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Challenges of circular new ventures: An empirical analysis of 70 cases

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ABSTRACT

The challenges encountered by established firms transforming their linear business models into circular business models (CBMs) have received extensive research attention. Such firms have experience and market foothold but tend to adopt an incremental approach to CBMs due to risks of business model cannibalization. However, there is relatively limited research on the challenges experienced by new ventures developing CBMs from scratch – circular new ventures. New ventures are often agile, experimental and deploy disruptive CBMs even though they lack resources. The lack of knowledge specific to this topic is constraining for entities such as incubators and accelerators that seek to facilitate the emergence and scale-up of circular new ventures. Furthermore, researchers cannot presume that the challenges experienced by established firms are the same for new ventures when developing CBMs. Thus, the aim of this article is to explore the challenges that new ventures experience while developing circular business models from scratch, synthesize the sources of these challenges and provide practitioner implications to overcome them. In doing so, we studied 70 circular new ventures across Europe. Our article makes four original contributions to the literature. First, our study is seminal in using a large cross-country dataset to qualitatively analyse the empirical challenges of new ventures developing circular business models. Second, we identify which challenges are generic for CBMs, which challenges are specific for certain CBM types and for circular new ventures in particular. Third, we show that the challenges of circular new ventures are determined by their: (i) type of circular business model, (ii) industrial sector, (iii) institutional context, and (iv) new ventures liabilities. Altogether, we highlight that while circular new ventures and new ventures experience several similar challenges, circular new ventures particularly struggle to scale-up due to their liabilities of newness and smallness which limits their resources and legitimacy to enter strategic partnerships crucial for new venture survival.

1. Introduction

This article explores challenges that new ventures experience while developing circular business models from scratch. New ventures[1] refer to founding teams, start-ups and young firms usually less than 10 years old (Fichter et al., 2022). New ventures are often in the process of bringing their initial products or services to the market and of seeking their initial customers. With challenges, we refer to critical aspects of development that firms experience and must overcome whilst developing a circular business model (CBM). Circular business models intend to replace the "end-of-life" concept with reuse, recycle, and recovery of materials in production and consumption processes. Thus, CBMs slow, narrow, and close recourse loops to reduce virgin resource extraction, waste, and emissions (Bocken et al., 2016; Geissdoerfer et al., 2020). New ventures developing CBMs must as all other firms deal with challenges while overcoming liabilities of newness and smallness. Such challenges[2] are connected to certain systemic (e.g., market, institutional) and endemic barriers (e.g., financial, knowledge) that are particular for circular business models (Tura et al., 2019; Vermunt et al., 2019). Thus, new ventures developing CBMs must overcome these

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[1] We decided to use the term "new ventures" instead of "start-ups" to encompass a broader range of entrepreneurial activities as captured by the diversity among our studied cases. We use "circular new ventures" to indicate the ambition of such ventures to develop circular business models.

[2] While challenges and barriers are used interchangeably in the literature, in this article, we use the term challenges to denote difficulties that require effort to overcome, while barriers are obstacles that prevent or obstruct progress.

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challenges to survive and scale-up.

Over the years, there have been several studies describing the early development of new ventures and the vulnerabilities connected to their newness and smallness which explains their high failure rate during their early years of existence (Davidsson and Klofsten, 2003; Gimenez-Fernandez et al., 2020). On the other hand, new ventures can be more receptive to disruptive thinking and embrace more radical circular business models than established firms. This is due to their agility, often lack of a functioning business model and investments (Henry et al., 2020). However, the survival of new ventures is more difficult in the early years especially when the business model they strive to develop is new and different to the market and customers (Kor and Misangyi, 2008; Stinchcombe, 1965). The challenge of being new and different is particularly pronounced for CBMs because of their new ways of organizing business, i.e. boundary spanning as well as new value propositions for markets and customers (Han et al., 2023). Thus, new ventures must build their legitimacy while simultaneously working to develop a platform within an emerging circular economy to access essential resources and opportunities (Suchek et al., 2022; Van Opstal and Borms, 2023).

The challenges encountered by established firms transforming their linear business models to circular business models have received extensive research attention (see e.g., Vermunt et al., 2019; Geissdoerfer et al., 2023; Tura et al., 2019). However, research on new ventures developing CBMs from scratch is relatively new and somehow dispersed (Suchek et al., 2022). New ventures are a crucial complement to established firms in facilitating the circular economy transition due to their ability to rapidly experiment and implement new CBMs. The related research has among others focused on developing a typology of circular new ventures (Henry et al., 2020), understanding entrepreneurial motivation and drive to develop CBMs (Henry et al., 2022), and the support ecosystem for circular entrepreneurship (Veleva and Bodkin, 2018). Studies focusing on the challenges of new ventures developing circular business models are very limited (Awana et al., 2023; Han et al., 2023). We identified fewer than five research articles on this specific topic (i.e., von Kolpinski et al., 2023; van Opstal et al., 2023; Awana et al., 2023; Geissdoerfer et al., 2023). Geissdoerfer et al. (2023) compare drivers and barriers for four generic circular business model innovation types: start-up, diversification, transformation, and acquisition based on 21 cases. von Kolpinski et al. (2023) focus on internal barriers, enablers, competencies, and drivers to circular business model implementation using interviews with 12 founders. van Opstal et al., 2023 report findings from a survey among 165 circular startups using multivariate statistics to analyse their personal and company characteristics and perspectives on circular strategies. Awana et al. (2023) conducted interviews with 18 founders in Australia to understand the challenges they experienced at different stages of their development and growth.

Altogether there is extensive knowledge about the challenges experienced by established firms transforming their linear business models into circular business models but limited insights into what specific challenges manifest in the case of new ventures developing circular business models. To address this gap, the aim of this article is to explore the challenges that new ventures experience while developing circular business models from scratch, synthesize the sources of these challenges and provide practitioner implications to overcome them. To do so, we qualitatively analyse the internal and external challenges of 70 circular new ventures (CNVs) developing CBMs from scratch in different industrial sectors across Europe. Analysing these challenges is crucial both for entrepreneurs as well as the supporting entrepreneurial ecosystem (Volkmann et al., 2019) that seek to facilitate the emergence and development of such ventures. The identified challenges can also provide relevant lessons even for established firms seeking to experiment with circular business models. Furthermore, researchers cannot presume that the extensive research on challenges experienced by established firms is directly applicable to new ventures developing circular business models. Thus our article is of practical and academic interest.

Our article makes four original contributions to the literature. First, our study is seminal in using a large cross-country dataset to qualitatively analyse the empirical challenges of circular new ventures. Second, we identify and analyse which challenges are applicable to CBMs in general and which challenges are specific for particularly CBM types and for circular new ventures. Third, we show that the challenges of circular new ventures are determined by their: (i) type of circular business model, (ii) industrial sector, (iii) institutional context, and (iv) new ventures liabilities. Finally, we highlight that while circular new ventures and new ventures in general experience several similar challenges, circular new ventures particularly struggle to scale-up due to their liabilities of newness and smallness which limits their resources and legitimacy to enter strategic partnerships crucial for new venture survival. By addressing this research gap, we strive to develop practically relevant scientific knowledge for actors interested in strengthening the role and impact of new ventures in the circular economy.

The rest of the article is structured as follows: In section 2, we review previous literature relevant for our research aim. This is followed by our research method in Section 3. Section 4 presents the empirical findings. We discuss our empirical findings in Section 5 and offer implications for practice in Section 6. We conclude on our research question in Section 7. Limitations and future research are presented in Section 8.

2. Literature review

2.1. Circular business models

Circular economy (CE) has gained traction as an approach to address contemporary sustainability challenges. In this regard, several governments and businesses worldwide have developed roadmaps and strategies to transform their linear *take-make-waste* economic systems to use material and energy resources more effectively. A CE is restorative and regenerative by design and aims to keep products, components and materials at their highest utility and value for as long as possible (Webster, 2017). A transition to a CE will depend on the strategic actions of policy makers and businesses on several societal levels (Lewandowski, 2016). On the organizational level, business models are important leverage points for the implementation of the CE (Geissdoerfer et al., 2023).

CE research has focused on business models to analyse the barriers and drivers to the circular economy. The Circular Business Model (CBM) concept is often defined based on the value creation logic of (Richardson, 2005) i.e., value proposition, value creation and value capture. Extending from the business model definition and the concept of the circular economy, Geissdoerfer et al. (2020) defined circular business models as business models that are developed with the ambition to either (i) cycle, (ii) extend, (iii) intensify and/or (iv) dematerialise material and energy loops to reduce the resource inputs into and the waste and emission leakage out of an organizational system. In this article, we focus on circular new ventures, i.e., new ventures striving to develop a functioning circular business model from scratch and their challenges.

For circular new ventures, the typical strategies to achieve circularity include the regeneration of ecosystems through products and services, the reduction of scarce input materials, the focus on reuse of resources/products and the recycling and recovery of embedded value or materials at a products end-of-life. Such business models can be implemented to a varying degree (e.g., as an “add-on” or side business or a central operation). While the R-strategies are not mutually exclusive - e.g., a biomaterial producer might also recycle the by-products of their production processes - a dominant R-strategy can typically be identified when scrutinizing a firms’ business models (Henry et al., 2020).

Finally, the literature offers several typologies of circular business models. According to Geissdoerfer et al. (2020), there is a range of understandings and definitions of the concept of circular business models

which has led to a number of circular business model archetypes. Pieroni et al. (2020), in a systematic literature review identified a total of sixteen grey and academic publications with a specific focus on circular business models archetypes. For example, the seminal work by Tukker (2004) introduced eight archetypes of business models on product-service systems (PSS). The archetypes are organized into three categories: (i) "product-oriented PSS" (comprising "product-oriented" and "advice and consultancy" (ii) "use-oriented PSS" (including "product lease", "product renting/sharing", and "product pooling"); and (iii) "result-oriented PSS (containing "activity management", "pay per service unit", and "functional result").

However, publications focusing explicitly on circular business model archetypes emerged in 2016 with the seminal paper by Bocken et al. (2016) who proposed six archetypes: (i) access and performance model; (ii) extending product value; (iii) classic long-life model; (iv) encourage sufficiency; (v) extending resource value and (vi) industrial symbiosis. Moreno et al. (2016) synthesized five archetypes from the literature: (i) "sharing platforms" and "extending product value" to "slow resource flows"; (ii) "product life extension" to "cycle resources for longer"; and (iii) "resource value" and "circular supplies" to "cascade or narrow resources flows". Related circular business model archetypes are also proposed by (Lüdeke-Freund et al., 2019; Planing, 2018; Rosa et al., 2019; Urbinati et al., 2017). In the specific context of new ventures and circular business models, Henry et al. (2020) based on empirical studies proposed five archetypes: design-based, waste-based, platform-based, service-based and nature-based.

The CBM archetype adopted in this article is from Bocken et al. (2016) for three main reasons. First, the archetype covers value creation from the re-circulation of both biological materials and technical products compared to archetypes focused on either of the two cycles. Second, this archetype explicitly highlights the rationale of how a venture creates, delivers, and captures value compared to archetypes focused on closing material and energy resource flows. Finally, the typology was specific enough to be operationalised in identifying new ventures in practise. According to Bocken et al. (2016), circular business modelling strategies include: (i) *access and performance model* – providing the capability or services to satisfy user needs without needing to own physical products; (ii) *extending product value* – exploiting residual value of products from - manufacture, to consumers, and then back to manufacturing-or collection of products between distinct business entities; (iii) *classic long life model* – business models focused on delivering long-product life, supported by design for durability and repair for instance; (iv) *encourage sufficiency* – solutions that actively seek to reduce end-user consumption through principles such as durability, upgradability, service, warrantees and reparability and a non-consumerist approach to marketing and sales (e.g. no sales commissions), (v) *extending resource value* – exploiting the residual value of resources: collection and sourcing of otherwise "wasted" materials or resources to turn these into new forms of value, (vi) *industrial symbiosis* – a process- orientated solution, concerned with using residual outputs from one process as feedstock for another process, which benefits from geographical proximity of businesses.

2.2. Challenges of circular business models

While insight into the challenges of circular new ventures is scarce in the literature, the generic challenges for circular business models are scrutinized by a variety of studies. To the best of our knowledge, there are a few studies (e.g., Geissdoerfer et al., 2023; Van Opstal and Borms, 2023) which touch upon the barriers to circular business models developed by new ventures. However, these studies often mix new ventures with established companies. They also study new ventures transforming their existing linear business models into circular business models. Some use little empirical data on new ventures, and rarely engage with the holistic perspective of new venture creation and the entrepreneurial character of new ventures. On the other hand, there are numerous studies which investigate the challenges that small- and medium-sized business face when developing CBMs but - like the dominant perspective on large corporations - these studies take a business model transformation perspective and do not focus on born circular business activities i.e., circular business model development from scratch (Rizos et al., 2015).

While the barriers for CBMs that recent literature identified are of both endemic and systemic character, the magnitude of external barriers tends to outweigh internal barriers (Vermunt et al., 2019). This is not surprising given CE's systemic character and the need for an ecosystem approach to comprehensively understand the value proposition of circular business models (Kanda et al., 2021) The typical external barriers relate to required changes in linear supply chains, lack of market readiness on supply and demand side, and a mismatch between CE practice and regulatory frameworks. Internal barriers are typically dominated by financial constraints, organizational and knowledge/technology dimensions. We argue that the new venture in CE requires a comprehensive perspective than only an environmental and organizational view. As such, the role of the entrepreneurial team as well as the process of business model development deserve more attention to comprehensively analyse the challenges such ventures experience.

There are several categorizations of challenges (including drivers) for circular business models in the literature. For example, Rizos et al. (2015) analysed barriers and enablers for the implementation of circular business models by small and medium sized enterprises. Bressanelli et al. (2019) identified barriers by life cycle phase and supply chain actor. Diaz Lopez et al. (2019) offered barriers to the implementation of circular business models as: institutional, market, organisational, behavioural and technological barriers. Tura et al. (2019) offered a systematic categorization of drivers and barriers into seven-factor categories (i.e., environmental, economic, social, institutional, technological and informational, supply chain and organisational). Takacs et al. (2022) identified six company-internal barriers (risk aversion, short-term orientation, economically dominated thinking, unwillingness to engage in trade-offs, shortage of resources, and lack of knowledge) and four levels of company-external barriers (technology, market, legislative, and society and consumers) among SMEs.

The categorization of challenges adopted in this article is from Vermunt et al. (2019). Vermunt et al. (2019) presents a categorization of the challenges of implementing different circular business models as: (i) financial challenges, (ii) organizational challenges, (iii) knowledge and technology challenges, (iv) supply chain challenges, (v) markets challenges and (vi) institutional challenges. We adopted this categorization from for three reasons. First, it was developed based on the type of business model which provides specific detail per business model type than challenges for circular business models in general. Second, since new ventures are still striving to develop a functioning circular business model, the categorization by Vermunt et al. (2019) was pragmatic and useful to capture the reality of new ventures such as their lack of supply chains, offerings, and customers. Finally, the categorization captures both factors internal and external to the focal firm which is relevant for new ventures which often lack resources, networks, and legitimacy. Nonetheless, we acknowledge the similarity and overlap between the categorizations of Vermunt et al. (2019) and other contributions such as Takacs et al. (2022) and Tura et al. (2019). According to Vermunt et al. (2019), financial challenges to circular business models include lack of financial resources, high up-front investment costs, higher costs related to the new circular business model (e.g., costs of collection and segregation of components), and unclear financial business case. Organizational challenges to circular business models include administrative burden, organization of reverse infrastructures, more complex management, and planning processes (Vermunt et al., 2019). Lack of technical know-how and expertise, lack of information/data, inability to deliver high quality products, and design challenges to create durable products are some of the challenges identified under knowledge and technology related challenges.

Supply chain related challenges include the lack of partners and low availability of materials, higher dependence on external parties, lack of information exchange between supply chain actors, conflicting interests between actors in the supply chain, lack of consideration on circular design from supply chain actors, lack of product/service standards, and bad re-use practices (Vermunt et al., 2019). Market challenges to circular business models include low virgin material prices, lack of consumer interest/non-acceptance of circular offerings together with their business models, resistance from stakeholders with vested interests in the linear economy (for instance original equipment manufacturers) (Vermunt et al., 2019). Institutional barriers refer to both hard (e.g., regulations) and soft (e.g., values, norms, culture) institutions that challenge the development of circular business models and can include ineffective recycling policies, incentives that promote material consumption above services, current accounting rules and management systems that are inappropriate for the circular economy, lack of standards and guidelines for quality and refurbishment of products, lack of awareness and sense of urgency within society.

2.3. New ventures and their liabilities of newness and smallness

The concept of new ventures has evolved both in research and practice over the past thirty years (Gilbert et al., 2006; Huang et al., 2023). A new venture is a firm striving to develop a business model while existing firms execute a business model. Therefore, a new venture is an evolving organization striving to develop a repeatable and scalable business model (Fritsch, 2011). New ventures continue to receive attention as entrepreneurship is increasingly viewed as a key driver for sustainable development and industrial renewal (Audretsch et al., 2022). Common research topics on new ventures include characteristics of the individual entrepreneur and the organizations they develop, financing of new ventures (Davidsson and Klofsten, 2003; Gartner, 1985) as well as their context and support ecosystem (Di Gregorio and Shane, 2003). Similarly, there has also been a lot of research interest into what kind of obstacles that new ventures face and how to overcome them (Clarysse and Bruneel, 2007). In recent years, research on entrepreneurship, new ventures and the circular economy has begun to emerge (Suchek et al., 2022). This is a refreshing new trajectory given that a dominant focus in the literature has been on the transformation of linear business models to circular business models by established firms (Geissdoerfer et al., 2023).

Compared to established firms, new ventures must wrestle with the liabilities of newness and smallness (Gimenez-Fernandez et al., 2020). Liabilities of newness refers to the difficulty new ventures face to effectively compete against established businesses (Stinchcombe, 1965). These difficulties stem from the fact that, new ventures need time to learn and develop efficient and effective routines and structure (Stinchcombe, 1965). Furthermore, new ventures have low legitimacy and thus struggle to establish strategic partnership with key stakeholders such as customers and suppliers (Singh et al., 1986). They also face challenges such as establishing credibility, building trust with customers, attracting investors, and recruiting talented employees (Zhang and White, 2016). Coupled with the liability of newness, new ventures must also deal with the liability of smallness which stems from their often lack of necessary resources to effectively deploy the routines and structure needed to implement their business strategy (Kale and Arditi, 1998). Furthermore, liabilities of smallness also relate to the constraints and limitations that small new ventures face in terms of capabilities and market power (Kale and Arditi, 1998). New ventures often have limited financial resources, smaller networks, and fewer employees, which can hinder their ability to compete with larger, established companies. Resource constraints can limit the ability of new ventures to invest in critical business development activities such as research and development.

Theoretical arguments highlight both advantages and disadvantages of the liabilities of newness and smallness. On the one hand, newness might present an advantage for new ventures in that they are more flexible and agile than older firms because of their emerging business model and often lack of lock-in investments. They also have fewer limitations in terms of technological trajectories based on their lower risk aversion or knowledge filter (Audretsch and Keilbach, 2007) and fewer constraints in terms of adapting innovation routines and organizational structure. On the negative side, new ventures need time to dynamically learn how to improve their organizational routines for searching, acquiring, and exploiting knowledge, and to accumulate knowledge and build absorptive capacity (Choi et al., 2022). New ventures can also have limited economies of scale, bargaining power, and brand recognition. This can make it difficult for them to compete with established companies on several dimensions including price (Choi et al., 2022).

In the context of a circular economy, the liabilities of newness and smallness can influence how firms perceive and experience various challenges (Kanda et al., 2022a). New ventures in the circular economy need to innovate and develop new business models that focus on the effective and efficient use of material and energy resources. However, due to the liabilities of newness and lack of experience and internal knowledge, new ventures can struggle in the development of such innovative business models. Furthermore, a defining characteristic of the circular business models is the need to work with an ecosystem of actors and relationships to be able to access resources and markets (Kanda et al., 2021). Essentially, circular business models require collaboration between different actors along the value chain such as suppliers, manufacturers, consumers, and policy makers. However, new, and small ventures will struggle to establish strategic partnerships with such actors due to their lack of market power and networks. Altogether, the liabilities of smallness and newness dynamically combine and make it difficult for new ventures to establish themselves on a market.

3. Method

We used a combination of different research methods to collect and analyse our empirical data (see Fig. 1). To collect empirical data, we conducted semi-structured interviews with new ventures developing circular business models from scratch. To identify these new ventures, we developed selection criteria based on existing literature (cf. Henry et al., 2022; Bocken et al., 2016). New ventures selected for our interviews were: (i) registered ventures up to 10 years old, (ii) profit-seeking ventures, (iii) independent ventures, not a subsidiary of an incumbent, (iv) striving to develop a circular business model. We used the circular business model archetypes proposed by Bocken et al. (2016) to search for and classify our cases. We interviewed new ventures developing circular business models based on: (i) access and performance model, (ii) extension of product value, (iii) classic long-life model, (iv) encourage sufficiency, (v) extension of resource value, and (vi) industrial Symbiosis (IS). Thus, we had the free choice to select new ventures to study. Our unit of analysis was new ventures and the eventual challenges they experience while developing circular business models. The new venture as a unit of analysis is well established in entrepreneurship research and is increasingly being used in circular economy research.

In total, we interviewed 70 new ventures across ten European countries. The interviews lasted between 45 and 60 min. Most firms are located in Sweden and Germany, representing half of the sample. Other key countries in the sample are the Netherlands and the United Kingdom which represent about one-fifth of the sample. The age of the firms ranges from slightly less than one year to up to 10 years. The median age is 5 and the average age is about 4 years. Average number of employees is 8 and the median is 5 with a range of 1–37 employees. Our ventures are operating in a variety of sectors with most of them in the food and agricultural sectors (25%, 17 cases). Other key sectors are energy, packaging, electronics, and textile. A majority of the ventures have business models focused on extending resource value (e.g., upcycling

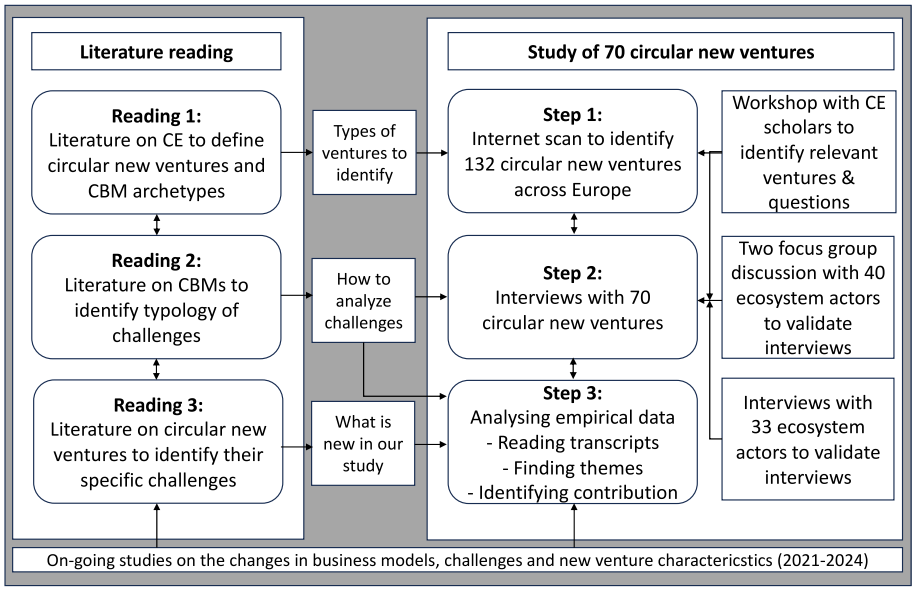

Fig. 1. Overview of research method.

bread waste into beer, upcycling coffee waste into scrubs), and extending of product value (e.g., refurbishment of electric batteries, mobile phone, laptops). This outcome is an empirical reflection of the nature of business models developed by new ventures based on circular economy principles. New ventures often seek to add value to resources and products which otherwise would be considered as waste in a linear economy. Such business models are attractive for new venture since they are based on access to resources for free or at a competitive price compared to using virgin resources to develop new offerings which are more resource intensive and challenging for new ventures. Finally, about a fourth (24%, 18) of the firm seek to develop access and performance-based business models. See Table A in appendix A for an overview of the studied cases.

Based on the interviews with the new ventures we present empirical data on their challenges when developing circular business models. These 70 cases were selected based on a diversity strategy and thus cover the entire archetype of circular business model proposed by Bocken et al. (2016) giving us the unique opportunity to develop generalizable knowledge on the challenges of circular new ventures. The interview questions covered a description of the business model the venture was developing, their challenges while developing such a business model and potential relation between the business model components and the challenges. To conduct high quality interviews and not waste the limited time of the interviewees, we read the webpages of the new ventures as a preparation and complementary step to our interviews. To increase the internal and external validity of our interview results, we have taken three complementary steps. First, we checked the validity of our interview transcripts and summaries with the interviewees, second, we conducted interviews with over thirty business coaches in incubators and science parks that support new venture development and finally we conducted two focus group discussion with such support actors and new ventures on their challenges and potential solutions. We have also used insights from an ongoing study on the changes in the business models, challenges, and new venture characteristics between 2021 and 2024. However, to write a coherent article, the results from these extra activities are mainly used to validate our results and not directly reported in this paper. All interviews were recorded, transcribed, and thematically analysed.

To analyse the empirical data, we adopted an analysis method based on the generation of insights from the empirical material that were systematically collected and analysed (Gioia et al., 2013; Straus, 1998). First, we read through the interview documentation to identify meaningful statements broadly related to the challenges of new ventures developing circular business models. Despite several categorisations of barriers to circular business models in the literature (e.g., Vermunt et al., 2019; Tura et al., 2019), we adopted an open coding approach to analyse the interview documentation without any pre-determined challenges to avoid confirmation bias and hopefully discover new insights (cf. Gioia et al., 2013). This approach was also particularly relevant in our case since previous studies on the challenges of circular new ventures remains limited. As described by Vaismoradi et al. (2016), reading the interview documentation thoroughly several times enabled us to develop a deep and valid representation of the respondent's perspective. In the second step, we reduced the extensive amount of raw data into themes and structured them to the six categories (financial, organizational, knowledge and technology, supply chain, market, and institutional challenges) of challenges to circular business models identified by Vermunt et al. (2019). This was essential to be able to present the results in a coherent and concise manner. Finally, we analysed these challenges against the background literature on the challenges of circular business modelling and new venture development to develop generalizable insights for stakeholders interested in scaling up the impact of new ventures in the circular economy. See data structure in Table 1.

4. Results

4.1. Financial challenges

Financial challenges were among the most frequently mentioned challenges by the interviewed new ventures. Since, circular business models can be new and different to the market and customers, investors sometimes lacked knowledge and understanding on the business model and could not judge the viability of certain circular business models since some even lacked proof-of-concept (e.g., Firm 31). Other CBMs were small-scale and thus could not attract investment particularly in mass production dominated sectors such as the fashion industry where investors expected rapid growth and scale-up (e.g., Firm 35).

Circular business models based on the access and performance model (cf. Bocken et al., 2016) are relatively novel to certain market sectors as their main offering is a shift from product ownership to access or performance. The most frequent challenge mentioned among new ventures developing such CBMs is the high upfront investment cost needed to acquire assets which are then offered based on access or performance to customers (e.g., Firm 12; 13; 25). Thus, the new ventures' revenues are

Table 1
Data structure inspired by Gioia et al. (2013).

1st order quotes (Exemplary quotes from transcripts)	2nd Order Description of challenges (according to Vermunt et al., 2019)	Aggregate Dimensions (Vermunt et al., 2019)
• "High upfront investment cost to acquire assets such as bicycles for renting" • "Investors lacked understanding of the business model to rent clothes and could not judge its viability" • "Finance since investors are not really interested. Especially in a profit-oriented investment system where ecological or social aspect are not equally valued as profit it is very difficult to get money from banks or traditional investors"	• Lack of financial resources • High up-front investment costs • Higher costs related to the new CBM • Unclear financial business case	Financial challenges
• "Finding employees that fully identify with circular economy was another key challenge" • "Building teams with complementary skills required to develop CBMs is challenging" • "We are a small team and cannot always fulfil the request from potential clients and the overall market"	• Administrative burden • Organization of reverse infrastructure • More complex management and planning processes	Organizational challenges
• "We could not find machines for production, so we are building them ourselves." • "Lack of expertise on customer facing business development activities e.g., marketing" • "Doing something new and unprecedented we did not have any guidance and examples of how to launch a business like this"	• Lack of technical know-how and expertise • Lack of information/data • Inability to deliver high quality products • Design challenges to create durable products	Knowledge and technology challenges
• "Dependence on partnerships for waste material makes the firm vulnerable" • "It is difficult to organize reverse logistics for products which are scattered over a territory" • "A classic problem in small-scale brewery is the requirement of a joint approach where you team up with other brewers to have full tanks – only later you can set up your very own autonomous production"	• Lack of partners and low availability of materials • Higher dependence on external parties • Lack of information exchange between supply chain actors • Conflicting interests between actors in the supply chain • Lack of consideration on circular design from supply chain actors • Bad re-use practices/ reluctance of third parties	Supply chain challenges
• "Challenging being a pioneer and having to create a market" • "Lack of customer interest in environmental benefits" • "Benefits of sustainable fashion are not fully clear and/or not valued significantly to justify higher prices than standard products"	• Low virgin material prices • Lack of consumer interest/non-acceptance of CBMs • Resistance from stakeholders with vested interests in the linear economy	Market challenges
• "We deal with waste material and the old rules are killing innovations." • "The waste market for certain materials is not properly regulated" • "We heavily rely on political awareness but cannot really influence it since we are too small to do so and get heard. I hope we can change that through our reports and partnerships with associations that can give us access at least on a local level"	• Ineffective recycling policies • Incentives that promote material consumption above services, such as V.A.T. (value-added tax) • Specific current accounting rules and management systems that are inappropriate for to the circular economy • Lack of standards and guidelines for quality of refurbishment products • Lack of awareness and sense of urgency within society	Institutional challenges

distributed over a period and not generated at the point of sales as in a linear business model. Essentially for a new venture operating this business model, their financial capital is tied up over a long period and thus scaling up such a business model can be challenging especially with constrained financial resources (e.g., Firm 55). For example, according to the CEO of Firm 25, offering a platform for subscription-based peer-to-peer lending for filming equipment, there is a challenge for a start-up to find investments to acquire assets which are then provided based on access to a community of users partly because such business models are new to that market segment and also estimating the residual value of such products can be challenging. A similar challenge was highlighted by the interviewee from Firm 26, constructing tiny homes from recycled industrial plastic waste. Even the CEO of Firm 14 (providing an online platform for renting electronic gadgets) went on to question the long-term profitability of access-based business models which can be challenging to verify for investors for certain products and market segments.

Financial challenges were also mentioned by Firm 4 (renting workwear) since investors considered their service-based business model as not innovative enough and intangible to invest in compared to technology-based new ventures. A similar challenge about the intangibility of services and perceived low innovativeness of such business models with no patentable solution was also mentioned by the founder of the new venture facilitating industrial symbiosis (Firm 22). Access to funding is important for the interviewed ventures to employ personnel, develop sales channels, develop take back systems, and reverse logistics, and repair services which are critical to deliver their core value propositions of circularity (e.g., Firm 4, renting workwear; Firm 24, offering reusable food packaging). Another financial challenge relates to the lack of investor interest in circular business models due to the difficulty to monetize all environmental and social value created by such models in a dominant linear economy (e.g., Firm 31, growing mushroom on organic waste). Sometimes, the lack of investor interest can be connected to the motivation and mindset of the entrepreneur. In circular new ventures, the entrepreneurial mindset and motivation can be driven by the desire to address an environmental and social problem and lack an explicit growth and scale-up strategy to convince investors. Such entrepreneurs can also set out with a low scaling up ambition. This entrepreneurial motivation and mindset make it difficult to secure investment from traditional investors focused on rapid economic growth in new ventures to secure returns on their investments (e.g., Firms 37).

4.2. Organizational challenges

A common organizational challenge mentioned by the interviewed firms was the lack of human resources. This often stems from the limited financial resources of new ventures but also the specific difficulty to find qualified personnel knowledgeable in circular economy (e.g., Firm 29; 36). Due to limited human resources, circular new ventures do not always have the capacity to meet the demand from potential customers and market (e.g., Firm 38). Furthermore, entrepreneurs even sometimes reported their own lack of capacity and competence to manage a circular new venture and how to develop a suitable organizational model for such a business model (e.g., Firm 8). For example, CBMs based on the development of online platforms for collaborative consumption, product sharing and matchmaking for circularity require expertise in developing, maintaining, and getting revenue from such platforms which can be challenging to organize in a new venture (e.g., Firm 53, providing a platform on eco-lifestyle guide connecting tourists to circular economy initiatives). Organizational challenges also relate to the difficulty in organizing the business operations such as securing operating space for circular practices. For example, securing space for storage of organic and inorganic recovered materials for further processing, storing products for access and performance-based consumption can be challenging when competing with other firms offering a linear service judged as a more valuable use of the storage space (e.g., Firm 36, 43).

To be employed by circular new ventures, knowledge in circular economy was not enough but founders demanded a passion for circularity to fit into the organizational culture, and business identity which can make it challenging to find employees (e.g., Firm 30). As interviewee from Firm 30 mentioned "finding employees that fully identify with circular economy was another key challenge especially since it is pivotal for our company's success to have passionate employees". Other organizational challenges mentioned relate to building a team with complementary competencies needed to address the many competencies required to develop a CBM and creating trustful relations among key stakeholders both inside and outside the organization (e.g., Firm 39).

4.3. Knowledge and technology challenges

A generic challenge reported by many of the interviewed ventures relate to the need for new knowledge and competence especially in the early phases of business development. This could relate to knowledge needed to develop circular products, online platforms, and organize the product recirculation. Lack of knowledge and competence can lead to a struggle to meet customer demand and to secure investments (e.g., Firm 43). For example, circular new venture founders often spring out of research projects, have design and engineering background, and can lack understanding of financial markets, business modelling and essentially the customer and investor facing side of business development. Furthermore, circular business models can be new to an entire sector and that entrepreneurs have limited mentors and examples on how to launch such business (e.g., Firm 60).

For circular new ventures dealing with the upcycling of waste resources, technological challenges can emerge with waste handling. For example, for a small new venture with no efficient dryers and limited resources to run energy intensive processes, drying waste coffee on time and with the desired characteristics can be challenging (e.g., Firm 42, upcycling coffee waste to make products). A similar technological challenge was reported by Firm 1 which processed duck feather waste to make thermos-insulation packaging. Essentially existing technology developed to handle virgin material must be adapted to handle waste material and make products which were not initially intended for the technology (e.g., Firm 1; Firm 10). The research and development of new technology coupled with the adaptation of exiting technology to upcycle waste material demands resources which can be limited for a new venture (e.g., Firm 3; 23). As exemplified by the interviewee offering compostable diapers-as-a-service "we do not yet have a production assembly for the diaper. We invented the compostable diaper inlay which is completely new. We could not find machines for production, so we are building them ourselves." (Firm 38).

4.4. Supply chain challenges

A common challenge mentioned by the interviewed ventures developing CBMs based on the extension of material resource value is the challenge of organizing logistics to collect waste resources which are often dispersed over a territory compared to virgin material resources which can be found concentrated and homogenous at a particular location. Thus, a crucial part of developing such circular business models is to establish contracts and networks with a variety of waste resource suppliers which can be a challenge for a new venture with limited resources, networks, and legitimacy (e.g., Firm 42, upcycling coffee waste into solid material such as cutlery, cups, and boards; Firm 65, cosmetics from coffee grounds). It is also challenging to transport certain categories of waste resources across national borders for upcycling due to regulations banning the transboundary movement of hazardous waste. Upcycling of waste also requires an extensive organization of pre-treatment to get the waste material into the desired characteristics for production. For example, the interviewee from Firm 32 (making fashion from discarded material) mentioned, a new venture does not have control over the quality and quantity of discarded materials it can collect from a particular source. Thus, it requires resources to sort the material to make it useful for new production. For example, for new ventures refurbishing electric batteries, it is important to get a stable supply of batteries in certain quality conditions (e.g., battery capacity, charge acceptance). This cannot be guaranteed and is out of control of the new venture (Firm, 21).

The need for pre-sorting, variations in the quality and quantity of waste can be even more pronounced for new ventures handling organic material since it may not be cost effectively stored for long periods. In other cases, new ventures struggle to get actors willing to sell waste material to them since they are new entrants in the supply chain and can handle only small volumes, or incumbents do not want to disclose their waste management practices or change them (e.g., Firm 43). Thus, partnerships with similar new ventures are sometimes necessary to collaboratively gain economies of scale when upcycling waste resources. This kind of partnerships creates strategic dependencies, constraints and risks for start-up growth and development (e.g., Firm, 34).

Organizing effective forward and reverse logistics is a particular challenge encountered for circular new ventures developing access and performance business models (e.g., Firm, 16). For Firm 14, which offered peer-to-peer renting platform for electronics, their challenge was to secure adequate supply stock for their users. In other cases, the demand (e.g., fashion) and supply are seasonal and thus challenging to kept in balance requiring adequate storage space and timing to access waste resources before they were discarded (e.g., Firm 12, renting clothes). Other reverse logistic issues relate to the need for customers to actively return products into circulation which can be challenging especially when the customers have little incentives. For new ventures working with the extension of product value (such as refurbishment of electric vehicle batteries), the challenge is to identify key stakeholders, build relationships, trust, and alignments to develop a functioning business model (e.g., Firm 5).

4.5. Market challenges

A common challenge mentioned by the interviewed circular new ventures was often the lack of problem owners and thus a functioning market for business models addressing social and environmental problems based on circularity. As the interviewee from Firm 51 (Platform for peer-to-peer sharing of transport) put it "there was much higher demand for our services from people who wanted to make money. The motivation of the platform users was different from what we promoted which

was more environmental reasons. So, we had to change our value proposition which was a good move since we have been growing ever since". Similarly, defining a financially sustainable CBM that is also environmentally and socially responsible is a challenge (e.g., Firm 39). Sometimes, circular new ventures cannot meet market demand due to their limited production capacity and human resources but also the nature of the business which can be very local and tied to specific industries for resources (e.g., Firm 47). Customers also expect circular products to have better quality or at least the same quality as their linear alternatives to justify higher prices which can be a challenge for a new venture due to limited economies of scale and scope (e.g., Firm 35).

For access and performance business models, the current dominant market logic is to buy and own products, thus offering rental, leasing, and refurbishment options require a mindset change among customers. This requires educating the customer, building customer trust and loyalty, and tailoring the value proposition to meet their specific needs (e.g., Firm 46; 55; 57). For example, interview Firm 35, upcycling design and consulting studio, mentioned that "we had to adapt our communication and selling arguments for every market and country we operate in to meet customer demands." And as the interviewee from Firm 33 put it, a majority of customers are not particularly interested in or knowledgeable about circularity, so there is a gap between what the circular new venture offers and what the customer and market demands. Market challenges are also related to customers' reluctance to accept the products made from waste (e.g., Firm 1, thermal packing from waste feathers) and reluctance to pay premium prices for upcycled products (e.g., Firm 3, beer brewed from waste bread).

Circular new ventures are often new entrants into existing sectors and can thus face stiff competition from incumbents. Industries can be locked into certain ways of thinking and thus require active effort from the new venture to change the dominant mindset and demonstrate the viability of circular offerings. Essentially, it is challenging "being a pioneer and having to create a market" (e.g., Firm 4; 5; 19). Initiatives for collaboration between incumbents and new ventures are still limited and crucial to overcome the stiff market competition (e.g., Firm 16).

In certain cases, entrepreneurs developing circular business models identified a social or environmental problem they want to solve without a clear business case making it challenging to find paying customers. As the interviewee from Firm 45 put it "it is one thing wanting to introduce something to the market, but you must understand it very well first in order to make it work. We needed to understand what the market needed so it was not just about launching a circular battery but for instance finding out first which battery market we want to enter".

4.6. Institutional challenges

Policy poses challenges to new ventures who want to upcycle waste since there is a disparity between circular ambitions and the desire to prevent toxic materials from entering food chains. As mentioned by the circular new venture working with bread waste to produce beer (Firm 34) due to the Swedish municipalities' responsibilities for waste management, it is challenging to get access to waste bread from grocery stores and thus they must make special arrangements to divert the bread from being classified as waste. Similar challenges are mentioned by a firm using organic waste to grow mushroom (Firm 31), "The coffee grounds we use for our mushroom growing is officially a waste product so there are regulatory barriers regarding working with this material. Here we rely on our entrepreneurial spirit and just go ahead without having regulatory clarity. So now we made a proposal to redefine this which might take 3 years to be passed". As another interviewee put it (Firm 70) "we deal with material streams (e.g., plastics) which are officially categorized as waste and therefore need special permits to handle them; the old rules are killing innovations […] and are not suited for the new solutions". The waste market for certain materials is not properly regulated. "So, in Germany if someone defines material as waste it must be disposed and cannot be reused. So, it is not allowed to take material out of recycling centres […] but you must take it before it has reached the disposal bin or use other workarounds. It is uncharted territory which makes it especially difficult." (Firm 44, marketplace for to recirculate discarded material).

Another challenge for circular new ventures is that even though their businesses are dependent on favourable policies to be able to compete with their linear counterparts, circular new ventures are often too small to influence policy. Thus, they often must work through partnerships and associations to influence policy at least at the local level (e.g., Firm 12). Regulations such as taxation systems (VAT) might not favour circular new ventures but rather benefit established linear firms.

In Table 2 below, we summarize the challenges identified in our empirical cases for the circular business model archetypes. Note: **GEN** indicates challenge can be generic for all archetypes of CBMs studied while **SPEC** indicates challenge specific for a particular CBM studied. Note there was no detectable classic long-life model (business models focused on delivering long-product life, supported by design for durability and repair for instance – cf. Bocken et al. (2016) in our sample. This reflects the general focus of new ventures in the circular economy and difficulty of developing a classic long-life business model by new ventures often with limited resources.

5. Discussion

First, some challenges identified seem to be inherent to certain ***types of circular business models.*** For example, ventures developing access and performance models such as the subscription-based access to bicycles, clothes and electronics faced financial challenges with the high upfront investment cost needed, the distribution of revenue over a period and not generated at the product's point of sale which consequently ties up firm capital. These set of financial challenges are well known and have been reported for access and performance models like product-as-a-service in the literature (see e.g., Mont, 2002). However, in the case of new ventures, this financial challenge can be particularly problematic since they may not have the financial resources of established firms to bear such high upfront investment cost and thus investors might find the business case unattractive in the long term. For new ventures, extending the value of waste resources through for example upcycling, a characteristic challenge is the uncertainty and heterogeneity in the quality and quantity of waste that a venture can access from waste generators. This uncertainly makes it difficult to plan and scale up production rapidly. Such business models create operational and strategic co-dependencies between the new venture and waste suppliers (often incumbents) which can constrain business development (Kanda et al., 2021). The possibility to access waste resources at a relatively lower fee or for free makes a good business case for waste-based business models since their raw material is relatively cheaper compared to virgin resources. However, there are inherent logistical and quality challenges in collecting and cleaning the waste to "raw material" quality.

Second, some challenges seem to be tied to ***the industrial sector*** within which the new venture operates. For example, institutional challenges regarding what is classified as waste, which waste resources actors can access, at which stage in the supply chain it can it be accessed for upcycling purposes were repeatedly mentioned as sources of challenges by new ventures exploiting opportunities to extend the resource value of food and agricultural waste (cf. Kanda et al., 2022b). This challenge stems from the industry logic to protect food chains from contamination which can occur through the re-circulation of heavy metals in biofertilizers to agricultural fields. In the fashion industry, the dominant market logic is mass production, seasonal and fast fashion, thus, circular new ventures seeking to disrupt this industry with renting of clothes and slow fashion can struggle to find investors who may not understand the necessity to grow and scale-up slowly to be able to satisfy customer needs. These institutional challenges are resource intensive to overcome since new ventures in addition to developing their business have to invest in educating their potential customers and policy makers

Table 2
Challenges for the various circular business model archetypes.

Challenges	Circular business model archetype				
	Access and performance model	Extending product value	Encourage sufficiency	Extending resource value	Industrial symbiosis
Financial	**GEN:** Limited financial resources **SPEC:** High upfront investment needed (Firm 12, 13, 25; 36; 37; 40; 57; 61) **SPEC:** Liquidity challenges (Firm 12, 13, 25, 26; 38; 55; 66) **SPEC:** Difficulty to prove long term economic viability of certain access-based business models (Firm 14) **SPEC:** Product-as a-service model perceived as less innovative by investors (Firm 4)	**GEN:** Limited financial resources	**GEN:** Limited financial resources	**GEN:** Limited financial resources **GEN:** Difficulty to judge economic viability of business models with no proof-of-concept (Firm 31) **GEN:** Difficulty to monetize environmental and social benefits of CBMs (Firm 31) **GEN:** Small-unscalable business models not attractive to investors (Firm 35)	**GEN:** Limited financial resources **SPEC:** The service of facilitating industrial symbiosis is perceived as less innovative by investors (Firm 22)
Organizational	**GEN:** Limited human resources (among most frequently mentioned challenges) **GEN:** Lack of knowledge on how to organize the CBM (Firm 53) **SPEC:** Rapid scale-up constrained by need optimize service component of business model for customer engagement and satisfaction (Firm 12)	**GEN:** Limited human resources (among most frequently mentioned challenges)	**GEN:** Limited human resources (among most frequently mentioned challenges) **GEN:** Lack of knowledge on how to organize the CBM (Firm 8)	**GEN:** Limited human resources (among most frequently mentioned challenges)	**GEN:** Lack of human resources (among most frequently mentioned challenges)
Knowledge and technology	**GEN:** Need to develop knowledge and competence in many different areas of CBMI (Firm, 43; 41; 44; 46; 48; 64; 69)			**GEN:** Few mentors and success stories for inspiration (Firm 60) **SPEC:** New technology needed (Firm 50; 56; 59) to upcycle organic waste (Firm 1; 10; 42)	
Supply chain	**SPEC:** Reverse logistics for certain access and performance-based models (e.g., renting clothes) is challenging to organize (Firm 12; 45)	**SPEC:** Organizing logistics to collect products which can be scattered over a territory (Firm 15; 16; 27; 49; 67) **SPEC:** Collected products can be heterogenous and in undesirable conditions (Firm 21) **SPEC:** Uncertain quality and quantity of waste products (Firm 21; 6; 7) **GEN:** Building strategic relationships to access residual products challenges for new ventures (Firm 5; 3; 9; 17; 18; 19; 24; 29; 30; 62)		**SPEC:** Organizing logistics to collect resources which can be scattered over a territory (Firm 42; 65; 33; 39) **SPEC:** Collected resources are heterogenous and can be contaminated (Firm 32; 2; 11; 23; 28; 58; 68) **SPEC:** Uncertain quality and quantity of waste resources (Firm 32; 2; 20; 52; 54; 63) **SPEC:** Storage of organic material is technically difficult to organize (Firm 43)	
Market	**GEN:** Customers not willing to pay for environmental and social benefits (Firm 51) **GEN:** Customers have higher demand on the quality and performance of circular offerings to justify higher prices (Firm 12) **SPEC:** Customers still prefer to buy and own products (Firm 12; 47)		**GEN:** Stiff competition from incumbent firms (Firm 8)	**GEN:** Inability to meet market demand due to limited capacity (Firm 42) **SPEC:** Inability to reach certain markets due to the localization of waste resources (Firm 42) **SPEC:** Customers reluctance to accept products made from waste (Firm 1)	
Institutional	**SPEC:** Unfavourable tax conditions V.A.T for circular offerings (Firm 12)			**SPEC:** Waste legislation hinders utilization of waste (Firm 31; 34; 70)	**SPEC:** Long permit process for industrial symbiosis (Firm 22)

to see the value in circular offerings and to evaluate them differently using new metrics compared to conventional new ventures.

Third, some challenges are connected to the new ventures' ***institutional context*** which includes both hard and soft institutions which serve as sources of challenges. For example, labour cost is relatively high in Sweden and has been an important challenge for ventures developing labour intensive activities such as repair. Similar challenges were identified with value added tax laws in Sweden which regarded renting of clothes as a service and thus was taxed (V.A.T) at a rate which impacted the competitiveness (e.g., profit margins) of such circular ventures negatively compared to second hand shops which sold products. On the other hand, customer values, norms and expectation of circular products differs between countries. This induces challenges for the new venture regarding the degree and quality of repair, marketing intensity, customer education and engagement to offer which altogether can have financial implications on the costs and revenue for the new venture. Thus, circular new ventures need to actively communicate the benefits of their CBMs and educate strategic customers, investors, and policy makers to create favourable conditions for their business models. A potential approach for addressing such institutional context challenges is to build coalitions of circular new ventures since such activities require resources, mandate and legitimacy beyond a single venture.

Fourth, some of the challenges identified are related to ***the liabilities of new ventures*** in general. Essentially, new ventures developing circular business models have many similarities with new ventures in general. New ventures developing CBMs often have no functioning business model and experiment with different approaches to create, deliver, and capture value for customers. They often have limited resources (e.g., financing, personnel, networks). The lack of legitimacy is characteristic of new ventures (Stinchcombe, 1965). To overcome these inherent liabilities of newness and smallness, be considered credible and gain trust among strategic stakeholders such as customers and investors, new ventures in general need to validate their business models and adjust to the realities of customer and market demand. Circular new ventures often seek to operate in a circular business ecosystem right from their inception as they by themselves cannot develop CBMs e.g., need to access to waste resources, secure reverse logistics (Kanda et al., 2022a). However, circular new ventures struggle to join established business networks due to their liabilities of newness and smallness, and often must work with other like-minded small firms and grow slowly together.

Table 3
Sources of challenge for circular new ventures.

Source of challenge	Explanation	Examples of challenge
1. Type of circular business model	Challenges inherent to the logic of value proposition, delivery, and capture of different types of circular business models.	• **Financial challenge:** access and performance models face challenge with high upfront investment cost (e.g., Firm 12, 13, 25). • **Supply chain challenge:** extension of resource value model faces challenge of dependence on other parties for waste and also uncertainty in quality and quantity of waste received (e.g., Firm 32).
2. Industrial sector	Challenges related to the dominant logic in different industrial sectors.	• **Market challenge:** the fashion sector is dominated by mass production, seasonal and fast fashion which can hinder certain CBM (e.g., renting of clothes) (e.g., Firm 12) • **Institutional challenge:** the food sector is characterised by a priority to protect food chains from contamination which can hinder certain CBMs (e.g., biofertilizer from anaerobic digestion) (e.g., Firm 31; 34)
3. Institutional context	Challenges stemming from the formal and informal institutions is a given context.	• **Institutional challenge:** Labour cost differ by country and can make labour intensive CBM activities such as repair expensive (e.g., Firm 55). • **Institutional challenge:** Customer culture, norms and values differ by country and influence customer expectations on circular offerings (e.g., quality of repair; "buy-and-own" culture) (e.g., Firm 12).
4. New venture liabilities	Challenges related to the inherent characteristics of new venture in general (i.e., liabilities of newness and smallness)	• **Financial challenge**: limited resources (e.g., finance, personnel, networks) (e.g., Firm 10; 22; 36) • **Market challenge:** Limited legitimacy to customers and the market (e.g., Firm 1)

As summarised in Table 3 these four critical aspects shape the challenges circular new ventures experience. These four sources of challenges are based on empirical observations and narratives from the 70 new ventures. After gaining insights into the challenges described in the interviews, we generated a cluster of sources where these challenges stem from by brainstorming. We landed on at least four sources of challenges after qualitative clustering based on the content of the challenges as described by the interviewees. Qualitative clustering is used for the classification of similar ideas into groups, where the number of groups, as well as their forms is not known beforehand. There are interactions and overlaps between these sources of challenges and of course there can be more sources of challenges than classified in Table 3.

Furthermore, circular new ventures experience some particularly pronounced challenges when compared to new ventures developing linear business models. While often new ventures developing linear business models focus on developing new products or services, circular new ventures in addition to developing new products or services must also consider the entire value chain and design systems (e.g., reverse logistics, repair, washing, storage) to circulate resources and products. Furthermore, while limited access to funding is a well-known challenge for start-ups in general (Bergset and Fichter, 2015), customers and investors may not fully understand the business case of certain circular business models (e.g., certain access and performance models) and thus may be hesitant to invest in new ventures developing new and different business models which may not be validated compared to their traditional linear counterparts.

Circular business models also require collaboration with different actors in the value chain, such as suppliers, manufacturers, retailers, and waste management companies, customers, and policy makers. Developing such partnerships can be challenging, as circular new ventures while being small and new may need to convince partners to adopt new processes and ways of working. A particularly pronounced challenge for circular new ventures is the difficulty of scaling up their business models. For circular new ventures to have a transformative impact on the linear economy, their business model needs to be scaled up from niche markets into mainstream markets. However, as circular business models require a higher degree of coordination and collaboration than traditional business models (Kanda et al., 2019), circular new ventures do not only need to invest in new technology, infrastructure, and logistics but also in strategic relationships (e.g., customers with circular ambitions) to achieve scale in the face of limited resources. Finally, while the benefits of the circular business model might be clear to the entrepreneurial team, some CBMs are relatively new to customers and certain market segments, and circular new ventures may need to educate consumers and key stakeholders such as investors and policy makers. Thus, an important part of developing a CBM is focused on activities to shape future markets and policy which can be challenging for a new and small firm.

As presented in the introduction and literature review sections, the literature is dominated by numerous articles on general challenges to CE. For example, Tura et al. (2019) combined a literature review and a case study of four large companies to synthesize seven categories of drivers and barriers to circular business models. These include environmental, economic, social, institutional, technological, and informational, supply chain, and organizational factors. Kirchherr et al. (2018) on the other hand focusing on the EU synthesized four general categories of barriers and their significance among businesses and policy makers in the transition towards a circular economy. The most significant challenges were cultural, regulatory, market and technological. Vermunt et al. (2019) analysed how the challenges to circular business models differ by type of business model. Most of these previous contributions focused on the challenges to circular business models in general. Specifically, they have largely focused on developing typologies of barriers and drivers, established firms making a transition from linear to circular business models and lack explicit theoretical anchoring in established literature. Even though, new ventures were not the empirical focus of

most of these articles, some of the challenges identified are applicable to circular new ventures because of their operation under the broader umbrella of CE. Recently, a few scholars highlighted the specificities of new ventures and have begun to investigate their challenges when developing circular business models. Geissdoerfer et al. (2023) show which barriers or drivers are experienced by the different approaches to circular business model innovation e.g., developing a CBM from the scratch vs. transforming an existing linear business. von Kolpinski et al. (2023) focus on the internal barriers, enablers, competences, and drivers to circular business model implementation in young and small-scale companies. van Opstal and Borms (2023) analysed personal and company characteristics and perspectives on circular strategies concluding that barriers and enablers vary significantly depending on the circular strategies that are applied (e.g., design to lower material use, design for longer product use, take-back systems for refurbishment, etc.). Awana et al. (2023) captures the barriers encountered by circular new ventures in Australia in different phases of their development and growth.

What is particularly new in our study compared to previous studies on challenges of firms developing circular business models (see Table 4) is that we offer an empirically rich qualitative analysis of the challenges faced by circular new ventures using a large cross-country dataset. In doing so, we also draw from previous literature which provides typologies of challenges to CBMs and also typologies of CBMs. Second, we identify and analyse which challenges are applicable to CBMs in general, which challenges are specific for particularly CBM types and also how these challenges manifest in the specific context of circular new ventures. Our findings reveal that these challenges are determined by several factors, including the type of circular business model, industrial sector, institutional context, and new ventures' liabilities. Even though these challenges are not entirely exclusive to circular new ventures since they share several similarities with new ventures in general such as the lack of resources, notably, circular new ventures encounter pronounced difficulties in scaling up due to their liabilities of newness and smallness, which constrain their resources and legitimacy in establishing vital strategic partnerships for venture survival. Overall, our study provides valuable insights into the pronounced obstacles faced by circular new ventures and sheds light on their distinctive struggles in the circular economy.

6. Implications for practice

This paper has some practical implications for entrepreneurs and their support system, policy makers, and students and teachers in higher education as elaborated below.

For entrepreneurs, this paper provides an overview of potential challenges to anticipate when developing circular business models which is essential for developing relevant mitigation and venture survival strategies. The surrounding support system for innovation and entrepreneurship, as highlighted in Kanda et al. (2022b), plays a crucial role in the success of circular new ventures. It is essential to recognize the specific characteristics and challenges faced by entrepreneurs with circular ambitions and tailor support approaches accordingly. This includes coaching, mentorship, and other forms of assistance aimed at early-stage business development. To effectively support circular new ventures, it is necessary to understand the nuances of their business models and the factors that particularly impact the challenges they encounter. These ventures operate within the context of a circular economy, which requires a different set of strategies and approaches compared to traditional linear business models. Therefore, support programs need to be adapted to meet the unique needs and circumstances of circular new ventures. Coaching and mentorship programs should provide guidance and expertise specific to circular business models, addressing challenges related to resource efficiency, closed-loop systems, and collaboration within the circular business ecosystem (Kanda, 2023). The support provided should be aligned with the principles and objectives of the circular economy, focusing on areas such as

Table 4
Main contributions of our study related to the literature.

Article	Geissdoerfer et al. (2023)	von Kolpinski et al. (2023)	van Opstal and Borms (2023).	Awana et al. (2023)	This article -Kanda et al. (2024)
Research question	What are the drivers and barriers for the different types of circular business model innovation?	To investigate managerial and social barriers in young and small-scale companies to the adoption of sustainable circular business model	**RQ1:** Which startups apply which circular strategies? What is the role of personal and company characteristics? **RQ2:** What are comparative advantages and disadvantages of circular startups? **RQ3:** What are barriers and enablers for startups to implement circular strategies?	The challenges of circular start-ups at their different stages of development and growth.	The aim of this article is to explore the challenges that new ventures experience while developing circular business models from scratch, synthesize the sources of these challenges and provide practitioner implications to overcome them
Research method	Qualitative study using comparative case studies	Qualitative study based on cases	Quantitative using multivariate statistical analysis	Qualitative studies	Qualitative study using interviews, webpage analysis and focus group discussions
Sample size	21 firms (of which 4 are "circular start-ups") with CBMs on the market	12 founders	165 start-ups	18 founders	70 new ventures developing CBMs from scratch
Geographical focus	Europe	Germany	Flanders (Belgium)	Australia	Europe
Main contribution	Empirically identified barriers and drivers and explored how they influence four generic types of circular business model innovation (start-up, transformation, diversification and acquisition).	Develop strategies to overcome barriers to sustainable circular business model adoption in young and small-scale companies.	Analysed personal and company characteristics and perspectives on circular strategies concluding that barriers and enablers vary significantly depending on the circular strategies that are applied.	Unveils barriers associated with distinct phases of the 'circular start-ups' development and growth, categorizing them into antecedent, beginner, and growth barriers.	Empirically rich qualitative analysis of the challenges of circular new ventures developing CBMs, the underlining determinants of these challenges, the specificity to CBMs type, CNVs, and practical implications how to overcome them.

sustainable sourcing, waste reduction, product lifecycle management, and the development of circular supply chains. By adjusting support approaches to the experiences of circular new ventures, the support system can better meet the real needs of these ventures (cf. Bank et al., 2017). However, our study also highlights that circular new ventures experience several challenges common to new ventures in general. Thus the support system actors such as incubators and accelerators are not eager to develop customized business development approaches for such ventures but rather strive for a general approach for most new ventures to use public resources efficiently.

Entrepreneurship and innovation policymakers should have a realistic understanding of the growth opportunities presented by circular new ventures, as emphasized in (cf. Klofsten et al., 2020). It is crucial to recognize that success for these ventures is not solely measured by traditional metrics of scaling up, such as increased employees and turnover. Circular new ventures often prioritize softer values, such as contributing to a vibrant local economy and addressing environmental and social challenges, even in the absence of clear economic driving forces. Policy makers should create the necessary conditions and frameworks for circular new ventures to develop in their own unique trajectory, free from unrealistic expectations and pressures. This involves providing support and creating an enabling environment that aligns with the specific goals and values of circular entrepreneurship. Policies can be designed to promote sustainability, resource efficiency, and social impact, acknowledging that the success of circular ventures can be measured by their positive contributions to these areas and not necessarily traditional indicators for economic growth.

Students enrolled in entrepreneurship and innovation courses at universities can benefit from engaged and experimental learning approaches, for example challenged-based learning (cf. Fang and O'Toole, 2023). This pedagogical approach involves providing students with real-world challenges derived from empirical findings in research papers, such as the challenges faced by circular new ventures discussed in this paper. In these learning exercises, students can be tasked with identifying circular new ventures, analyzing their specific challenges, and exploring potential solutions. By engaging in such activities, students can develop a deeper understanding of the unique nature of circular new ventures and gain inspiration for their own entrepreneurial aspirations. To effectively implement challenged-based learning activities, it is crucial for universities to foster strong connections with the surrounding entrepreneurial ecosystem (Kanda, 2023). This ensures access to real business cases, anchoring the learning experiences in the realities of the entrepreneurial world. By collaborating with local businesses, universities can create meaningful learning opportunities that bridge theory and practice, preparing students for the challenges and opportunities they may encounter as entrepreneurs.

7. Conclusion

This study represents one of the initial qualitative explorations into the challenges faced by new ventures when developing circular business models from scratch. The research has successfully identified several crucial challenges encountered by new ventures in their pursuit of circularity. Furthermore, the study highlights that the challenges experienced by circular new ventures are influenced by various factors, including the specific nature of the circular business model being developed (Vermunt et al., 2019), the industrial sector in which the new venture operates (cf. Pedersen et al., 2021), the institutional context (cf. Mourik et al., 2020), as well as the liabilities associated with newness and smallness. In addition, the findings suggest that circular new ventures face several similar challenges as those encountered by new ventures in general. However, circular new ventures encounter an additional hurdle in their ability to scale up and close resource loops effectively since they are new and different to the linear market economy. Furthermore, it is evident that circular new ventures require access to critical resources that align with the specific material and energy resource loops they seek to enter, emphasizing the need for strategic partnerships and collaborations. By shedding light on these challenges and their influencing factors, this study contributes to a deeper understanding of the complexities faced by circular new ventures. It also emphasizes the importance of providing appropriate support mechanisms and resources to help overcome these challenges and facilitate the growth and success of circular new ventures.

8. Limitations and future research

Finally, we highlight some limitations of our study. First, there are analytical difficulties in identifying new ventures that are fully circular in practice. However, we observe that the ventures in our sample have pure circular ambitions from scratch – i.e., so called born circular ventures, but it could be questioned to what degree their circular ambition (cf. Henry et al., 2022) has been attained in practice. Essentially, it is thus challenging to establish empirically whether a new venture is circular or not. Thus, a more critical perspective on the framing of a circular business models by new ventures should be taken. This raises the question of whether we as researchers can solely rely on statements made by new venture founders and CEOs regarding the circularity of their business models. This presents a potential risk of "circularity washing" particularly when these new ventures seek funding from investors or interact with potential customers. Moreover, there is an inherent hierarchy between different strategies within CBMs, such as recycling and reduce, which suggests that certain CBM archetypes may hold a greater potential than others in terms of their environmental and social sustanability. Thus, as researchers, we must be critical when selecting cases for our studies and especially when engaging with profit seeking ventures. Thus, there is a need for research to develop assessment criteria for the circularity of new ventures which often have no customers or offering.

A second issue is the heterogonic character of our sample. New and small ventures are very different in terms of starting conditions (cf. Bamford et al., 2000) as for example, motivation behind starting the venture, networks, and financial conditions which altogether influence their development and growth. We have chosen to mainly focus on the circular business model, and this is a limitation in connecting to other non-business model aspects of new ventures. However, we also observed that several of the challenges we identified among the studied circular new ventures were also similar for challenges reported for new ventures and circular business models in general. This is an interesting empirical finding on the overlaps between challenges experienced by different types of ventures (including new and incumbents) in the circular economy and not necessarily an analytical limitation of this paper.

Finally, we have chosen an interview approach and benefit from its advantages such as gaining a deeper understanding of each venture. However, we are aware of the potential added value of understanding the processes of experimentation, learning and adjustment of the circular business model, including changing context. Thus following the new ventures over a longer period (cf. Hoang and Antoncic, 2003) will enable us to understand such processes and is an ambition we have already started working on. Additionally, a larger dataset of circular new ventures could be compiled to enable quantitative analysis as a follow-up to this qualitative exploratory study.

CRediT authorship contribution statement

Wisdom Kanda: Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Magnus Klofsten:** Writing – review & editing, Writing – original draft, Project administration, Investigation, Funding acquisition, Formal analysis, Conceptualization. **Dzamila Bienkowska:** Writing – review & editing, Writing – original draft, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Marvin Henry:** Writing –

original draft, Data curation, Conceptualization. **Olof Hjelm:** Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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Appendix A

Table A
Overview of circular ventures interviewed in this study as of 2021

Firm no.	Year established	Number of employees	Sector	Type of Circular business model	Core activities in CBM	Interviewee position
Firm 1	2016	4	Packaging	Extending resource value	Using waste feather to produce packing	CEO and Co-founder
Firm 2	2015	6	Textile	Extending resource value	Using waste leather to make bags	Founder and designer
Firm 3	2020	3	Food	Extending resource value	Using waste bread to make beer	CMO and Co-founder
Firm 4	2019	4	Textile	Access and performance model	Renting workwear	CEO and founder
Firm 5	2020	8	Automotive	Extending product value	Provides an online platform to recirculate electric vehicle batteries	CEO and founder
Firm 6	2016	3	Food	Extending resource value	Upcycling coffee grounds into products (e.g., notebooks, business)	Co-founder
Firm 7	2015	12	Food	Extending resource value	Upcycling crop residue into products (e.g., cups)	CEO and founder
Firm 8	2019	6	Cosmetics	Encourage sufficiency	Customized cosmetics to reduce overconsumption	CEO and Co-founder
Firm 9	2015	16	Energy	Extending resource value	Energy recovery from polluted airstreams	Co-founder and future revenue
Firm 10	2020	3	Furniture	Extending resource value	Makes hand tools from waste wood and leather	CEO and Co-founder
Firm 11	2017	3	Food	Extending resource value	Grows mushroom on waste streams such as coffee grounds	Co-founder
Firm 12	2019	32	Fashion	Access and performance model	Renting of clothes	COO and Co-founder
Firm 13	2018	12	Household appliances	Access and performance model	Leasing household appliances	Co-founder and marketing manager
Firm 14	2016	7	Electronics	Access and performance model	Provides an online platform for renting gadgets	Co-founder
Firm 15	2018	5	Food	Extending product value	Reusable take-away packaging	Co-founder, financial & economic planner
Firm 16	2019	5	Food	Extending product value	Reusable take-away packing	CEO and Co-founder
Firm 17	2011	7	Furniture	Extending product value	Provides an online platform for reusing furniture	CEO and founder
Firm 18	2015	37	Food	Extending product value	Provides an online platform for sharing food	CEO and Co-founder
Firm 19	2020	13	Packaging	Extending product value	Reusable packaging	CEO and Co-founder
Firm 20	2020	2	Household items	Extending resource value	Household items design and produced by reuse material	CEO and founder
Firm 21	2020	4	Energy	Extending product value	Repurposing second life EV batteries for other applications	CEO and Co-founder
Firm 22	2021	1	Cross sectoral (residual energy and material)	Industrial symbiosis	Facilitating industrial symbiosis	CEO and founder
Firm 23	2015	12	Agriculture	Extending resource value	Bio composite materials from agricultural waste	CEO and founder
Firm 24	2019	2	Food	Extending product value	Reusable packaging for food	Co-founder
Firm 25	2018	13	Creative arts	Access and performance model	Renting high end movie and sound equipment	CEO and Co-founder
Firm 26	2020	3	Housing	Extending resource value	Constructing tiny homes from recycled industrial plastic waste	CEO and founder
Firm 27	2020	7	Electronics	Extending product value	Repairs mobile phones for reuse	CEO & founder

(*continued on next page*)

Table A (*continued*)

Firm no.	Year established	Number of employees	Sector	Type of Circular business model	Core activities in CBM	Interviewee position
Firm 28	2012	25	Manufacturing	Extending resource value	Logistics equipment made from agricultural waste	Founder and CTO
Firm 29	2015	15	Fashion	Extending product value	Trading and design firm for upcycled material made from recused alienated products	Founder and CMO
Firm 30	2016	5	Service	Extending resource value	Provides online platform to conduct trade on secondary resources	Founder and CEO
Firm 31	2014	3	Agriculture	Extending resource value	Mushroom grown on organic waste	Co-Founder and CEO
Firm 32	2016	5	Fashion	Extending resource value	Fashion made from discarded material	Founder and CEO
Firm 33	2013	18	Food	Extending resource value	Upcycling food waste	Founder and CEO
Firm 34	2017	3	Beverage	Extending resource value	Brewing beer from organic waste material	Founder and CEO
Firm 35	2016	2	Textile	Extending resource value	Upcycling design and consulting studio	Co-Founder and Creative Director
Firm 36	2013	1	Fashion	Access and performance model	Offers collaborative use of professional machinery	Co-Founder and CEO
Firm 37	2013	8	Fashion	Access and performance model	Upcycling design and consulting studio	Co-Founder and CEO
Firm 38	2015	12	Childcare	Access and performance model	Compostable diapers-as a service	Co-Founder and CEO
Firm 39	2017	5	Rubber & Plastics	Extending resource value	Rubber and plastic upcycling from ocean and seashore	COO
Firm 40	2012	4	Fashion	Access and performance model	Upcycling design and consulting studio	Founder and CEO
Firm 41	2012	3	Food	Access and performance model	Offers open access map to identify freely accessible food sources	Co-Founder and CEO
Firm 42	2015	5	Food	Extending resource value	Upcycling coffee waste to make products (e.g., cups)	Co-Founder and CEO
Firm 43	2021	2	Fashion	Extending resource value	Upcycling design and consulting studio	Founder and CEO
Firm 44	2013	3	Construction	Access and performance model	Marketplace for to recirculate discarded material	Founder and CEO
Firm 45	2015	21	Energy	Access and performance model	Energy-as-a service using modular and reusable lithium batteries	Founder and CEO
Firm 46	2015	12	Transport	Access and performance model	Providing a platform for ride sharing	COO
Firm 47	2012	2	Fashion	Access and performance model	Service model for collaborative consumption	Co-Founder and CEO
Firm 48	2014	18	Food	Access and performance model	Online platform to connect coffee farmers and drinkers to minimize waste in coffee farming	Business Development
Firm 49	2014	8	Packaging	Extension of product value	Reusable food containers	Founder and CEO
Firm 50	2015	22	Water	Extending resource value	Distillation machine for water reuse	Business Development
Firm 51	2016	4	Transport	Access and performance model	Platform to share peer-to-peer transport	Co-Founder and CMO
Firm 52	2015	5	Food	Extending resource value	Drink made from agricultural by-products	Co-Founder and CEO
Firm 53	2016	4	Tourism	Access and performance model	Eco-lifestyle guide connecting tourists to circular economy initiatives	Co-Founder and CEO
Firm 54	2013	7	Fashion	Extension of resource value	Fashion from waste material	Founder
Firm 55	2020	4	Transport	Access and performance model	Subscription based access to bicycles	Founder and CEO
Firm 56	2019	7	Forestry	Extending resource value	Technology to track and upcycle forestry waste	Founder and CEO
Firm 57	2021	1	Electronics	Access performance model	Platform to rent electronic equipment	Founder
Firm 58	2017	9	Agriculture	Extending resource value	Upcycling agricultural waste into products (e.g., floor pallets)	Founder
Firm 59	2013	5	Energy	Extending resource value	Technology to facilitate circular energy resources use	Business developer and energy specialist
Firm 60	2013	4	Agriculture	Extending resource value	Farming using organic fertilizer, vertical, mobile, controlled environment	Chief technical officer
Firm 61	2018	13	Electronics	Access and performance model	Renting high quality movie and sound equipment	Co-founder and CEO
Firm 62	2018	6	Packaging	Extending product value	Reusable packaging	Co-founder
Firm 63	2020	2	Household items	Extending resource value	Household items from waste material	Founder and CEO
Firm 64	2018	4	Plastics	Access and performance model	Connecting supply and demand to recycle plastics	Founder and CEO

(*continued on next page*)

Table A (*continued*)

Firm no.	Year established	Number of employees	Sector	Type of Circular business model	Core activities in CBM	Interviewee position
Firm 65	2020	5	Cosmetics	Extending resource value	Cosmetics from waste material (e.g., coffee grounds)	Founder
Firm 66	2020	5	Childcare	Access and performance model	Subscription model for childcare equipment	Founder and CEO
Firm 67	2016	4	Fashion	Extending product value	Recirculating of textile through traceability	Founder
Firm 68	2016	16	Construction	Extending resource value	Producing construction cement from waste	CEO
Firm 69	2019	3	Plastics	Access and performance model	Provides an online platform to enable recirculation of plastic waste	Founder and CEO
Firm 70	2020	24	Plastics	Extending resource value	Transforming industrial residues into new materials	Founder and CEO

References

Audretsch, D.B., Belitski, M., Caiazza, R., Desai, S., 2022. The role of institutions in latent and emergent entrepreneurship. Technol. Forecast. Soc. Change 174, 121263.

Audretsch, D.B., Keilbach, M., 2007. The theory of knowledge spillover entrepreneurship. J. Manag. Stud. 44, 1242–1254.

Awana, S., Chavan, M., Sedera, D., Cheng, Z., Ganzin, M., 2023. Unlocking Circular Start-ups: A Model of Barriers. Business Strategy and the Environment.

Bamford, C.E., Dean, T.J., McDougall, P.P., 2000. An examination of the impact of initial founding conditions and decisions upon the performance of new bank start-ups. J. Bus. Ventur. 15, 253–277.

Bank, N., Fichter, K., Klofsten, M., 2017. Sustainability-profiled incubators and securing the inflow of tenants–The case of Green Garage Berlin. J. Clean. Prod. 157, 76–83.

Bergset, L., Fichter, K., 2015. Green start-ups–a new typology for sustainable entrepreneurship and innovation research. Journal of innovation management 3, 118–144.

Bocken, N.M., De Pauw, I., Bakker, C., van der Grinten, B., 2016. Product design and business model strategies for a circular economy. Journal of Industrial and Production Engineering 33, 308–320.

Bressanelli, G., Perona, M., Saccani, N., 2019. Challenges in supply chain redesign for the Circular Economy: a literature review and a multiple case study. Int. J. Prod. Res. 57, 7395–7422.

Choi, Y.R., Ha, S., Kim, Y., 2022. Innovation ambidexterity, resource configuration and firm growth: is smallness a liability or an asset? Small Bus. Econ. 58, 2183–2209.

Clarysse, B., Bruneel, J., 2007. Nurturing and growing innovative start-ups: the role of policy as integrator. R&d Management 37, 139–149.

Davidsson, P., Klofsten, M., 2003. The business platform: developing an instrument to gauge and to assist the development of young firms. J. Small Bus. Manag. 41, 1–26.

Di Gregorio, D., Shane, S., 2003. Why do some universities generate more start-ups than others? Res. Pol. 32, 209–227.

Fang, J., O'Toole, J., 2023. Embedding sustainable development goals (SDGs) in an undergraduate business capstone subject using an experiential learning approach: a qualitative analysis. Int. J. Manag. Educ. 21, 100749.

Fichter, K., Lüdeke-Freund, F., Schaltegger, S., Schillebeeckx, S.J., 2022. Sustainability impact assessment of new ventures: an emerging field of research. J. Clean. Prod., 135452

Fritsch, M., 2011. 23 Start-ups in innovative industries: causes and effects. In: Handbook of Research on Innovation and Entrepreneurship, vol. 365.

Gartner, W.B., 1985. A conceptual framework for describing the phenomenon of new venture creation. Acad. Manag. Rev. 10, 696–706.

Geissdoerfer, M., Pieroni, M., Pigosso, D., Soufani, K., 2020. Circular business models: a review. J. Clean. Prod.

Geissdoerfer, Martin, Pieroni, M.P., Pigosso, D.C., Soufani, K., 2020. Circular business models: a review. J. Clean. Prod. 123741.

Geissdoerfer, M., Santa-Maria, T., Kirchherr, J., Pelzeter, C., 2023. Drivers and barriers for circular business model innovation. Bus. Strategy Environ. 32 (6), 3814–3832.

Gilbert, B.A., McDougall, P.P., Audretsch, D.B., 2006. New venture growth: a review and extension. J. Manag. 32, 926–950.

Gimenez-Fernandez, E.M., Sandulli, F.D., Bogers, M., 2020. Unpacking liabilities of newness and smallness in innovative start-ups: Investigating the differences in innovation performance between new and older small firms. Res. Pol. 49, 104049.

Gioia, D.A., Corley, K.G., Hamilton, A.L., 2013. Seeking qualitative rigor in inductive research: notes on the Gioia methodology. Organ. Res. Methods 16, 15–31.

Han, D., Konietzko, J., Dijk, M., Bocken, N., 2023. How Do Circular Start-Ups Achieve Scale? Sustainable Production and Consumption.

Henry, M., Bauwens, T., Hekkert, M., Kirchherr, J., 2020. A typology of circular start-ups: an Analysis of 128 circular business models. J. Clean. Prod. 245, 118528.

Henry, M., Hoogenstrijd, T., Kirchherr, J., 2022. Motivations and Identities of "Grassroots" Circular Entrepreneurs: an Initial Exploration. Business Strategy and the Environment.

Hoang, H., Antoncic, B., 2003. Network-based research in entrepreneurship: a critical review. J. Bus. Ventur. 18, 165–187.

Huang, S., Battisti, M., Pickernell, D., 2023. The roles of innovation strategy and founding team diversity in new venture growth. J. Bus. Res. 158, 113653.

Kale, S., Arditi, D., 1998. Business failures: liabilities of newness, adolescence, and smallness. J. Construct. Eng. Manag. 124, 458–464.

Kanda, W., 2023. Systems and ecosystems in the circular economy: what's the difference? Circ. Econ. 1 (3), 1–10.

Kanda, W., Bienkowska, D., Klofsten, M., Marvin, H., Hjelm, O., 2022a. Challenges of start-ups developing circular business models. In: Presented at the IDEAS 2022: Interdisciplinary Conference on Innovation, Design, Entrepreneurship, and Sustainable Systems.

Kanda, W., del Río, P., Hjelm, O., Bienkowska, D., 2019. A technological innovation systems approach to analyse the roles of intermediaries in eco-innovation. J. Clean. Prod. 227, 1136–1148.

Kanda, W., Geissdoerfer, M., Hjelm, O., 2021. From circular business models to circular business ecosystems. Bus. Strat. Environ. 30, 2814–2829.

Kanda, W., Klofsten, M., Bienkowska, D., Henry, M., Hjelm, O., 2024. Challenges of circular new ventures: an empirical analysis of 70 cases. J. Clean. Prod. https://doi.org/10.1016/j.jclepro.2024.141103.

Kanda, W., Zanatta, H., Magnusson, T., Hjelm, O., Larsson, M., 2022b. Policy coherence in a fragmented context: the case of biogas systems in Brazil. Energy Res. Social Sci. 87, 102454.

Kirchherr, J., Piscicelli, L., Bour, R., Kostense-Smit, E., Muller, J., Huibrechtse-Truijens, A., Hekkert, M., 2018. Barriers to the circular economy: evidence from the European Union (EU). Ecolog. Econ. 150, 264–272.

Klofsten, M., Norrman, C., Cadorin, E., Löfsten, H., 2020. Support and development of small and new firms in rural areas: a case study of three regional initiatives. SN Appl. Sci. 2, 1–9.

Kor, Y.Y., Misangyi, V.F., 2008. Outside directors' industry-specific experience and firms' liability of newness. Strat. Manag. J. 29, 1345–1355.

Lewandowski, M., 2016. Designing the business models for circular economy—towards the conceptual framework. Sustainability 8, 43.

Lopez, F.J.D., Bastein, T., Tukker, A., 2019. Business model innovation for resource-efficiency, circularity and cleaner production: what 143 cases tell us. Ecol. Econ. 155, 20–35.

Lüdeke-Freund, F., Gold, S., Bocken, N.M., 2019. A review and typology of circular economy business model patterns. J. Ind. Ecol. 23, 36–61.

Mont, O., 2002. Drivers and barriers for shifting towards more service-oriented businesses: analysis of the PSS field and contributions from Sweden. J. Sustain. Prod. Des. 2, 89–103.

Moreno, M., De los Rios, C., Rowe, Z., Charnley, F., 2016. A conceptual framework for circular design. Sustainability 8, 937.

Mourik, R.M., Breukers, S., van Summeren, L.F., Wieczorek, A.J., 2020. The impact of the institutional context on the potential contribution of new business models to democratising the energy system. In: Energy and Behaviour. Elsevier, pp. 209–235.

Pedersen, E.R.G., Lüdeke-Freund, F., Henriques, I., Seitanidi, M.M., 2021. Toward collaborative cross-sector business models for sustainability. Bus. Soc. 60, 1039–1058.

Pieroni, M.P., McAloone, T.C., Pigosso, D.C., 2020. From theory to practice: systematising and testing business model archetypes for circular economy. Resour. Conserv. Recycl. 162, 105029.

Planing, P., 2018. Towards a circular economy-how business model innovation will help to make the shift. Int. J. Bus. Glob. 20, 71–83.

Richardson, J.E., 2005. The Business Model: an Integrative Framework for Strategy Execution. Available at: SSRN 932998.

Rizos, V., Behrens, A., Kafyeke, T., Hirschnitz-Garbers, M., Ioannou, A., 2015. The Circular Economy: Barriers and Opportunities for SMEs. CEPS Working Documents.

Rosa, P., Sassanelli, C., Terzi, S., 2019. Towards Circular Business Models: a systematic literature review on classification frameworks and archetypes. J. Clean. Prod. 236, 117696.

Singh, J.V., Tucker, D.J., House, R.J., 1986. Organizational legitimacy and the liability of newness. Adm. Sci. Q. 171–193.

Stinchcombe, A.L., 1965. Organizations and social structure. Handbook of organizations 44, 142–193.

Straus, A., 1998. Techniques and procedures for developing grounded theory. Basics of Qualitative Research 265–274.

Suchek, N., Ferreira, J.J., Fernandes, P.O., 2022. A Review of Entrepreneurship and Circular Economy Research: State of the Art and Future Directions. Business Strategy and the Environment.
Takacs, F., Brunner, D., Frankenberger, K., 2022. Barriers to a circular economy in small- and medium-sized enterprises and their integration in a sustainable strategic management framework. J. Clean. Prod. 362, 132227.
Tukker, A., 2004. Eight types of product–service system: eight ways to sustainability? Experiences from SusProNet. Bus. Strat. Environ. 13, 246–260.
Tura, N., Hanski, J., Ahola, T., Ståhle, M., Piiparinen, S., Valkokari, P., 2019. Unlocking circular business: a framework of barriers and drivers. J. Clean. Prod. 212, 90–98.
Urbinati, A., Chiaroni, D., Chiesa, V., 2017. Towards a new taxonomy of circular economy business models. J. Clean. Prod. 168, 487–498.
Vaismoradi, M., Jones, J., Turunen, H., Snelgrove, S., 2016. Theme Development in Qualitative Content Analysis and Thematic Analysis.
Van Opstal, W., Borms, L., 2023. Startups and circular economy strategies: profile differences, barriers and enablers. J. Clean. Prod. 396, 136510.
Veleva, V., Bodkin, G., 2018. Corporate-entrepreneur collaborations to advance a circular economy. J. Clean. Prod. 188, 20–37.
Vermunt, D., Negro, S., Verweij, P., Kuppens, D., Hekkert, M., 2019. Exploring barriers to implementing different circular business models. J. Clean. Prod. 222, 891–902.
Volkmann, C., Fichter, K., Klofsten, M., Audretsch, D.B., 2019. Sustainable entrepreneurial ecosystems: an emerging field of research. Small Bus. Econ. 1–9.
von Kolpinski, C., Yazan, D.M., Fraccascia, L., 2023. The impact of internal company dynamics on sustainable circular business development: insights from circular startups. Bus. Strat. Environ. 32, 1931–1950.
Webster, K., 2017. The Circular Economy: A Wealth of Flows. Ellen MacArthur Foundation Publishing.
Zhang, W., White, S., 2016. Overcoming the liability of newness: entrepreneurial action and the emergence of China's private solar photovoltaic firms. Res. Pol. 45, 604–617.