

Antecedents and Outcomes of Circular Economy Adoption in SMEs: A Systematic Review of Empirical Evidence

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Abstract

The Circular Economy (CE) has turned out to be very helpful in fulfilling the needs for sustainable development and resource efficiency at different sectors of economy. Small and medium-sized enterprises (SMEs) are significant contributors to economic growth; however, their transition to CE has not occurred on large scale yet, the process is uneven and there are a number of hindrances (like organizational problems, financial barriers, technology-related issues, and institutional factors, etc.) to overcome. In light of the above-mentioned challenges in the field of CE adoption, this paper aimed to conduct a systematic review of the empirical (quantitative) literature relevant to the antecedents and outcomes of CE adoption by SMEs. The systematic analysis of Scopus database has shown that there were 783 empirical studies relevant to the topic indexed within the period of time between 2010 and 2025, among which 107 studies were selected for synthesis. The systematic review has demonstrated that the most influential factors that promote CE adoption are regulations, management support, capacity to innovate, market demands, and technological readiness versus the barriers encountered on the way to CE implementation such as lack of financial resources, insufficient experience, operational complexity, and limitations of policies. The research results indicate that CE adoption positively influences environmental sustainability, organizational efficiency, innovativeness and competitive advantages but the influence on finances still remains unclear and depends on the context of implementation. The research relied on the Triads of Institutional Theory, Resource-Based View, and Natural Resource-Based View. The results of this research make a contribution into the current knowledge of Circular Economy by consolidating and synthesizing the existing data on the topic and identifying the future directions for research.

Keywords: Circular Economy, Sustainability, Systematic Review.

1. Introduction

Due to increasing concern over various environmental issues such as resource depletion, the creation of waste, and climate change, the globe is beginning to transition from a traditional linear economy (which is characterized by the take-make-dispose processes) to a Circular Economy (CE) approach. A CE differs from a linear economy in that it puts more emphasis on the efficient utilization of resources (efficiency in terms of reusing, recycling, remanufacturing) and the practice of producing products in a way that supports and enhances sustainability. A CE therefore represents a significant and viable option for both governments

and industries across the globe and is beginning to be seen by politicians, entrepreneurs, and business leaders as a pathway towards sustainability and resiliency to future environmental issues.

More than 90% of businesses around the globe are considered to be SMEs and play a significant role in job creation, industrial production, and the overall economy of the world (OECD, 2022). SMEs are the dominant entity type within the global economic arena and represent a key source of innovation and local economic development. Nevertheless, in spite of the significant role they play in the economy, SMEs experience significant constraints due to their size, resources, and capabilities; many SMEs do not have the necessary financial, human, or technological resources available to implement sustainable development or Circular Economy initiatives (Rizos et al., 2016). This creates a paradox where the very entities that are critical to the overall transition of the economy towards sustainable development, are also the entities with the fewest resources available to begin this transition.

Despite this, small- and medium-sized enterprises increasingly incorporate circular economy (CE) principles as a result of legislation, increased stakeholder interest in sustainable business models, growing environmental awareness at both a corporate and individual level, and the need for distinct competitive advantages. Much research has focused on what drives small- and medium-sized enterprises to adopt circular economy practices, as well as on barriers to CE adoption and performance from CE adoption; however, findings are still fragmented and contradictory. For example, some researchers cite government regulation/institutional pressures as the leading driver of CE practices (Dey et al., 2020), while other researchers cite the importance of management commitment/innovation capability (Ünal et al., 2019). CE outcomes also differ among various industries, contexts, and regions. There have been many reported instances of environmental and operational benefits arising from CE adoption, but the impact of CE on a firm's financial performance remains highly debatable (Ghisetti & Montresor, 2020).

Although de Jesus & Mendonça (2018) and Khan et al. (2022) have provided conceptual overviews in their respective papers regarding the current literature that addresses Circular Economy (CE) in SMEs, there remain gaps in the literature where empirical evidence has not been synthesized as it pertains to the antecedents and consequences of adopting CE within SMEs. As well, previous papers have not addressed the different constraints & enablers associated with Small and Medium-Sized Enterprises (SMEs), as they have tended to treat them similarly to larger companies in regards to Circular Economy (CE). Therefore, this paper will perform a systematic literature review of all empirical research on CE adoption in SMEs, providing a synthesis of the empirical evidence of the Drivers, Barriers & Organisational Outcomes associated with SMEs adopting CE.

The study addresses the following research objectives:

1. To identify the major antecedents influencing Circular Economy adoption in SMEs.
2. To examine the barriers hindering CE implementation among SMEs.
3. To analyse the organizational outcomes associated with CE adoption.
4. To identify theoretical perspectives and future research directions in CE adoption literature.

2. Theoretical Background

2.1 Circular Economy and SMEs

A circular economy is an organization of an economic system to reduce waste & increase the efficiency of resource utilization through recycling, re-use, sustainable production processes and remanufacturing (Kirchherr et al., 2017). The circular economy seeks to create and sustain a circular economy by creating closed-loop systems for closing and maintaining products and materials within the economic cycle. This

change in thinking about the way products are designed, how businesses operate, and how the supply chain is organised requires businesses to undergo radical changes from the way they currently operate. In particular, SMEs play a critical role in moving toward a circular economy due to their ability to rapidly respond to changing requirements, innovate and help local communities build economic power. SMEs are significantly smaller than large multinationals and therefore, have more opportunities to quickly be incorporated into the circular economy than multinationals, which are generally slower to adapt. Nevertheless, products and materials produced by SMEs are often of lower quality than products produced by larger companies. SMEs also generally are constrained by limited financial resources and lack of expertise, and limited institutional support available to help SMEs implement circular economy practices effectively (Rizos et al., 2016).

2.2 Institutional Theory

Institutional Theory explains how organizations respond to external pressures such as regulations, industry norms, and stakeholder expectations (DiMaggio & Powell, 1983). It posits that organizational behavior is shaped profoundly by the regulatory, normative, and cognitive pillars of the external environment. In the context of CE adoption, coercive pressures from governments (e.g., environmental regulations, waste directives), normative pressures from industry associations (e.g., sustainability standards, professional norms), and mimetic pressures from competitors (e.g., imitating successful green strategies of market leaders) significantly influence SMEs' sustainability decisions.

2.3 Resource-Based View (RBV)

According to the Resource-Based View (RBV), firms obtain their competitive advantages from the resources they have at their disposal that are Valuable, Rare, Inimitable, and Non-substitutable (VRIN) (Barney, 1991). This perspective emphasizes internal (rather than external) conditions of an entity's environment to identify the sources of its competitive advantage. Some of the key resources for CE adoption for SMEs are managerial capability, innovation orientation, financial resources, and technological readiness. Firms that possess superior dynamic capabilities will thus be better able to reorganise their VRIN resources in order to successfully implement circular strategies and differentiate themselves from others in the relevant marketplace.

2.4 Natural Resource-Based View (NRBV)

The concept of Natural Resource-Based View (NRBV) builds on Resource-Based View (RBV) theory while placing emphasis on the need for companies to develop sustainable capabilities in the area of their environmental impact, as this provides an opportunity for them to have a sustainable long-term competitive advantage (Hart, 1995). The NRBV articulates three systems-based strategies (pollution prevention, product stewardship, and sustainable development), which when coupled with CE allow SMEs to develop environmentally responsible practices while improving upon operational efficiencies and creating sustainable business outcomes via transforming ecological imperatives into rent opportunities. Through adopting CE principles, firms can take a proactive approach to developing regulatory frameworks and building reputational equity, thus progressing their efforts from minimal compliance to strategic proactivity.

3. Methodology

3.1 Research Design

This research utilized systematic literature review methodology in accordance with the PRISMA 2020 guidelines (Page et al., 2021). The research concentrated specifically on quantitative empirical research

studies related to the antecedents and outcomes for circular economy adoption by small and medium businesses.

3.2 Search Strategy

On February 12, 2026, an extensive search was conducted for the literature using the Scopus database. The Scopus database is suitable for this study as it provides a vast selection of peer-reviewed social science and business literature that is ideally suited for conducting bibliometric analysis (Baas et al., 2020). The search strategy has been designed to include empirical studies that examine relationships between circular economy and SMEs. A Boolean search was constructed as follows:

(TITLE-ABS-KEY (("circular economy" OR "circular business model*" OR "closed loop*")) AND TITLE-ABS-KEY (("small and medium-sized enterprise*" OR "SME*" OR "small business*")) AND PUBYEAR > 2009 AND PUBYEAR

3.2 Study Selection Process

According to the PRISMA 2020 flow diagram, which is presented as Figure 1 (Page et al, 2021), the study selection process was performed using systematic phases. Initial searches across selected databases produced an initial pool of 783 records, which were then progressively filtered based upon publication years and subjects, document types (academic articles, etc.), and languages. The initial set of records was progressively reduced, leaving 783 records after removing one duplicated record. A title/abstract screening was performed independently by two reviewers and based on an a priori established list of exclusion criteria. 564 non-empirical/review articles were excluded during this title/abstract screening process, leaving 107 studies eligible for full-text review. Included studies focused upon Circular Economy (CE) practices/adoption in relation to Small and Medium-sized Enterprises (SMEs) or Micro, Small, and Medium-sized Enterprises (MSMEs), utilized empirical quantitative research methodologies, provided indication of statistical relationships via means of regression analyses, Structural Equation Modeling (SEM), Partial Least Squares Structural Equation Modeling (PLS-SEM) AND/OR similar quantitative methods. Studies were ONLY included if published in English- language peer-reviewed journals.

Studies that presented concepts, literature reviews or theoretical discussions without presenting empirical data were excluded from the study. Research regarding organizations that were too big were excluded as well as studies where quantitative empirical data did not exist. The final sample was further reduced by excluding any articles that did not investigate either the adoption, implementation of the Circular Economy or any of its outcomes. These criteria allowed only rigorous and applicable studies to remain for systematic review and analysis.

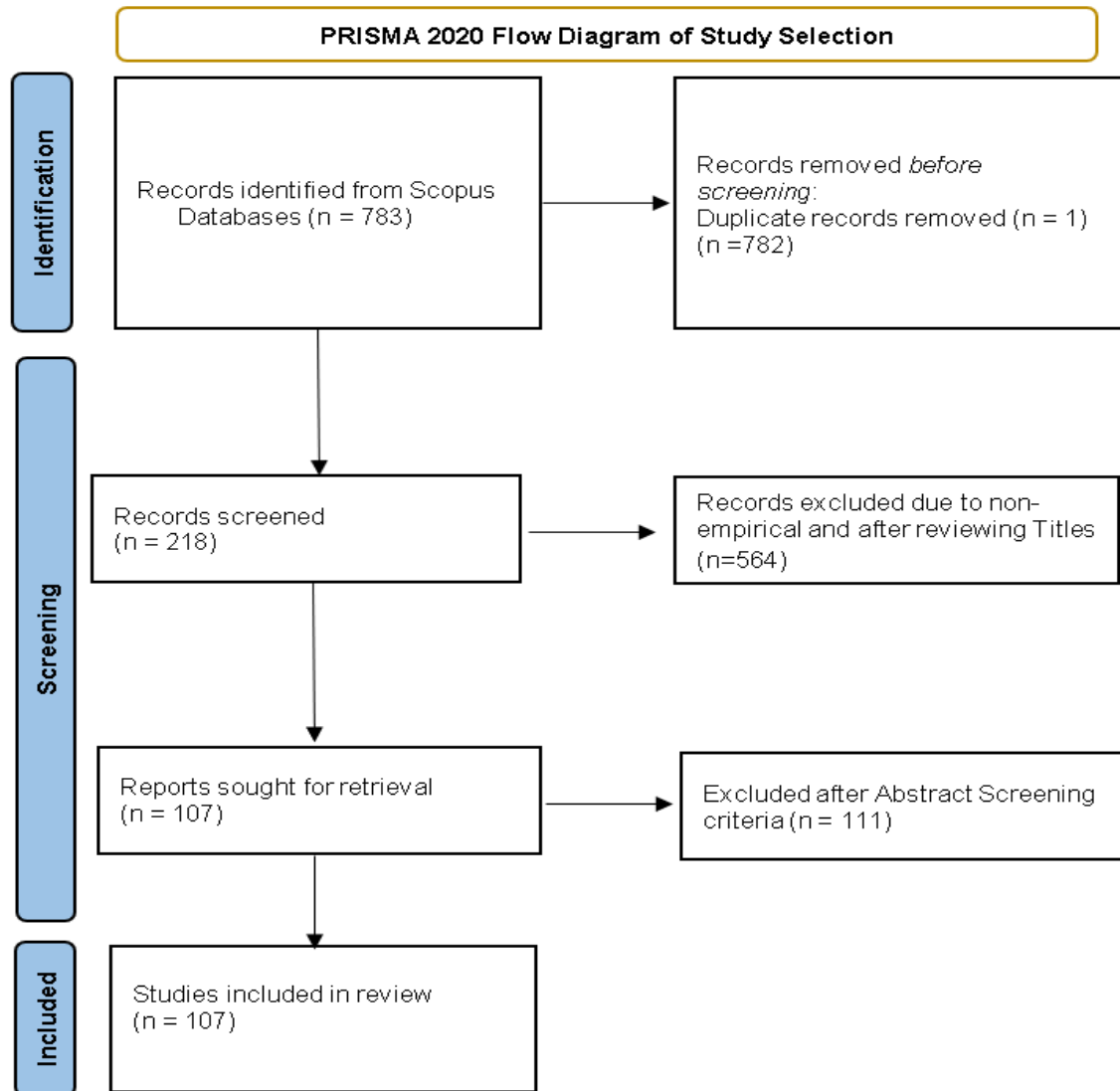


Figure 1: PRISMA flow diagram

4. Antecedents of Circular Economy Adoption in SMEs

A systematic review of 107 empirical studies indicates that SMEs experience pressure from several different sources as they adopt Circular Economy (CE). These include external institutional pressures, such as government regulations and environmental policies, and internal organizational capabilities, including the ability to develop innovation and generate new revenue streams.

4.1 Government Regulatory Pressure

Government regulations and associated policies relating to environmental management are considered to be the primary motivators for SMEs adopting CE. Regulatory framework in turn creates opportunities for SMEs to meet criteria for maintaining legitimacy and compliance to government's guidelines (Dey et al., 2020). Furthermore, due to the coercive forces of the government, such as waste management regulations and minimum standards for emissions, governments' regulatory framework provides a minimum requirement that forces SMEs into adopting CE practices.

The systematic review found that SMEs who have access to clear and consistent enforcement of government regulations define the greatest success for SMEs when establishing their CE practices (e.g.,

waste minimization, recycling, etc.). SMEs who possess the ability to implement a sustainable model within their business are more likely to be successful in doing so.

4.2 Managerial Support

CE Implementation requires Managerial Commitment and Leadership. SME owners and managers shape the Organizational Culture, Strategic orientation, and the Sustainability effort within their firm (Ünal et al., 2019). In most cases, the Owner(s) and Management Team's personal values and visions are the greatest drivers for change in the resource-constrained environment of SMEs. When Leadership prioritizes Environmental Goals by allocating limited resources towards CE, they demonstrate a strong commitment to CE throughout the organisation and the behaviour of their employees.

4.3 Customer Demand and Market Pressure

SMEs are motivated to adopt Circular Economy practices because of the growing awareness of consumers related to sustainability, along with the demand by stakeholders for Circular Economy through their competitive advantage in the marketplace. Additionally, many end-user customers (particularly large corporations) are establishing green procurement policies which require SMEs within their supply chains to implement Circular Economy practices in order to sustain a business relationship. Therefore, demand for circular practices from SMEs is particularly prevalent when those SMEs are supplying goods or services to multinational corporations that have made public commitments to sustainability.

4.4 Innovation Capability and Technological Readiness

The implementation of circular economy (CE) can be facilitated by a firm's capabilities to innovate and assess its technological preparedness for adopting new business models: process optimisation, reduced waste through efficient use of resources, are some characteristics of CE implementations that companies that successfully innovate tend to embrace. Companies that are committed to being innovative tend to be more apt to utilise a sustainable business model than those that are not committed to being innovative. The technological preparedness of a firm includes the use of the Internet of Things (IoT) and analytic data through Industry 4.0 technology, as well as tracking of material flows, identification of waste streams, optimisation of resource loops that convert the CE intention into an operational reality (Klimecka-Tatar & Kapustka, 2025)

5. Barriers to Circular Economy Adoption

SMEs have many challenges when trying to move towards a circular economy due to the presence of many barriers. These include financial issues, knowledge gaps, operational constraints and institutional issues.

5.1 Financial Barriers

Financial limitations pose one of the largest barriers to SMEs adopting a Circular Economy (Ghisetti & Montresor, 2020). High costs associated with implementing new technology, upgrading infrastructure, redesigning products, as well as a lack of access to green financing, and long payback periods can prevent SMEs from investing in circular economy technologies. In addition, traditional financing models do not account for the long-term environmental and operational benefits associated with circular economy projects and tend to favour predictable returns associated with the linear economy.

5.2 Lack of Knowledge and Expertise

The lack of technical resources and knowledge surrounding Circular Economy (CE) are negatively impacting the ability for Small and Medium Enterprises (SMEs) to implement CE practices (Rizos et al., 2016). There is a great deal of competency gap between the owners and employees at SMEs and what is needed to achieve the level of circular design, reverse logistics management and material health

assessments. Often these gaps in knowledge lead to incorrect assumptions concerning the cost and benefits of CE and cause businesses to remain inactive.

5.3 Operational Complexity

Moving from a linear to a circular economy model frequently necessitates the need to change the operation and structure of the business, change the supply chain and/or adapt the technology being used, which may prove a challenge for smaller businesses. For SMEs, CE practices must be incorporated into the everyday tasks of their already stressed employees, therefore it is not possible to create a dedicated department similar to that of a larger organisation to support this transition. In addition, developing an effective reverse logistics system for take-back products and collaborating with various third-party suppliers to build a material reprocessing network will create challenges for SMEs.

5.4 Policy and Institutional Challenges

SMEs are often faced with uncertainty when they attempt to undertake CE efforts because of varying policies, limited or poorly defined incentives, and lack of organisational support. The introduction of inconsistent regulations at all levels across different jurisdictions, the bureaucratic processes necessary for classifying waste materials, and a lack of government-supported programs make investing in CE initiatives challenging. Moreover, the absence of markets for secondary raw materials can severely limit an SME's ability to obtain and sell recycled materials, undermining the financial viability of circular loops.

6. Outcomes of Circular Economy Adoption

Adoption of Circular Economy (CE) practices brings a variety of benefits, including improved environmental, operational and strategically aligned performance for Small and Medium Enterprises (SMEs). However, CE adoption by SMEs does not guarantee improved financial outcomes.

6.1 Environmental Performance

CE adoption provides an increase in environmental sustainability due to the reduction of waste produced by an SME, lowering the use of non-renewable resources and reducing pollution produced by an SME (Geissdoerfer et al., 2017). The improvement of environmental sustainability is the most consistent finding across all the studies reviewed. CE adoption has directly reduced the ecological footprint of SMEs and has improved their ability to be compliant with environmental regulations, as well as creating an avenue for SMEs to contribute to reduction of Climate Change.

6.2 Operational Performance

CE adoption allows SMEs to improve their Operational Efficiency through the more efficient use of resources, a reduction of waste and the development of processes that are innovated. The implementation of CE Practices allows SMEs to understand waste as a Design Fault, enabling them to identify areas of inefficiency within their Production Processes. By eliminating inefficiencies, SMEs can reduce the costs associated with the purchase of Energy, Water and Raw Materials. The relief of these inefficiencies creates immediate Operational Benefits for SMEs that enhance the business case to make additional Circular Investments.

6.3 Competitive Advantage and Innovation

CE adoption enhances innovation ability and enhances organizational competitiveness by utilizing sustainable product development and differentiation methods. By creating circular products or services through pioneering new Circular Economy Business Models, SMEs have an opportunity to develop distinct marketplaces, increase brand loyalty with environmentally friendly consumers, decrease reliance

on volatile virgin material markets, and develop a sustainable competitive advantage through the creation of unique circular products or services.

6.4 Financial Performance

There is a lack of agreement about the impact of CE adoption on financial performance results. Some studies suggest that CE adoption is associated with reduced costs associated with manufacturing and re-manufacturing and longer-term profits, while others suggest that it can take longer to receive the profit associated with CE adoption (Ghisetti & Montresor, 2020). The degree to which a SME will see a return on the investments associated with CE will depend on the industry sector, the stage of development of the CE adopted, and the presence of supportive market conditions that enhance CE development and implementation. Sustainable Eco-design or Recycling Technologies may not provide immediate profitability upon initial investments into these technologies; however, there is ample evidence that the adoption of CE will assist with building SME Resilience and better Cost Structures in the long run.

7. Discussion

The review observed that, in addition to regulatory pressure from both government and the market, managerial support and the ability to innovate are consistently mentioned as major influences that drive CE adoption by SMEs. In accordance with Institutional Theory, coercive pressures from regulators and normative pressures from the market significantly impact an organisation's environmental strategy.

The findings of this study also reveal that limitations on financial capacity and a lack of expertise, particularly in developing economies, continue to impede CE engagement by SMEs. The Resource-based View (RBV) and the Natural Resource-based View (NRBV), both support the RBV, as they both indicate that without the proper internal capabilities (e.g., financial slack) or the proper tangible resources (e.g., technical expertise), an SME will not be able to acquire the resources necessary to navigate the operational challenges of transitioning to a circular economy.

In addition to confirming the significant positive impact that CE has on environmental performance and operational performance, the review indicates that the financial outcomes of CE are dependent on both the industry context in which the company operates as well as the size of the firm and how mature the implementation of CE is. This means that, among SMEs, there is no direct or automatic link between environmental and economic performance, and this link is mediated by factors like the firm's ability to capture value from secondary material markets or reverse logistics systems efficiency. Given that many SMEs have achieved mixed financial results, researchers and practitioners should focus beyond short-term profit-generating measures to assess the value created through CE, including factors such as risk reduction and long-term business resilience.

8. Implications

8.1 Theoretical Implications

Using Institutional Theory, Resource-Based View (RBV), and Natural Resource Based View (NRBV) theory, this study made an important contribution to the business literature on circular economies by providing a framework for understanding how small and medium-sized enterprises (SMEs) behave with regard to sustainability. The integrated framework illustrates that, in order for SMEs to successfully adopt Circular Economies, external pressures must be matched with internal resource and capability availability. The review of prior literature supports the creation of a contingent model in which the extent to which

institutional pressures are perceived as coercive and/or normative acts as a moderating effect on the relationship between managerial support and Circular Economy adoption outcomes.

8.2 Practical Implications

Policymakers should provide incentives (financial, technical, and training) to assist SMEs in adopting Circular Economies. Low-interest green loans, subsidized energy audits, and waste exchange programs will assist SMEs in overcoming financial and operational obstacles associated with adopting Circular Economies. Managers of SMEs should emphasize building innovative capabilities and sustainability-focused leadership talent and incorporating Circular Economy principles into the core of their business strategy rather than relying solely on peripheral compliance activities.

9. Limitations and Future Research Directions

Several limitations exist in this review. This study did not evaluate non-English language Scopus-indexed empirical literature (e.g., non-English language literature) and also omitted grey literature from the review process. Another limitation is the substantial geographic concentration of studies from Europe on the subject matter. This concentration may limit the extent to which these findings can be applied to emerging markets or economies, which have more diverse institutional and infrastructural environments.

Future studies related to this topic should concentrate on;

- The relationship between circular economy (CE) adoption and longitudinal analyses examining drivers/barriers as well as performance outcomes of CE over time;
- Investigating CE adoption within developing countries, including how CE adoption is influenced by challenges to institutional structures and informal economies;
- Developing specific frameworks for CE that are designed based on the specific characteristics of each industry, such as construction, textile, and electronic industries; and
- Understanding the influence of digital technologies such as AI, Blockchain, and Internet of Things (IoT) on implementing CE and how these new digital technologies can be used to assist SMEs with resource restrictions.

10. Conclusion

The systematic review was conducted using peer-reviewed studies providing empirical evidence on antecedent and outcome variables that drive the adoption of Circular Economy in Small to Medium Enterprises (SMEs). The results of the review show that the following four variables, Regulatory pressures, Managerial Support, Innovative Capabilities, and Customer Demands, significantly influence CE adoption and lead to positive environmental sustainability, operational efficiency, and competitive advantages. However, the other two categories of potential barriers - Financial Constraints and Lack of Expertise - are also very significant impediments to CE adoption by SMEs. In contrast, the financial outcomes associated with CE will vary greatly by context. Overall, this systematic review presents an extensive body of 107 empirical studies that will help inform future research on the transitional pathways involved in achieving improved sustainability for SMEs. Additionally, this review provides policymakers with insights and information to enhance the development of sustainable business practices through Circular Economy.

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