling deep implies influencing cultural beliefs and values, as well as spreading cultural ideas and sharing knowledge (Moore et al. 2015; Sandberg and Hultberg 2021). This strategy concentrates on enhancing existing processes to amplify the effect on beneficiaries (André and Pache 2016). In this study, scaling up is categorised as **institutional** and scaling deep as **cultural** growth strategies, thus clarifying the type of impact of each scalability strategy. This categorisation will guide the empirical analysis, showing more clearly the impact of formal structures versus cultural norms.

To summarise the main scalability strategies analysed, Table 1 presents the different approaches into five types of scalability strategies: impact; commercial; institutional; cultural; and

TABLE 1 | Scalability strategies according to several authors.

Scalability strategies	Definition	Authors/sources
Impact	Entails efforts beyond the scope of organisational growth and income generation, by addressing social and environmental issues at individual or systemic levels to increase the extent of positive societal changes.	Islam 2020 ; Hultberg and Pal 2021 ; Han et al. 2023 ; Niessen et al. 2023
Commercial	Directs initiatives and allocating resources to expand the company's organisational growth with the aim of maximising profits, expanding geographically and replicating business models.	Westley et al. 2014 ; Moore et al. 2015 ; Picken 2017 ; Sandberg and Hultberg 2021 ; Han et al. 2023
Institutional	Focuses on shaping policies and regulations, with the aim to impact more individuals requiring social innovation or addressing a broader institutional foundation of an issue.	Westley et al. 2014 ; Moore et al. 2015 ; André and Pache 2016
Cultural	Aims to change cultural norms, beliefs and values by enhancing the impact on individuals and communities through cultural influence and knowledge sharing.	Moore et al. 2015 ; André and Pache 2016
Ecosystem	Extends the vision beyond the organisation's scope, through strategic partnerships and collaborations, striving for efficiency and leveraging the work of both partners and customers, as well as fostering new connections, uncovering opportunities and achieving scale and impact.	Lund and Nielsen 2018 ; Acquier et al. 2019 ; Islam 2020 ; Hultberg and Pal 2021 ; Han et al. 2023

ecosystem. Since the ecosystem strategy was not explored in previous literature as a scalability strategy for CSU, this study proposes it as a new strategy, seeking to highlight the relevance of networks and partnerships within CBMs.

3 | Research Method

To address the research questions, 'How do Circular Business Models shape the growth strategies of Circular Startups?' and 'How relevant is the company's ecosystem to implementing such growth strategies?', this study adopts a multiple case study methodology within an interpretivist paradigm (Antwi and Hamza [2015](#)). This approach acknowledges that the growth strategies of CSUs are influenced by social constructions and subjective meanings embedded in each firm's ecosystem, including founders' perceptions and interactions (Wahyuni [2012](#)). The choice of a case study methodology also aligns directly with the research questions, where a multiple studies approach aims to provide a comprehensive understanding of an emerging phenomenon within its real-world context (Yin [2017](#)). Besides, examining multiple cases enables theory-building and enhances the generalizability of the findings through systematic comparisons within and across cases (Eisenhardt [2021](#)). By using multiple data sources, qualitative case studies are able to capture individuals' diverse subjective perspectives regarding the phenomenon under analysis, thereby enhancing the study's validity (Creswell and Creswell [1994](#); Robson [2002](#); Yin [2017](#)).

3.1 | Criteria for Case Selection

This study aims to analyse the growth strategies of CSU, due to their role in promoting the shift towards CE. To this end, we

analysed CSU supported by a Horizon Europe project that aimed to promote the circularity of key product VCs (EC [2020](#)), namely, packaging and plastics, textiles, and food, water and nutrients. The selection of these VCs was the result of a public consultation throughout seven EU regions, which aimed to identify the most relevant VCs (according to EC [2020](#)) to each region. Seven workshops were conducted, with approximately 60 experts each. As a result, the project had two open calls to select startups with circular solutions for these three VCs. A total of 224 companies applied and 50 high-tech CSU, with potential scalable solutions focused on higher R-strategies, were selected by the project. Each startup received a maximum of €100,000, while also participating in a 12-month capacity building programme that improved their skills in developing and implementing CBMs, adopting systemic and entrepreneurial approaches and enhancing governance, funding and innovation capabilities.

The sampling logic balances within-case depth and cross-case breadth, strengthening theoretical relevance (Eisenhardt [2021](#)). The selected cases aimed to maximise theoretical insight (Eisenhardt and Graebner [2007](#)), given the limited number of empirical analyses in this context. For this reason, a diverse group of CSU with growth strategies across similar contexts was selected to enable analytical generalisation (Yin [2017](#)), where each case serves as a distinct theoretical replication contributing to refining emerging propositions.

3.2 | Data Collection and Analysis

Data collection involved all 50 companies that participated in the project. Each company constitutes a bounded case, defined by its engagement with the same programme structure and by the complete set of strategic information provided to the project

through different standardised research instruments developed by the authors. Different instruments were designed specifically for this research, ensuring that all data are primary sources collected for analytical purposes. Data collection and analysis were conducted in two main phases:

First, researchers analysed individual reports provided by each company during project execution. The three reports analysed are as follows:

- **Project application**, providing general demographic information; details on business model and feasibility; market focus; unique value proposition; team composition; funding and maturity stage; information related to business reliability; circular approach; and scalability potential.
- **Impact assessment** form, based on a tool designed to capture each company's perceived environmental, socio-economic and systemic impact potential, providing insights into how these CSU address sustainability concerns and intend to scale impact through their business models. This form was first submitted at project kick-off and again at the end of the capacity building programme, which allowed each company to review their strategy based on the content of the training sessions.
- **Progress report**, submitted after a series of workshops and mentorships, which reviewed each company's business model, solution validation, action plans, funding and intellectual property strategies and demonstrator implementation plans. These documents captured companies' ongoing progress, operational planning, technological validation, risk management and scaling strategies, offering a comprehensive perspective on their journey towards scalable circular solutions.

After the analysis of the documents provided by the 50 startups, six startups were excluded due to the lack of a clear scalability strategy or circular approach, resulting in a final set of 44 companies.

Second phase encompasses individual in-depth interviews, aiming to gain more detailed information about the decision process and implementation of scalability strategies. Sixteen companies participated in semi-structured interviews, offering extended contextual and interpretive insights, reaching theoretical saturation (Low 2019). Interviews were conducted with founders or CEOs of the startups, allowing a deeper understanding of the startups' motivations, challenges and scalability strategies employed (Saunders et al. 2009). By using open-ended questions, semi-structured interviews are more flexible, allowing the conversation to navigate through planned agenda topics, but also to delve into unexpected information (Adams 2015; Leedy and Ormrod 2023). The interview script, developed based on Han et al. (2023), included 11 open questions across three themes: CE strategies, CBM and scalability strategies. Interviews were conducted online (synchronously), since the interviewed companies were located in different geographic regions of Europe (Janghorban et al. 2014). The interviews were carried out between March and October 2024, lasting between 45 and 60 min. All the interviews were recorded to facilitate their transcription

and subsequent analysis of the information. The recordings were authorised by the interviewees in advance.

Combining different data sources allowed for methodological triangulation (Yin 2017; Jick 1979), improving the validity and reliability of findings. Table 2 showcases the profiles of the interviewed companies (in-depth cases) and their representatives.

A qualitative and deductive content analysis was performed, both for cross-case comparison and thematic content analysis, based on the categories that were identified in the literature review (Burns and Grove 2005). Reports and interview transcriptions were uploaded into the NVivo qualitative data analysis software. This process allowed the classification of data into distinct thematic categories (and sub-categories) relevant to this study, namely, CE (R-strategies), CMB (types of) and scalability strategies (typology). The data analysis process was conducted by two researchers, and in case of discrepancies, a third researcher was involved to achieve a consensus.

4 | Results

The analysed companies show a shared commitment to reduce environmental harm, improve social welfare and foster economic prosperity. While all firms address specific environmental challenges, such as food waste, single-use packaging, end-of-life textile management or the transformation of food by-products and waste, some go beyond environmental concerns to adopt a more holistic approach. The majority of firms (26) focus on solutions that tackle both environmental and economic sustainability, such as machine learning models to predict both the profitability and environmental impact of fashion brand designs (Company 17). In addition, seven companies explicitly embrace all three pillars of sustainability (environmental, social and economic), such as the solutions provided by Companies 1 and 11 that support the development of a specific rural community, contributing local economy and social well-being. For instance, six companies combine environmental and social goals, as shown in the case of Company 2 that tackles the challenge of post-consumer textiles, while also making its technology freely available to non-profit organisations, thus amplifying its social impact. The remaining five firms focus mainly on environmental problems, such as Company 34, which provides a digital tool for seafood companies to trace catch origin and reduce environmental risks. Table 3 presents the R-imperatives reflecting the circular strategies adopted by the companies.

As it can be seen, the main circularity strategy addressed by the analysed companies was based on the *smarter product use and manufacture*, demonstrating the overall concern on the responsible use of raw inputs. For instance, in the food, water and nutrients VC, these solutions were based on data-driven transparency to support circularity and valorisation of food by-products. At the textile VC, most solutions were based on the use of eco-friendly alternatives to chemical materials, which would also allow fibres to be fully recyclable. On the plastics and packaging VC, there is a broad focus on plastic waste reduction, with companies focusing on developing sustainable material alternatives to replace conventional plastics with biodegradable or compostable materials.

TABLE 2 | Profiles of interviewed companies and their representatives.

Company	Value chain ^a	Foundation	Country	Interviewee position ^b	R-strategy ^c
1	FW&N	2022	Spain	CEO	(3)
2	T	2020	Italy	CEO	(2)
3	T	2021	Turkey	CEO	(1)
4	FW&N	2023	Spain	CEO	(3)
5	FW&N	2016	Austria	CEO	(1)
6	FW&N	2022	Germany	CEO	(3)
7	T	2019	Belgium	CEO	(1)
8	T	2022	Belgium	CEO	(2)
9	P&P	2023	Germany	CEO	(2)
10	T	2023	Portugal	CEO	(2)
11	FW&N	2020	Portugal	CEO	(1)
12	P&P	2021	Germany	CEO	(2)
13	T	2020	Italy	CEO/co-founder	(1)
14	FW&N	2021	Germany	CEO and two employees	(3)
15	P&P	2020	Germany	CEO/co-founder	(1)
16	FW&N	2017	Greece	NA	(3)
17	T	2023	Luxembourg	NA	(1)
18	FW&N	2021	Turkey	NA	(3)
19	FW&N	2021	Belgium	NA	(1)
20	P&P	2021	Germany	NA	(2)
21	FW&N	2021	Israel	NA	(3)
22	FW&N	2021	Portugal	NA	(1)
23	FW&N	2013	Italy	NA	(3)
24	FW&N	2020	Greece	NA	(1)
25	FW&N	2016	Greece	NA	(1)
26	T	2023	Netherlands	NA	(1)
27	T	2020	Netherlands	NA	(1)
28	T	2022	Netherlands	NA	(2)
29	FW&N	2021	Estonia	NA	(1)
30	T	2019	Netherlands	NA	(1)
31	FW&N	2021	Ireland	NA	(3)
32	P&P	2023	Turkey	NA	(1)
33	FW&N	2020	Estonia	NA	(1)
34	FW&N	2022	France	NA	(1)
35	P&P	2021	Estonia	NA	(2)
36	FW&N	2022	Poland	NA	(2)
37	FW&N	2020	Netherlands	NA	(3)
38	FW&N	2010	Romania	NA	(1)

(Continues)

TABLE 2 | (Continued)

Company	Value chain ^a	Foundation	Country	Interviewee position ^b	R-strategy ^c
39	P&P	2022	Poland	NA	(1)
40	FW&N	2014	Hungary	NA	(1)
41	T	2020	Finland	NA	(1)
42	FW&N	2014	Italy	NA	(1)
43	FW&N	2017	Poland	NA	(1)
44	FW&N	2023	Finland	NA	(2)

^aFW&N = food, water and nutrients; T = textiles; P&P = plastics and packaging.

^bNA = not applicable, as the company was not interviewed.

^c(1) Smarter product use and manufacture: refuse, rethink, reduce; (2) Lifespan of products and its parts extension: reuse, repair, refurbish, remanufacture, repurpose; (3) Useful application of materials: recycle and recover.

Regarding *lifespan of product and its parts extension* strategy, solutions based in food, water and nutrients VC focused on preserving food quality through improved processing and redistribution. At the textile VC, services aimed to promote responsible product management and facilitate circular processes, mainly through platforms that connect consumers, needleworkers/artisans that could fix used clothes and retail stores. Regarding plastics and packaging VC, strategies focused on the reuse of plastic boxes in partnership with logistic companies, which can be used for multiple shipping cycles.

The circular strategy *useful application of materials*, food water and nutrients VC solutions were mostly aimed to use food waste for feedstock, fertilisers or energy generation. At the Textile VC, all companies had a clear view about recycling, although this was not the main strategy for any of the analysed cases. The same could be observed at the plastics and packaging VC, where all companies foresee circular recycling practices at the end of a products' life cycle, although this is not the main circular strategy.

4.1 | Scalability Strategies of CSUs

The growth strategies of CSU are shaped by their CBM, since it defines how ventures create, deliver and capture value while maintaining alignment with CE principles. Thus, the configuration of a CBM determines not only the pace but also the direction and nature of growth. Since most interviewed companies are start-ups and still have not implemented such a strategy, two planned growth strategies were presented by the companies. In that sense, the scalability strategies observed can be seen in Table 4.

Most interviewed companies, in all VCs, mentioned they would follow a traditional *commercial* scalability strategy (37 of the 44 analysed companies), pursuing geographical expansion. Companies start locally, in specific regions with strong local knowledge and strategic networks, gradually moving to regional and international markets. Company 12 mentions that 'Our main focus is on the German market right now, but we are already operate in 4/5 different countries inside the EU. In the middle term, we would like to focus on the EU side because I think 27 states are more than enough'. To implement a commercial growth strategy, most companies (14) are developing a platform-based business model, mainly described by B2C or B2B

online marketplaces. Waste-based, with 11 companies, is the second most implemented CBM, mostly with solutions that use food surplus or food waste to create new products such as new types of flours or in bio-energy generators. Company 1, which has a waste-based BM, mentioned that it wants to focus first on similar areas, 'traditional farms and environmentally protected areas', increasing their capacity and reducing the cost before expanding to other regions. In addition, technology licencing was also mentioned as part of their commercial scalability model. Company 8, with a platform business model, emphasises that their plan to scale their platform is by 'increasing our customer base and offering a licensing system for our concept to be replicated'.

Ecosystem scalability strategy was the second most relevant strategy, mentioned by 24 companies. They leverage relationships with local actors and other key ecosystem partners, since their operations depend on close relationships with diverse stakeholders (e.g., material suppliers and retailers). Company 5 emphasised cooperation agreements with dominant players, as well as establishing strategic partnerships with a '*primus inter pares* partner' which leads to 'complexity reduction'. Likewise, the CEO of Company 6 noted that it aims to build strong partnerships in a similar area because 'if we try to do it on our own, it becomes very hard and difficult'. Similarly to commercial strategy, the most relevant business models in ecosystem strategy are platform-based (12 companies) and waste-based (6 companies). For platform-based BM, companies from all VC analysed had services that connect different types of stakeholders, such as marketplaces. For Food, water and nutrients, solutions aimed to connect farmers, retailers and consumers, or bakeries and consumers. For textile, connecting consumers, needleworker/artisans and retail stores. For plastics and packaging, however, solutions rely mostly on logistic companies, who provide specific services to manufacturers that could use and re-use packaging boxes, being the logistic company the main client to those circular solutions.

Institutional, cultural and impact strategies had a less relevant role in the analysed companies, being the *institutional* and *cultural* strategy mentioned by 10 companies each. Concerning *institutional* strategy, Company E emphasise that they are 'institutional entrepreneurs [...]', so we try to cooperate with the governance actors in the field. We also need strategies to cooperate with the powerful government actors

TABLE 3 | R-imperatives alignment in the analysed companies.

Value chain	R-imperatives		
	Smarter product use and manufacture	Lifespan of product and its parts extension	Useful application of materials
Food, water and nutrients	13	2	10
Textiles	8	4	0
Plastics and packaging	3	4	0

TABLE 4 | Scalability strategies.

Value chain	Scalability strategies				
	Impact	Commercial	Institutional	Cultural	Ecosystem
Food, water and nutrients	2	21	6	6	15
Textiles	3	9	3	3	6
Plastics and packaging	2	7	1	1	3
Total	7	37	10	10	24

for the food sector in our country'. Other companies also mentioned the need for more comprehensive and expansive approaches to scale their influences, instigating systemic reforms within the agricultural domain and beyond. As mentions Company 10 'legislation is coming in [...] and is going to be the main factor for us'. Here again the platform-based BM is more relevant (five companies), followed by design and nature based. Design-based BM were used by textile companies like Companies 7 and 30 who created new textile processes that could be boosted by regulatory changes. Company 7 mentions they are 'actively participating in round tables with different actors, to promote policies regarding biobased alternatives and textile waste regulation'. For nature based BM, Packaging Company 32 mentions their bio-based polymers could create 'structural changes through the introduction of new roles and rules within the industry, developing advanced carbon capture technologies, and integrating them into broader industrial applications'.

Regarding the *cultural* scalability strategy, the circularity approach tackles consumer behaviour, as it is necessary to change the mindset from a linear to a circular vision. Company 11 mentions that their approach aims at 'shifting cultural norms and mindsets towards sustainable agricultural practices. We will launch educational campaigns, engage communities actively, and highlight success stories that demonstrate the tangible benefits of adopting our solutions for sustainable local agriculture'. For this scalability approach, platform-based is the main BM, mostly addressing a larger engagement of consumers towards circular solutions—e.g., providing traceability data for fishery (Company 34), connecting consumers for clothing re-sell (Company 26) or creating farming communities (Company 40). Service-based BM, with solutions for packaging (Company 9) and traceability of the textile industry (Company 41), and waste-based BM, using food waste as input to other products (e.g., Companies 6 and 23), are other relevant BMs within the

cultural scalability strategy. As Company 6 emphasises, 'We are planning to build up communities around our ideas [...] to keep people engaged so they stay motivated and drive the change we are seeking'.

Finally, the *impact* scaling strategy had fewer cases, mentioned by seven companies. Here, Company L emphasises the importance of contributing to society: 'the revenue model is designed to ensure both sustainability and profitability', while non-profit organisations are not charged to use Company L's technology. Within the impact strategy, waste-based and platform-based are the most relevant BM, with waste-based BM identified in solutions for the food industry, addressing energy generation (Company 1) and alternative food sources (Company 21). By its turn, platform-based BM was represented by solutions that provide sustainable alternatives to textile production (Company 2) or connects consumers for textile re-use (Company 10). Company 2 mentioned aiming for the social impact of its product and addressed initial investor concerns about scalability by developing 'a tool that can be provided to any entity, anywhere, without geographical limits or quantitative limits'.

Although aiming at different scalability strategies, challenges related to scaling still arise. From the interviews, it was possible to notice that all companies face difficulties when it comes to expanding their operations across different contexts, which underscores the multifaceted nature of these scalability challenges. Legal and regulatory matters present significant obstacles in the three analysed VCs. The lack of legislative action and enforcement in promoting CE practices makes it difficult for companies to scale, as businesses require clear guidelines and legal frameworks to adopt new practices. However, the CEO of Company 8 considered that 'the biggest bottleneck is that there is no sense of urgency' in matters of circularity legislation and law.

5 | Discussion

According to the findings, the analysed companies had different approaches towards their scalability strategy, mostly related to their VC. When addressing circular strategies, at the food, water and nutrients VC, most companies offer products and services related to *smarter product use and manufacture* strategy—new ways to refuse, rethink and reduce food waste. This can be justified by its organic transformative nature, as it involves rethinking products at the very beginning of their lifecycle, influencing every subsequent stage and enabling other CE strategies (Morsetto 2020). In addition, the use of technologies to increase efficiency in food distribution—also observed among the analysed companies—is key to align supply and demand forecasts, reducing food waste (Tseng et al. 2019). It is also relevant to emphasise the *useful application of materials* strategy, mostly represented by valorising by-products. One could argue that food processes leftovers, such as peels or grains, would go to waste anyway. However, such waste contributes to the environmental impacts on food supply chains. Finding ways to reduce this impact, mainly given by the perishable nature of food VC, is the main challenge of companies aiming to improve the circularity of this sector. Regarding the textile VC, *smarter product use and manufacture* strategy was also the main strategy among textile companies interviewed. Given that this sector is famous for ‘fast fashion’ (Pal and Gander 2018), strategies that aim to reduce, refuse or rethink the textile VC by using sustainable or alternative fibres could mitigate the adverse effects of materials and the impact on the environment (Todeschini et al. 2017). For plastics and packaging VC, main strategies are divided between *smarter product use and manufacture* and *lifespan of product and its parts extension*, emphasising the orientation of this sector to not only develop alternative solutions for the use of plastics in packaging, but also extending the use of such materials, thus maximising the circular use of resources throughout the packaging life cycle (Nuojua et al. 2024).

Regarding CBM, the most adopted strategy among interviewed companies was *platform-based*, mainly in food, water and nutrients and textile VC. Regarding food, water and nutrients VC, the use of platforms aimed to improve the connection between producers/retailers and consumers, aiming to reduce food waste. For textile VC, the main use was to improve the reuse and repair of clothing, connecting consumers and consequently extending its life cycle. This is in line with the concept of online platforms, which can potentially extend the use of resources by providing access to existing products and being a way to share knowledge and information (Konietzko et al. 2019).

Adding to the CBMs, the analysis of scalability strategies among the interviewed companies reveals their common objective for commercial growth (emphasising the commercial strategy), leveraging scalability to handle more elements, expanding workloads, promoting organisational expansion and maximising profits (Bondi 2000; Picken 2017; Han et al. 2023). Although it was mentioned that such companies have limited scalability (Pal and Gander 2018), the analysed business models have a real growth potential, mostly due to their platform-based BM. As explained by Company B, ‘although with a circular mindset to address the challenge of end-of-life-textiles, investors pressured us to go more technological in order to scale up’.

Regarding the ecosystem strategy—the second most relevant scalability strategy among interviewed companies, it relies on the relationship with a particular set of stakeholders (Parmar et al. 2010). Complementing Han et al. (2023) framework, this strategy highlights the importance of different stakeholders of CSU's VC when scaling. Across the three VCs, interviewees mentioned the need to include large retailers, food producers or logistics operators to expand their activities to other regions. In practice, the ecosystem strategy is applied through a set of mechanisms, such as securing access to critical resources (e.g., stable waste streams, product returns, physical space for pilots), using partners' channels and reputational capital to reach new customer segments, co-developing and testing circular solutions with lead users. This also reflects the fact that circular businesses often start out based on local relationships, and their growth necessarily involves identifying partners in other regions and levels of the VC (Kanda et al. 2021). However, founders also reported that some ecosystem actors (e.g., large organisations with an established linear model, public authorities with rigid procedures) can slow down or even block collaboration. Although relying on an ecosystem might reinforce the complexity of the transition from linear to circular business initiatives (Khan et al. 2020), collaboration with external partners can ease business experimentation and field experiments (Bocken et al. 2018; Konietzko et al. 2019).

The analysis also showed that 39% (17) of the companies combine commercial and ecosystem strategies, highlighting the mutually reinforcing nature of these two approaches. Rather than functioning in isolation, the results suggest that both strategies appear to co-evolve: commercial strategy drives firms to expand into new markets, while ecosystem engagement provides the partnerships, legitimacy and resource access needed to make such expansion viable. For example, several CSUs reported that geographical expansion became feasible only after a local pilot with a major manufacturer/retailer or municipality had demonstrated results and reduced perceived risks, enabling replication of the solution through those partners' existing infrastructure and customer base. In practice, companies pursuing this combined approach tend to support their growth on a commercial logic (such as geographical expansion or technology replication) while simultaneously cultivating the stakeholder networks required to operationalise their CBMs across different contexts. This often involved building platform-based interfaces that allow different actors to connect (e.g., producers, consumers, waste managers), formalising long-term agreements for access to secondary materials or joining accelerators and clusters that act as conveners of relevant ecosystem players. This approach can be explained by the presence of strong local knowledge and strategic networks, underlining also that as operations expand, the whole ecosystem must grow as well. Given that most interviewed companies rely on Platform- and Waste-based business models, both with strong influence of technological platforms and products, the growth of such businesses can be achieved not only on their commercial perspective but also through technology licencing, replication, adaptive designs and other technology-driven solutions (Konietzko et al. 2019; Han et al. 2023). Such a technology-based approach evidences its scalability potential, which can be duplicated even if it relies on specific types of organisations.

The findings align with stakeholder theory (Parmar et al. 2010), which posits that companies create value by engaging with a broad set of interconnected stakeholders. The prominence of the ecosystem strategy in the analysed companies illustrates that CSU depend on coordinated interactions with suppliers, customers, regulators and technology partners to deliver and scale their solutions. Our results show that value is co-created not only with customers but also with upstream and downstream actors, for instance, through joint optimisation of logistics for food redistribution, co-design of repair and reuse services with fashion brands or the integration of CSU digital platforms into existing waste-collection systems. This reinforces that growth in CBMs emerges not only from internal initiatives but also from the capacity to mobilise and align diverse stakeholders around shared circular objectives; particularly relevant for platform- and waste-based CBMs, which inherently require multi-actor collaboration (Freudenreich et al. 2020; Re and Magnani 2022). On the other hand, when startups lack stakeholder alignment or face unsupportive ecosystem actors, their ability to scale is constrained (Averina et al. 2022; Provensi and Sehnem 2025). In such cases, opportunities identified at the level of a single CSU are not translated into systemic circular impact, because the necessary changes in complementary activities (e.g., procurement practices, collection systems, consumer engagement) do not materialise. This highlights that stakeholder engagement is a central mechanism in enabling the transition from local experimentation to broader circular impact.

From an RBV perspective (Lockett et al. 2009), the results demonstrate that CSU's growth strategies are strongly influenced by the unique resources and capabilities embedded in their CBMs. Startups adopting platform- or waste-based models rely on digital infrastructures, circular design knowledge and technological capabilities that enable replication and adaptation across contexts, resources that are valuable, rare and often difficult to imitate. These internal assets not only guide the choice of scalability strategies, particularly commercial and ecosystem-based growth, but also allow companies to leverage their core competencies to create new value streams and strengthen their competitive position. At the same time, interviewees emphasised that these capabilities had to be complemented by the ability to navigate and influence their ecosystems, for example, by learning how to work with public procurement rules, adjusting their offers to incumbents' operational constraints or translating environmental benefits into business cases that resonate with investors and corporate partners. Consistent with Han et al. (2023), von Kolpinski et al. (2022) and Coppola et al. (2023), the evidence suggests that the capacity to scale circular solutions depends on combining these internal capabilities with the development of dynamic abilities to navigate regulatory complexity, build partnerships and adjust the business model, pointing to RBV as a useful lens to understand how CSU grow within evolving ecosystems.

6 | Conclusion

CE is an emerging topic, and it is possible to realise that some companies need to have a paradigm shift in the market in order to grow their operations. Environmental beliefs are identified

as key drivers for adopting circular R-based strategies, and education and access to information can enhance environmental awareness and support the adoption of the CE (Zimmermann et al. 2024). CSU, leveraging their flexibility and innovative capacity, play a pivotal role in the industrial transition from linear to CBM (Zucchella and Urban 2019; Sandberg and Hultberg 2021). As research on how CSU scale is still incipient, this study aims to provide insights about how CBMs shape their growth strategies and how the surrounding ecosystem enables or constrains the implementation of such strategies. To achieve this objective, a qualitative case study methodology was adopted, using semi-structured interviews and document analysis to gather comprehensive data, allowing us to capture the perceptions of circular entrepreneurs across three different VCs.

The present research presents the analysis of Growth strategies of CSU, based on their circular strategies, CBM and scalability strategies. Based on the analysis of 45 circular businesses from three different VCs, insights into circular growth strategies can be identified. The application of the circular strategy *smarter product use and manufacture* emphasises the innovative role of the solutions analysed, where new technologies, materials and processes are being developed to refuse, reduce and mainly rethink the circular strategies. In addition, platform- and waste-based CBM demonstrate the replication potential of such businesses, as they are developing products and services that can be replicable and generate new value streams for potential partners, which could raise the interest of potential clients. These main CBM are also related to the companies' scalability strategies, being commercial and ecosystem the most common approaches for such circular companies. Taken together, the findings show that CSU growth is driven not only by adopting higher R-imperatives but also by designing CBM that can be replicated and adapted across contexts, and by combining commercial expansion with ecosystem-oriented strategies that anchor these business models in specific VC relationships.

The main theoretical contribution of this study is to expand on Han et al. (2023) research, which only considers the *impact* and *commercial* strategies, by including other strategies—with a particular focus on the *ecosystem*. By conceptualising ecosystem strategy as a distinct yet complementary dimension of growth, the study shows that CSU do not scale only through internal decisions about markets and technology, but also through the way they mobilise and coordinate actors in their business ecosystems.

This strategy highlights the importance of different stakeholders of CSU's VC when scaling. The findings underlined a strong commitment across various VCs—food, water and nutrients, textile and plastics and packaging—to minimise environmental impact, enhance social welfare and foster economic growth. Other key findings reveal the presence of R-imperatives across different VCs, leading to industry-specific approaches. In addition, this research contributes to the literature on CE by: (1) providing empirical insights of three VCs about scalability strategies used by CSU; (2) enriching existing theoretical frameworks regarding the definition of growth strategies based on R-imperatives, CBM and scalability; (3) and linking the findings to stakeholder-oriented and resource-based perspectives on how firms create and capture value in circular ecosystems.

As a managerial contribution, this research provides insights into companies' decision-making processes when planning to scale, acting as a guideline to circular entrepreneurs. In particular, it suggests that circular entrepreneurs should align their growth strategies with their CBMs, deliberately combining commercial scaling with ecosystem-building efforts, structuring collaborative arrangements and anticipating potential barriers in their VCs. In addition, it supports policymakers to identify and define investment strategies, thus accelerating the circular transformation. To deploy and scale effectively, this study urges companies to critically examine their existing growth approach, as well as adjust their strategy to overcome existing barriers. In addition, a lack of legislative action promoting CE practices was observed, which hinders scaling, suggesting the need for greater government and policymaker proactivity on the topic. For policymakers, the main recommendations are on the importance of creating enabling regulatory and financial frameworks that reduce uncertainty, encourage experimentation with circular pilots and foster collaboration between start-ups, incumbents and public actors, thereby strengthening the ecosystems in which CSU operate.

Avenues for future research can include a larger number of companies, including other VCs, while also addressing longitudinal studies to identify how they successfully scaled their operations. This perspective could bring more insights on the challenges to implement the planned scalability strategies, and how they overcome them. In addition, the perspectives of various stakeholders on the scalability strategies and their implementation can be examined, including social and public policy implications, resulting in future recommendations for EU initiatives. Future research could also examine in more detail the role of specific ecosystem actors (such as municipalities, large incumbents or investors) in supporting or hindering CSU growth and explore cases where promising circular ventures did not scale, in order to further refine theory on circular growth strategies.

Acknowledgements

Open access publication funding provided by FCT (b-on).

Funding

This work was supported by the HORIZON EUROPE Framework Programme (101058385).

References

- Aarikka-Stenroos, L., P. Ritala, and L. D. W. Thomas. 2021. "Circular Economy Ecosystems: A Typology, Definitions, and Implications." In *Research Handbook of Sustainability Agency*, edited by S. Teerikangas, T. Onkila, K. Koistinen, and M. Mäkelä, 260–276. Edward Elgar Publishing. <https://doi.org/10.4337/9781789906035.00024>.
- Acquier, A., V. Carbone, and D. Massé. 2019. "How to Create Value(s) in the Sharing Economy: Business Models, Scalability, and Sustainability." *Technology Innovation Management Review* 9, no. 2: 5–24. <https://doi.org/10.22215/timreview/1215>.
- Adams, W. C. 2015. "Conducting Semi-Structured Interviews." In *Handbook of Practical Program Evaluation*, edited by K. Newcomer, H. P. Hatry, and J. S. Wholey, 492–505. Jossey-Bass. <https://doi.org/10.1002/9781119171386.ch19>.

- Alcalde-Calonge, A., P. Ruiz-Palomino, and F. J. Sáez-Martínez. 2024. "Fostering Circular Economy in Small and Medium-Sized Enterprises: The Role of Social Capital, Adaptive Capacity, Entrepreneurial Orientation and a Pro-Sustainable Environment." *Business Strategy and the Environment* 33: 8882–8899. <https://doi.org/10.1002/bse.394>.
- Alka, T. A., R. Raman, and M. Suresh. 2024. "Research Trends in Innovation Ecosystem and Circular Economy." *Discover Sustainability* 5: 323. <https://doi.org/10.1007/s43621-024-00535-5>.
- André, K., and A. C. Pache. 2016. "From Caring Entrepreneur to Caring Enterprise: Addressing the Ethical Challenges of Scaling Up Social Enterprises." *Journal of Business Ethics* 133, no. 4: 659–675. <https://doi.org/10.1007/s10551-014-2445-8>.
- Antwi, S. K., and K. Hamza. 2015. "Qualitative and Quantitative Research Paradigms in Business Research: A Philosophical Reflection." *European Journal of Business and Management* 7, no. 3: 217–225.
- Averina, E., J. Frishammar, and V. Parida. 2022. "Assessing Sustainability Opportunities for Circular Business Models." *Business Strategy and the Environment* 31, no. 4: 1464–1487. <https://doi.org/10.1002/bse.2964>.
- Awana, S., M. Chavan, D. Sedera, Z. Cheng, and M. Ganzin. 2023. "Unlocking Circular Start-Ups: A Model of Barriers." *Business Strategy and the Environment* 33, no. 3: 2546–2577. <https://doi.org/10.1002/bse.3608>.
- Bauwens, T., M. Hekkert, and J. Kirchherr. 2020. "Circular futures: What Will They Look Like?" *Ecological Economics* 175: 106703. <https://doi.org/10.1016/j.ecolecon.2020.106703>.
- Bloom, P. N., and A. K. Chatterji. 2009. "Scaling Social Entrepreneurial Impact." *California Management Review* 51, no. 3: 114–133. <https://doi.org/10.2307/41166496>.
- Bocken, N. M. P., I. de Pauw, C. Bakker, and B. van der Grinten. 2016. "Product Design and Business Model Strategies for a Circular Economy." *Journal of Industrial and Production Engineering* 33, no. 5: 308–320. <https://doi.org/10.1080/21681015.2016.1172124>.
- Bocken, N. M., C. S. Schuit, and C. Kraaijenhagen. 2018. "Experimenting With a Circular Business Model: Lessons From Eight Cases." *Environmental Innovation and Societal Transitions* 28: 79–95. <https://doi.org/10.1016/j.eist.2018.02.001>.
- Bondi, A. B. 2000. "Characteristics of Scalability and Their Impact on Performance." In *Proceedings of the 2nd International Workshop on Software and Performance*, 195–203. <https://doi.org/10.1145/350391.350432>.
- Burns, N., and S. K. Grove. 2005. *The Practice of Nursing Research: Conduct, Critique & Utilization*. Elsevier Saunders.
- Campbell-Johnston, K., W. J. Vermeulen, D. Reike, and S. Brullot. 2020. "The Circular Economy and Cascading: Towards a Framework." *Resources, Conservation and Recycling: X* 7: 100038. <https://doi.org/10.1016/j.rcrx.2020.100038>.
- Coppola, C., A. Vollero, and A. Siano. 2023. "Developing Dynamic Capabilities for the Circular Economy in the Textile and Clothing Industry in Italy: A Natural-Resource-Based View." *Business Strategy and the Environment* 32, no. 7: 4798–4820. <https://doi.org/10.1002/bse.3394>.
- Crecente, F., M. Sarabia, and M. T. Del Val. 2021. "Sustainable Entrepreneurship in the 2030 Horizon." *Sustainability* 13, no. 2: 909. <https://doi.org/10.3390/su13020909>.
- Creswell, J. W., and J. D. Creswell. 1994. *Research Design*. Sage.
- Cullen, U. A., and R. De Angelis. 2021. "Circular Entrepreneurship: A Business Model Perspective." *Resources, Conservation and Recycling* 168: 105300. <https://doi.org/10.1016/j.resconrec.2020.105300>.
- Dobson, K., S. Boone, P. Andries, and A. Daou. 2018. "Successfully Creating and Scaling a Sustainable Social Enterprise Model Under

- Uncertainty: The Case of ViaVia Travellers Cafés." *Journal of Cleaner Production* 172: 4555–4564. <https://doi.org/10.1016/j.jclepro.2017.09.010>.
- EC (European Commission). 2020. *A New Circular Economy Action Plan: For a Cleaner and More Competitive Europe*. Publications Office of the European Union. <https://doi.org/10.2779/05068>.
- Eisenhardt, K. M. 2021. "What is the Eisenhardt Method, Really?" *Strategic Organization* 19, no. 1: 147–160. <https://doi.org/10.1177/14761270209828>.
- Eisenhardt, K. M., and M. E. Graebner. 2007. "Theory Building From Cases: Opportunities and Challenges." *Academy of Management Journal* 50, no. 1: 25–32. <https://doi.org/10.5465/AMJ.2007.24160888>.
- Font-Cot, F., P. Lara-Navarra, C. S. Arnau, and E. Serradell-Lopez. 2025. "Scaling Wheel Framework: A Holistic Approach to Startup Scalability, Governance Models, and AI-Driven Innovation Ecosystem Competitiveness." *Journal of Open Innovation: Technology, Market, and Complexity* 11, no. 3: 100619. <https://doi.org/10.1016/j.joitmc.2025.100619>.
- Freudenreich, B., F. Lüdeke-Freund, and S. Schaltegger. 2020. "A Stakeholder Theory Perspective on Business Models: Value Creation for Sustainability." *Journal of Business Ethics* 166, no. 1: 3–18. <https://doi.org/10.1007/s10551-019-04112-z>.
- Geissdoerfer, M., P. Savaget, N. M. P. Bocken, and E. J. Hultink. 2017. "The Circular Economy—A New Sustainability Paradigm?" In *Journal of Cleaner Production*, vol. 143, 757–768. Elsevier Ltd. <https://doi.org/10.1016/j.jclepro.2016.12.048>.
- Ghisellini, P., R. Passaro, and S. Ulgiati. 2023. "Environmental Assessment of Multiple "Cleaner Electricity Mix" Scenarios Within Just Energy and Circular Economy Transitions, in Italy and Europe." *Journal of Cleaner Production* 388: 135891. <https://doi.org/10.1016/j.jclepro.2023.135891>.
- Han, D., J. Konietzko, M. Dijk, and N. Bocken. 2023. "How Do Circular Start-Ups Achieve Scale?" *Sustainable Production and Consumption* 40: 363–375. <https://doi.org/10.1016/j.spc.2023.06.007>.
- Henry, M., T. Bauwens, M. Hekkert, and J. Kirchherr. 2020. "A Typology of Circular Start-Ups: An Analysis of 128 Circular Business Models." *Journal of Cleaner Production* 245: 118528. <https://doi.org/10.1016/j.jclepro.2019.118528>.
- Hultberg, E., and R. Pal. 2021. "Lessons on Business Model Scalability for Circular Economy in the Fashion Retail Value Chain: Towards a Conceptual Model." *Sustainable Production and Consumption* 28: 686–698. <https://doi.org/10.1016/j.spc.2021.06.033>.
- Hultberg, E., and R. Pal. 2023. "Exploring Scalability From a Triple Bottom Line Perspective: Challenges and Strategic Resources for Fashion Resale." *Circular Economy and Sustainability* 3, no. 4: 2201–2231. <https://doi.org/10.1007/s43615-023-00267-0>.
- Islam, S. M. 2020. "Towards an Integrative Definition of Scaling Social Impact in Social Enterprises." *Journal of Business Venturing Insights* 13: e00164. <https://doi.org/10.1016/j.jbvi.2020.e00164>.
- Islam, S. M. 2022. "Social Impact Scaling Strategies in Social Enterprises: A Systematic Review and Research Agenda." *Australian Journal of Management* 47, no. 2: 298–321. <https://doi.org/10.1177/03128962211014931>.
- Janghorban, R., R. L. Roudsari, and A. Taghipour. 2014. "Skype Interviewing: The New Generation of Online Synchronous Interview in Qualitative Research." *International Journal of Qualitative Studies on Health and Well-Being* 9, no. 1: 24152. <https://doi.org/10.3402/qhw.v9.24152>.
- Jick, T. D. 1979. "Mixing Qualitative and Quantitative Methods: Triangulation in Action." *Administrative Science Quarterly* 24, no. 4: 602–611. <https://doi.org/10.2307/2392366>.
- Kanda, W., M. Geissdoerfer, and O. Hjelm. 2021. "From Circular Business Models to Circular Business Ecosystems." *Business Strategy and the Environment* 30, no. 6: 2814–2829. <https://doi.org/10.1002/bse.2895>.
- Khan, O., T. Daddi, and F. Iraldo. 2020. "Microfoundations of Dynamic Capabilities: Insights From Circular Economy Business Cases." *Business Strategy and the Environment* 29, no. 3: 1479–1493. <https://doi.org/10.1002/bse.2447>.
- Kirchherr, J., D. Reike, and M. Hekkert. 2017. "Conceptualizing the Circular Economy: An Analysis of 114 Definitions." *Resources, Conservation and Recycling* 127: 221–232. <https://doi.org/10.1016/j.rescon.2017.09.005>.
- Konietzko, J., N. Bocken, and E. J. Hultink. 2019. "Online Platforms and the Circular Economy." In *Innovation for Sustainability: Business Transformations Towards a Better World*, edited by N. Bocken, P. Ritala, L. Albareda, and R. Verburg, 435–450. Palgrave Macmillan. https://doi.org/10.1007/978-3-319-97385-2_23.
- Korhonen, H. M. E., K. Still, M. Seppänen, M. Kumpulainen, A. Suominen, and K. Valkokari. 2017. "The Core Interaction of Platforms: How Startups Connect Users and Producers." *Technology Innovation Management Review* 7, no. 9: 17–29. <https://doi.org/10.22215/timreview/1103>.
- Korhonen, J., A. Honkasalo, and J. Seppälä. 2018. "Circular Economy: The Concept and Its Limitations." *Ecological Economics* 143: 37–46. <https://doi.org/10.1016/j.ecolecon.2017.06.041>.
- Leedy, P. D., and J. E. Ormrod. 2023. *Practical Research: Planning and Design*. Pearson.
- Lockett, A., S. Thompson, and U. Morgenstern. 2009. "The Development of the Resource-Based View of the Firm: A Critical Appraisal." *International Journal of Management Reviews* 11, no. 1: 9–28. <https://doi.org/10.1111/j.1468-2370.2008.00252.x>.
- Low, J. 2019. "A Pragmatic Definition of the Concept of Theoretical Saturation." *Sociological Focus* 52, no. 2: 131–139. <https://doi.org/10.1080/00380237.2018.1544514>.
- Lund, M., and C. Nielsen. 2018. "The Concept of Business Model Scalability." *Journal of Business Models* 6, no. 1: 1–18. <https://doi.org/10.5278/ojs.jbm.v6i1.2235>.
- Maes, J., and S. Jacobs. 2017. "Nature-Based Solutions for Europe's Sustainable Development." *Conservation Letters* 10, no. 1: 121–124. <https://doi.org/10.1111/conl.12216>.
- Martín-Peña, M. L., P. C. Lorenzo, and N. Meyer. 2024. "Digital Platforms and Business Ecosystems: A Multidisciplinary Approach for New and Sustainable Business Models." *Review of Managerial Science* 18, no. 9: 2465–2482. <https://doi.org/10.1007/s11846-024-00772-y>.
- Moore, M.-L., D. Riddell, and D. Vocisano. 2015. "Large Systems Change: An Emerging Field of Transformation and Transitions." *Journal of Corporate Citizenship* 58: 67–84. <https://doi.org/10.2307/jcorpciti.58.67>.
- Morseletto, P. 2020. "Targets for a Circular Economy." *Resources, Conservation and Recycling* 153: 104553. <https://doi.org/10.1016/j.rescon.2019.104553>.
- Niessen, L., N. M. Bocken, and M. Dijk. 2023. "The Impact of Business Sufficiency Strategies on Consumer Practices: The Case of Bicycle Subscription." *Sustainable Production and Consumption* 35: 576–591. <https://doi.org/10.1016/j.spc.2022.12.007>.
- Nuojua, S., S. Pahl, and R. C. Thompson. 2024. "Plastic Alternatives and Substitutes in the Packaging Sector—A UK Consumer Perspective." *Sustainable Production and Consumption* 46: 68–81. <https://doi.org/10.1016/j.spc.2024.02.019>.
- Pal, R., and J. Gander. 2018. "Modelling Environmental Value: An Examination of Sustainable Business Models Within the Fashion Industry." *Journal of Cleaner Production* 184: 251–263. <https://doi.org/10.1016/j.jclepro.2018.02.001>.

- Parmar, B. L., R. E. Freeman, J. S. Harrison, A. C. Wicks, L. Purnell, and S. De Colle. 2010. "Stakeholder Theory: The State of the Art." *Academy of Management Annals* 4, no. 1: 403–445. <https://doi.org/10.5465/19416520.2010.495581>.
- Picken, J. C. 2017. "From Startup to Scalable Enterprise: Laying the Foundation." *Business Horizons* 60, no. 5: 587–595. <https://doi.org/10.1016/j.bushor.2017.05.002>.
- Potting, J., M. P. Hekkert, E. Worrell, and A. Hanemaaijer. 2017. "Circular Economy: Measuring Innovation in the Product Chain." In *Planbureau voor de Leefomgeving*. PBL Publishers.
- Provensi, T., and S. Sehnem. 2025. "Toward Circular Transition: Exploring the Role of Circular Start-Ups." In *Sustainable Production and Consumption* 57, no. 2: 46–60. <https://doi.org/10.1016/j.spc.2025.05.009>.
- Re, B., and G. Magnani. 2022. "Value Co-Creation in Circular Entrepreneurship: An Exploratory Study on Born Circular SMEs." *Journal of Business Research* 147: 189–207. <https://doi.org/10.1016/j.jbusres.2022.03.090>.
- Rizos, V., A. Behrens, W. Van der Gaast, et al. 2016. "Implementation of Circular Economy Business Models by Small and Medium-Sized Enterprises (SMEs): Barriers and Enablers." *Sustainability* 8, no. 11: 1212. <https://doi.org/10.3390/su8111212>.
- Robson, C. 2002. *Real World Research: A Resource for Social Scientists and Practitioner-Researchers*. 2nd ed. Blackwell Publishers Ltd.
- Sandberg, E., and E. Hultberg. 2021. "Dynamic Capabilities for the Scaling of Circular Business Model Initiatives in the Fashion Industry." *Journal of Cleaner Production* 320: 128831. <https://doi.org/10.1016/j.jclepro.2021.128831>.
- Saunders, M., P. Lewis, and A. Thornhill. 2009. *Research Methods for Business Students*. Pearson Education.
- Suchek, N., J. J. Ferreira, and P. O. Fernandes. 2022. "A Review of Entrepreneurship and Circular Economy Research: State of the Art and Future Directions." *Business Strategy and the Environment* 31, no. 5: 2256–2283. <https://doi.org/10.1002/bse.3020>.
- Terán-Yépez, E., G. M. Marín-Carrillo, M. del Pilar Casado-Belmonte, and M. de las Mercedes Capobianco-Uriarte. 2020. "Sustainable Entrepreneurship: Review of Its Evolution and New Trends." *Journal of Cleaner Production* 252: 119742. <https://doi.org/10.1016/j.jclepro.2019.119742>.
- Todeschini, B. V., M. N. Cortimiglia, D. Callegaro-de-Menezes, and A. Ghezzi. 2017. "Innovative and Sustainable Business Models in the Fashion Industry: Entrepreneurial Drivers, Opportunities, and Challenges." *Business Horizons* 60, no. 6: 759–770. <https://doi.org/10.1016/j.bushor.2017.07.003>.
- Tseng, M. L., A. S. Chiu, C. F. Chien, and R. R. Tan. 2019. "Pathways and Barriers to Circularity in Food Systems." *Resources, Conservation and Recycling* 143: 236–237. <https://doi.org/10.1016/j.resconrec.2019.01.015>.
- Van Opstal, W., and L. Borms. 2023. "Startups and Circular Economy Strategies: Profile Differences, Barriers and Enablers." *Journal of Cleaner Production* 396: 136510. <https://doi.org/10.1016/j.jclepro.2023.136510>.
- von Kolpinski, C., E. Cagno, and A. Neri. 2024. "Investigating the Entrepreneurial Orientation of Circular-Social Hybrid Start-Ups by Assessing Their Path Toward Sustainability: Evidence From 20 European Cases." *Sustainable Production and Consumption* 47: 222–235. <https://doi.org/10.1016/j.spc.2024.03.036>.
- von Kolpinski, C., D. M. Yazan, and L. Fraccascia. 2022. "The Impact of Internal Company Dynamics on Sustainable Circular Business Development: Insights From Circular Startups." *Business Strategy and the Environment* 32, no. 4: 1931–1950. <https://doi.org/10.1002/bse.3228>.
- Wahyuni, D. 2012. "The Research Design Maze: Understanding Paradigms, Cases, Methods and Methodologies." *Journal of Applied Management Accounting Research* 10, no. 1: 69–80. <https://ssrn.com/abstract=2103082>.
- Westley, F., N. Antadze, D. J. Riddell, K. Robinson, and S. Geobey. 2014. "Five Configurations for Scaling Up Social Innovation: Case Examples of Nonprofit Organizations From Canada." *Journal of Applied Behavior Science* 50, no. 3: 234–260. <https://doi.org/10.1177/0021886314532945>.
- Yang, M., and S. Evans. 2019. "Product-Service System Business Model Archetypes and Sustainability." *Journal of Cleaner Production* 220: 1156–1166. <https://doi.org/10.1016/j.jclepro.2019.02.067>.
- Yin, R. K. 2017. *Case Study Research and Applications: Design and Methods*. 6th ed. Sage Publications.
- Zimmermann, R., A. Inês, G. Dalmarco, and A. C. Moreira. 2024. "The Role of Consumers in the Adoption of R-Strategies: A Review and Research Agenda." *Cleaner and Responsible Consumption* 13: 100193. <https://doi.org/10.1016/j.clrc.2024.100193>.
- Zucchella, A., and S. Urban. 2019. *Circular Entrepreneurship*. Springer International Publishing.