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Sustainability and Innovation in SMEs: A Systematic Literature Review

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Abstract

Research Purpose: *The paper analyses management and integration practices of innovation and sustainability in European Small and Medium Enterprises SMEs. Through a systematic literature review, this research aims to understand the trends, approaches, and challenges European SMEs face regarding innovation and sustainability.*

Design / Methodology / Approach: *This study is the outcome of a systematic literature review conducted between March and October 2024, utilizing Scopus as a database. A total of 483 articles in English were analyzed, and considering the inclusion criteria, 99 studies were identified and reviewed as the final body of literature. The authors synthesize existing knowledge into six themes: Eco-innovation, innovative practices, sustainability practices, CSR, CE, and Educational eco-innovation programs.*

Findings: *The study enriches the academic discourse by clarifying the interplay between sustainability and innovation in European SMEs through a thematic synthesis of recent empirical evidence. These findings highlight key considerations for business managers in implementing business models and management tools and adhering to training programs that include the issues in the company vision.*

Originality / Value / Practical implications: *The literature analysis revealed the need for SME management to integrate sustainability into the corporate culture and adopt innovative digital practices. The SMEs play an outstanding role in the general success of sustainability and are often an important driver of innovations. Nonetheless, the diversity of SMEs makes it difficult to get clear advice on how this important part of our industries acts in practice. Our findings suggest a holistic approach to sustainability and innovation that flows into an interconnected ecosystem to create a complete picture that goes beyond the adoption of individual practices. Our model confirmed the contributions of previous literature, according to which innovation and sustainability represent the perfect combo for following market trends and the vision of European legislation in recent years.*

Keywords: EMS, Sustainability, Innovation, Systematic Literature Review.

Introduction

Small and Medium-sized Enterprises (SMEs) are key drivers of economic growth, often regarded as “catalysts” due to their ability to foster innovation, enhance competitiveness, and create employment opportunities [1]. These represent a crucial target for analysis, constituting a substantial part of the European entrepreneurial fabric, with over 99.8% of active businesses across the entire community territory [2]. SMEs are a continuously growing trend, generating over 70% of turnover and employing over 81% of the workforce [3].

Adapting SMEs to new competitive scenarios, which increasingly push for the implementation of forward-looking and environmentally responsible approaches, requires more significant

effort than that conducted by large enterprises or multinational corporations [4].

The limited awareness of benefits, exacerbated by a notable lack of resources during the integration of sustainable innovations, may require collaborative efforts involving various internal and external partners for SMEs [5].

The research gap to which we tried to respond with this research is to broaden the elements connected to the trends of sustainable innovations in SMEs, innovation characteristics and environmental characteristics [6].

The flexibility and versatility of SMEs make them particularly suited to promote research and development, aligning with the goals of innovation and sustainable technology. In this regard, in the European context, SMEs have a crucial function in advancing the Agenda 2030, aiding employment generation, reinforcing inclusive economic progress, promoting gender equality, and fostering innovation and technology [7].

This research examines European SMEs' trends and organizational business models, demonstrating how business orientations have shifted from entrepreneurial, market-driven, and predictive orientations to sustainable and innovative orientations.

To bridge the theoretical and empirical gap in understanding how European SMEs approach sustainability and innovation, this study is guided by two research questions:
RQ1) What sustainable and innovative practices exist in European SMEs that can be developed or implemented?
RQ2) What are sustainable innovation's challenges, obstacles, and benefits in SMEs?

The proposed methodology of Systematic Literature Review (SLR) summarizing studies in a comprehensive overview to highlight key findings and developments regarding SMEs and provide suggestions for future research [8]. The systematic literature review represents a well-established methodological approach in the social sciences, characterized by its transparency, replicability, and rigor [9].

The literature analysis has identified the main emerging trends, the approaches adopted to make them effective in different contexts, the controversies and the various challenges European SMEs face.

The following sections present the peculiarities of SMEs, and the new innovative and sustainable scenarios discussed. Section 3 explains the methodology used. Subsequently, the systematic literature analysis results are presented. Section 5 provides discussions and suggestions for future research. Finally, the last section presents conclusions.

Background

SME Definition

The definition of Small and Medium-sized Enterprises (SMEs) is subject to various criteria, which may differ across national contexts, and several publications provide interpretations of the SME classification. Some of the most commonly used criteria for defining SMEs include workforce size, overall asset value, revenue and investment thresholds, yearly working time, total annual income, production output, and the degree of autonomy from other enterprises [10].

In Europe, enterprises with 10-49 employees are considered small businesses, while those with 50-250 employees are classified as medium-sized [11]. Despite their smaller size, SMEs are often described as dynamic and creative drivers of innovation, with the ability to detect market opportunities that might be overlooked by larger corporations [12].

Essential for economic growth, SMEs can act as stabilizers during recession periods (Beck et al., 2005). By adopting local economic strategies, they can also provide concrete support for sustainable, innovative development and the economic growth of local communities. SMEs distinguish themselves from large enterprises; on the flip side, They are often marked by resource constraints, simplified managerial hierarchies, and restricted international market reach, and a need for skills development and continuous learning, which are intrinsic characteristics of large enterprises [13].

SMEs between Sustainability and Innovation

In recent years, there has been a growing interest in the connection between innovation and sustainability, with numerous studies dedicated to this integration in SMEs [14, 15].

Various studies have revealed the need for SMEs to balance innovation and sustainability [16]. Starting in 2020, a key component of the European strategy has focused on strengthening competencies and facilitating the transition of SMEs toward sustainability and digital transformation [17].

According to Trainer (1998), SMEs are key contributors to in sustainable growth and development and are a significant part of a sustainable world.

Companies increasingly integrate CSR and sustainability practices into their corporate culture in a competitive market to meet customer expectations. This requires effective leadership to consolidate business ethics, CSR, and sustainability [18]. Thanks to their diversity and flexibility, SMEs are well-positioned to address sustainability challenges at the local level, given their close ties to the communities in which they operate [19, 20]. Likewise, their limited use of non-renewable resources can be attributed to their small scale makes it easier for them to adopt green strategies than large companies (Jones et al., 1997). This involves a systematic organizational asset that analyzes the drivers and organizational capabilities, such as collaboration with supplier partners, product innovation, internal motivation, and systemic interaction [22].

Previous studies have indicated that SMEs find another crucial key to success in innovation. For instance, Korres (2008) emphasized how innovation contributes to enhancing product quality and lowering process costs, while Lalicic (2018) emphasized that integrating consumer input with creativie approaches can boost business profitability.

Innovation contributes to enhancing product quality and lowering process-related expenses, whereas Lalicic (2018) empha-

sized that integrating consumer input with creative approaches can boost business profitability. For SMEs to reduce uncertainties and improve decision-making capacity, it is essential to establish decision-making processes to identify innovation potential and analyze internal and external opportunities and threats to the company [23]. In summary, studies emphasize the need for SMEs to balance innovation with the preservation of traditional values, leverage digitization, and embrace sustainability.

Methodology

The study relies on a systematic literature review, following the guidelines proposed by Tranfield et al. (2003) to ensure a rigorous and objective methodology.

The research process involved 483 articles that underwent a series of selection criteria to pinpoint the most significant contributions in the field. The literature search was carried out using Scopus database. The research was performed on a single database to ensure the process's clarity, rigor, and replicability, avoiding redundancy and overlap (Parè et al., 2015).

The keywords used for the search were:
TITLE-ABS-KEY "Small and medium size enterprises" or "SME," " sustainab *" and " innovat *".

Subsequently, articles underwent a selection process based on specific criteria.

Articles addressing sustainability and innovation in SMEs from a managerial perspective were examined. The research did not impose temporal limits to offer a comprehensive exploration of SME developments and progress in the studied areas of innovation and sustainability.

Given the wide range of territorial contexts analyzed in the articles, the decision was made to focus the analysis on the context of European SMEs, leading to the exclusion of 152 studies. After applying the selection criteria, 94 articles relevant to the research were identified. During the research process, five articles of particular interest for defining the state of the art were integrated as cross-references (Cooper, 1989).

At the end of the selection and systematic analysis process, a total of 99 articles have been included in this research. To ensure efficiency and maintain traceability of the studies selected or excluded throughout the various stages of the literature review process, Figure 1 provides the PRISMA flowchart adapted from Moher et al. (2009).

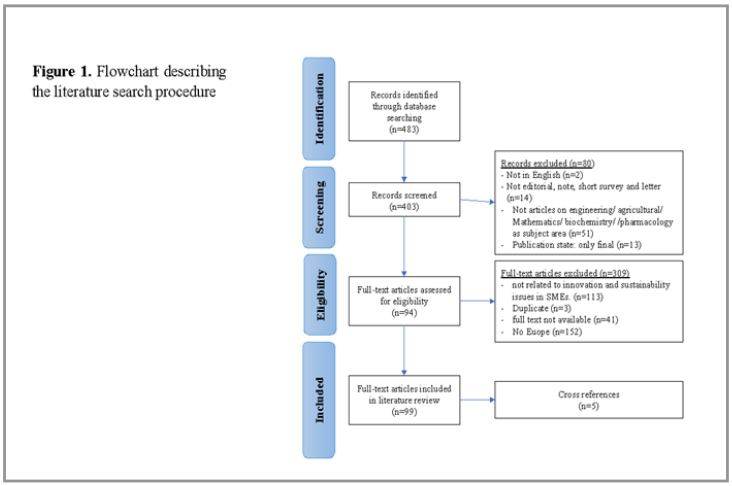

Figure 1: Flowchart describing the literature search procedure

To collect, integrate, and examine the findings of the selected studies, the MAXQDA11 software was used as an organizational tool, which helped map the main findings and recurring perspectives for future research identified in the identified studies. In case of any disagreement, the study was re-evaluated to reconcile the differing perspectives [26].

Results

The researchers outline six key themes that illustrate the connection between SMEs, sustainability and innovation (Figure 2).

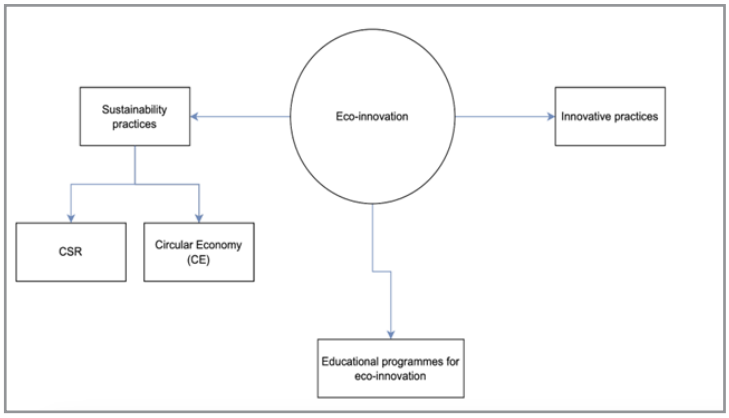

Figure 2:

Eco-Innovation

Eco-innovation in SMEs represents one of the most promising strategies to combine environmental sustainability and competitive advantages, contributing to the development of products, processes, and services that systematically reduce environmental impact, in line with ESG (Environmental, Social, and Governance) principles and European incentive policies [27].

The integration of sustainable innovations reflects how adapting to new market trends requires knowledge and a willingness to invest in various themes of sustainability and innovation [28]. The desire to integrate eco-innovation practices is mainly driven by community initiatives aimed at ensuring that national governments support their integration into the practices of small enterprises in particular [29].

The study by Xie et al. (2010) identified a wide range of strategic behaviors among SMEs, ranging from resistant, reactive, anticipatory behaviors—sometimes more focused on innovation, others more rooted in sustainability—but all aimed at adopting strategies that pursue the same objective. The research explored various eco-innovation relationships at the product, process, and organizational level, concerning employee work and customer relations [30, 31].

Eco-innovation practices influence not only values, products, and processes but also employees and managers, redefining an organization's practices with the aim of generating social and environmental benefits in addition to economic returns. In this sense, eco-innovations can emerge as a crucial factor in balancing economic growth, long-term development, and job creation, strictly following ESG criteria [31, 32].

A case study on Ecobabydesign, an Italian company entirely inspired by the principles of ecological innovation, demonstrates how eco-innovation can be fully applied, influencing both products and the corporate mission [33].

The benefits of eco-innovation manifest not only in environmental efficiency but also in economic and social performance, strengthening stakeholder engagement, corporate resilience in the face of crises, and new learning networks around emerging trends [34-36].

The main drivers of eco-innovations include regulatory pressure, policy incentives, conscious consumer demand, and the enabling role of digital technologies such as IoT, big data, and artificial intelligence [37-39]. However, persistent barriers such as limited financial resources, regulatory complexity, and a resistant managerial culture remain major challenges [40, 41].

In summary, eco-innovation reconfigures itself as a complex and multidimensional process that requires a holistic and systemic vision to be effectively implemented within European SMEs. The combination of resources, supportive policies, and emerging research-driven skills contributes to defining a complete framework for the sustainable transition of these enterprises [35, 39].

Innovative Practices

Innovative practices are crucial for digital transformation, efficiency, and strategic agility in evolving markets [42]. These innovations refer to a wide spectrum of digital technologies, data analytics tools, and business models.

In line with Edler and Fagerberg (2017), innovation represents the fundamental driver of economic development and competitiveness; for SMEs, having solid decision-making foundations is essential to discern which entrepreneurial elements to innovate and which to enhance within their traditions. However, SMEs often face uncertain ground, especially in relation to the integration of advanced digital technologies such as cloud computing, the Internet of Things (IoT), big data, robotics, and artificial intelligence [43, 44].

SMEs explore in the application of technologies through innovative business models, allowing them to test, adapt, and learn from decision-making processes [45]. In particular, digitalization helps to reduce uncertainty in strategic choices by integrating digital information with traditional physical products [46].

Business model innovation strategies are especially relevant, evolving toward digital solutions, collaborative platforms, and dynamic capabilities that enhance corporate resilience [47-49].

The drivers of innovative practices include the need for rapid adaptation to market demands, competitive pressures, the availability of public incentives, and a growing demand for sustainability [50]. At the same time, significant challenges remain, including resource scarcity, gaps in digital skills, regulatory complexities, organizational inertia, and risks linked to cybersecurity [42, 51].

Nonetheless, the systematic adoption of innovative practices enhances SMEs' strategic flexibility, strengthening their capacity to react to market turbulence and contributing to both their economic and environmental sustainability [52].

Overall, strategic innovations in SMEs represent a critical factor for sustainable and competitive development, with a growing convergence between digitalization and sustainability, as highlighted by recent international policies and support programs [53, 54].

Sustainability Practices

SMEs are capable of embrace sustainability due to their flexibility and the ability to develop close relationships with customers and the local community [22].

Sustainability has become one of the major challenges for organizations, with society's perception of their credibility and competitiveness closely tied to their approach to environmental responsibility [55].

Factors influencing sustainability in SMEs include cnsumer demand for sustainable products and services. Additionally, financial resources and the skills required for implementing environmental regulations, ethical motivations, social commitment, the elements that define the entire corporate culture, and the availability of additional resources [56].

However, many SMEs find it difficult to recognize the financial advantages of sustainable investments, as they perceive a limited demand for sustainable products and feel little pressure from

customers to adopt environmentally responsible practices [57].

The implementation of sustainable strategies within SMEs is often hindered by a shortage of skills, knowledge, and financial resources [58].

Given the recurrence of articles highlighting these two specific sustainable practices among the performances of European SMEs, it has been decided to provide separate treatment one for the focus on CSR, the other for the implementation of concepts and practices of CE.

CSR

In recent years, attention to Corporate Social Responsibility (CSR) has increased considerably. Initially a conceptual framework, CSR has gradually evolved into a concrete business strategy for the success of SMEs [59].

While in the past CSR was more closely associated with large corporations and multinationals, recent studies highlight the importance of SMEs as dynamic and influential actors in promoting sustainable practices, thanks to their organizational flexibility and strong connection to the local context [60, 61].

Several methods and sustainability management tools have been developed to facilitate the integration of CSR into SMEs [30]. A notable example is CSR4UTOOL, a digital platform that enables SMEs to carry out detailed self-assessments in the field of social responsibility, translating international indicators into concrete data to monitor and improve social and environmental performance [2]. Its web-based approach actively engages SMEs in self-evaluation, transforming accounting and non-accounting data into valuable insights for business management. The adoption of these digital tools represents a consolidated trend that helps companies handle the complexity of CSR in a more systematic and effective way [14].

The development of sustainable entrepreneurship in SMEs requires an integrated approach that identifies the key factors supporting the inclusion of sustainability in decision-making processes. The IAPMEI study proposed a holistic model that, by combining cognitive mapping with the Best-Worst Method (BWM), assesses the social impact and effectiveness of corporate social responsibility initiatives through tools such as the Social and Environmental Responsibility Indicators (SERI).

At the same time, responsible leadership emerges as a fundamental element for enhancing financial and innovative performance, thanks to practices that, according to the ranking established by the study of Castañeda García et al. (2023), integrate ethics, stakeholder engagement, power sharing, and environmental orientation. This approach not only improves financial performance but also fosters sustainable innovation and internal cohesion.

In conclusion, the analysis conducted allows us to affirm that SMEs develop numerous CSR practices. Therefore, it can be stated that there is a consensus in academic research: "engaging in CSR will improve a company's quality and success". Hence, essential correlations emerge between commitment to CSR, business quality, and overall corporate success. However, the complexity of the concept of responsible leadership requires appropriate management tools that go beyond achieving business objectives, encompassing social, environmental, and ethical impacts.

Circular Economy

The Circular Economy (CE) is a paradigm for promoting environmental sustainability in SMEs, encouraging the adoption of production and consumption models that minimize resource use and waste generation, aligning with the European strategies defined in the Circular Economy Action Plan [54].

These models foster innovation by encouraging the redesign of economic systems, emphasizing market adoption of greener solutions that rely on less intensive resource consumption.

In SMEs, the implementation of CE presents unique characteristics due to their organizational structure and limited resources. Although many SMEs are aware of the importance of circular principles, they tend to focus more on energy efficiency and waste reduction solutions rather than on complex circular economy models such as design for recycling or the bio-based manufacturing paradigm [62].

Among the main barriers that have emerged are regulatory obstacles, financial constraints, and the lack of specific skills that slow the full adoption of CE principles among SMEs [7]. At the same time, digitalization presents itself as a crucial enabling factor, creating opportunities for resource traceability, smart waste management, and the promotion of new circular business models [63, 64].

On the other hand, industrial research has validated circular business models with the aim of overcoming the so-called "Valley of Death"—the critical point between research and commercialization [63]. The effectiveness of these approaches can be seen in the development and dissemination of extremely versatile bioproducts: biocompatible materials for the packaging, textile, construction, and pharmaceutical sectors, which are demonstrating the flexibility to adapt to market needs.

In general, CE in SMEs is not limited to a set of isolated practices, but must be understood and managed as part of an interconnected ecosystem in which sustainability, innovation, and digitalization are integrated to ensure long-term resilience and competitiveness [65].

Education Programme for Eco-Innovation

Education and training are key levers for fostering the widespread adoption of eco-innovation practices in SMEs, as they help consolidate a sustainability-oriented corporate culture and develop specific technological and managerial skills [64, 66].

Training services and various interaction programs are essential for maintaining enthusiasm for following current trends. In this analytical context, they promote the integration and diffusion of eco-innovations in European SMEs [67]. Investment decisions and collaboration in research and development (R&D) influence sustainable corporate innovation [68]. Adoption and investment in training programs emerge as essential practices for attracting qualified employees, competing in the face of new legal require-

ments, and, above all, not hindering company growth towards market trends [69].

The strengthening of these programs is part of a context of public policies and European initiatives aimed at supporting the digitalization and eco-sustainability of SMEs, offering educational tools, funding, and collaborative networks that stimulate responsible innovation [66].

Discussion

The central role of SMEs in the European economic system requires a comprehensive and integrated approach to sustainability and innovation, which requires their active participation in multilevel governance frameworks.

In response to RQ1, the analysis of the themes revealed strong interconnections in the adoption of innovative and sustainable practices, highlighting the complexity and complementarity of their operational dynamics, which ultimately leads to eco-innovation. In this scenario, CSR emerges as a cross-cutting dimension, capable of enhancing corporate reputation and increasing social awareness, creating a positive environmental and social impact [61].

Another key aspect is the close correlation between eco-innovation and the Circular Economy (CE). SMEs that integrate eco-innovation often adopt circular principles, creating a virtuous circle in which waste reduction and resource reuse are combined with environmental innovation [65].

In response to RQ2, research has emerged regarding the effectiveness of digital strategies for SMEs, differences between production sectors, and the impact of responsible leadership models across diverse sectoral and geographical areas [37, 42, 61]. From a practical and policy perspective, the literature converges on the need to propose agile and customized tools for managing sustainability and innovation in SMEs. In particular, the importance of modular training models, accessible digital platforms, and collaborative networks between companies, research institutions, and policymakers is emphasized [51, 54, 69]. Institutional support should emphasize incentives, ongoing training, and capacity-building tools tailored to the real needs of different types of SMEs [56, 64]. Best practices already in place in some contexts show that similar interventions, when tailored by sector and size, improve the propensity to adopt eco-innovations and resilience to market changes [50, 62].

The results of this review highlight the coexistence of innovation drivers and structural constraints, with differing outcomes depending on the sector, digital maturity, and institutional context [1, 4]. The percentages of European SMEs adopting sustainability software, eco-innovation models, and collaborative platforms remain low compared to their potential [54, 63]. This finding is supported by case studies emerging from the literature—from biotech packaging to food—where success often depends on a corporate culture open to innovation and the ability to network [36, 65].

Conclusion

This study explored the integration of sustainability and innovation in European SMEs, addressing QD1 and QD2 through a systematic literature review. The analysis of 99 articles revealed six key themes—eco-innovation, innovative practices, sustainability strategies, CSR, circular economy, and training programs—demonstrating how these dimensions coevolve in SME contexts [70-73].

The combined reading of the six themes illustrates an interconnected ecosystem that transcends isolated practices, offering a structured model to guide future strategic decisions. The literature confirms the strategic value of investing in sustainability and innovation, even in contexts with limited resources.

Studies suggest that unresolved challenges, such as the difficulty for SMEs to translate sustainability approaches into tangible financial results, the persistence of cultural and regulatory barriers, and resource scarcity, can stimulate innovation and empower SMEs to balance resource disparities [55, 57, 70]. In this sense, research theoretically contributes to strengthening the idea that innovation and sustainability are not separate paths, but interdependent forces that shape SME resilience.

Examining the types of resources that support sustainable innovation is crucial to unlocking the potential of SMEs [15]. Policymakers should provide targeted tools to facilitate this integration, while SMEs must recognize sustainability not just as compliance, but as a lever for growth.

Although SMEs contribute significantly to the global economy, it appears necessary, both theoretically and practically, to strengthen a critical and multidimensional approach: only by integrating seemingly diverse ambitions, valorizing differences, and operating on concrete data can the transition of European SMEs towards sustainable and innovative models become structural and lasting [74-78].

This study is subject to limitations. A single database was used to ensure methodological rigor, however, relevant publications may have been excluded. Furthermore, articles not included in the search string or indexed elsewhere may have been overlooked.

Future research should broaden the scope to include other databases, non-European contexts, and non-English-language scientific contributions. Comparative studies and mixed approaches are encouraged to improve the generalizability of the findings [79, 80].

Declaration of Competing Interests

The authors declare no conflict of interest.

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Data Availability Statements

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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