



SMEs on the way to a circular economy: insights from a multi-perspective review

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Abstract

The transition to a circular economy (CE) has garnered widespread attention as a solution to address economic, environmental, and social challenges. While large enterprises and policymakers have made steps in adopting CE practices, small and medium-sized enterprises (SMEs) face unique challenges due to limited resources and expertise. Understanding the multi-level perspective (MLP) is essential for SMEs to successfully transition to a CE, as it considers factors at the micro, meso, and macro levels. However, current research often focuses on single levels, necessitating a comprehensive understanding of the phenomenon through systematic research. To address this need, this study conducts a systematic literature review (SLR) using the MLP framework to analyse existing research on SMEs' transition to a CE. The study aims to identify macro-, meso-, and micro-level factors, actors, and mechanisms influencing the transition process. The SLR contributes to academic understanding by developing a conceptual model that elucidates the dynamics of the circular transition process within SMEs. Additionally, it provides practical recommendations to support SMEs in navigating the transition successfully. The adoption of the MLP framework empowers SMEs, policymakers, industry associations, and consumers to play their roles effectively in driving the CE transition. While the study acknowledges certain limitations, it opens avenues for future research and enhancement of CE practices in SMEs.

Keywords Small and medium-sized enterprises · Circular economy · Multi-level perspective · Transition · Systematic literature review

JEL Classification M10 · Q56

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1 Introduction

The emergence of the circular economy (CE) as an alternative to the linear economic model has garnered significant attention as a means to address economic, environmental, and social challenges (Cagno et al. 2023; Knable et al. 2022). The CE concept revolves around the idea of decoupling economic growth from resource extraction and environmental destruction (Franzo et al. 2021). Governments, companies, and influential figures from various sectors are increasingly recognizing the importance of transitioning to a CE to combat resource scarcity (Maher et al. 2023) and mitigate environmental impacts (Schroeder et al. 2019; Yang et al. 2023). This urgency stems, among other things, from the pressure exerted on the global economy by the continuous consumption of finite resources (Ibn-Mohammed et al. 2021). However, despite growing attention and efforts, the global economy's circularity remains low, with only 8.6% being circular, and resource recycling rates are generally insufficient (Circle Economy 2020; Tan et al. 2022).

While large enterprises and policymakers have started adopting CE practices (Garces-Ayerbe et al. 2019; Ghisellini et al. 2016), small and medium-sized enterprises (SMEs), defined by the European Union as businesses that employ up to 250 people with an annual turnover of up to EUR 50 million (EC 2020), face distinct challenges due to their limited resources and expertise (Dey et al. 2019; Mura et al. 2020). Although SMEs play a vital role in the global economy, contributing to economic growth, employment, and innovation, their capacity to adopt CE practices is often constrained compared to larger enterprises (Rotar et al. 2019). Against the background of their importance, the active involvement and support of SMEs in the transition to a CE is not only critical but also essential for achieving widespread sustainable change (Smith et al. 2022). While existing literature has shed light on various aspects of SMEs' transition to a CE, such as management (Khan et al. 2023), strategies (Yazdani et al. 2021), supply chains (MahmoumGonbadi et al. 2021), innovation (Suchek et al. 2021), government policies (Mhatre et al. 2021) and others, in this vein, there is a lack of studies on SMEs transition to CE that consider a broader, multi-level perspective. It is crucial to recognize the significance of implementing CE at various levels, as acknowledged by multiple scholars. The micro-level involves factors at the firm level (Ghisellini et al. 2016). The meso-level pertains to the geographical proximity of supply chain partners and market-related aspects, such as customer acceptance (Delgadillo et al. 2021; Ghisellini et al. 2016) while the macro-level encompasses policy structures (Kirchherr et al. 2017).

However, current research often focuses on just one level, disregarding the fact that SMEs transitioning to CE require considering multiple perspectives. To transition towards CE, one must take into account various levels and overcome obstacles collectively. Despite the wealth of attention paid to the topic, a comprehensive understanding of the phenomenon is essential, requiring systematic research that looks in more detail at the interdependence and interactions of businesses with other stakeholders, specifically for SMEs (Dzhengiz et al. 2023; Trevisan et al. 2023),

facilitating the successful transition towards CE. It is necessary to unpack the multi-level perspective of SMEs transition towards CE, increase the knowledge of the different levels that are missing in the previous literature.

To address this gap, this study adopts the Multi-Level Perspective (MLP) framework as a theoretical lens. This framework explains social transformations that elaborate both the bottom-up and top-down dynamics and the multi-level nature of change (El Bilali 2019; Geels 2002, 2020; Walrave et al. 2018), offering a holistic view of the complex relationships and interactions among factors, actors, and mechanisms that influence SMEs' transition to a CE (Trevisan et al. 2023). By shifting the research focus from single-level aspects to the MLP, this study aims to identify and examine macro-, meso-, and micro-level factors, actors, and mechanisms that shape the transition to a CE within SMEs. The application of MLP can provide a systematic approach to examining intricate and extensive transitions such as sustainability (Kuhl et al. 2023; Smith et al. 2010), and can be applied for transition to CE. Therefore, MLP serves as a valuable theoretical lens for analysing the dynamics of the transition process.

The primary objective of this paper is to conduct a systematic literature review (SLR) using the MLP approach as the theoretical lens to determine and analyse existing research on SMEs' transition to CE. The guiding research question for this study is: How does the existing literature analyse and address the factors, actors, and mechanisms that influence the transition process toward CE in SMEs, as viewed through the lens of the Multi-Level Perspective?

By examining the factors, actors and mechanisms in-depth, this review aims to contribute to both academic understanding and practical implementation. The academic contribution lies in the development of a conceptual model that elucidates the dynamics of the circular transition process within SMEs, incorporating the interplay of factors, actors, and mechanisms at multiple levels. Additionally, this study seeks to provide practical recommendations to the unique challenges faced by SMEs, enabling them to navigate the transition successfully.

The paper is structured as follows: Sect. 2 provides the theoretical background on SMEs' transition to a CE and the MLP framework. Section 3 details the methodology employed for the systematic literature review. This is followed by sections presenting and discussing the findings in Sect. 4. Section 5 discuss the findings and Sect. 6 concludes the paper, presenting future research avenues and study limitations.

2 Theoretical background

2.1 CE and SMEs transition towards CE

CE has garnered significant attention and recognition for its potential to address pressing global challenges related to sustainability, resource efficiency, and economic growth. Several articles highlight its multifaceted benefits, emphasizing its capacity to reduce waste, promote sustainable development, and enhance resource efficiency (Bowen et al. 2023; D'Angelo et al. 2023; Neri et al. 2023; Shao et al.

2023). The adoption of CE strategies has been identified as a crucial factor in achieving sustainability goals, offering economic, environmental, and social advantages (D'Angelo et al. 2023). Moreover, the implementation of CE practices at the SME level is seen as a faster route to reaching sustainable development targets, underscoring its potential environmental and economic advantages (Massari and Giannoccaro 2023). The concept's appeal lies in its ability to decouple economic and social growth from natural resource usage and environmental degradation (Mura et al. 2020). Furthermore, the transition to a CE can lead to a low-carbon economy, reduced greenhouse gas emissions, and increased workforce opportunities (Findik et al. 2023). Governments, industries, and societies worldwide are actively promoting the CE concept to tackle resource scarcity and environmental concerns (Sohal and De Vass 2022). With its emphasis on redesigning products and processes, circular principles are expected to pave the way for more sustainable business practices (Hull et al. 2021). According to Zhu et al. (2022), CE is becoming increasingly important as a guiding framework for a more sustainable future that balances social, economic and environmental considerations. Arranz et al. (2022) note a consensus on the power of CE that underscores the need for a restorative industrial system that ensures economic growth while preserving natural capital and promoting societal well-being. The importance of incorporating sustainability into business strategies and product design is also increasingly acknowledged in organizations (Dorado et al. 2022).

Considering the discussion around CE by various researchers (e.g., Arranz et al. 2022; Ahmadov 2023; Bowen et al. 2023; D'Angelo et al. 2023; Dorado et al. 2022; Findik et al. 2023; Hull et al. 2021; Massari and Giannoccaro 2023; Mura et al. 2020; Neri et al. 2023; Shao et al. 2023; Sohal and De Vass 2022; Zhu et al. 2022), we view CE as an economic model that seeks to decouple economic growth from resource consumption and environmental degradation by promoting the continuous flow and regeneration of materials and resources within the system. It aims to design out waste and pollution, maintain the value of products, and regenerate natural systems. CE is crucial because it presents a sustainable alternative to the traditional linear economy, where resources are extracted, used, and then discarded as waste. Through a circular approach, CE can significantly contribute to reducing waste, increasing resource efficiency, and promoting sustainable development.

Morseletto (2020) suggests that adopting a methodical approach is crucial for transitioning towards CE, and this involves developing a tool to analyse a company's current position and establish a route for the transition. Merli et al. (2018) also emphasize the importance of such a methodical approach. In line with this, a sustainable business model, often referred to as a circular business model (CBM), is defined as one that focuses on creating value by utilizing economic value present in items after their initial use, to manufacture new offerings (Frishammar and Parida 2019; Linder and Williander 2017; Rittershaus et al. 2023; Shao et al. 2023). This view aligns with the idea of closed-loop supply chains and encompasses practices like recycling, remanufacturing, reusing, refurbishing, restoration, or repair (Linder and Williander 2017). By embracing a circular business model, companies can capitalize on the economic benefits of reusing resources and minimizing waste,

contributing to both their profitability and environmental sustainability (Lahti et al. 2018; Lüdeke-Freund et al. 2019; Riesener et al. 2019).

As far as strategies are concerned, Barros et al. (2021), for example, highlight the significance of prioritizing sustainable strategies, such as implementing a circular supply chain. According to their research, to effectively achieve CE, companies need to collaborate, communicate, and configure their operations across different business units and organizational functions. This approach aims to close energy and waste loops, thereby reducing resource consumption and minimizing leakages. Geissdoerfer et al. (2018) further emphasize that working together and fostering collaboration are essential for attaining long-term competitive advantages in the context of a circular supply chain. By adopting such collaborative measures and implementing circular practices, companies can facilitate a successful and enduring transition towards sustainability, promoting both environmental preservation and economic prosperity.

According to Lieder and Rashid (2016), the implementation of a CE can occur through two main approaches. Firstly, it can be driven from the top down by society through legislation and regulations, encouraging businesses to adopt circular practices and policies. Secondly, it can also be initiated from the bottom up by industries, who may find a competitive edge and improved profitability by focusing on environmental impact, economic benefits, and resource scarcity while transitioning towards circular models. Kirchherr et al. (2017) and Korhonen et al. (2018) propose a view of the potential transition as an economic system that supports companies in remaining viable while challenging the traditional linear model of growth and resource optimization. Emphasizing the importance of reducing raw material consumption and recovering waste through recycling or repurposing, these researchers highlight that the government's role is vital in guiding and supporting this transition as well. By adopting either top-down or bottom-up approaches and redefining economic systems, societies can pave the way for a sustainable future, where CE fosters both business viability and responsible resource management.

In recent years, there has been significant attention towards the transition to a CE and given that over 99% of businesses in the European Union are SMEs, accounting for two-thirds of total employment (Eurostat 2020), their crucial role in driving this shift is evident. Nevertheless, the shift from linear to circular operations requires a complete restructuring of industries in terms of development, management, operations, supply chain, business strategy, and customer relationships (Frishammar and Parida 2019). Previous research suggests that organizations implementing CE principles gain a competitive edge over traditional linear models (Rizos et al. 2016). However, diverse stakeholder interpretations of the CE concept seem to have led to ambiguous strategies for implementation and operationalization (Ho et al. 2023). Hence, the development of a well-conceived plan becomes vital to effectively address the complexity of this transformation. By adopting comprehensive, industry-specific strategies and fostering collaborative efforts between governments, enterprises, and consumers, businesses can successfully navigate this paradigm shift towards a circular and sustainable future, unlocking opportunities for innovation, competitiveness, and long-term growth while minimizing environmental impact (Assmann et al. 2023; Mauss et al. 2022; Piispanen et al. 2022).

To facilitate the understanding and support of SMEs in their CE transition, researchers have proposed several frameworks. One notable approach is the MLP framework, which has found application in various contexts including small firm contexts. Researchers (e.g., Malik et al. 2022; Zhu et al. 2022) have developed conceptual frameworks that outline the micro-, meso-, and macro-level factors influencing the adoption of CE practices in SMEs operating in emerging markets. These frameworks can aid SMEs and the broader economic to increase a successful transition towards CE.

2.2 The multi-level perspective as the theoretical underpinning

The MLP is viewed as a promising analytical tool for comprehending socio-technical transitions and their complexities. The tool was first postulated by Rip and Kemp (1998), and further refined by Geels (2002) as an analytical framework that conceptualises transition processes as the result of the interplay of developments at three analytical levels. This framework provides a comprehensive approach to investigating technological transitions, recognizing the interplay of micro-, meso-, and macro-level factors (Klein et al. 1999).

At the micro-level, niches are identified as breeding grounds for radical innovations. These innovations, shielded by specific contexts or supported by targeted policies, hold the potential to instigate transformative changes within established systems (Geels et al. 2017). The micro level refers to wider firm-level factors affecting how a firm proposes, creates, captures and delivers value for its stakeholders in the context of a CE (Joore and Brezet 2015). At this level, the literature (e.g., Bocken and Geradts 2020; Kirchherr et al. 2018; Tura et al. 2019) referred organisational factors linked to strategy, culture, structure and processes as micro level perspective.

The meso-level is represented by socio-technical regimes, comprising institutionalized sets of rules that govern agent groups and their actions within socio-technical systems (Geels 2004, 2011). The literature addressing this level points to various actors, from the geographical proximity of supply chain partners (Delgadillo et al. 2021), to market-related factors, such as customer acceptance (Hina et al. 2022; Kirchherr et al. 2018; Vermunt et al. 2019) as meso level factors. Additionally, the macro-level encompasses broader external factors, such as cultural changes, political shifts, and macro-economic trends, which exert influence over both the regimes and niche innovations (Geels 2002, 2012). An example of a macro-level perspective could be a change triggered by an increasing societal awareness of the urgency and need to transition to a more CE society (Vermunt et al. 2019).

Several advantages are associated with MLP that make it highly applicable to studying SMEs in their transition to CE. Firstly, the framework offers an integrated and systemic perspective for examining socio-technical change (Whitmarsh 2012). Secondly, the focus on niche innovations aligns well with SMEs' potential role as niche innovators (Maher et al. 2023). The emphasis on radical changes sheds light on how SMEs can spearhead transformative shifts in the transition to CE. Moreover, MLP's analysis of socio-technical regimes can enable the identification of barriers that SMEs

encounter while navigating the complexities of transitioning to CE-related practices. Additionally, it provides insights into the governance mechanisms enacted by various actors at different levels, elucidating the roles of government, industry, and society in facilitating or hindering the transition process (Chembessi et al. 2023).

To sum, the MLP literature argues that transitions come about through interacting processes within and between these levels and highlights how novelty, as captured in new knowledge, ideas, and practices is derived from a niche group of innovators, spreads to the socio-technical regimes and before finally shaping into a sound practice at a societal level (Geels 2002; Zhu et al. 2022).

3 Methodology

To develop a comprehensive understanding of the research progress related to SMEs transitioning to CE, we conducted a SLR utilizing a combined approach of descriptive statistical analysis, by diving into the evolution of the research, use of methodologies and theories, and qualitative content analysis (Lahane et al. 2021; Sudusinghe and Seuring 2022; Tranfield et al. 2003). A SLR approach was chosen due to its effectiveness in rigorously investigating the current state of research in a specific area (Kraus et al. 2020).

To answer our research question, the SLR followed a five-step process which are outlined in the following.

The initial step involved conducting a search and selecting relevant strings to survey the existing literature in the Web of Science (WoS) and Scopus databases. These platforms were chosen for their comprehensive coverage of articles from various databases, ensuring the availability of reliable metadata for descriptive statistics and content analysis. After multiple simulations, search strings were refined to align more closely with the study's objectives. The selected search string was:

"circul*" AND ("SME" OR "SMEs" OR "small and medium enterpris*" OR "Small and medium-sized enterpris*" OR "small and medium-sized business*" OR "entrepreneur*") AND ("trans*" OR "chang*" OR "proces*").

All academic articles recorded in English in these databases until 9th June 2023 were considered as part of the initial group (please refer to “Appendix” for more details).

In the second step, we conducted a screening process for the initial sample of 357 documents. Duplicate documents were removed, resulting in a reduced set of 272 documents. The third step involved a careful examination of the title, abstract, and keywords of these documents, applying selection criteria to identify those that studied SMEs' transition to a CE. This process led to the exclusion of 139 documents, leaving a final set of 133 documents. The fourth step, involved a comprehensive review of the full text of all 133 documents, applying the selection criteria to determine if the document specifically studied the transition of SMEs to a CE. As a result, 38 documents were excluded, leaving a final set of 95 documents for further analysis. In the fifth step, we utilized these 95 documents to perform descriptive statistical analysis and content analysis, enabling us to address the research question.

Table 1 Usage of theories and their frequency

Theory	Frequency	Publication Years
Resource-based view (RBV and NRBV)	13	2021, 2022, 2023
Institutional theory	6	2021, 2022
Dynamic capability theory (DCT)	4	2020, 2022
Absorptive capacity (ACAP) theory	3	2022, 2023
Grounded theory approach	3	2022, 2021
Multi-level perspective (MLP)	2	2022, 2023
Self-determination theory (SDT)	2	2022, 2023
System dynamics (SD) theory	1	2021
Extended theory of planned behaviour (ETPB)	1	2021
Fuzzy set theory	1	2021
Institutional entrepreneurship (IE)	1	2021
Contingent theory (CT)	1	2023
Leader-member exchange theory (LMXT)	1	2023
Organizational learning	1	2021
Paradox theory	1	2019
Pecking-order theory	1	2020
Practice-based view (PBV)	1	2022
Stakeholder theory	1	2022
Signaling theory	1	2021
Socio-technical systems (STS) theory	1	2022
Subjectivist entrepreneurial theory	1	2020
System theory	1	2022
Theory elaboration	1	2022
Theory of reasoned action (TRA)	1	2022

We used NVIVO 14 and MS Excel to analyse the articles and produce the descriptive results (please refer to Figs. 2, 3, 4 and Table 1). The content analysis led to the emergence of codes, introducing a feedback loop to enhance the content analysis for the entire iterative process. Content analysis embrace both quantitative and qualitative research (Kannan et al. 2022). This approach holds promise for exploring challenging yet vital issues of interest to management researchers through rigorous investigation of articles, providing valuable insights and understanding of complex managerial phenomena and organizational dynamics (Duriau et al. 2007). The content analysis used in this paper followed the main steps proposed by Mayring (2014), including the review idea (research questions, search strategy, and coding), operationalization (frequency counts and cross-tabulations), and the results and main conclusions (interpretation).

The coding process adhered to the Webber protocol (Duriau et al. 2007), involving various stages: (a) defining the recording units as word and text segments on various levels of MLP and factors, (b) determining the coding categories related to SMEs' transition to CE, (c) identifying codes for the transition themes and

categories from MLP, (d) testing the coding on a sample of text to create a codebook by assigning values to text, such as frequency and presence/absence of information, (e) assessing the accuracy and reliability of the sample coding by comparing the code database and the research database, (f) revising the coding rules to ensure they capture the core of texts related to SMEs' transition to CE, (g) coding all the text and finalizing the codebook, and (h) evaluating the achieved reliability and accuracy by comparing the complete research database with the completed codebook using multiple coders to ensure data source validity, specifically from journals indexed in Scopus or WOS. The research question was ultimately addressed through content analysis of the final sample size of $n=95$. The complete process comprising all five steps is illustrated in Fig. 1.

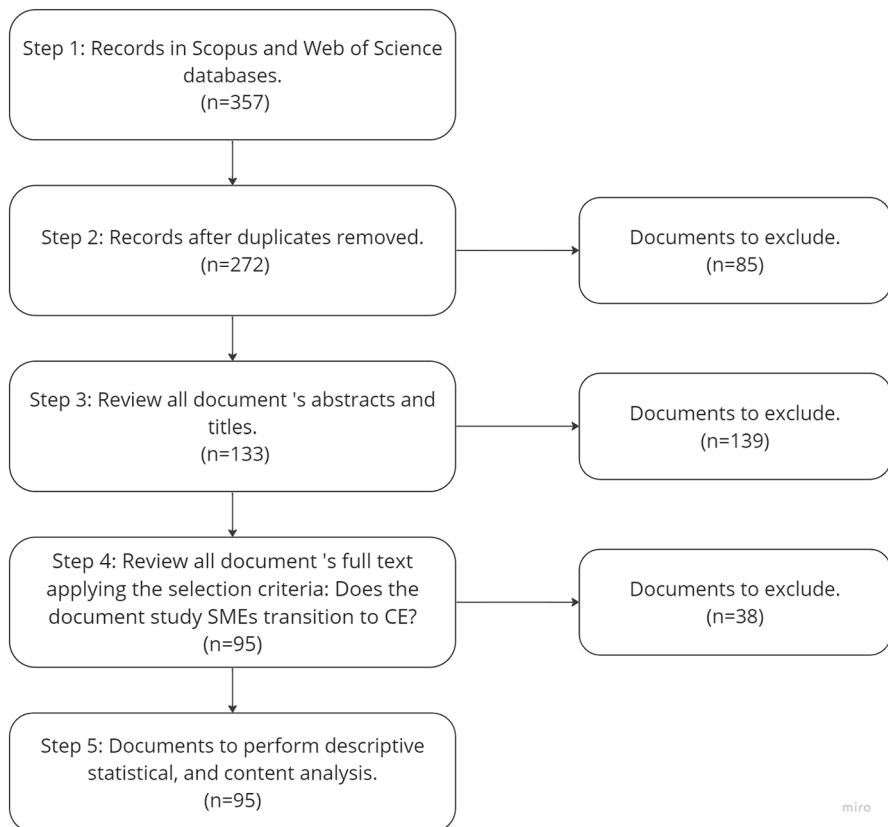


Fig. 1 The data selection process

4 Results

This section is structured as follows. Section 4.1 provides the descriptive statistical analysis and Sect. 4.2 presents the results of the content analysis of the reviewed articles.

4.1 Descriptive analysis of reviewed articles

Figure 2 summarizes the evolution of the number of articles in business and management fields since 2018. Notably, starting from 2021, the topic has gained considerable momentum, with around 80.0% of all articles published (27.0% in 2021, 40.0% in 2022 and 13.0% in 2023).

Regarding the research methods employed in the analysed papers, over the six-year period from 2018 to 2023, we can see the shift in methods employed (Fig. 3). While case studies maintained a prominent position as the most widely used method, the prevalence of surveys significantly increased, becoming a dominant research tool by 2022. The use of interviews showed consistent relevance throughout the period covered, while conceptual development and focus groups displayed moderate and steady usage, respectively.

Throughout the years, a diverse range of theories has been employed. Notably, the resource-based view (RBV) and the institutional theory emerged as the most frequently used theoretical frameworks. RBV and natural resource-based view (NRBV), provided a foundation for several studies, emphasizing the significance of an organization's resources in achieving a CE (e.g., Agyabeng-Mensah et al. 2022; Schmidt et al. 2021). Additionally, institutional theory, often combined with other

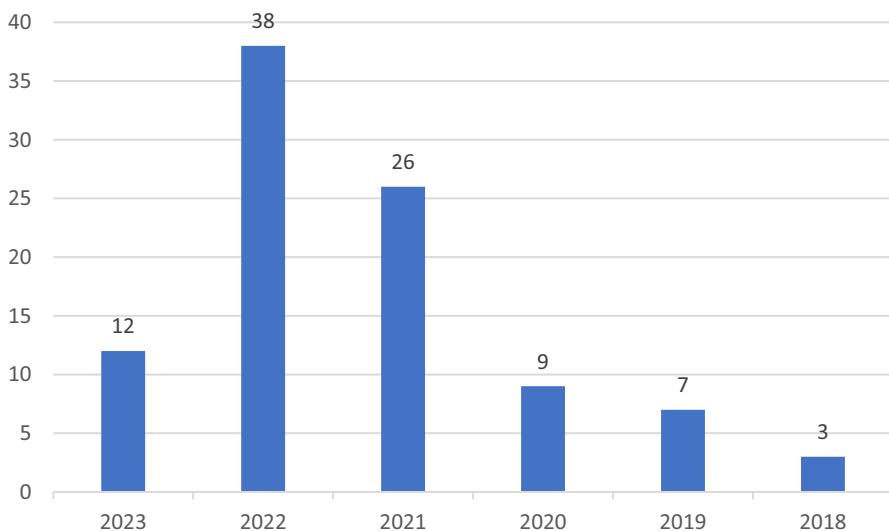


Fig. 2 Evolution of publications by year across the period of analysis (up to June-2023)

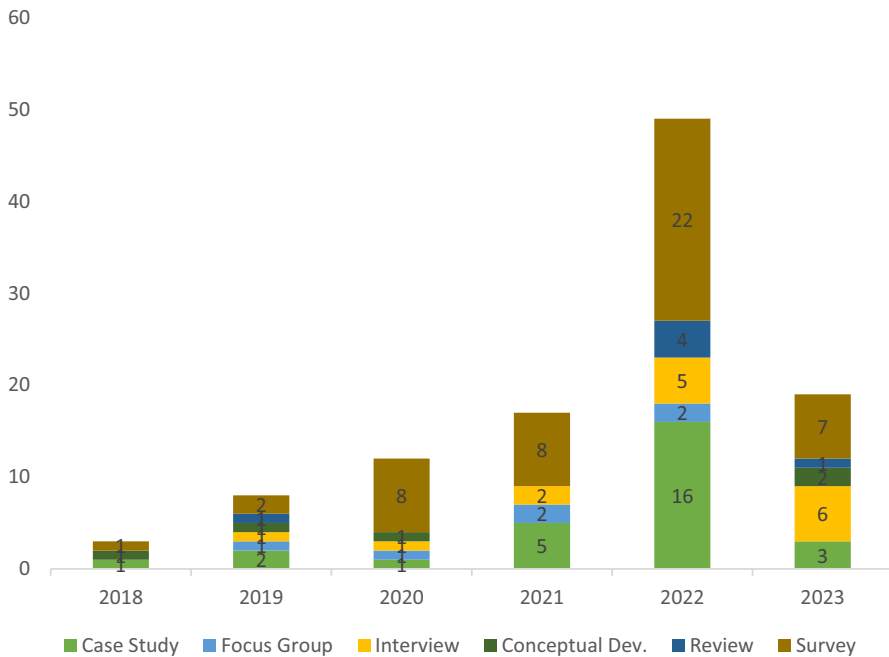


Fig. 3 Publications by research method

perspectives such as institutional entrepreneurship and resource-based view, showcased its relevance in understanding how organizations influence and are influenced by the broader institutional context in the context of CE adoption (e.g., Arranz et al. 2022; Mathivathanan et al. 2022). Furthermore, dynamic capability theory (DCT), Absorptive capacity (ACAP) theory and Grounded theory approach were also notable theories used in a considerable number (29/50) of publications during the studied period.

However, it's worth noting that the application of theories in this field has been somewhat limited. This can be attributed to the emerging nature of the research field, variations in study types and disciplines, and instances where studies do not explicitly mention or employ specific theories or theoretical frameworks. Additionally, some authors may choose to adopt an exploratory approach to understand specific CE practices or phenomena without grounding their work in a particular theory.

Out of the 95 documents analysed, they were published in a total of 31 different journals. A significant concentration of 54 documents, which accounts for 57% of the total, was found in only three specific journals. These journals include “Journal of Business Research” with 19 publications, “Business Strategy and the Environment” with 18 publications, and “Journal of Cleaner Production” with 17 publications. The findings regarding the journals is presented in Fig. 4.

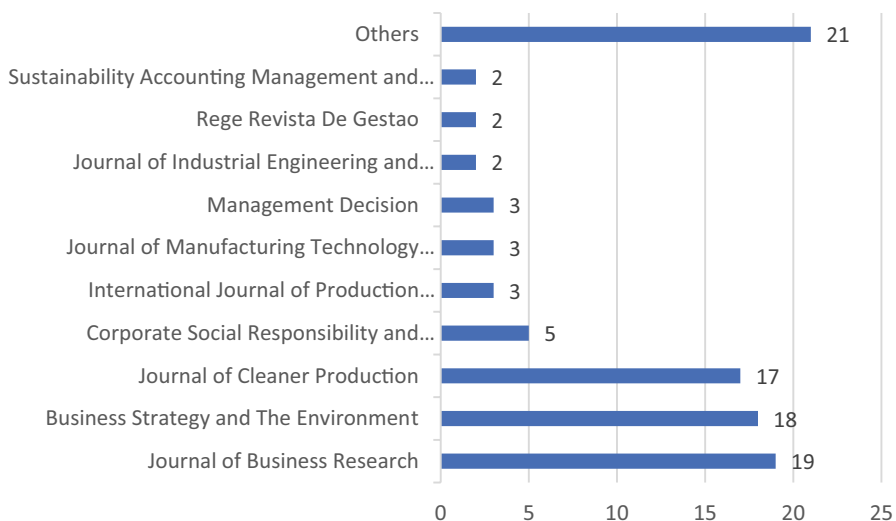


Fig. 4 Publications by journal

4.2 Content analysis and discussion

The following section present the findings of analysed articles that focused on SMEs' transition to a CE at different levels: macro, meso, and micro. Based on the analysis, various themes emerged to reflect the distinct dimensions of influence, encompassing external factors, stakeholder interactions, and internal aspects of SMEs that collectively shape the successful circular transition. At the macro level, the analysis highlights four key themes: taxation and incentives, regulatory policy, collaboration and partnerships, and advocacy and awareness. At the meso level, the text identifies four themes: supply chain practices, the role of consumers, the role of associations and networks, and engagement and collaboration. Lastly, at the micro level, the text covers four themes: strategies, resources and capabilities, management and leadership, and innovation and digitalization.

Macro level:

Four key themes were found to be relevant at the macro level: (I) taxation and incentives, (II) regulatory policy, (III) collaboration and partnerships, and (IV) advocacy and awareness. The 17 examined articles that fit the macro level shed light on various actors and mechanisms that contribute to the adoption and implementation of CE practices. These themes explore the role of stakeholders, such as policymakers, institutions, non-profits, and other government agencies, in creating a supportive environment for CE initiatives through various mechanisms.

(I) Taxation and incentives Policymakers, financial institutions, and regulatory bodies play a crucial role in creating a supportive environment for CE initiatives. Austin and Rahman (2022) covers diverse finance sources, like crowdfunding and capital market funding, to aid SMEs in the necessary knowledge and resources to adopt circular business models and overcome financial barriers. Nudurupati et al.

(2022) explores government initiatives, environmental regulations, and competitive advantage as drivers of CE adoption, fostering a supportive environment for the transition to a CE. Maher et al. (2023) emphasizes the significance of supportive government programs and policies for SMEs to implement circular business models, along with the need for training and support programs to encourage and facilitate the uptake of CE practices among SMEs.

(II) *Regulatory Policy* Six articles share a common focus on studying the regulatory policies for the CE. Droege et al. (2023) emphasises the importance of policy entrepreneurs, who drive the adoption of CE policies by creating a vision, deriving solutions, and garnering support. Ostermann et al. (2021) highlights the role of laws and regulations as external drivers for CE adoption in the fashion sector. Several articles address the policy aspect under enablers and barriers, collectively revealing the importance of regulatory policies (Droege et al. 2023; Kayikci et al. 2021; Rodriguez-Espindola et al. 2022; Sohal et al. 2022), development of conceptual models and transformative frameworks (Zhu et al. 2022), exploration of standardized approaches for CE disclosure (Massari and Giannoccaro 2023), shaping regulatory policies and addressing the challenges associated with transitioning to a CE.

(III) *Collaboration and Partnerships* Three articles were assigned to this theme which highlights the significance of collaboration and partnerships involving actors such as non-profits, government agencies, and policymakers in promoting CE practices. Agyabeng-Mensah et al. (2022) examines the role of external pressure and various capabilities (engagement, alliance, circular supply chain) in achieving CE performance, and highlights the importance of collaboration and partnerships in enhancing environmental sustainability commitment and circular supply chain capability. Similarly, Bag et al. (2022) explores the relationships between various factors including institutional pressures, eco-innovation, and firm performance. Hull et al. (2021) explores the challenges and opportunities in developing circular-economy incubators in Trinidad and Tobago. The study emphasizes the need for collaboration among stakeholders, including entrepreneurs, non-profits, academics, and government agencies, with a limited role for the government. Finally, Holzer et al. (2021) investigates the practices and topical areas that are central to the transition towards a CE in SMEs in Austria. The study identifies resource efficiency, cooperation with stakeholders, and sustainability as crucial areas. It emphasizes the importance of addressing these areas to improve overall performance and identifies different strategic groups of SMEs, providing insights for policymakers and intermediaries to effectively target diverse SMEs.

(IV) *Advocacy and awareness* Three articles formed this theme which collectively highlight the importance of institutions and policymakers as actors in creating advocacy and awareness for CE principles and practices. Cullen (2023) investigates how circular entrepreneurs navigate institutional value systems to create financially viable business models with social and environmental value. It emphasizes adhering to norms, acquiring competencies, and managing tensions in value creation as mechanism. Alonso-Almeida et al. (2021) examines the role of institutional entrepreneurship in driving the CE in the EU. It emphasizes the need for transformative changes by institutions and policymakers. Triguero et al. (2022) focuses on factors influencing environmental innovation adoption in EU firms for the CE. It highlights

financial capabilities, technology, public funding, and collaboration networks to drive transformative change.

Meso level:

This section focuses on four key themes at the meso level: (I) Supply Chain Practices, (II) the Role of consumer, (III) the Role of Associations and Networks, and (IV) Engagement and Collaboration. 22 articles were group under this level. These articles explore different factors and mechanisms that contribute to the adoption and implementation of CE practices at meso level. They provide insights into the relationships between SMEs and their suppliers, the influence of consumers on circular practices, the role of associations and networks in facilitating the transition, and the importance of engagement and collaboration among various stakeholders.

(I) *Supply Chain Practices* The six articles that belong to this theme share a common focus on supply chain practices and discuss various aspects. The actors involved are SMEs and their suppliers while talking about mechanisms such as stakeholder relations, the role of cooperation and different types of supply chain. Centobelli et al. (2021) focuses on exploring the relationships between various factors related to supply chain management specifically examining the impact of these factors on SMEs. In contrast, Susanty et al. (2020) investigates the implementation of CE practices in the wooden furniture industry in Indonesia, with a specific focus on the role of environmental-oriented supply chain cooperation (ESCC) practices. While both articles examine the factors influencing supply chain practices, Staicu and Pop (2018) explores CE and social entrepreneurship in the textile and apparel sector, emphasizing stakeholder mapping, collaborative spaces, and increasing awareness. Kusumowardani et al. (2022) investigates CE principles to address food loss and waste in the agri-food supply chain, analysing growers, distributors, and retailers. Kayikci et al. (2022) delves into the concept of a smart circular supply chain and closed-loop supply chain, assessing the readiness and maturity levels of SMEs. Finally, Le et al. (2022) explores how CE practices and circular entrepreneurship promote sustainable supply chain management and performance in SMEs within the food value chain. Overall, the selected articles show how different practices, collaborations, and frameworks influence the adoption and implementation of circular supply chain practices across various industries.

(II) *Role of Consumer* Three articles provide insights into the role of the consumer in the dynamic of the CE transition. Sharma et al. (2021) focuses on the prospects, impediments, and prerequisites for transitioning to a CE from a linear economy. It acknowledges the role of consumer acceptability in this transition, emphasizing the importance of gaining consumer support for circular practices. In contrast, Nudurupati et al. (2022) primarily centres around the adoption of CE practices in Indian SMEs and it touches upon the influence of customer pressure. The article recognizes that customer demands and competitive advantage act as market forces that encourage SMEs to embrace circular practices to meet consumer expectations and gain a competitive edge. On the other hand, Re and Magnani (2022) takes a broader perspective by exploring the co-creation processes and value creation in circular entrepreneurship involving SMEs and their key actors. It identifies the importance of customers, suppliers, and partners in these processes, highlighting their active role in collaborative activities such as product design, waste reduction

initiatives, knowledge sharing, resource pooling, and joint innovation projects. The article emphasizes the significance of these co-creation mechanisms in achieving circular outcomes.

(III) Role of Associations and Networks Four articles discuss the role of associations and networks to facilitate the transition of SMEs towards the CE. Ormazabal et al. (2018) emphasises the role of industrial associations in promoting collaboration among SMEs. Silva et al. (2019) focuses on the specific network of small companies and entrepreneurs, investigating the interactions and dynamics within the network, and highlighting challenges and the need for restructuring commercial relations. Zucchella et al. (2022) emphasizes the role of entrepreneurs, organizations, and external stakeholders in driving the CE transition and examines the firm's network and interactions with external stakeholders, emphasizing the role of customers' culture and willingness to pay. Zhu et al. (2022) adopts a multilevel perspective, addressing macro, meso, and micro factors and actors and highlighting the importance of government policies, industry collaborations, and internal capabilities within SMEs. Also, underline industry associations and networks that play a crucial role in disseminating knowledge, sharing best practices, and facilitating the adoption of CE practices.

(IV) Engagement and Collaboration Nine articles provide insights into engagement and collaboration in the transition towards a CE from a meso-level perspective. These findings underscore the significance of active engagement, collaboration, and coordination among actors to foster a sustainable and CE. Scipioni and Niccolini (2021) explores the transition of SMEs towards a CE through organizational learning processes, emphasizing the importance of engagement and collaboration among the actors. In line with this, Hull et al. (2021) focuses on understanding stakeholders' perceptions and barriers to participation in CE strategies. Similarly, Mishra et al. (2021) examines the role of collaboration in technology transfer and organizational learning to enable resource efficiency and the adoption of clean technology. Building on this, Holzer et al. (2021) delves into corporate practices in SMEs, emphasizing factors such as cooperation with stakeholders. Furthermore, Wade et al. (2022) highlights the significance of capabilities, experimentation, collaboration, and stakeholder connections for successful circular innovation in the mining industry. Expanding the discussion, Sohal et al. (2022) provides a comprehensive understanding of the transition towards a CE in the Indian SME sector, emphasizing engagement and collaboration among actors at different levels, with a focus on industry associations and initiatives. Moreover, Virmani et al. (2022) examines the adoption of CE practices in Indian micro, small, and medium enterprises (MSMEs), identifying roadblocks and effective solutions, while considering stakeholder engagement, supply chain management, and collaboration. Additionally, Kuhl et al. (2022) explores how the implementation of product-service systems (PSSs) and the adoption of circular supply chain (CSC) practices are influenced by interactions and collaborations among various actors. Finally, Howard et al. (2022) emphasizes the importance of engagement, collaboration, and coordination among SMEs and local actors, considering factors such as place-based coordination, cross-institutional organizing, and value sharing.

Micro level:

This section focuses on the micro-level perspective of the CE, exploring strategies, resources and capabilities, management and leadership, innovation and digitalization, and models and frameworks. 62 articles were assigned to this level.

(I) *Strategies* Nineteen articles addressed the strategies. Firstly, integrating lean management principles and practices with circular production systems emerges as a common strategy across several articles (Afum et al. 2022a, 2022b; Chaudhuri et al. 2022; D'Angelo et al. 2023). This approach focuses on minimizing waste, maximizing resource efficiency, and improving zero-waste performance. Secondly, organizational commitment and leadership play a crucial role in driving the transition to a circular model. Several articles (Dorado et al. 2022; Prieto-Sandoval et al. 2021; Sohal and De Vass 2022; Stelmaszczyk et al. 2023) highlight the significance of top management's commitment and vision in embracing CE practices. Managers are encouraged to demonstrate leadership initiative by exploring sustainable ways of operating and engaging new stakeholders. Collaboration and value co-creation among actors are key strategies identified in the articles. Several articles stress the importance of aligning strategies, fostering a culture of sustainability, and collaborating with industry, government, and university partners (Cullen 2023; Dey et al. 2020; Prieto-Sandoval et al. 2021; Re and Magnani 2022, 2023; Rittershaus et al. 2023; Schmidt et al. 2021). Collaborative efforts range from co-creating processes and product design to waste reduction initiatives, shared knowledge and resources, and joint innovation projects. Lastly, several articles collectively explore various strategic approaches for the transition towards a CE. They highlight the importance of aligning strategies (Scipioni and Niccolini 2021), managing paradoxical tensions (Daddi et al. 2019), considering institutional norms (Cullen 2023), adopting circular practices at different levels (Blasi et al. 2021; Schmidt et al. 2021; Sohal et al. 2022), and integrating sustainability into organizational processes to successfully implement CE practices at SMEs (Afum et al. 2022a).

(II) *Resources and Capabilities* Eleven articles show the findings related to resources and capabilities for the transition to a CE. Eikelenboom and de Jong (2022) emphasized the significance of organizational attributes, including managers' interpretation and network interactions, in integrating CE into business strategies. Centobelli et al. (2021) explored the impact of factors, actors, and mechanisms at the organizational level on supply chain management and CE capabilities. Scarpellini et al. (2020) focused on environmental capabilities, such as environmental management systems and corporate social responsibility, applied by firms during the introduction of the CE. Ghisetti and Montresor (2020) investigated the relationship between the adoption of CE practices by SMEs and their financing choices, considering different funding sources. O. Khan et al. (2020) delved into the role of dynamic capabilities within organizations and their influence on CE implementation. Prieto-Sandoval et al. (2019) identified key strategies and resources necessary for SMEs to implement the CE, emphasizing eco-innovation, competitive advantage, value creation, differentiation, and dynamic capabilities while Garcia-Quevedo et al. (2020) examines barriers related to resources and capabilities that hinder the implementation of CE activities. Elf et al. (2022) highlighted the importance of dynamic capabilities and entrepreneurship in CE business model innovation. Wade

et al. (2022) analysed the capabilities enabling the creation of products from waste resources, including experimentation, research and development, stakeholder connections, and ecosystem development. Marrucci et al. (2022) focused on absorptive capacity as a critical factor influencing the implementation of CE practices. Finally, Bowen et al. (2023) examined the experiences of SMEs in implementing CE activities post-COVID-19, considering factors such as financial efficiency, resource constraints, and proactive strategies.

(III) *Management and Leadership* Twelve articles shed light on the importance of ethical leadership, awareness, and management commitment to overcoming barriers in driving the adoption and implementation of CE practices in SMEs. Firstly, based on several studies (e.g., Agyabeng-Mensah et al. 2023; Cheffi et al. 2023; Chowdhury et al. 2022; De Vass et al. 2023; Soni et al. 2023), management commitment is consistently identified as a driving force behind adopting and implementing CE practices. Ethical supply chain leadership (Agyabeng-Mensah et al. 2023), management control systems (Cheffi et al. 2023), adaptive distributed leadership (Soni et al. 2023), leaders' values and vision (De Vass et al. 2023) and overall organizational leadership (Chowdhury et al. 2022) play significant roles in fostering CE concept within organizations. The studies highlight that management commitment is crucial for setting the direction, establishing a culture of CE, allocating resources, and ensuring the successful implementation of CE practices. Secondly, the studies recognize the importance of awareness and knowledge sharing in promoting CE practices (Choudhary et al. 2022; Liakos et al. 2019). They emphasize the role of awareness levels (Liakos et al. 2019), personal norms and behavioural intentions (Choudhary et al. 2022), and motivation (Henry et al. 2023; Rovanto and Finne 2023) that drive organizations' intentions to adopt circular practices. Furthermore, the articles highlight the importance of managerial commitment in achieving the goals of CE business models (Unal et al. 2019) and emphasizes the need for organizations to improve their efforts in engagement with circular practices (Barreiro-Gen and Lozano 2020).

(IV) *Innovation and Digitalization* Twelve studies emphasize the importance of adopting innovative practices and digital technologies to enable the transition to CE principles, achieve sustainable performance, and address environmental and economic challenges. The mechanisms explored in these articles revolve around how innovation, specifically digitalization and Industry 4.0, facilitates the adoption of CE practices, drives growth, enhances competitiveness, and improves sustainability. They emphasize the significance of innovative practices, technologies, and strategies within small and medium enterprises (SMEs) for achieving growth, competitiveness, and sustainability (Dey et al. 2022; Mondal et al. 2023; Pizzi et al. 2021; Rodriguez-Espindola et al. 2022). The studies also explore the enabling role of Industry 4.0 (Zheng et al. 2023) and digital innovations (Oyinlola et al. 2022) in the CE, identifying mechanisms through which it facilitates SMEs (Zheng et al. 2023). Additionally, the articles discuss the relationship between eco-innovation features and the CE, emphasizing the importance of systemic eco-innovations (Kiefer et al. 2021). Furthermore, the impact of digital technologies, such as reservation systems, and their connection to the CE is examined (Saura et al. 2022). The findings highlight long-term economic and environmental improvements through digital solutions (Darmandieu et al. 2022; Findik et al. 2023; S. A. R. Khan et al. 2022).

(V) *Models and Frameworks* Five articles provide frameworks, and tools to guide SMEs in their transition to the CE. They address specific challenges, propose management strategies, and offer practical approaches to foster CE within SMEs. The study by Malik et al. (2022) focuses on the challenges faced by SMEs in India in adopting CE practices. It proposes a multilevel conceptual framework grounded in CE and change management literature to facilitate the transition. While Piller (2023) examines how Australian fashion SMEs are implementing circular design practices to overcome the linear fashion model's challenges and provides insights and tools to promote circular design practices. Gennari (2022) identifies key pillars of CE for SMEs and provides a conceptual framework that explains the development of these pillars and offers practical advice for SMEs to assess their transition path and maximize policy interventions' effectiveness. Meanwhile, Guevara-Rivera et al. (2021) provides insights into the challenges and opportunities faced by SMEs in adopting CE practices through the simulation model's evaluation and visualization capabilities. Lastly, Garza-Reyes et al. (2019) proposes the Circularity Measurement Toolkit (CMT) as a means to assess the degree of circularity in manufacturing SMEs. It contributes to the field of CE measurement by enabling companies to evaluate their circular practices, identify corrective actions, and guide future efforts for adopting CE practices.

5 An integrated view of the SMEs transition to CE research

The development of the model was guided by the MLP framework, but the framework has not been without criticisms. Some scholars have argued that it lacks a comprehensive consideration of actor agency (Smith et al. 2005), potentially overlooking the active role of individual actors and social groups in shaping transitions. Furthermore, concerns have been raised about conceptual ambiguities within MLP, particularly regarding the understanding of actors and the distribution of power across different levels (Avelino et al. 2016). Acknowledging these shortcomings, our model further developed upon on MLP, mapping the factors and the identification of key actors and mechanisms on the SMEs transitioning to CE, but lacking on the power dynamics of them.

Figure 5 provides a holistic view of the CE transition in SMEs, showcasing the interconnectedness and interdependence of various factors and actors at different levels: macro, meso, and micro. The MLP framework provides a comprehensive understanding of the complex relationships and interactions among these factors and actors that influence SMEs' successful transition to a CE. Each level plays a crucial role in driving the adoption and implementation of CE practices, and the interactions between these levels create a supportive ecosystem for SMEs' transition towards CE. The macro level sets the policy framework, providing financial incentives and regulatory guidance to foster circular practices. At the meso level, associations and networks disseminate knowledge, and consumers drive market demand, influencing SMEs' circular practices. At the micro level, strategies and innovative practices are implemented, supported by management and leadership commitment, and enabled by the utilization of resources and digital technologies.

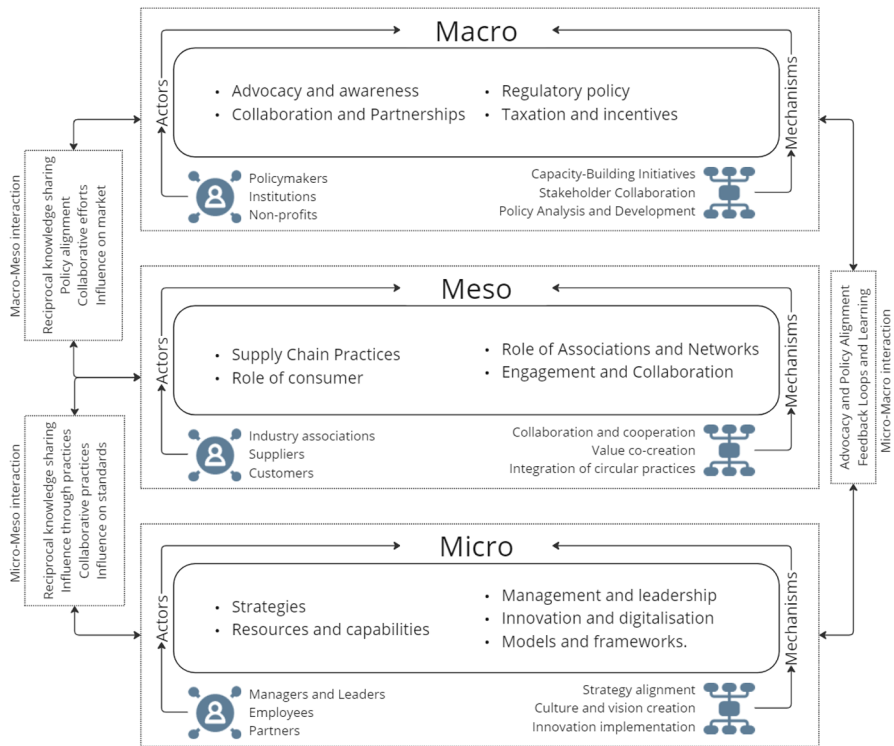


Fig. 5 Multi-level perspective of circular economy transition in SMEs

Macro Level: at the macro level, four key themes have been identified: taxation and incentives, regulatory policy, collaboration and partnerships, and advocacy and awareness. These themes illustrate the influence of policymakers, institutions, non-profits, and government agencies in creating an enabling environment for CE initiatives. Taxation and incentives (I) serve as financial motivators for SMEs to embrace circular business models and overcome financial barriers. Regulatory policies (II) act as external drivers, providing guidelines and standards for adopting circular practices in different industries. Collaboration and partnerships (III) involving various stakeholders foster knowledge exchange, resource sharing, and joint initiatives towards CE. Advocacy and awareness (IV) play a pivotal role in promoting CE principles and practices, influencing public opinion and driving transformative changes.

Meso Level: moving to the meso level, the figure highlights four themes: supply chain practices, the role of consumers, the role of associations and networks, and engagement and collaboration. These themes explore the dynamics between SMEs and their suppliers, the influence of consumers on circular practices, the role of industry associations, and the significance of active engagement among stakeholders. Supply chain practices (I) underscore the importance of circularity in the flow of materials and products among SMEs and their suppliers. The role

of consumers (II) is essential in driving market demand for circular products and services, pushing SMEs to adopt circular practices to meet customer expectations. Associations and networks (III) play a pivotal role in disseminating knowledge, sharing best practices, and fostering collaborations among SMEs. Engagement and collaboration (IV) among various actors lead to the co-creation of circular solutions, resource pooling, and cross-sectoral partnerships, enhancing the overall CE practices in SMEs.

Micro Level: at the micro level, the figure delves into four key themes: strategies, resources and capabilities, management and leadership, and innovation and digitalization. These themes illuminate the internal aspects of SMEs' CE transition, including the strategies employed, the resources and capabilities harnessed, the role of management and leadership, and the significance of innovation and digital technologies. Strategies (I) involve the adoption of lean management practices, fostering collaboration, and aligning with market-oriented approaches. Resources and capabilities (II) are critical for SMEs to implement circular practices, encompassing organizational attributes, environmental capabilities, dynamic capabilities, and financial choices. Management and leadership (III) are central to driving the CE transition, as committed leaders set the vision, establish a culture of CE, and engage employees in circular initiatives. Innovation and digitalization (IV) enable SMEs to adopt innovative circular practices, harnessing digital technologies and Industry 4.0 to achieve sustainability and improve competitiveness. In addition to the main themes, several articles provide practical insights and advice in the form of frameworks and models. These findings support the SMEs and other related stakeholders with hand on tools to further practice the transition towards CE.

Figure 5 emphasizes the interdependence of the macro, meso, and micro levels, with each level contributing to a supportive ecosystem for the CE transition in SMEs. Policymakers, institutions, non-profits, government agencies, industry associations, suppliers, consumers, managers, and employees all play crucial roles in driving the successful adoption and implementation of CE practices in SMEs. At the macro-meso interface, knowledge sharing is a reciprocal process, with macro-level actors offering valuable insights, trends, and research findings to meso-level industry associations and networks. In return, meso-level entities act as knowledge hubs, aggregating practical experiences and case studies from SMEs, ultimately contributing to evidence-based policymaking. Policy alignment is pivotal, with macro-level actors shaping the direction of meso-level initiatives, ensuring compliance with regulatory standards objectives. Simultaneously, meso-level actors advocate for policy changes that better support SMEs, offering insights into their challenges and opportunities and acting as midpoint between micro and macro level actors and mechanism. Collaborative efforts foster co-creation of policies and strategies aligning with the industry's collective goals, while macro-level influence on consumer behaviour influences meso-level market promotion strategies. At the micro-meso level, knowledge sharing is facilitated by SMEs sharing practical experiences with meso-level associations and networks, inspiring others to follow suit. Practices initiated at the micro level can drive meso-level promotion. Showcasing the best practices by SMEs that made the transition towards CE, and the aggregation of knowledge by meso-level actors on those practices aids micro-level actors in implementing CE practices with the help of mechanisms.

Collaborative practices extend to resource pooling, cross-sectoral partnerships, and standard influence, further bridging the micro-meso gap. In the micro-macro interaction, advocacy and policy alignment are key, with SMEs collectively influencing macro-level policymaking, and macro-level regulations impacting micro-level compliance. Feedback loops and learning cycles exist in both directions, with macro-level actors sharing insights, and micro-level actors providing feedback, ensuring continuous improvement of CE practices and strategies at all levels. These interactions, which encompass knowledge exchange, policy shaping, collaboration, and market influence, are essential for the effective transition toward a CE in SMEs. Based on the review conducted it can be concluded that an understanding and leveraging of these relations and factors are essential for supporting the transition of SMEs towards CE.

6 Conclusion

In conclusion, this SLR has provided valuable insights on how the transition of SMEs to CE could succeed with the help of the MLP framework. By adopting the MLP as the theoretical lens, an alternative perspective has been added to the existing literature. The MLP seems to offer the opportunity to develop a more comprehensive view of the CE transition in SMEs by considering the interconnectedness and interdependencies between the micro, meso, and macro levels, thereby going beyond linear and top-down approaches. The interactions between different levels which are dynamic and complex, with bottom-up initiatives from SMEs influencing meso and macro-level policies, and vice versa. This in turn allows for an improved understanding of these relationships. Understanding the interconnectedness between SMEs, the broader institutional contexts, social dynamics, and technological advancements is crucial for supporting SMEs' transition to CE and thus theory advancement.

The use of the MLP as a theoretical lens for studying SMEs allows researchers to better grasp the intricacies and challenges faced by SMEs in their transition to the CE. By recognizing the interplay of factors and actors at different levels, this approach can facilitate the development of tailored and effective strategies, interventions, and policies that support SMEs' in their efforts; thereby contributing to the overall sustainability of economies.

Furthermore, this work ideally serves as a foundational steppingstone for future research and discussions in this field. It has opened avenues for continued exploration and enhancement of CE practices in SMEs. Researchers can build upon the insights gained from this SLR to delve deeper into specific aspects of SMEs CE transition.

6.1 Practical contribution

Promising practical contributions could be derived based on the interconnected factors and actors at the macro, meso, and micro levels, highlighting in turn the roles and responsibilities of various stakeholders in driving successful CE transition.

- **SMEs:** The MLP framework empowers SMEs with a comprehensive understanding of the CE transition. It emphasizes the importance of adopting circular business models, lean management practices, and innovative approaches to achieve sustainability and improve competitiveness. SMEs can use the insights provided at the micro level (strategies, resources, management, and innovation) to develop actionable plans for embracing CE concept within their organizations. The knowledge of supply chain practices (meso level) can help SMEs foster collaboration with suppliers, ensuring circularity throughout the value chain. Additionally, engagement and collaboration (meso level) can facilitate SMEs in forming partnerships with industry associations and networks, driving joint initiatives, and accessing valuable resources for circular adoption.
- **Policymakers and Government Agencies:** Policymakers and government agencies can leverage the MLP framework to design and implement effective CE policies and incentives (macro level). Understanding the interconnectedness of factors at different levels can help in creating a supportive regulatory environment that encourages SMEs to transition towards circular practices. Advocacy and awareness initiatives (macro level) can be strategically designed to promote CE principles among SMEs and the general public.
- **Industry Associations and Networks:** The meso-level insights on supply chain practices, consumer role, and engagement and collaboration offer a roadmap for industry associations and networks to support SMEs' CE transition. They can facilitate knowledge exchange, best practice sharing, and collaborative projects that drive CE within SMEs. By promoting circular supply chain practices and engaging stakeholders, industry associations can play a pivotal role in creating a circular ecosystem.
- **Consumers:** The MLP framework emphasizes the critical role of consumers in driving market demand for circular products and services. Consumers can contribute to the CE transition by making conscious and sustainable choices, supporting SMEs that adopt circular practices, and advocating for CE in their communities. Their demand for circular products and services can incentivize SMEs to invest in CE and expand their offerings.

6.2 Limitations and future research opportunities

A few limitations to this article should also be mentioned, such as the exclusive focus on academic journals, limiting the selection to only English language, omitting potential contributions from grey literature on SMEs' transition to CE. Therefore, grey literature might add to the existing knowledge on the SMEs transition to CE, however, the analysis of these is left as suggestions for future research endeavours. Moreover, the research field is still in its early stages for the meso and macro level perspectives, as can be seen from the findings that majority of the articles focuses on various factors at micro level. Failing to consider the meso and macro levels, and interaction between these two with micro level could limit researchers' ability to fully grasp the

systemic challenges and opportunities related to the CE. The gap observed in the list is not only limited to the levels (meso and macro), but also to methodologies (Fig. 3). There are gaps related to the research design, which academic community need to embrace a mixed-methods approach in their future studies related to the CE. As surveys have become a dominant research tool by 2022, they offer valuable quantitative data to understand trends, patterns, and generalizability of findings. However, to gain deeper insights and context-specific understanding, researchers should complement survey data with qualitative methods like interviews and focus groups. Additionally, conducting focus groups can provide a platform for diverse stakeholders to engage in meaningful discussions, uncovering perspectives that may not be apparent through individual interviews or surveys alone. Furthermore, researchers can consider incorporating case studies and conceptual development to provide in-depth exploration and theory-building in specific contexts. Case studies offer an opportunity to examine real-life CE implementations and understand the complexities of individual cases, while conceptual development allows researchers to conceptualize and model the interplay of various factors within the CE. As the field matures and becomes more established, we might expect to see an increased integration of theoretical frameworks to better conceptualize and explain the complexities of CE transitions and implementations.

To address these gaps and further advance the understanding of SMEs' transition to a CE, future research should focus on a comprehensive exploration and examination of the intricate interactions between meso, micro, and macro levels. Below are some key future research recommendations for exploring these levels and addressing the identified gaps:

Macro-Meso: Exploration of the complex dynamics within multi-stakeholder ecosystems operating at the macro-meso interface, investigating the roles, motivations, and power structures of key actors, and their impact on SMEs' transition to CE.

Meso-Micro: An analysis of the strategies SMEs employs to adapt to meso-level influences (e.g., consumer demand, market change, association initiatives), examining the resource (tangible and intangible) and knowledge constraints faced by SMEs, and how they innovate, co-create and reconfigure their business models to align with meso-level circular initiatives.

Micro-Macro: Exploration of the regulatory compliance challenges encountered by SMEs when implementing CE practices, with a focus on understanding the specific barriers and potential policy interventions; An investigation into the mechanisms of knowledge exchange and inter-organizational learning between macro and micro-level actors, considering how feedback loops, and knowledge transfer can be optimized for more effective CE implementation; A longitudinal analysis of the long-term impacts of macro-level CE policies on SMEs, evaluating the sustainability outcomes, economic performance, and resilience of SMEs influenced by these policies over extended periods.

Appendix

See Table 2.

Table 2 Searching details

Database	String	Search in	Doc. Type	Category	Period	Date	Doc	Duplicate removed
WoS Scopus	"Circular economy" AND "SMEs" AND "transition"	Title, abstract, and keywords	Article and early access	Business or Management	Up to June 9th 2023	06/06/23	22 24	10
WoS Scopus	"Circular economy" AND ("SME" OR "SMEs" OR "small and medium enterpris*" OR "small and medium-sized enterpris*" OR "small and medium-sized business*" OR "entrepreneur*") AND "transition"	Title, abstract, and keywords	Article and early access	Business or Management	Up to June 9th 2023	06/06/23	44 51	23
WoS Scopus	"Circular economy" AND ("SME" OR "SMEs" OR "small and medium enterpris*" OR "small and medium-sized enterpris*" OR "small and medium-sized business*" OR "entrepreneur*") AND ("transition" OR "change*" OR "process*")	Title, abstract, and keywords	Article and early access	Business or Management	Up to June 9th 2023	06/06/23	96 128	48

Table 2 (continued)

Database	String	Search in	Doc. Type	Category	Period	Date	Doc	Duplicate removed
WoS Scopus	"circu*" AND ("SME" OR "SMEs" OR "small and medium enterpris*" OR "Small and medium- sized enterpris*" OR "small and medium- sized business*" OR "entrepreneur*") AND ("trans*" OR "chang*" OR "proces*")	Title, abstract, and key- words	Article and early access	Business or Management	Up to June 9th 2023	06/06/23	139 218	85

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Declarations

Conflict of interest All authors declare that they have no conflicts of interest.

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