

# Integrating ESG Criteria in Italian SMEs: A Systematic Literature Review on Sustainability and Circular Economy Transitions

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## Abstract

This systematic literature review examines how Italian small and medium-sized enterprises (SMEs) integrate Environmental, Social, and Governance (ESG) criteria to advance sustainability and circular economy transitions. SMEs represent over 99% of EU businesses and driving regional innovation, yet they face uneven ESG adoption due to resource limitations, knowledge gaps, and regulatory complexity. This study analyzes 71 academic and grey literature sources from the period 2015-2025 to address two research questions: Why should SMEs adopt ESG criteria? and What challenges hinder effective implementation? Findings reveal three thematic clusters of action for SMEs: (1) strategic ESG management (e.g., CSR, GRI frameworks), (2) sustainable innovation initiatives, and (3) circular economy transitions. Moreover, successful ESG integration depends on eco-innovation, stakeholder engagement, digitalization, and human capital, yet is constrained by financial limitations, capacity gaps, cultural resistance, and misaligned regulations. Hence, while strategic ESG embedding - beyond mere compliance - enhances financial performance, risk management, and stakeholder trust, it requires SME-tailored policies, simplified reporting tools, and targeted support and guidance. This review synthesizes fragmented literature into an integrated framework, offering actionable insights for researchers, practitioners, and policymakers to transform SMEs into drivers of sustainable development.

**Keywords** SME · Italy · ESG · Sustainability

## 1. Introduction

The integration of Environmental, Social, and Governance (ESG) principles into business strategies has become a central issue in both academic research and policy discourse, reflecting increasing pressure on firms to align with global sustainability agendas such as the UN's 2030 Agenda and the European Green Deal. Within this context, frameworks such as Corporate Social Responsibility (CSR) and the Global Reporting Initiative (GRI) have emerged as key instruments for translating sustainability principles into operational and measurable practices, supporting firms in assessing their environmental and social impacts, enhancing transparency, and strengthening stakeholder trust.

This transformation is particularly relevant for small and medium-sized enterprises (SMEs), which represent over 99% of European businesses and play a fundamental role in regional development, employment, and innovation. In Italy, SMEs are deeply embedded in local production systems and socio-economic networks, often characterized by family ownership, strong territorial ties, and the presence of industrial districts. However, despite their strategic importance, SMEs face structural and organizational

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constraints that differentiate their approach to ESG from that of large firms: limited financial and human resources, less formalized governance structures, and a tendency to integrate sustainability practices into existing operations in a flexible but less standardized manner. Consequently, ESG in SMEs is often driven by entrepreneurial orientation, stakeholder proximity, and operational pragmatism rather than by formal compliance systems and dedicated reporting infrastructures.

From a conceptual perspective, ESG encompasses three interrelated dimensions - environmental, social, and governance - which together provide a multidimensional framework for enhancing long-term value creation, resilience, and innovation; however, in the SME context, these dimensions are typically implemented through adaptive and incremental processes rather than through fully codified systems. In parallel, the increasing integration of circular economy principles is reshaping the logic of ESG implementation by shifting the focus from compliance and disclosure toward systemic innovation, resource efficiency, waste reduction, and value regeneration across production cycles, a transition that may be particularly suited to SMEs given their operational flexibility, albeit constrained by limited capabilities and access to technology. At the same time, the coexistence of multiple sustainability-related frameworks highlights the need for greater conceptual clarity: ESG functions as an overarching evaluative framework for sustainability performance, CSR reflects a broader normative commitment to responsible business conduct, GRI provides standardized guidelines for sustainability reporting, and the circular economy represents a regenerative production model; distinguishing among these concepts is essential to avoid analytical ambiguity and to better understand their distinct contributions to SME strategies.

The Italian context further reinforces the relevance of this analysis, as SMEs are increasingly exposed to external drivers - including evolving consumer preferences, supply chain pressures, and regulatory frameworks such as the Corporate Sustainability Reporting Directive (CSRD) and the European Sustainability Reporting Standards (ESRS) - as well as to enabling initiatives such as Industry 4.0 and Spread2Inno, which provide technological and institutional support for sustainability transitions. Despite the growing attention to these dynamics, the literature remains fragmented in explaining how ESG principles are concretely implemented in resource-constrained contexts and how different sustainability frameworks interact at the firm level. In particular, there is limited understanding of how ESG implementation in SMEs structurally and strategically differs from that in large firms, how the integration of circular economy principles modifies the underlying logic of ESG adoption, and whether specific national contexts - such as that of Italian SMEs - require differentiated theoretical approaches.

Addressing these gaps is essential to move beyond generic prescriptions and to develop a more nuanced understanding of sustainability transitions in SMEs. Against this backdrop, this study examines how ESG, CSR, sustainability reporting, and circular economy principles are interpreted and implemented within Italian SMEs, drawing on a wide range of academic and institutional sources to integrate conceptual perspectives with evidence on practical initiatives and policy instruments, while acknowledging existing constraints and highlighting emerging strategies and enabling factors that support the diffusion of sustainability practices; the paper is structured as follows: Section 2 outlines the methodology adopted for the literature review, Section 3 presents the core analysis across ESG strategies, sustainable projects, and circular economy transitions, Section 4 discusses the main findings in terms of drivers, benefits, challenges, and policy implications, and Section 5 concludes with key insights, limitations, and directions for future research.

## 2. Methodology

This study is based on a systematic literature review (SLR), following the PRISMA protocol for transparent and structured source identification, screening, and inclusion. The review synthesizes existing research to address the key question of how SMEs can integrate ESG criteria in their strategies for a sustainable and circular economy.

### 2.1. Identification

The identification phase involved searching academic databases such as SCOPUS and Web of Science using a primary search string, namely “SME” AND “Italy” AND (“ESG” OR “Sustainab\*” OR “SDG”). This

search yielded 46 records from SCOPUS and 50 from Web of Science, covering the period from 2015 to 2025. To ensure broader coverage, additional and complementary search strings were also tested, including “enterprise” AND “Italy” AND (“indicator” OR “ESG”) AND “sustainab\*”, “enterprise” AND “Italy” AND (“ESG” OR “sustainab\*” OR “SDG”), “ESG” AND “Italy” AND “SME” AND “sustainab\*”, and “SME” AND “Italy” AND (“ESG” OR “sustainab\*” OR “SDG”). These supplementary searches largely overlapped with the results obtained through the primary string and did not substantially increase the number of unique relevant records. After removing duplicates, a total of 89 unique records were included in the final sample. In addition to peer-reviewed articles, Grey literature was included to capture policy-oriented and practice-based perspectives that are often underrepresented in academic databases. Relevant documents were identified through targeted searches of institutional websites and repositories, including those of European and Italian public bodies, industry associations, and research institutes. This process resulted in the inclusion of 14 grey literature documents, such as policy reports, strategic guidelines, and sustainability frameworks, which were used to contextualize empirical findings and complement the academic evidence.

## 2.2. Screening

The screening process excluded publications that were overly generic, not directly relevant to the research question, or not focused on Italian SMEs. After this process, 57 publications were selected for inclusion in the analysis.

## 2.3. Eligibility and Included Papers

The full-text review identified 57 papers that met the following inclusion criteria: a focus on ESG, an examination of strategies for ESG implementation in SMEs, and a connection to sustainability and circular economy transitions. These papers were categorized into three thematic clusters: (1) strategic approaches to ESG in SMEs, (2) sustainable projects and technological programs supporting SMEs, and (3) the transition to a circular economy.

The analysis of the selected studies was conducted through a dual analytical approach combining qualitative and critical perspectives. From a qualitative standpoint, the review assessed the depth and scope of treatment of the investigated topics, considering the extent to which each study addressed ESG-related dimensions and their implications for SMEs. Attention was devoted to identifying the relevance and level of conceptual and empirical development within the selected contributions.

In parallel, a critical analysis was undertaken to examine how specific issues and key dimensions related to ESG adoption were conceptualized and discussed across the literature. This approach aimed to identify convergences, divergences, and potential inconsistencies among the selected studies, with particular attention to contrasting interpretations, implementation challenges, and the different perspectives adopted regarding sustainability practices, circular economy transition, and ESG-related frameworks. Such an approach enabled not only synthesizing existing evidence but also identifying recurring patterns and critical gaps within the literature.

## 2.4. Research Question

This study seeks to explore in depth the growing relevance of ESG criteria within the context of small and medium-sized enterprises (SMEs), structuring its analysis around two central research questions:

- RQ1: Why should SMEs adopt ESG criteria?
- RQ2: What challenges must SMEs overcome in order to implement them effectively?

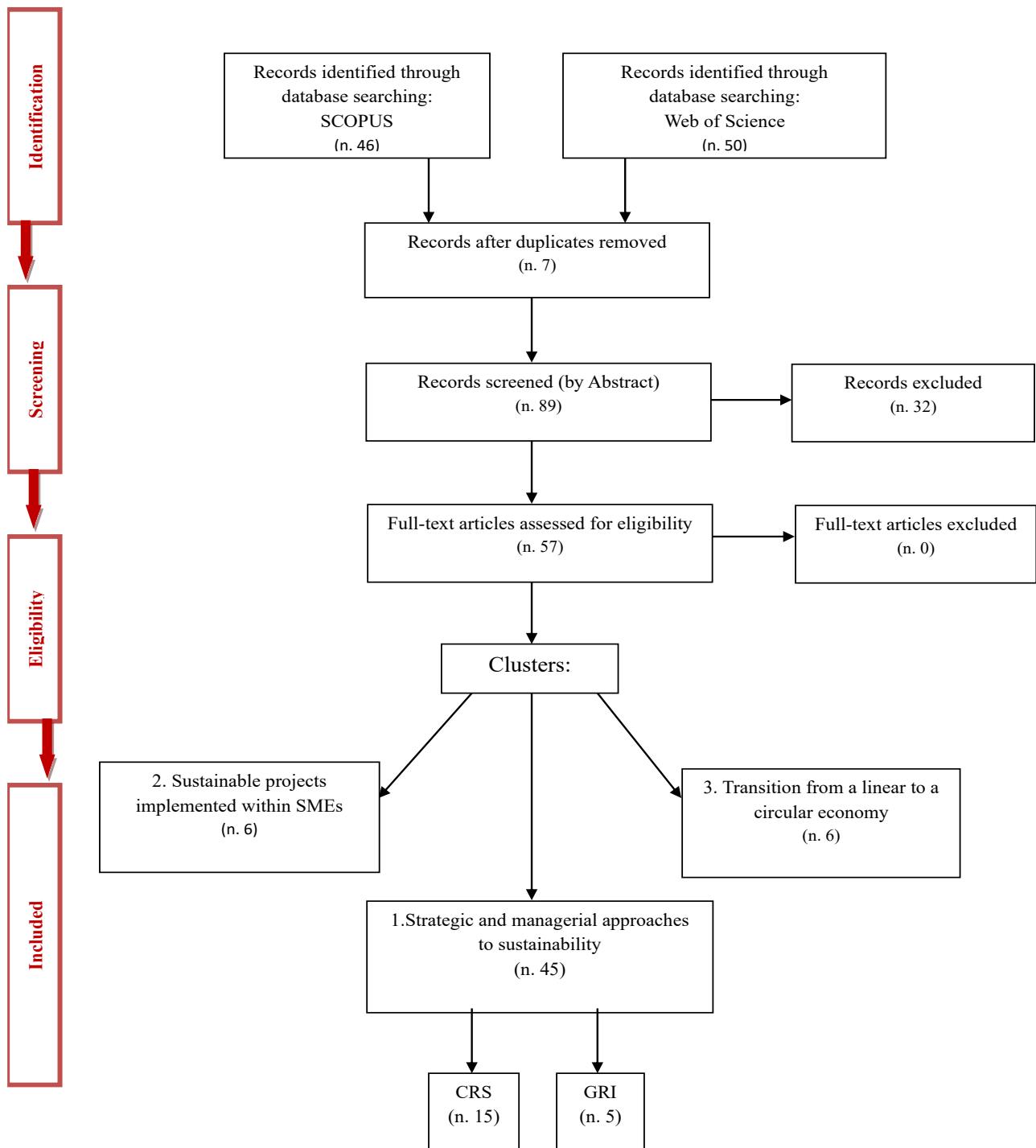
These research questions are grounded in the observation of an increasingly prominent trend: the integration of ESG principles is becoming strategically significant not only for large corporations but also for SMEs, which have traditionally been less engaged in such practices. This shift is driven by a combination of interrelated factors.

First, the escalating urgency of reacting to climate change and broader environmental issues has compelled businesses of all sizes to reassess their environmental responsibilities and the long-term sustainability of their operations. In parallel, the expansion of information availability - facilitated by

digitalization and the diffusion of more accessible reporting standards - has enhanced transparency and raised awareness regarding ESG performance.

Moreover, there is a notable increase in stakeholder sensitivity toward the social, environmental, and economic impacts of business activities. Consumers, investors, regulatory bodies, and local communities are placing growing pressure on firms to operate in a more responsible and sustainable manner. As a result, SMEs are progressively expected to align with these evolving expectations, despite often facing resource constraints and organizational limitations.

Within this framework, the two research questions aim not only to investigate the underlying drivers encouraging SMEs to adopt ESG criteria, but also to identify the structural, managerial, and cultural barriers that may hinder or slow down their effective implementation.



**Figure 1.** Selection process based on PRISMA protocol statement.

### 3. Systematic Literature Review

SMEs play a central role in economic and sustainable development, contributing significantly to the UN's 2030 Agenda. Despite operating under resource constraints, they are increasingly adopting ESG practices in response to regulatory pressures and changing market expectations. However, implementation remains constrained by high costs, limited technical expertise, and restricted access to specialized knowledge. Sectors such as agri-food and manufacturing nevertheless demonstrate increasing integration of sustainability into strategic and operational activities, supported by eco-innovation, human capital development, and flexible business models that facilitate adaptation to evolving environmental and social demands.

ESG implementation in SMEs differs substantially from that of large firms. While large corporations generally rely on formalized and compliance-driven systems supported by dedicated structures and reporting mechanisms, SMEs tend to adopt more adaptive and resource-efficient approaches. Sustainability practices are often integrated into existing managerial routines rather than developed as independent systems, making ESG adoption more dependent on entrepreneurial orientation, stakeholder proximity, and operational pragmatism.

The growing integration of circular economy principles is further reshaping ESG implementation by introducing a systemic approach centered on resource efficiency, waste reduction, and value regeneration. This shifts ESG beyond a purely compliance-oriented perspective toward a more transformative and innovation-driven process, often involving the redesign of products, processes, and supply chains.

The case of Italian SMEs also suggests the presence of a distinctive institutional configuration. The prevalence of family-owned firms, strong territorial embeddedness, and industrial districts influences sustainability practices through local networks, informal governance structures, and long-term relational dynamics. As a result, ESG implementation often combines formal frameworks with context-specific practices rooted in local business traditions. This configuration appears particularly relevant in sectors such as agri-food and manufacturing, although with different implementation patterns. In the agri-food sector, sustainability practices tend to be more strongly associated with territorial identity, supply chain relationships, product quality, and environmental resource management. By contrast, manufacturing SMEs more frequently adopt ESG-related initiatives through technological upgrading, process optimization, and Industry 4.0 applications aimed at improving operational efficiency and resource utilization.

Greater conceptual differentiation is also required among ESG, Corporate Social Responsibility (CSR), Global Reporting Initiative (GRI) standards, and the circular economy. Although frequently used interchangeably, these concepts represent distinct dimensions of sustainability and perform different strategic and operational functions within SMEs. Analyzing these dimensions is particularly relevant because they capture the strategic, organizational, and institutional factors shaping sustainability adoption in SMEs, while also providing a framework for understanding how firms translate sustainability principles into operational practices and long-term competitive advantages.

Current literature highlights three interrelated areas of inquiry: ESG adoption frameworks, sustainability-oriented business initiatives, and circular economy transition models. Examining these dimensions helps identify the key mechanisms, barriers, and enabling conditions that influence the integration of sustainability practices within SMEs. Increasingly, these processes are shaped by international and European policy frameworks, including the UN 2030 Agenda, the European Green Deal, the Corporate Sustainability Reporting Directive (CSRD), the European Sustainability Reporting Standards (ESRS), and the Global Reporting Initiative (GRI) standards, which position sustainability not merely as a compliance obligation, but as a strategic lever for enhancing competitiveness, fostering innovation, strengthening resilience, and improving risk management.

#### 3.1. Towards an Integrated Framework for ESG Adoption in SMEs

To provide a structured interpretation of the literature and avoid a fragmented analysis of sustainability-related dimensions, this study adopts an integrated conceptual framework linking ESG orientation, sustainability-oriented innovation, and circular economy transition mechanisms. These dimensions were selected because they consistently emerge across the reviewed literature as key determinants shaping sustainability implementation within SMEs.

The framework assumes that ESG orientation represents the strategic foundation of sustainability adoption, providing the governance principles and stakeholder-related mechanisms through which sustainability objectives are defined. Sustainability-oriented innovation, including eco-innovation, digitalization, and human capital development, is considered an enabling mechanism through which strategic objectives are translated into operational capabilities and organizational practices.

Within this process, circular economy principles are expected to represent a subsequent stage of implementation, transforming sustainability commitments into measurable outcomes through resource efficiency, process redesign, and value regeneration. Rather than representing isolated dimensions, these components are assumed to interact dynamically, generating mutually reinforcing effects.

The proposed framework further assumes that these relationships are influenced by contextual and organizational conditions specific to SMEs, including resource availability, managerial capabilities, organizational culture, and regulatory environments. In the Italian context, factors such as family ownership structures, territorial embeddedness, and industrial districts may further shape these dynamics.

### 3.2. Strategies and implementation associated with ESG in SMEs

The literature reveals that systems thinking provides a crucial cognitive framework for managing this complexity. Abonguie et al. (2025) and Damiano & Valenza (2025) argue that adopting a *holistic, learning-oriented mindset* enhances SMEs' capacity to respond adaptively to socio-environmental pressures and interdependencies across value chains. *Performance measurement systems* and *certification frameworks*, such as those based on ISO 14001, are increasingly employed by SMEs. Studies by Bianchi et al. (2015) and Carlsson & Nevzorova (2025) demonstrate that the adoption of structured sustainability metrics improves both internal decision-making and external compliance. Cardoni et al. (2020) further illustrate how *knowledge management systems* help SMEs convert intangible assets, such as employee know-how and organizational learning, into measurable ESG outcomes.

At the *governance level*, Antoldi & Cerrato (2020) and Macchion et al. (2023) underscore the importance of trust-based inter-firm collaboration, particularly in networked environments where joint value creation and sustainable innovation can be co-developed. *Financial performance* is another critical enabler, especially under increasing capital market scrutiny. Indeed, Gjergji et al. (2021) and D'Apolito et al. (2024) show that ESG transparency reduces information asymmetries, improves access to credit, and lowers capital costs for SMEs, especially family-owned firms. In this context, ESG reporting becomes not only a compliance mechanism but a strategic financial lever. Meanwhile, *digitalization* is both a challenge and an opportunity for SMEs. Avram et al. (2019) and Melo et al. (2023) argue that overcoming ICT skill mismatches is essential to leveraging digital tools for environmental and social governance. Ferraro et al. (2025) confirm that digital transformation enhances eco-innovation by enabling data-driven monitoring and more responsive business models. Concrete operational strategies, such as those highlighted in energy audits (Fresner et al., 2017) and ISO-certified lean practices (Chiarini & Cobelli, 2023) offer scalable ways to increase efficiency while aligning with regulatory and sustainability targets.

Beyond operational adjustments, strategic shifts in *business models* are vital. As the academic discourse increasingly focuses on *circularity*, several studies examine how SMEs are embedding circular principles into value creation. Cosenz & Bivona (2021) and Troise et al. (2024) highlight how SMEs are redesigning their value propositions around reuse, recycling, and service-based logic. Case studies by Gatto & Parziale (2024) and Broccardo et al. (2019) confirm that successful circular transitions are often rooted in local ecosystems and territorial specializations, such as traditional industrial districts in Italy. Stakeholder engagement also supports these transitions, particularly in consumer-facing sectors (Caputo et al., 2018; Briamonte et al., 2021). Finally, the *human capital dimension* remains a cornerstone of sustainable SME transformation. Avram et al. (2019) and the ASviS 2025 Spring Report highlight that inclusive labor policies, digital re-skilling, and equitable wage structures are not only social imperatives but also competitiveness enablers.

**3.2.1. Corporate Social Responsibility (CSR) and Stakeholders' Engagement** *Corporate Social Responsibility (CSR) and Stakeholder Engagement* are widely recognized as foundational dimensions of sustainability-oriented strategies among SMEs. As SMEs increasingly align their activities with

environmental, social, and governance (ESG) objectives, CSR becomes not only a tool for ethical compliance but a strategic pathway to long-term value creation, legitimacy, and competitiveness.

A core insight emerging from several studies is that CSR enables SMEs to create sustainable value by embedding stakeholder needs into core business logic. Ciasullo and Troisi (2013) demonstrate how CSR-oriented SMEs shift from reactive compliance to proactive value co-creation with customers, suppliers, employees, and the local community. This stakeholder-inclusive model is echoed in Matarazzo, Oduro, and Gennaro (2025) who argue that Italian SMEs in the "Made in Italy" sectors successfully co-create value by adopting stakeholder-specific strategies, leading to increased brand equity, innovation, and market resilience.

Stakeholder engagement as both a process and an outcome of CSR. Oduro and Haylemariam (2025) find that both social and environmental dimensions of sustainability contribute significantly to SME competitiveness, but only when stakeholder interests are consistently integrated into decision-making. Similarly, Del Giudice et al. (2017) show how SMEs strengthen sustainability practices through trust-based relationships with external stakeholders. Caputo et al. (2018) show that the cognitive alignment between consumer expectations and SME identity can strengthen loyalty and facilitate the acceptance of sustainable offerings. Rabino et al. (2008), focusing on SMEs in the Italian fashion and jewellery sector, highlight that competitive positioning is increasingly tied to how effectively firms communicate and enact social and environmental values demanded by conscious consumers.

Farao, Bernuzzi, and Ronchetti (2023) identify the role of "green soft skills" and values-driven leadership in an Italian food-sector SME, showing that sustainability implementation is often informal and culturally embedded rather than procedural. This finding aligns with Fernandes et al. (2023), who argue that sustainable innovation, when guided by responsible leadership and stakeholder responsiveness, contributes not only to environmental outcomes but also to SME growth path. CSR is also deeply connected to networked business models and inter-organizational collaboration. Antoldi and Cerrato (2020) and Macchion et al. (2023) describe how trust and control mechanisms within strategic networks enhance SMEs' capacity to innovate and respond to societal expectations. These insights are supported by Liakh and Spigarelli (2020), who find that SMEs embedded in business groups or networks tend to adopt more structured and impactful CSR practices, due to increased resource sharing and reputational accountability. From a behavioural perspective, consumer trust and stakeholder legitimacy play an enabling role in the broader adoption of sustainability practices. Briamonte et al. (2021) demonstrate that in the agri-food sector, SMEs that engage transparently with stakeholders and align their strategies with the Sustainable Development Goals (SDGs) receive greater social acceptance and competitive advantage. Broccardo et al. (2019) reinforce this by highlighting how innovation management and business process redesign, when accompanied by CSR orientation, improve both operational performance and stakeholder satisfaction.

Finally, several contributions emphasize that CSR is not only an ethical commitment but a strategic enabler of long-term viability. Gjergji et al. (2021) find that ESG disclosures, of which CSR is a central pillar, lower the cost of capital. This reinforces the idea that responsible engagement with stakeholders is financially material. Moreover, the integration of CSR into broader performance frameworks, as illustrated by Cardoni et al. (2020), allows SMEs to track progress, align with regulatory frameworks, and improve organizational learning.

Overall, the literature shows that CSR in SMEs is most effective when embedded across strategic, operational, and relational dimensions. Stakeholder engagement plays a central role in shaping sustainability practices and supporting value creation.

**3.2.2. Global Reporting Initiative (GRI)** The academic literature on sustainability in SMEs reveals a progressive transition from informal CSR practices and stakeholder-oriented actions to more structured approaches such as sustainability reporting, particularly through the Global Reporting Initiative (GRI). While CSR provides the cultural foundation of sustainable behavior, GRI-based reporting translates these practices into standardized and communicable frameworks. Previous studies show that CSR and stakeholder engagement support legitimacy, resilience, and long-term value creation in SMEs (Ciasullo & Troisi, 2013; Matarazzo et al., 2025; Caputo et al., 2018). These practices are often shaped by leadership and internal organizational dynamics (Farao et al., 2023; Fernandes et al., 2023) and typically emerge in resource-constrained environments. As these approaches evolve, sustainability reporting increasingly enables their formalization and communication. Borga et al. (2009), for example, demonstrate that Italian furniture SMEs, although aware of sustainability goals, rarely implement GRI comprehensively due to operational

constraints. Nevertheless, even partial alignment with GRI standards can facilitate internal performance tracking and reinforce external legitimacy, particularly in stakeholder-sensitive sectors such as manufacturing and agri-food (Briamonte et al., 2021; Rabino et al., 2008). Studies by Rossi & Luque-Vílchez (2021) and Del Baldo (2017) reveal how SMEs that adopt GRI frameworks evolve from fragmented CSR reporting to holistic sustainability strategies. In these cases, GRI not only standardizes reporting practices but also serves as a managerial tool for strategic alignment, internal coordination, and stakeholder involvement. Materiality analysis, as explored by Calabrese et al., becomes essential in helping SMEs prioritize relevant ESG topics and avoid overwhelming reporting burdens. However, tensions persist. Galli et al. (2024) frame the SME-GRI relationship as “a love affair or a fight,” noting that while the ambition to communicate sustainability is strong, the capability to do so systematically is often limited. Similar to the challenges discussed by Broccardo et al. (2019) and Gjergji et al. (2021) regarding innovation and ESG disclosure, the GRI framework, though conceptually robust, demands a level of formalization and resource investment that can be burdensome for smaller firms. Yet, where adoption occurs, often led by values-driven leadership or external pressures, it enhances stakeholder trust, strategic planning, and access to credit, echoing earlier results from D’Apolito et al. (2024) and Cardoni et al. (2020). It provides SMEs with tools to improve transparency and align with regulatory frameworks such as the CSRD and the UN 2030 Agenda and strengthens their strategic positioning (Table 1).

### 3.3. Sustainable projects implemented within SMEs

Several initiatives have been carried out to implement sustainability criteria and practices both efficiently and effectively through specific projects. The literature primarily focuses on Industry 4.0, alongside European initiatives such as Spread2Inno and the Copernicus Program.

**3.3.1. Industry 4.0** The adoption of Industry 4.0 in Italian SMEs represents a significant shift in production systems, offering enhanced productivity and competitiveness. However, the transition is complex and uneven, particularly for SMEs with limited resources and capabilities.

Brozzi et al. (2020) examine the relationship between Industry 4.0 technologies and corporate sustainability, finding that digital tools like real-time monitoring and data analytics improve environmental and operational outcomes in manufacturing SMEs. These benefits go beyond technological upgrades, promoting waste reduction, energy efficiency, and better decision-making.

Rauch et al. (2020) propose a maturity-based assessment tool for SMEs, suggesting that successful digital transformation relies on aligning digital tools with a firm's strategic goals and capabilities. Their model emphasizes a gradual, scalable approach rather than large-scale investments.

Bianchini et al. (2024) focus on Manufacturing Execution Systems (MES), showing that even resource-constrained SMEs can use MES to integrate real-time data, control processes, and set performance benchmarks, all critical for sustainable productivity. They stress the importance of managerial commitment and workforce engagement in achieving measurable improvements.

Abdel-Aty et al. (2023) explore low-cost digital solutions for industrial sustainability, arguing that affordable, modular technologies like cloud-based applications and sensors lower barriers to Industry 4.0 adoption for SMEs, while advancing sustainability goals.

Overall, the literature suggests that Industry 4.0 adoption in SMEs requires alignment between technological investment, organizational capabilities, and strategic orientation (Table 2).

**3.3.2. Spread2Inno** The Spread2Inno project addresses the innovation gap between leading and emerging regions in Europe by empowering SMEs and start-ups in less advanced ecosystems. Funded by the EU, the project aims to enhance strategic capabilities, improve access to finance, and foster cross-border networking.

The project unfolds in three phases. The first involves local innovation events and matchmaking platforms, such as “We Make Future” in Rimini, where start-ups pitch their models, connect with investors, and participate in workshops. The second phase provides intensive training through Business Acceleration Academies where SMEs undergo feasibility studies and develop tailored funding strategies. The final stage focuses on investor readiness, offering seven-day training and one-on-one coaching to help firms refine their value propositions and attract investment.

For Italian SMEs, Spread2Inno provides access to cross-border financing, European innovation networks, and the development of vital intangible capabilities. It offers Italian SMEs a structured pathway to innovation through strategic training, practical support, and European integration, contributing to bridging the innovation gap between core and emerging regions in Europe.

**3.3.3. Copernicus Program** This project proposes an innovative approach to assessing the environmental performance of SMEs by addressing the persistent “ESG gap” through accessible, objective, and data-driven evaluation methods. Unlike conventional ESG assessment frameworks, which are primarily tailored to the needs and reporting capacities of large corporations, the project harnesses environmental data from the Copernicus Programme, the European Union’s flagship Earth observation initiative providing high-resolution, real-time satellite information. By leveraging these independently generated datasets, the project enables robust, transparent, and scalable monitoring of environmental impacts, reducing reliance on self-reported information and voluntary disclosures, which are often incomplete, inconsistent, or unavailable among SMEs. This approach enhances the credibility and comparability of sustainability assessments while lowering reporting burdens and supporting evidence-based decision-making by firms, investors, and policymakers.

The project employs advanced AI techniques, specifically Neural Networks, to process complex data and generate reliable environmental ratings. This approach helps SMEs, particularly in Italy, overcome challenges related to resource constraints and limited expertise in sustainability assessment, facilitating more informed and strategic sustainability practices.

The work by Ozkan et al. (2023) presents a significant contribution to corporate sustainability, offering SMEs a credible, tech-driven tool for improving environmental accountability and driving sustainable development.

### 3.4. Transition from Linear to Circular Economy

The transition to a circular economy (CE) represents both a challenge and an opportunity for SMEs. Recent academic contributions provide a multidimensional understanding of how SMEs can successfully adopt circular business models (CBMs) by leveraging organizational capabilities, technological innovation, and structured strategic tools. Gatto et al. (2021) focus on the capacity of circular bio-economy models to overcome the so-called “Valley of Death”, that is the critical phase in which innovative technologies fail to move from the pilot phase and reach the market. Through a systematic statistical review of EU-funded projects under the SME Instrument, the authors demonstrate that firms engaged in bio-based circular practices show a higher potential for commercialization, but this potential is only realized when innovation is supported by coherent business models, funding access, and strategic alignment.

Sarfraz et al. (2021) explore the relationship between sustainability and organizational performance, emphasizing that sustainability alone does not lead to improved outcomes unless it is embedded within a firm’s competitive capabilities.

Ünal et al. (2019) examine an Italian SME in the office supply sector that successfully redesigned its business model around circular principles. The study highlights how managerial decision-making is central to CE implementation, requiring a shift in value proposition, resource management, and stakeholder engagement, and suggesting that circularity must be a deliberate, strategic redesign rather than a peripheral adjustment. Scipioni et al. (2021) focus on organizational learning as a critical enabler of CE transitions in SMEs, arguing that internal barriers, such as resistance to change or lack of knowledge, can be transformed into opportunities through learning processes that promote experimentation, reflection, and adaptation. Saari et al. (2023) propose the Circular Economy Matrix, a diagnostic and strategic planning tool developed through multiple case studies in the manufacturing sector. This matrix allows firms to assess their current maturity level in terms of circular practices and to identify tailored actions for progress, offering SMEs a clear and structured pathway towards circularity through dimensions such as resource efficiency, life-cycle thinking, and system-level innovation. Lastly, Beducci et al. (2023) examine the role of “*digital servitization*” within an Italian extended industrial partnership, showing how the integration of digital technologies with service-based business models can support the development of data-driven circular practices, enhance traceability, and foster collaborative innovation. Their research suggests that when

supported by shared governance and inter-organizational coordination, digital tools become accelerators of circularity, particularly in complex production networks.

Across the six studies, the evidence consolidates into four interrelated dimensions that structure the implementation of circular economy practices in SMEs: Business Model Innovation, Internal Capabilities, Strategic Tools and Frameworks, and Digitalization and Servitization (see Table 3).

## 4. Discussion

### 4.1. Reasons to Adopt ESG in SMEs

The integration of Environmental, Social, and Governance (ESG) principles into SMEs is increasingly driven by institutional, economic, and cultural dynamics. Policy frameworks such as the United Nations 2030 Agenda and the European Green Deal extend their influence to SMEs through supply chain requirements, sectoral guidelines, and financial pressures. While largely targeting large corporations, these regulations influence SMEs' access to credit, risk premiums, and investor attractiveness, making sustainability reporting a key market signal, even if still voluntary. Internally, SMEs motivated by stakeholder logic - aligning with community, employee, and customer values - often adopt ESG practices for value co-creation, as shown by Ciasullo and Troisi (2013). Studies (e.g., Matarazzo et al., 2025; Caputo et al., 2018) emphasize that consumer ethics and community legitimacy influence ESG adoption, particularly in sectors like agri-food and cultural production. Additionally, ESG is linked to strategic foresight, with family-owned SMEs more likely to adopt long-term, integrated models, viewing ESG as a tool for internal coherence, succession, and continuity (Rossi & Luque-Vílchez, 2021; Del Baldo, 2017).

### 4.2. Benefits and Impacts of ESG Adoption

The literature highlights a broad and multifaceted set of benefits associated with ESG adoption in SMEs, spanning financial, operational, strategic, and organizational dimensions. Rather than emerging as isolated outcomes, these benefits appear to be interrelated and mutually reinforcing, contributing to more resilient and adaptive business models.

From a financial perspective, there is strong convergence in the literature regarding the positive relationship between ESG adoption and improved access to external funding, as well as reduced cost of capital. This effect is generally attributed to enhanced transparency and more structured risk management practices (Gjergji et al., 2021; D'Apolito et al., 2024). In this context, the formalization of ESG practices through standardized reporting frameworks, such as GRI, further strengthens these advantages by increasing the credibility and comparability of disclosed information (Rossi & Luque-Vílchez, 2021; Calabrese et al., 2023). This suggests that ESG functions not only as an operational tool but also as a signaling mechanism toward financial stakeholders.

Operationally, ESG integration is consistently associated with improvements in efficiency and performance optimization. Empirical evidence shows that the adoption of structured environmental management systems and process-oriented approaches - such as ISO 14001 and lean methodologies - enables SMEs to achieve measurable gains in resource efficiency and environmental performance (Chiarini & Cobelli, 2023). Similarly, while energy audit initiatives across European SMEs reveal the presence of significant inefficiencies, they also highlight the potential for substantial cost reductions when sustainability-oriented interventions are systematically implemented (Fresner et al., 2017). This indicates that ESG adoption can act as a driver of operational rationalization rather than merely an additional compliance burden.

From a strategic standpoint, the literature emphasizes the role of ESG in fostering business model innovation, particularly in relation to circular economy principles. Studies suggest that the integration of circular logic within ESG frameworks enables SMEs to simultaneously address environmental challenges and identify new sources of value creation (Cosenz & Bivona, 2021; Troise et al., 2024). However, the extent to which these opportunities are effectively captured depends on the firm's ability to align sustainability objectives with its core strategic processes, highlighting again the importance of internal capabilities.

At the organizational level, ESG practices are associated with higher levels of employee engagement and the development of sustainability-oriented cultures. In particular, leadership styles that promote environmental responsibility and employee empowerment play a critical role in translating ESG principles into everyday organizational practices (Farao et al., 2023; Fernandes et al., 2023). This reinforces the view that ESG integration is not only a structural or procedural change, but also a cultural transformation process.

Externally, ESG adoption contributes to strengthening firm legitimacy and improving relationships with key stakeholders, including customers, regulators, and supply chain partners (Macchion et al., 2023; Rabino et al., 2008). This relational dimension is particularly relevant for SMEs, which often rely on trust-based networks and reputation to compensate for resource limitations. In this sense, ESG can be interpreted as a mechanism for enhancing relational capital and market positioning.

Overall, the literature suggests that the combined effect of these financial, operational, strategic, and organizational benefits contributes to increased resilience and adaptability in SMEs. In particular, sustainable innovation emerges as a key mechanism through which ESG adoption supports long-term growth, especially in sectors characterized by high cultural and territorial embeddedness, such as creative industries and agri-food systems (Fernandes et al., 2023; Briamonte et al., 2021).

### 4.3. Barriers and Challenges

Despite the well-documented benefits, the literature consistently identifies a set of structural barriers that limit the widespread and effective implementation of ESG frameworks in SMEs. These constraints can be analytically grouped into four interrelated dimensions: resource limitations, capability gaps, cultural factors, and regulatory misalignment, which together contribute to a fragmented and uneven adoption landscape.

Resource constraints emerge as the most critical and widely acknowledged barrier. Empirical evidence shows that SMEs often lack the financial, technical, and human resources required to implement structured ESG systems, particularly those based on comprehensive frameworks such as GRI (Borga et al., 2009; Galli et al., 2024). In addition to financial limitations, time constraints and competing managerial priorities further reduce the capacity of firms to engage in sustainability-related activities. This suggests that ESG adoption is frequently perceived not only as resource-intensive, but also as misaligned with short-term operational imperatives.

Capacity and knowledge gaps further exacerbate these limitations. The literature indicates that many SMEs operate in informationally fragmented environments, with limited access to support ecosystems, benchmarking tools, and policy-driven initiatives (Liakh & Spigarelli, 2020; Oduro & Haylemariam, 2025). This lack of connectivity constrains both the development of structured ESG strategies and the diffusion of best practices. In this context, sectoral differences become particularly relevant, as firms operating in traditional industries - such as manufacturing or artisan production - often exhibit lower levels of ESG awareness and engagement. This highlights the role of knowledge infrastructures as a critical enabling condition for sustainability transitions.

Cultural and organizational factors also play a significant role in shaping ESG adoption. Studies suggest that owner-manager orientation, often characterized by short-term decision-making and a predominantly economic logic, may conflict with the long-term and multidimensional nature of ESG integration (Del Giudice et al., 2017; Calabrese et al., 2023). Even when sustainability is recognized as a relevant value, its implementation frequently remains informal and lacks strategic integration. The limited adoption of structured tools - such as materiality assessments - further reflects the perceived complexity and low prioritization of formal ESG processes. This indicates that cultural alignment and managerial mindset are key determinants of effective implementation.

Finally, regulatory misalignment represents a systemic barrier affecting SME participation in ESG ecosystems. While the expansion of regulatory frameworks reflects increasing institutional commitment to sustainability, their complexity and administrative burden often limit accessibility for smaller firms. In the absence of simplified tools, sector-specific adaptations, and targeted guidance, many SMEs remain only marginally involved in formal ESG practices. This suggests that the effectiveness of regulatory frameworks depends not only on their scope, but also on their adaptability to SME-specific characteristics (Table 4).

#### 4.4. Regulations and Guidelines

The European regulatory landscape for ESG disclosure has undergone significant transformation in recent years, generating both compliance pressures and enabling mechanisms for SMEs. Rather than representing a purely coercive framework, regulation increasingly functions as a driver of standardization, transparency, and strategic alignment in sustainability practices.

A central driver of this evolution is the Corporate Sustainability Reporting Directive (CSRD), which represents a major step toward more comprehensive, standardized, and comparable ESG reporting across the European Union. While most SMEs are not currently subject to its direct reporting requirements, the literature increasingly emphasizes their indirect exposure to the Directive through supply chain relationships, investor expectations, financial institutions, and contractual obligations imposed by larger firms. As a result, sustainability disclosure and performance management are becoming increasingly important for SMEs seeking to maintain market access, secure financing, and enhance their competitive positioning. In particular, SMEs operating within supply chains led by large corporations, or participating in public procurement processes, are progressively required to align with ESG reporting expectations also through Minimum Environmental Criteria (MEC). This suggests that regulatory influence extends beyond formal obligations, shaping SME behavior through market-based transmission mechanisms.

Complementing the CSRD, the European Sustainability Reporting Standards (ESRS) provide a structured framework aimed at enhancing consistency and comparability across ESG disclosures. Their alignment with international standards reinforces the convergence of global sustainability reporting practices. Within this broader ecosystem, the Global Reporting Initiative (GRI) remains one of the most widely adopted frameworks, particularly due to its flexibility and scalability. Empirical evidence indicates that even partial adoption of GRI guidelines can support the development of integrated thinking, improve stakeholder engagement, and enhance strategic planning processes (Del Baldo, 2017; Rossi & Luque-Vílchez, 2021). This highlights the role of reporting frameworks not only as disclosure tools, but also as managerial instruments.

From an operational perspective, ISO standards play a crucial role in translating ESG principles into concrete organizational practices. In particular, ISO 14001 provides a process-oriented approach to environmental management, enabling SMEs to systematically monitor and reduce their environmental impact. Its alignment with life cycle thinking and continuous improvement principles makes it a key tool for operationalizing sustainability. Empirical findings suggest that firms adopting ISO 14001 achieve not only improvements in environmental performance but also benefits in terms of internal coordination and external credibility (Chiarini & Cobelli, 2023). This indicates that standardization can generate both efficiency gains and reputational advantages.

In addition, ISO 26000 offers a complementary framework focused on the social dimension of sustainability. Although non-certifiable, it promotes a comprehensive approach to social responsibility, encompassing stakeholder engagement, human rights, labor practices, and ethical governance. Its relevance for SMEs lies in its ability to support the transition from informal CSR practices to more structured and integrated ESG approaches, particularly in contexts where formal reporting adoption remains limited.

Finally, the literature underscores the growing importance of EU-funded initiatives in supporting ESG adoption among SMEs. These programmes help address critical capacity constraints by providing financial resources, technical assistance, knowledge transfer opportunities, and access to collaborative innovation ecosystems. Initiatives such as the Spread2Inno project and the Copernicus Programme exemplify this supportive role, offering training activities, digital tools, environmental data services, and networking opportunities that facilitate the implementation of sustainability practices. In this context, public policy functions not only as a regulatory driver but also as an enabling mechanism, fostering the diffusion of ESG principles and accelerating the sustainability transition across the SME sector.

Nevertheless, regulatory architecture still presents challenges. While frameworks are becoming increasingly comprehensive, they are not always proportionally adapted to the capabilities of SMEs. Many SMEs struggle to interpret and implement standards designed for larger enterprises, especially without simplified templates, sector-specific KPIs, or national-level assistance programs. Therefore, expanding access to modular reporting systems, creating SME-specific versions of ISO and GRI guidelines, and promoting targeted support mechanisms remain essential for broadening ESG adoption and closing the implementation gap.

## 5. Research Gaps and Future Research Directions

Building on the findings of this review, several critical gaps emerge, opening avenues for further investigation. From a theoretical perspective, the literature still lacks an integrated framework capable of linking ESG adoption, circular economy transitions, and SME-specific organizational dynamics, as these dimensions are predominantly addressed in isolation. Empirically, existing evidence remains fragmented and context-dependent, with a prevalence of case-based and sector-specific studies that limit general information and cross-country comparability. From a methodological standpoint, ESG assessment in SMEs is characterized by limited standardization and an over-reliance on complex frameworks, such as GRI-based reporting, which are often difficult to implement at smaller scales. In addition, the absence of simplified and scalable measurement tools constrains the ability of SMEs to systematically monitor and communicate sustainability performance. Finally, a significant policy-related gap persists, as current regulatory frameworks are primarily designed for large firms, generating indirect compliance pressures on SMEs without providing adequately tailored instruments or support mechanisms. Considering these limitations, future research should focus on developing integrative theoretical models that capture the interplay between ESG practices, circular economy strategies, and organizational capabilities within SMEs. Further empirical studies are needed to provide more robust and comparable evidence across sectors and geographical contexts. Moreover, advancing methodological approaches through the design of SME-adapted ESG metrics and tools represents a key priority. Lastly, greater attention should be devoted to policy design, particularly in exploring how regulatory frameworks can be simplified and aligned with SME characteristics while maintaining consistency and comparability in sustainability reporting.

## 6. Conclusion

This study has examined the integration of Environmental, Social, and Governance (ESG) principles within Italian SMEs through a systematic literature review, providing a structured synthesis of the main drivers, enabling factors, and constraints shaping sustainability adoption in this context.

The findings indicate that ESG integration in SMEs is evolving from informal and fragmented practices toward more structured and strategically embedded approaches. While external pressures - such as regulatory developments, supply chain requirements, and financial expectations - play a significant role in the process, internal dynamics, including stakeholder orientation, organizational capacity, and long-term strategic vision, are equally critical in shaping adoption pathways.

The analysis highlights the importance of key enablers, including innovation, digitalization, stakeholder engagement, and human capital development. Existing initiatives such as Industry 4.0, Spread2Inno, and the Copernicus Program illustrate how technological and institutional support mechanisms can facilitate ESG implementation, especially in resource-constrained environments.

At the same time, persistent barriers continue to limit the effective diffusion of ESG practices among SMEs. Financial and organizational constraints, limited expertise, and the complexity of existing reporting frameworks hinder the transition toward fully integrated sustainability models. These challenges underline the need for more accessible, flexible, and proportionate tools tailored to SME characteristics.

From a theoretical perspective, this study contributes to the literature by integrating insights from ESG frameworks, CSR practices, and circular economy models into a coherent analytical perspective focused on SMEs. It also emphasizes the relevance of a systemic approach, in which sustainability is embedded across strategic, operational, and organizational dimensions rather than addressed through isolated initiatives.

From a policy and managerial standpoint, the findings suggest that strengthening support systems - through simplified reporting standards, targeted training, and innovation-oriented programs - remains essential to foster broader ESG adoption. Ensuring alignment between regulatory frameworks and SME capabilities represents a critical condition for the effectiveness of sustainability policies.

Finally, this study opens several avenues for future research. Comparative analyses across national contexts and industrial sectors could provide further insights into the variability of ESG adoption patterns. In addition, the role of emerging technologies - particularly in data-driven sustainability assessment and circular business models - deserves deeper investigation.

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**Data availability** Data used for the SLR will be made available upon request.

## Declarations

**Competing Interests** The authors declare no competing interests.

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## References

- Abdel-Aty, T. A., McFarlane, D., Brooks, S., Salter, L., Abubakar, A. S., Evans, S., ...& Macchi, M. (2024). The role of low-cost digital solutions in supporting industrial sustainability. *Sustainability*, 16(3), 1301.
- Abonguie, D. F., Nyam, Y. S., & Hoeyi, P. K. (2025). Topic: A systematic analysis of Systems Thinking and the Sustainability of Small and Medium Size Enterprises (SMEs): A global evaluation. *Scientific African*, e02738.
- Antoldi, F., & Cerrato, D. (2020). Trust, control, and value creation in strategic networks of SMEs. *Sustainability*, 12(5), 1873.
- Assembly, G. (2015). Resolution adopted by the General Assembly on 11 September 2015. *New York: United Nations*.
- AsVis, Rapporto di Primavera 2025, *Scenari per l'Italia al 2035 e al 2050. Le scelte da compiere ora per uno sviluppo sostenibile*.
- Avram, A., Benvenuto, M., Avram, C. D., & Gravili, G. (2019). Assuring SME's sustainable competitiveness in the digital era: A labor policy between guaranteed minimum wage and ICT skill mismatch. *Sustainability*, 11(10), 2918.
- Beducci, E., Acerbi, F., De Carolis, A., Terzi, S., & Taisch, M. (2023, November). Towards Circular Systems: The Role of Digital Servitization in an Italian Extended Partnership. In *International Conference on Innovative Intelligent Industrial Production and Logistics* (pp. 239-249). Cham: Springer Nature Switzerland.
- Bergsten, A., Jiren, T. S., Leventon, J., Dorresteyn, I., Schultner, J., & Fischer, J. (2019). Identifying governance gaps among interlinked sustainability challenges. *Environmental Science & Policy*, 91, 27-38.
- Bianchi, C., Cosenz, F., & Marinković, M. (2015). Designing dynamic performance management systems to foster SME competitiveness according to a sustainable development perspective: empirical evidences from a case-study. *International Journal of Business Performance Management* 31, 16(1), 84-108.
- Bianchini, A., Savini, I., Andreoni, A., Morolli, M., & Solfrini, V. (2024). Manufacturing execution system application within manufacturing small-medium enterprises towards key performance indicators development and their implementation in the production line. *Sustainability*, 16(7), 2974.
- Borga, F., Citterio, A., Noci, G., & Pizzurno, E. (2009). Sustainability report in small enterprises: Case studies in Italian furniture companies. *Business Strategy and the Environment*, 18(3), 162-176.

- Briamonte, L., Pergamo, R., Arru, B., Furesi, R., Pulina, P., & Madau, F. A. (2021). Sustainability Goals and Firm Behaviours: A Multi-Criteria Approach on Italian Agro-Food Sector. *Sustainability* 2021, 13, 5589.
- Broccardo, L., Culasso, F., & Truant, E. (2019). Business process and innovation management: the situation of SMEs in Italy. *Global Business and Economics Review*, 21(2), 232-245.
- Brozzi, R., Forti, D., Rauch, E., & Matt, D. T. (2020). The advantages of industry 4.0 applications for sustainability: results from a sample of manufacturing companies. *Sustainability*, 12(9), 3647.
- Ceconello, M. A. (2022). Circular economy solutions and strategies for the furniture sector in the European union. *DIID. DISEGNO INDUSTRIALE INDUSTRIAL DESIGN*, 78, 108-117.
- Calabrese, A., Costa, R., Ghiron, N. L., & Menichini, T. (2019). Materiality analysis in sustainability reporting: A tool for directing corporate sustainability towards emerging economic, environmental and social opportunities. *Technological and Economic Development of Economy*, 25(5), 1016-1038.
- Caputo, F., Carrubbo, L., & Sarno, D. (2018). The influence of cognitive dimensions on the consumer-SME relationship: a sustainability-oriented view. *Sustainability*, 10(9), 3238.
- Cardoni, A., Zanin, F., Corazza, G., & Paradisi, A. (2020). Knowledge management and performance measurement systems for SMEs' economic sustainability. *Sustainability*, 12(7), 2594.
- Carlsson, R., & Nevzorova, T. (2025). Measuring sustainable transformation of small and medium-sized enterprises using management systems standards. *Business Strategy and the Environment*, 34(1), 708-723.
- Chiarini, A., & Cobelli, N. (2023, August). Performing Audits in a Service Company that is Implementing Lean and ISO 14001 for Environmental Sustainability. A Case Study from Italy. In *Excellence in Services International Conference* (pp. 194-199). Cham: Springer Nature Switzerland.
- COMMISSIONE EUROPEA, Direttiva 2022/2464 impone nuovi obblighi di rendicontazione del bilancio di sostenibilità per le imprese europee (secondo gli ESRS).
- COMMISSIONE EUROPEA, Programma per piccole e medie imprese ecologiche e competitive.
- COMMISSIONE EUROPEA, Regolamento – 2018/2026.
- COMMISSIONE EUROPEA, Regolamento Delegato (UE) - 2020/1818.
- Copernicus Program - Programma di incubazione Copernicus | Obiettivo Europa sito ufficiale.
- Cosenz, F., & Bivona, E. (2021). Fostering growth patterns of SMEs through business model innovation. A tailored dynamic business modelling approach. *Journal of Business Research*, 130, 658-669.
- D'Apolito, E., Galletta, S., Iannuzzi, A. P., & Labini, S. S. (2024). Sustainability and bank credit access: New evidence from Italian SMEs. *Research in International Business and Finance*, 69, 102242.
- Damiano, R., & Valenza, G. (2025). Enacting resilience in small and medium enterprises following the sustainability path: a systematic literature review. *Strategic Change*, 34(2), 237-252.
- Deal, E. G. (2019). Communication from the commission to the european parliament, the european council, the council, the european economic and social committee and the committee of the regions.
- Del Baldo, M. (2017). The implementation of integrating reporting in SMEs: Insights from a pioneering experience in Italy. *Meditari Accountancy Research*, 25(4), 505-532.
- Del Giudice, M., Khan, Z., De Silva, M., Scuotto, V., Caputo, F., & Carayannis, E. (2017). The microlevel actions undertaken by owner-managers in improving the sustainability practices of cultural and creative small and medium enterprises: A United Kingdom–Italy comparison. *Journal of Organizational Behavior*, 38(9), 1396-1414.
- Farao, C., Bernuzzi, C., & Ronchetti, C. (2023). The crucial role of green soft skills and leadership for sustainability: a case study of an Italian small and medium enterprise operating in the food sector. *Sustainability*, 15(22), 15841.
- Fernandes, C. I., Ferreira, J. J., Veiga, P. M., Kraus, S., & Jones, P. (2023). Does sustainable innovation respond to SME's growth? European empirical evidence. *The International Journal of Entrepreneurship and Innovation*, 14657503231194263.

- Ferraro, G., Passaro, R., Quinto, I., & Thomas, A. (2025). The process supporting the emergence of the environmental innovation capabilities within small businesses: An empirical investigation. *Business Strategy and the Environment*, 34(1), 1027-1042.
- Fresner, J., Morea, F., Krenn, C., Uson, J. A., & Tomasi, F. (2017). Energy efficiency in small and medium enterprises: Lessons learned from 280 energy audits across Europe. *Journal of Cleaner Production*, 142, 1650-1660.
- Galli, D., Torelli, R., & Caccialanza, A. (2024). Sustainability performance and sustainability reporting in SMEs: a love affair or a fight?. *Journal of Management & Organization*, 30(3), 574-599.
- Gatto, A., & Parziale, A. (2024). Towards a green and just industry? Insights from traditional leather districts in Southern Italy. *Science of The Total Environment*, 942, 171552.
- Gatto, F., & Re, I. (2021). Circular bioeconomy business models to overcome the valley of death. A systematic statistical analysis of studies and projects in emerging bio-based technologies and trends linked to the SME instrument support. *Sustainability*, 13(4), 1899.
- Gjergji, R., Vena, L., Sciascia, S., & Cortesi, A. (2021). The effects of environmental, social and governance disclosure on the cost of capital in small and medium enterprises: The role of family business status. *Business strategy and the environment*, 30(1), 683-693.
- Korsakienė, R., & Raišienė, A. G. (2022). Sustainability drivers of small and medium sized firms: A review and research agenda.
- Jakobs, L., Cano, A. K. S., & Rauch, E. (2024). Sustainability in SMEs: A comparative study to assess current status and setting targets for action. *IFAC-PapersOnLine*, 58(19), 836-841.
- Li, B., Fan, X., Álvarez-Otero, S., Sial, M. S., Comite, U., Cherian, J., & Vasa, L. (2021). CSR and workplace autonomy as enablers of workplace innovation in SMEs through employees: Extending the boundary conditions of self-determination theory. *Sustainability*, 13(11), 6104.
- Liakh, O., & Spigarelli, F. (2020). Managing corporate sustainability and responsibility efficiently: A review of existing literature on business groups and networks. *Sustainability*, 12(18), 7722.
- Macchion, L., Toscani, A. C., & Vinelli, A. (2023). Sustainable business models of small and medium-sized enterprises and the relationships to be established within the supply chain to support these models. *Corporate Social Responsibility and Environmental Management*, 30(2), 563-573.
- Martins, A., Branco, M. C., Melo, P. N., & Machado, C. (2022). Sustainability in small and medium-sized enterprises: A systematic literature review and future research agenda. *Sustainability*, 14(11), 6493.
- Matarazzo, M., Oduro, S., & Gennaro, A. (2025). Stakeholder engagement for sustainable value co-creation: Evidence from made in Italy SMEs. *Business Ethics, the Environment & Responsibility*, 34(2), 347-361.
- Melo, I. C., Queiroz, G. A., Junior, P. N. A., de Sousa, T. B., Yushimito, W. F., & Pereira, J. (2023). Sustainable digital transformation in small and medium enterprises (SMEs): A review on performance. *Heliyon*, 9(3).
- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Bmj*, 339.
- Norme ISO reperibili al link [ISO - Search](#)
- Paez, A. (2017). Gray literature: An important resource in systematic reviews. *Journal of Evidence-Based Medicine*, 10(3), 233-240.
- Parlamento e Consiglio Europeo (2014), *DIRETTIVA (UE) 2014/95*, del 22 ottobre 2014 pubblicata in Gazzetta Ufficiale.
- Parlamento e Consiglio Europeo (2022), *DIRETTIVA (UE) 2022/2464*, del 14 dicembre 2022 pubblicata in Gazzetta Ufficiale.
- Plan, C. E. A. (2020). For a cleaner and more competitive Europe. European Commission (EC): Brussels, Belgium, 28.
- Presidente della Repubblica (2016), *Decreto legislativo n.254/2016*, del 30 dicembre 2016 pubblicato in Gazzetta Ufficiale.

- Progetto MEF “Improving ESG Data availability and sustainability corporate reporting in Italy”, [https://www.dt.mef.gov.it/attivita\\_istituzionali/sistema\\_bancario\\_finanziario/finanza\\_sostenibile/improving\\_esg/](https://www.dt.mef.gov.it/attivita_istituzionali/sistema_bancario_finanziario/finanza_sostenibile/improving_esg/)
- Prashar, A. (2020). A bibliometric and content analysis of sustainable development in small and medium-sized enterprises. *Journal of cleaner production*, 245, 118665.
- Oduro, S., & Haylemariam, L. G. (2025). Effect of social and environmental sustainability on SME competitiveness: a meta-analytic review. *Management Review Quarterly*, 1-32.
- Omowole, B. M., Olufemi-Philips, A. Q., Ofodili, O. C., Eyo-Udo, N. L., & Ewim, S. E. (2024). Conceptualizing green business practices in SMEs for sustainable development. *International Journal of Management & Entrepreneurship Research*, 6(11), 3778-3805.
- Ozkan, S., Romagnoli, S., & Rossi, P. (2023). A novel approach to rating SMEs’ environmental performance: Bridging the ESG gap. *Ecological Indicators*, 157, 111151.
- Rabino, S., Simoni, C., & Zanni, L. (2008). Small & medium gold & fashion enterprises (SMEs) in Arezzo, Italy: competitive challenges and strategic implications. *Journal of Global Marketing*, 21(2), 141-159.
- Rauch, E., Unterhofer, M., Rojas, R. A., Gualtieri, L., Woschank, M., & Matt, D. T. (2020). A maturity level-based assessment tool to enhance the implementation of industry 4.0 in small and medium-sized enterprises. *Sustainability*, 12(9), 3559.
- Reitano, A., Taylor, D., Greig, K., & Sposato, C. (2014). Sustainability, eco-innovation and technology—an Italian perspective. *International Journal of Technology Marketing* 5, 9(3), 270-287.
- Rigillo, M., Galluccio, G., Fabbricatti, K., Block, M., Ermolli, S. R., & Perriccioli, M. (2024). Digital and Circular Innovation for Made in Italy Wood Supply Chain: The FoWARD Research Project. In *INTERNATIONAL SYMPOSIUM: New Metropolitan Perspectives* (pp. 138-147). Springer, Cham.
- Rossi, A., & Luque-Vílchez, M. (2021). The implementation of sustainability reporting in a small and medium enterprise and the emergence of integrated thinking. *Meditari Accountancy Research*, 29(4), 966-984.
- Saari, L., Valkokari, K., Martins, J. T., & Acerbi, F. (2024). Circular economy matrix guiding manufacturing industry companies towards circularity—a multiple case study perspective. *Circular Economy and Sustainability*, 4(4), 2505-2530.
- Sarfraz, M., Ivascu, L., Belu, R., & Artene, A. (2021). Accentuating the interconnection between business sustainability and organizational performance in the context of the circular economy: The moderating role of organizational competitiveness. *Business Strategy and the Environment*, 30(4), 2108-2118.
- Scipioni, S., Russ, M., & Niccolini, F. (2021). From barriers to enablers: The role of organizational learning in transitioning SMEs into the circular economy. *Sustainability*, 13(3), 1021.
- Singer-Coudoux, K., Buxmann, H. N., & Will, M. (2024). STRATEGY DEVELOPMENT BASED ON INTANGIBLES FOR STARTUPS: CAPACITY BUILDING IN EMERGING EUROPEAN INNOVATION ECOSYSTEMS. *Annals of DAAAM & Proceedings*, 35.
- Smith, H., Discetti, R., Bellucci, M., & Acuti, D. (2022). SMEs engagement with the Sustainable Development Goals: A power perspective. *Journal of business research*, 149, 112-122.
- Spread2Inno - [https://www.spread2inno.eu/about/?utm\\_source=chatgpt.com](https://www.spread2inno.eu/about/?utm_source=chatgpt.com) sito ufficiale.
- Susilawati, M. (2024). Entrepreneurial Resilience: Strategies for MSMEs to Navigate Uncertainties and Challenges in Contemporary Markets. *International Journal of Business, Law, and Education*, 5(2), 1687-1695.
- Thollander, P., Paramonova, S., Cornelis, E., Kimura, O., Trianni, A., Karlsson, M., ... & Navarro, J. P. J. (2015). International study on energy end-use data among industrial SMEs (small and medium-sized enterprises) and energy end-use efficiency improvement opportunities. *Journal of Cleaner Production*, 104, 282-296.
- Tiago, F., Gil, A., Stemberger, S., & Borges-Tiago, T. (2021). Digital sustainability communication in tourism. *Journal of Innovation & Knowledge*, 6(1), 27-34.
- Troise, C., Santoro, G., Jones, P., & Bresciani, S. (2024). Small and medium enterprises and sustainable business models: Exploring enabling factors for adoption. *Journal of Management & Organization*, 30(3), 452-465.

- 
- Tyler, B., Lahneman, B., Beukel, K., Cerrato, D., Minciullo, M., Spielmann, N., & Discua Cruz, A. (2020). SME managers' perceptions of competitive pressure and the adoption of environmental practices in fragmented industries: a multi-country study in the wine industry. *Organization & Environment*, 33(3), 437-463.
- Ünal, E., Urbinati, A., & Chiaroni, D. (2019). Managerial practices for designing circular economy business models: The case of an Italian SME in the office supply industry. *Journal of manufacturing technology management*, 30(3), 561-589.
- UN, 2015. Resolution A/RES/70/1. Transforming Our World: the 2030 Agenda for Sustainable Development.
- UNEP, 2016a. Global Guidance for Life Cycle Impact Assessment Indicators, 1. "<http://www.lifecycleinitiative.org/applying-lca/lcia-cf/>" (Accessed 1 February 2021). UNEP, 2016b. Global Guidance on Environmental Life Cycle Impact Assessment Indicators –, vol. 2. (Accessed 1 February 2021).
- 5-Step Starting Guide per la transizione delle PMI verso la sostenibilità AcE-5-step-Starting-Guide-per-le-PMI-verso-la-sostenibilita-9-2023.pdf
- Vincenza Ciasullo, M., & Troisi. Sustainable value creation in SMEs: A case study. *The TQM Journal*, 25(1), 44-61.

## Tables

**Table 1.** ESG Adoption in SMEs: Drivers, Barriers, and Impacts

Study	Dimension	Type	Factor	Mechanism/ Description	Outcome / Impact
Gjergji et al. (2021)	Financial	Driver	Access to capital	Increased transparency	Lower cost of capital
D'Apolito et al. (2024)	Financial	Driver	ESG disclosure	Risk reduction	Investor attractiveness
Troise et al. (2024)	Strategic	Driver	Circular economy	Business model innovation	New market opportunities
Farao et al. (2023)	Organizational	Driver	Green leadership	Cultural change	Employee engagement
Fernandes et al. (2023)	Strategic	Driver	Innovation	Capability development	Firm growth
Borga et al. (2009)	Resource	Barrier	Lack of capital	Limited investment capacity	Low ESG adoption
Galli et al. (2024)	Resource	Barrier	High implementation cost	Financial burden	Delayed adoption
Liakh & Spigarelli (2020)	Knowledge	Barrier	Informational isolation	Weak external linkages	Poor strategy development
Oduro & Haylemariam (2025)	Knowledge	Barrier	Lack of benchmarks	Limited learning	Low ESG maturity
Del Giudice et al. (2017)	Cultural	Barrier	Short-term orientation	Misalignment with ESG logic	Weak integration
Calabrese et al. (2023)	Cultural	Barrier	Informal practices	Lack of structure	Ineffective implementation
Chiarini & Cobelli (2023)	Environmental	Impact	ISO adoption	Process optimization	Improved performance
Fresner et al. (2017)	Operational	Impact	Energy audits	Efficiency improvements	Cost reduction
Macchion et al. (2023)	Relational	Impact	Stakeholder engagement	Trust building	Stronger supply chains
Rabino et al. (2008)	Market	Impact	Reputation	Legitimacy	Competitive advantage
Briamonte et al. (2021)	Sectoral	Impact	Sustainability innovation	Local adaptation	Cluster development

**Table 2.** Digitalization and Sustainability in SMEs: Comparative Literature Synthesis

Theme	Brozzi et al. (2020)	Rauch et al. (2020)	Bianchini et al. (2024)	Abdel-Aty et al. (2023)
Sustainability orientation	Emphasizes environmental and social benefits (waste reduction, ergonomic improvements, flexible work)	Includes sustainability as a dimension in maturity assessment	Links MES to sustainable performance through resource transparency and process efficiency	Identifies low-cost digital tools as enablers of sustainable transformation
Digital maturity pathway	Digitalization enables sustainability improvements	Provides a maturity model for structured adoption	Frames MES within progressive KPI development	Supports modular solutions aligned with firm maturity
Data-driven decision support	Real-time data supports logistics optimization and waste reduction	Categorizes Industry 4.0 tools to guide prioritization	Centralizes shop-floor data into KPIs for operational control	Uses low-cost sensors and analytics to enable accessible data use
Incremental and modular approach	Advocates scalable, stepwise digital investments	Supports gradual adoption based on maturity levels	Describes MES implementation as incremental and scalable	Promotes modular, low-cost entry strategies
Organizational and cultural shift	Links Industry 4.0 to improved working conditions	Includes organizational and human factors in maturity models	Highlights managerial engagement and workforce training	Emphasizes integration of sustainability into organizational mindset

**Table 3.** Key Dimensions of Circular Economy Implementation in SMEs

Theme	Key Insight	Analytical Focus	Article(s)
Business Model Innovation	Circularity requires integration into core business models rather than peripheral adoption	Strategic integration	Gatto & Re (2021); Ünal et al. (2019)
Internal Capabilities	Organizational learning and capabilities enable the operationalization of circular strategies	Capability development	Sarfraz et al. (2021); Scipioni et al. (2021)
Strategic Tools and Frameworks	Structured tools support the assessment of circular maturity and guide strategic decision-making	Decision-support tools	Saari et al. (2023)
Digitalization and Servitization	Digital servitization enables coordination, traceability, and value creation across systems	Technological enablers	Beducci et al. (2023)

**Table 4.** Integrated ESG Adoption Framework

Theme	Key Insight	Analytical Focus	Article(s)
Business Model Innovation	Circularity requires integration into core business models rather than peripheral adoption	Strategic integration	Gatto & Re (2021); Ünal et al. (2019)
Internal Capabilities	Organizational learning and capabilities enable the operationalization of circular strategies	Capability development	Sarfraz et al. (2021); Scipioni et al. (2021)
Strategic Tools and Frameworks	Structured tools support the assessment of circular maturity and guide strategic decision-making	Decision-support tools	Saari et al. (2023)
Digitalization and Servitization	Digital servitization enables coordination, traceability, and value creation across systems	Technological enablers	Beducci et al. (2023)