Tools and Methods Supporting SMEs in Implementing Circular Practices

Jessica Fink[1[0009-0007-9857-7738]], Thomas Potempa[1[0000-0003-4823-0924]], Max Juraschek[1[0000-0001-7877-8363]], Klaus Bolze[1[0009-0005-3465-0647]], Suharshi De Silva[2[0009-0003-5441-1665]], Deborah Huber[3[0009-0005-1320-9107]], Albert Dietrich[3[0000-0001-6701-3058]], Erich Weichselgartner[3[0000-0002-5247-4510]], Aurora Dimache[2[0000-0003-4891-4381]], David Gorman[2[0009-0005-7418-2497]], Max Ehleben[1[0009-0005-1636-7581]]

[1] Institute of Recycling, Ostfalia University of Applied Sciences, Wolfsburg, Germany
jessi.fink@ostfalia.de
[2] Department of Mechanical and Industrial Engineering, Atlantic Technological University, Galway, Ireland
[3] Institute of Psychology, University of Graz, Graz, Austria

Abstract. With 25.8 million small and medium-sized enterprises (SMEs) in the EU, SMEs represent an essential role in the European economy, thus having a significant cumulative impact on the environment. One measure to reduce these environmental impacts is the implementation of circular practices, enabling waste prevention and resource efficiency. To support enterprises moving from linear to circular practices, numerous methods and tools have been developed. However, while these tools can offer substantial benefits to enterprises, there is a need to explore whether they are tailored to the specific needs of SMEs that may face cost or time constraints.

This study addresses this gap by systematically reviewing and evaluating currently available circular economy tools, focusing on online visibility and ease of access for SMEs. The findings reveal access barriers, such as mandatory registration and difficulty discovering suitable tools, along with a clear lack of SME-specific solutions. These insights offer practical value for both researchers and SMEs seeking more targeted sustainability solutions.

Keywords: Circular economy, Circular design, Tool review, Small and medium-sized enterprises, SME.

1 Introduction

Circular economy (CE) addresses the shift from a linear, end-of-life approach to a regenerative economic system. Its aim is to minimise waste and reduce harm to the environment, economy, and society [1]. Achieving this transition requires fundamental changes at the micro (products, companies, consumers), meso (regions, industrial parks), and macro (nations, global) levels [2]. Small and medium-sized enterprises (SMEs) make up approximately 99% of enterprises worldwide and therefore play a key role in this paradigm shift. As the backbone of many economies, SMEs are critical to

driving systematic change [3]. While studies have shown that SMEs are overall becoming increasingly aware of the potentials of adopting circular practices, such as cost savings, competitive advantages, and access to new markets, implementing these practices can be particularly challenging. This is often due to limited access to resources [4, 5]. Previous research has identified key barriers such as a lack of capital, inadequate support from the supply networks, insufficient expertise, and a continuing lack of understanding of the economic benefits [5, 6].

To support businesses in this transition, a wide range of methods and digital tools have been developed to facilitate the adoption of CE principles. In line with the distinction by Royo et al. (2023) [7], methods refer to broader approaches aimed at analysing or understanding problems, whereas digital tools are seen as instruments used to support specific activities. These methods and tools have been reviewed and analysed in academic literature, providing insights into their key attributes and classifications. Early contributions by Bovea and Pérez-Belis (2011) [8] and Rossi et al. (2016) [9] focused on ecodesign tools and highlighted barriers to implementation. Similarly, Chrispim et al. (2022) [10] evaluated CE assessment tools, discussing both their contributions and limitations. More recently, Rexfelt and Selvefors (2024) [11] mapped 65 circular design tools, detailing their features and grouping them into categories. Across these reviews, several reoccurring barriers of CE tools have been identified. These include low acceptance among companies, high complexity of tools, mismatches with company needs, and incompatibility with existing processes [9–11]. The fragmented and constantly evolving tool landscape further complicates selection. As a result, many of these tools are rarely applied in real-world settings [11].

Moreover, most of the reviews mentioned are primarily based on academic literature, meaning they often highlight tools developed and documented in scientific contexts. While this is in line with academic practice, it may not reflect the tools that SMEs actually encounter or use in practice. The limited real-world application noted in previous studies highlights the need for a different approach. To address this gap, this study systematically reviews CE tools available through online searches. Unlike prior research, which has primarily addressed tool content, this paper explores how visible and accessible these tools are to manufacturing SMEs and whether they are explicitly targeted at this group. Aspects that, as initial research suggests, have been scarcely addressed in the existing literature.

2 Search strategy and selection process for CE tools

The online search process resulted in the identification of 23 unique tools, following a four-step approach. This outcome was achieved through a structured search strategy developed using commonly used platforms such as Google. According to a 2023 study in Switzerland and Germany, web search accounts for approximately 13% of all desktop browsing activity, highlighting its relevance as an information source [12]. The first step involved conducting an initial online search in April 2025 to identify CE tools. To ensure comprehensive coverage and to capture a broad range of resources, three search engines were selected: Google.com and Bing.com, which hold the highest global

market shares among desktop search engines as of January 2025 [13], providing insight into the tools that SMEs are most likely to encounter. Additionally, Mojeek.com, an independent search engine that uses its own index, was included. This choice was made to potentially offer more diverse results, as Mojeek.com claims not to track user data and may provide a different selection of resources [14]. Two search strings were developed. The first string aimed to identify general CE tools: Search A *("circular" OR "circular economy" OR "circularity" OR "CE" OR "circular design") AND ("tool" OR "tools" OR "guide" OR "toolkit")*. The second string aimed to identify tools potentially targeted at SMEs: Search B *("circular" OR "circular economy" OR "circularity" OR "CE" OR "circular design") AND ("tool" OR "tools" OR "guide" OR "toolkit") AND ("SME" OR "small and medium-sized enterprises")*. These search strings were adapted to match the syntax requirements of each search engine. For each engine, only the first three pages of results were reviewed, as most users typically do not go beyond these [12]. This resulted in an initial dataset of 180 websites, with duplicates within each search engine removed before further screening.

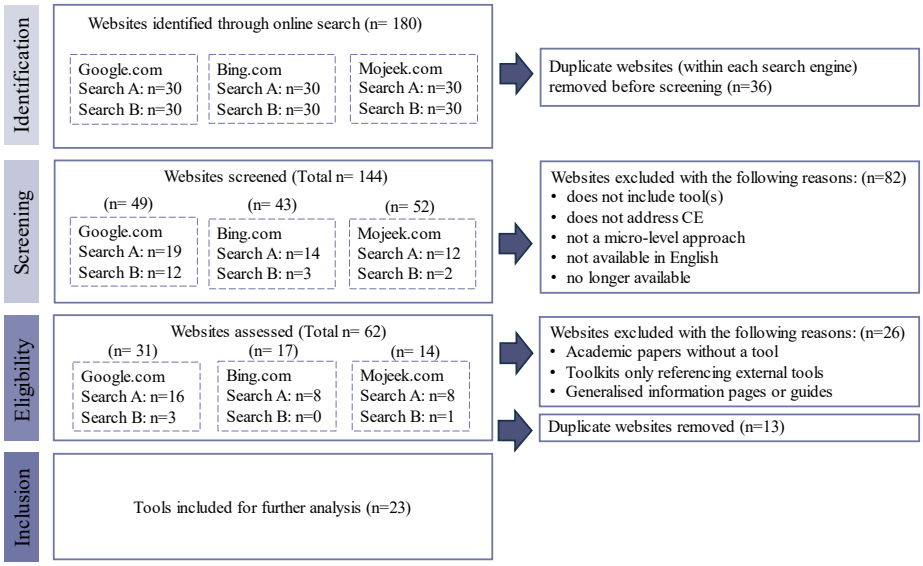

Fig. 1. Systematic review protocol for CE tool search based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) [15]

In the second step, the initial set of websites was narrowed down through screening based on predefined criteria. Each website was quickly reviewed by examining its headlines, descriptions, and introductory sections. Only those that met the definition of a "tool" as proposed by Royo et al. [7] were included. Additionally, websites were excluded if they did not explicitly address circular economy or circular design, if they focused solely on the meso- or macro-level, or if they were not available in English. In the third step, 62 websites underwent a more detailed assessment. At this step, academic papers that did not present an actual tool or only provided overviews were excluded. Toolkits that only listed external resources or guides that did not facilitate specific user

actions were also removed. Finally, after removing duplicates across all three search engines, the refined dataset consisted of 23 unique tools, as shown in Fig. 1.

3 Analysis of identified CE tools considering barriers for SMEs

To understand the potential organisational barriers that may prevent SMEs from using relevant tools, the 23 identified tools were analysed in detail. Additionally, insights from 14 previously conducted semi-structured interviews with manufacturing SMEs in Germany, Austria, and Ireland were incorporated. Both the interviews and the tool analysis revealed recurring barriers, including high costs, limited ease of access, poor discoverability, and a general lack of tools tailored specifically for SMEs.

Based on these findings, a structured evaluation scale was applied. Each tool was assessed in terms of pricing, access methods (i.e., required actions to access the tool), discoverability (i.e., frequency of appearance in online search results), and SME targeting (i.e., how often SMEs were mentioned). The following rating scale was used: A full circle (●) indicates tools that are free of charge, require no registration, appeared in four or more searches, and mention SMEs more than 50 times. A three-quarter circle (◕) refers to tools costing up to €10 per year, requiring only a contact form without email confirmation, found in three searches, and referencing SMEs between 15 and 50 times. A one-quarter circle (◔) indicates tools costing between €10 and €50 per year, requiring registration or a contact form with email confirmation, found in two searches, and referencing SMEs between 1 and 10 times; an empty circle (○) represents tools costing more than €50 per year, requiring a full subscription and download, found in one search, and not mentioning SMEs; a dash (–) indicates that no access or information was available. A summary of the evaluated tools based on these criteria is presented in Table 1. In addition to this evaluation, the analysis also explored which search engines yielded the highest number of relevant tools. This analysis focuses on the initial ease of access or entry to the tools, without assessing their complexity or the full process required for effective use. Furthermore, it does not evaluate accessibility in the broader sense, i.e., the extent to which products or systems can be used by people with diverse needs and capabilities to achieve specific goals [16].

The results showed that Google yielded the highest number of tools (n = 19), followed by Mojeek (n = 9) and Bing (n = 8). Most tools were found using the first search string (Search A), which did not include the term "SME". In contrast, only four tools were identified using the second search string (Search B) across all search engines. Although most of the results from Bing overlapped with those from Google, Mojeek provided three unique tools not identified by the other search engines. With regard to pricing, most tools (n = 21) were freely accessible, while only two required payment: OneClick LCA [19] and the Circular Tool by Matrec [20], both quantitative assessment tools. In terms of access methods, tools were available either directly on their respective websites or as downloadable PDF documents. One tool could not be accessed due to a lack of response after submitting the required contact form [21]. Thirteen tools were directly accessible without the need for user registration. The remaining tools required either registration or the submission of an email address and other personal details to

Table 1. Evaluation of CE tools: Cost, Access, Discoverability, and SME Targeting

Source	Tool name	Cost	Easy Access	Discover-ability	SME target-ing
[17]	Circular Economy Toolkit	●	●	●	○
[18]	Circularity Assessment	-	-	◔	-
[19]	CIRCit Nord: Tools	●	●	●	○
[20]	Circular design toolkit	●	●	◔	◔
[21]	Circular Economy Self-Assess-ment	●	●	○	○
[22]	KATCH-e Knowledge Platform	●	◔	◕	◔
[23]	Circular Buildings Toolkit	●	●	◔	○
[24]	CTI Tool	●	◔	◕	○
[25]	Circularity Assessment Tool	●	◔	●	○
[26]	The Circular Design Guide	●	●	◔	○
[27]	The Circular Behavior Toolkit	●	●	◔	○
[28]	Circular Society Toolkit	●	●	○	○
[29]	One Click LCA: Circular As-sessment	-	○	○	○
[30]	Circularity Deck	●	◔	◔	○
[31]	CircularTool	◑	○	●	○
[32]	Circular Design Toolkit	●	●	◔	○
[33]	SME Climate Hub	●	◕	◔	◕
[34]	L2C: USER GUIDE for you and your SME	●	●	○	◕
[35]	CE maturity matrix	●	●	○	◑
[36]	Circulab Toolbox	◕	◔	◔	○
[37]	Creating Customer Experiences in a CE Toolkit	●	●	●	○
[38]	Circular Business Model Design Guide	●	◔	○	○
[39]	REFRAME: ILEARN Tool	●	●	○	○

● = Free of charge / No registration / Found 4 times or more / SME mentioned more than 50 times
◕ = Up to 10 € per year / contact form needs to be filled out (no email confirmation) / Found 3 times / SME mentioned up 15-50 times
◔ = 10€ to 50€ per year / contact form needs to be filled out (with email confirmation) or registration / Found 2 times / SME mentioned 1-10 times
○ = More than 50€ per year / Full subscription and download / Found once / SME not mentioned
- = no access / no information

gain access. The most frequently identified tools were the Circular Economy Toolkit by Bocken and Evans [17] and the CIRCit Nord toolkit [19], each appearing five times across different search queries. Seven tools were found only once, while the remaining tools appeared in two or three searches. Regarding SME relevance, only five of the 23 tools explicitly mentioned SMEs. Of these, only two, the SME Climate Hub [33] and the L2C User Guide for you and your SME [34], explicitly targeted SMEs as their primary audience.

In summary, the initially assumed barriers identified through the interviews – high costs, limited ease of access, poor discoverability, and a general lack of SME-specific tools – were partially confirmed. While most tools were free of charge, many required additional steps for access, such as registration or contact form submission. Although these steps involve limited effort, they may still discourage user engagement. For tools requiring payment, unclear pricing structures and service descriptions may further discourage uptake. With regard to discoverability, the analysis showed that while some tools could be easily located, many appeared only on the second or third pages of search results or were accessible only through specific search engines. This indicates that, despite the wide range of CE tools available, finding a suitable one remains challenging. Notably, only two out of the 180 websites explicitly targeted SMEs, reinforcing concerns about the lack of solutions tailored to their specific needs, despite their critical role in the CE transition. Therefore, when developing requirements for CE tools, particular attention should be paid to the aspects of online visibility, ease of access, and SME-specific design. One potential solution strategy in this regard is to increase online visibility through search engine optimisation (SEO), which could be considered for both new and existing tools to potentially increase their reach among SME users.

4 Conclusion

This review shows that although many CE tools are available and can be found via search engines, several barriers remain. As noted in the introduction, SMEs often face limited time, staff, and financial capacity. Even minor hurdles such as unclear pricing or time-consuming registration can discourage tool adoption. In addition, the absence of SME-orientated language and examples may reduce relevance. These findings highlight the need for better alignment between tool design and the specific needs of SMEs.

While this review provides valuable insights into the access characteristics of CE tools, certain limitations must be acknowledged. The classification of "tools" inherently involves a degree of subjectivity, particularly for multifunctional platforms. Moreover, the analysis was restricted to surface-level attributes (cost, format, access methods, SME targeting) and did not examine usability, user experience, or the effectiveness of tools in supporting circular transitions. These limitations suggest that further research is needed to evaluate the practical usability of these tools in real-world SME contexts.

The findings also have implications for future tool development. Efforts should focus on improving visibility to ensure that SMEs and relevant target groups can more easily identify suitable tools, particularly through online searches. Simplifying access requirements and clearly communicating the intended target audience using SME-

specific language are also essential. It is crucial that future tools, whether developed in academic or commercial contexts, consider practical applicability from the outset. Tools that are difficult to find or remain unused represent missed opportunities. Therefore, real-world implementation and user uptake should be central considerations to avoid merely adding to the growing pool of underutilised CE tools.

Ultimately, improving the availability, online visibility, and practical relevance of CE tools for SMEs is essential to enabling their broader participation in circular strategies and advancing circular practices.

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