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From Data to Action: The Role of Reports and Certifications in Driving Corporate Sustainability

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ABSTRACT

Corporate sustainability has become a central issue for businesses, driven by environmental, social and governance pressures and stakeholder expectations. The present study aimed to assess how reports and certifications influence motivations, operational practices and perceptions of obstacles, verifying whether these tools promote sustainable maturity regardless of the structural characteristics of businesses. Data were collected through a survey involving 100 companies located in an Italian region (Abruzzo). The results show that the presence of formal sustainability tools (e.g., reports, certifications) significantly influences the motivational profile of companies. Those that adopt them attach greater importance to strategic and external drivers, such as customer demand, competitive advantage and workplace well-being. These companies also show greater implementation of operational practices, particularly in technically intensive environmental areas (e.g., renewable energy, energy efficiency, material recycling). The perception of barriers is lower in companies with formal tools, while companies without reports or certifications report higher operating costs, investments and information difficulties. This suggests that formalisation through reports and certifications not only improves the adoption of environmental, social and governance practices, but also reduces perceived barriers and consolidates sustainability as a strategic and operational lever.

1 | Introduction

Companies today face complex challenges in the transition to sustainability, in a context where regulatory pressures, stakeholder expectations and competitive dynamics are intertwined. A first challenge concerns the quality and credibility of disclosure—an element that guides both external perception and internal decision-making processes. Some studies show that high levels of integration in reporting are associated with better social and environmental performance (Sun 2023), while the choice to adopt standards such as the global reporting initiative (GRI) depends on structural factors such as profitability and financial strength (Fülöp and Cifuentes-Faura 2025). However, not all sectors are equally mature: in energy, for example, disclosure on the sustainable development goals (SDGs) remains limited and uneven (Tsalis et al. 2023).

Alongside the quantity of information, external verification also affects the quality of reporting, although its effects vary depending on the geographical context. In some contexts, content-oriented assurance significantly increases the level of disclosure (Darnall et al. 2022), while in others, assurance is

not decisive in improving environmental performance (Khatri and Kjærland 2023). The verification market is growing more slowly than reporting, with accounting firms playing a dominant role but with an increase in technical specialists (Alsahali and Malagueño 2021).

The adoption of reports and certifications is part of a broader framework of strategic responses. Companies use formal tools not only to improve transparency and accountability, but also to gain competitive advantage, reduce risks and strengthen social legitimacy. Environmental certifications (e.g., ISO, EMAS, eco-label) have a positive impact on internal efficiency and reputation, albeit with mixed effects on financial performance (Citterio 2025; He et al. 2022). In some contexts, certifications such as Green Factory stimulate green innovation through learning mechanisms and government incentives (Lan et al. 2025). However, in contexts characterised by weak regulation, certification can also encourage greenwashing practices (Battisti et al. 2025), highlighting the importance of the institutional context.

SMEs represent a particularly complex case. The perceived costs of reporting, the expected benefits for competitiveness and the need for legitimacy have a decisive influence on disclosure choices (Castilla-Polo and Guerrero-Baena 2023). At the same time, studies on European SMEs show that drivers and barriers vary significantly across sectors and supply chains, influencing adoption and sustainable performance (Moursellas et al. 2024, 2023). In Italian benefit corporations, size and non-financial performance are directly correlated with higher levels of corporate social responsibility (CSR) disclosure (De Luca et al. 2025).

At the same time, sustainability is interwoven with innovation, digitalisation and circular models. Spanish manufacturers adopt circular practices especially when they have structured environmental management systems (Barón Dorado et al. 2022). In the foodtech sector, Industry 4.0 technologies and co-creation with stakeholders represent important levers for accelerating the circular transition, although this process is often hampered by costs and regulatory constraints (da Silva and Sehnem 2025). In the textile sector, tools such as digital product passports are emerging as key mechanisms for enhancing traceability, recycling and transparency (D'Adamo et al. 2025).

Corporate responses are also influenced by organisational and governance variables (Hadjielias et al. 2025; Oduro et al. 2025). Family businesses exhibit different environmental behaviours based on their internal governance logic (Miroshnychenko et al. 2025), while the presence of external managers in family firms can strengthen commitment to specific SDGs (Mismetti et al. 2025). Pressure from local communities and signalling mechanisms further contribute to shaping climate strategies (Lee and Rhee 2025). CSR and sustainability reporting can generate significant economic effects (Christensen et al. 2021). However, CSR does not directly improve environmental performance, but contributes indirectly by developing green capacity, which in turn influences environmental outcomes.

Finally, the relationship between reporting and performance is not linear. Some studies highlight initially negative effects on financial performance or customer reactions, which become positive over time as the quality of disclosure improves and stakeholders' ability to interpret such information improves (Alghamdi and Agag 2023; Friske et al. 2023). Large companies and multinationals, despite being among the most active in disclosure, still display significant gaps regarding critical environmental issues such as biodiversity and effluents (Murillo-Avalos et al. 2021).

The adoption and disclosure of environmental, social and governance (ESG) factors support sustainable performance and contribute to corporate value (Vishnu Nampoothiri et al. 2024). In particular, environmental and social disclosures tend to promote sustainable production and alignment with the SDGs, while governance information often remains more procedural in nature (Zhou et al. 2025). Furthermore, the adoption of standards such as the GRI is associated with higher levels of performance across individual SDGs (Gutiérrez-Ponce 2023).

Regulatory changes, negative reactions to ESG and growing fatigue with greenwashing underscore the need for a comprehensive view of the topic. Evidence shows that companies encounter structural obstacles in implementing ESG practices, while entrepreneurial innovation can transform negative reactions into opportunities to improve transparency, strengthen stakeholder trust and pursue long-term sustainability goals (Son and Suh 2025). At the same time, ESG investments have increasingly become the subject of political controversy (Harmes 2025). Furthermore, vague or exaggerated sustainability claims have generated consumer scepticism and greenwashing fatigue, thereby complicating the relationship between disclosure and reputation (Fu et al. 2025; Zhang et al. 2025). In response, regulatory frameworks have evolved through hybrid approaches combining self-regulation with strict environmental governance aimed at rebuilding trust, reducing controversy and strengthening accountability (Muhammad and Aman 2026; Smoleńska and Levi-Faur 2025).

Governance and political factors significantly influence the quality of CSR disclosure. Elements such as executive turnover, political ties and CEO duality are negatively associated with communication transparency, while stronger financial performance tends to improve reporting quality, highlighting the role of agency and stakeholder mechanisms (Rauf et al. 2021; Voinea et al. 2022). More recent studies show that AI-enabled governance structures and the heterogeneity of sustainability committees contribute to improving the quality of ESG disclosures, emphasising that formal instruments act primarily through governance channels and not merely through their adoption (Naveed et al. 2025). The effectiveness of sustainability mechanisms also varies across a company's life cycle, suggesting that the impact of reporting and certifications is context-dependent (Rauf et al. 2025). Their influence is further shaped by organisational context, strategic orientation and firm-specific characteristics, which affect the strength and direction of ESG outcomes (Rauf et al. 2025; Voinea et al. 2019).

In the present study, sustainability maturity was conceptualised as the degree to which sustainability practices are operationally integrated into everyday organisational activities. In empirical terms, this construct is reflected in the extent to which firms integrate sustainability practices into their operational activities. Operational practices represent the implementation dimension of sustainability, while formal

tools such as sustainability reporting and certifications are governance-embedded mechanisms. Rather than assuming a strictly linear causal relationship, a co-evolutionary perspective was adopted, seeing reporting and certification as reflecting existing organisational maturity while contributing to its further institutionalisation through learning, coordination and stakeholder signalling processes.

The study addressed the tension within the existing sustainability literature between governance-embedded tools (e.g., reporting, certifications) and the operational integration of sustainability practices, which are often implicitly treated as linearly aligned despite evidence of decoupling and heterogeneous organisational responses. This study primarily aims to extend prior literature by empirically examining how these dimensions interact in a context characterised by heterogeneous organisational responses, while also providing partial confirmation of existing evidence on the role of formal sustainability tools. Accordingly, the research question investigated how the adoption of formal sustainability tools relates to motivational mechanisms, the implementation of operational practices, the perception of barriers and the overall level of sustainability maturity within firms. The empirical analysis was based on a survey of 100 companies located in southern Italy (Abruzzo), subsequently classified by organisational size, sector, type of activity and target market.

The paper is organised as follows: Section 2 presents the literature review, while Section 3 illustrates the methodology adopted and describes the questionnaire administered to the companies. Section 4 reports the results of the survey, with particular attention to the differences between companies that were or were not producing a sustainability report and between those that had or did not have certifications. Finally, Section 5 discusses the managerial implications that emerged and Section 6 presents the conclusions of the work.

2 | Literature Review

2.1 | Conceptual Framing of Sustainability Tools

Recent research highlights that sustainability reporting and certification should not be interpreted as purely operational tools, but as mechanisms embedded in institutional, signalling and stakeholder dynamics. ESG performance has become a central indicator of corporate sustainable development (Liu et al. 2025). Drawing on legitimacy theory, institutional perspectives suggest that disclosure practices are shaped by legitimacy-seeking behaviour, stakeholder pressure and organisational characteristics, rather than solely by coercive regulation (Solimene et al. 2025). Evidence also suggests that ESG institutionalisation in resource-constrained firms emerges through leadership framing, accountability structures and data-driven integration processes (Hsu and Chang 2026).

From a signalling perspective, sustainability disclosure communicates strategic information to external audiences. ESG performance acts as a signal that influences innovation and productivity outcomes, particularly when signal visibility and credibility are reinforced by media attention and reputation (Xiao et al. 2025). Sustainability commitments may also intensify stakeholder scrutiny when symbolic signals diverge from internal governance practices (Zaccone 2026). Furthermore, disclosure characteristics such as readability affect the extent to which ESG information translates into firm value (Huang et al. 2025). Stakeholder and governance perspectives further clarify these mechanisms. From a stakeholder theory perspective, stakeholder interaction moderates the financial implications of sustainability disclosures (Lin et al. 2025; Talan et al. 2024), while agency-based analyses show that ESG practices may also reflect opportunistic managerial incentives under governance asymmetries (Mao et al. 2024).

Taken together, these perspectives jointly position reporting and certification as governance-embedded instruments, a conceptual positioning that informed the interpretation of sustainability tools in the present study. Specifically, institutional pressures define the external legitimacy context, signalling mechanisms translate sustainability practices into credible information, and stakeholder interactions shape how these signals are interpreted. These mechanisms jointly influence how reporting and certification contribute to sustainability maturity by aligning external expectations, internal governance processes, and organisational responses.

Building on these perspectives, the study distinguished between three analytical dimensions: (i) sustainability maturity refers to the operational integration of ESG practices within firms, (ii) operational practices capture the implementation of sustainability initiatives in daily activities and (iii) sustainability reporting and certifications are formal governance tools that may function simultaneously as signalling devices toward external stakeholders, coordination mechanisms supporting organisational learning and legitimacy instruments responding to institutional pressures. The empirical analysis examined how these dimensions interact without assuming unidirectional causality.

2.2 | Certification and Sustainability Reporting in Sustainable Firms

Following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol (Page et al. 2021), a Scopus search (12 December 2025) was conducted using the search query applied to all fields ‘certification’ and ‘sustainability report’ and ‘sustainable enterprise OR sustainable firm’, limited to the year 2025. The aim was to measure the intersection between these topics, with a specific focus on the last year, and 1480 records emerged. Exclusion criteria were applied to: (E1) documents not published in English, (E2) publications other than journal articles or review articles, and (E3) the presence of ‘certification’ and ‘sustainability report’ in the ‘article title, abstract, keywords’, in order to identify a more appropriate set of works. This resulted in 18 works, which were further reduced to 11, as those not in line with the purpose of the study (E4) were excluded (see Figure 1).

The analysis of these 11 works enabled us to make some observations. Sustainability reports are key tools for transparently communicating corporate commitments to sustainability, helping to improve the legitimacy perceived by various stakeholders (Maleki Vishkaei et al. 2025). External certification (e.g., environmental

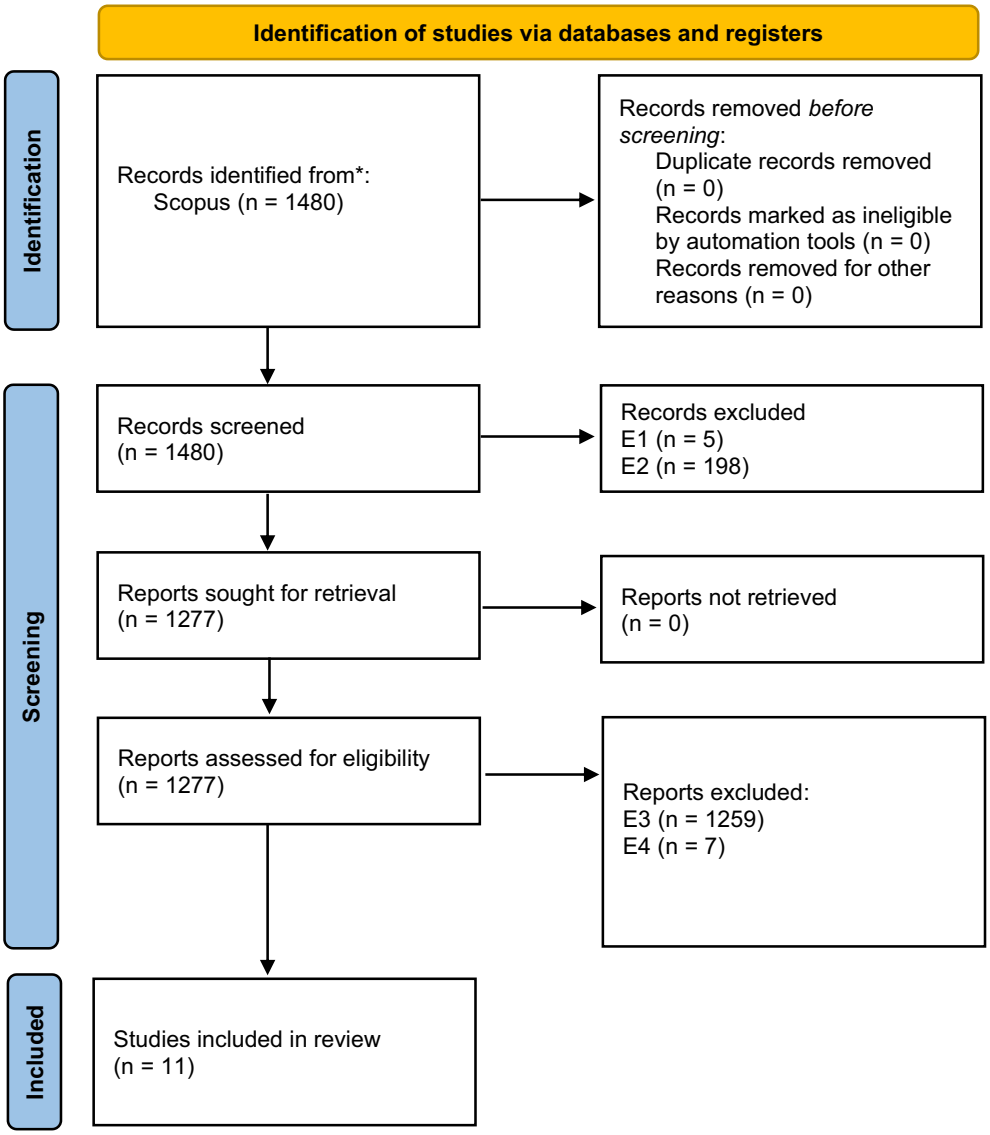

FIGURE 1 | PRISMA diagram.

or social) strengthens the credibility of corporate practices and makes it possible to distinguish between truly strategic actions and those that are merely symbolic (Ruberti and Calciolari 2025). The presence of committees or figures dedicated to sustainability can improve the quality of disclosures, but does not always prevent the risk of greenwashing, especially if dominated by executive interests (Pratama et al. 2025). Companies often use rhetorical and framing strategies in their reports to emphasise innovation and progress, presenting sustainability as part of their long-term vision (Kurniawati and Budi Raharjo 2025). However, the adoption of formal tools such as sustainability reports and certification is linked to greater operational commitment and the integration of sustainability into corporate strategy (Gabrielli et al. 2025). Furthermore, the transparency and quality of reports directly influence stakeholder trust and the perception of accountability, especially in contexts where certifications are verified by third parties (Farace et al. 2025). Finally, the effective implementation of environmental and sustainable strategies requires the support of organisational factors, staff skills and collaboration with external stakeholders, integrating reports and certifications into a systemic approach to maximise impact (Farrukh 2025). Green SMEs are crucial for the transition to a sustainable economy, but they face difficulties accessing credit; targeted loans may increase profitability and banking stability, while certifications alone do not reduce financial risk (Zheng et al. 2025). Dual-purpose enterprises, oriented towards profit and the common good, often show low quality in sustainability reporting, with limited impact of external certifications on transparency (Riso et al. 2025). The green transition also requires a workforce with sustainable skills, but gaps persist between university education and industrial needs (Da Costa et al. 2025; Gomez-Carrasco et al. 2025).

In order to not overlook relevant works published before 2025, the analysis was also conducted for the previous period. An additional 48 works emerged, confirming a publication peak in 2025, after which attention was focused on nine works. Companies in high environmental risk sectors adopt sustainable practices and certification to improve their profile and reduce asymmetric information towards consumers (Nikolaou

and Kazantzidis 2016). Tools such as sustainability indices and CSR reports help to clearly communicate environmental, social and economic impact (Hickle 2017). Transparency through reports and certifications can increase the market value of companies, even if in some cases green certifications do not produce immediate benefits (Merello et al. 2022). In the agri-food sectors, the combination of internal practices and external standards helps to differentiate companies in the market, reducing the risk of greenwashing (Bager and Lambin 2020). The adoption of international standards such as ISO 14001 improves the quality of voluntary environmental disclosures (Rahman et al. 2019), and companies that obtain environmental certifications tend to provide more detailed and transparent information in their sustainability reports (Amran et al. 2014). The integrated management of economic, social and environmental certifications is associated with better economic performance (Nadae et al. 2019). However, there are still some critical issues, and environmental reporting must be linked to business strategies to improve transparency and credibility (Corvino et al. 2021). Regional differences must also be taken into account (Freundlieb and Teuteberg 2013).

2.3 | Research Hypothesis

The literature reviewed in accordance with the research question allowed us to formulate four research hypotheses:

Hypothesis 1. *Firms that adopt formal sustainability tools (reports and certification) place greater emphasis on strategic and external drivers of sustainability, compared to those that do not*.

Hypothesis 2. *The adoption of formal sustainability tools (reports and certifications) is linked to higher levels of operational sustainability practices, particularly in technically demanding environmental areas such as renewable energy, energy efficiency and material recycling*.

Hypothesis 3. *Firms that adopt formal sustainability tools perceive lower barriers to sustainability implementation, particularly economic (*e.g., *operating and investment costs, lack of incentives) and informational barriers (*e.g., *difficulty measuring benefits), which tend to be more pronounced in firms without such tools*.

Hypothesis 4. *Level of sustainable maturity is driven not by firms' structural characteristics (*e.g., *macro-sector, size*, B2*B*/B2*C orientation, types of product/service), but by their capacity to institutionalise sustainability through formal mechanisms such as reports and certification, with effectiveness shaped by governance and organisational context*.

3 | Methodology

The research followed a structured process: a systematic literature review (SLR) highlighted the main elements to be investigated, leading to an empirical analysis to both support companies and contribute to the literature (Forza 2002). Company surveys are useful for gathering direct information on firms' activities, opinions and strategies regarding day-to-day management and more specific topics, such as sustainability. Using questionnaires, interviews or online surveys, aspects such as the use of governance tools, the adoption of sustainable practices, the perception of factors that may drive or hinder sustainability and the use of reports or certifications can be analysed.

The literature highlights that online tools such as Google Forms guarantee confidentiality, thereby reducing bias and incomplete responses (Barbosa et al. 2024). They also facilitate access to and completion of questionnaires, improving the efficiency of data collection (Oke et al. 2023). Some questionnaires concern managers (Le et al. 2025), while others extend the analysis to consultants (D'Adamo et al. 2025). In the present study, the analysis focused on individual companies, though additional responses were obtained through participation in a number of conferences where the questionnaire was presented. Once created, the questionnaire was shared with both international experts on the subject and industrial managers, in order to identify critical issues and nuances. Once finalised, the leaders of Confindustria Abruzzo Medio Adriatico — Chieti Pescara Teramo and Confindustria L'Aquila — Abruzzo Interno disseminated it directly on their websites. The time frame was extensive (May to September 2025), in order to collect a substantial number of responses. The questionnaire was completed anonymously.

The questionnaire, entitled 'Sustainability for Businesses: Strategies, Challenges and Opportunities', had the main objective of exploring the role of sustainability in business strategies, analysing the motivations, challenges and opportunities associated with the adoption of sustainable practices. The information gathered provided an overview of companies' perceptions and actions on sustainability, offering a basis for a strategic assessment of the sector. The questionnaire was structured in three main sections (see Supporting Information):

1. Company information: assessed the type of activity, sector, number of employees, target market, business model and sustainability report management (i.e., internal or with external support).
2. Sustainability practices and drivers: assessed the main factors driving the company to adopt sustainable practices, using a scale of 1–10 to ensure variability in responses (Almanza Floyd et al. 2024); as well as current sustainable operating practices and the presence of sustainability certifications.
3. Strategic perception of sustainability: assessed the extent to which sustainability represented a competitive advantage, the obstacles the company encountered in integrating sustainability and how it expected the issue to evolve over the next 5 years.

The sustainable maturity index was constructed as the average of operational practice items (e.g., waste reduction, energy efficiency, digitalisation), measured on a 1–10 Likert scale, with equal weighting across dimensions. The selected items capture key practices and were aggregated to provide a composite measure of sustainability integration within firms. However, the index relies on self-reported perceptions and equal weighting, which may not fully capture the relative importance or actual performance impact of different sustainability dimensions.

As the study relied on self-report data, social desirability bias and common method bias could not be fully excluded, as

data on predictors and outcomes were collected from the same respondents. To mitigate these risks, respondents were assured of their anonymity and the confidentiality of their data. The data collected was analysed using descriptive statistics and then broken down according to key variables. The groups thus defined were compared using statistical tests, in particular the Kruskal-Wallis test, using Stata software. Companies were divided on the basis of two main criteria, related to the degree of formalisation and the institutionalisation of sustainability:

- The first criterion concerned the use of a sustainability report, distinguishing between companies that did not produce any reports and those that did, and further differentiating the former according to whether these reports were produced internally or with the support of external bodies.
- The second criterion concerned the adoption of sustainability certifications (e.g., ISO 14001, EMAS), considered formal tools for validating the firm's sustainable practices.

The analyses were also conducted according to other variables (i.e., organisational size, sector, type of activity, reference market). Of note, the study focused on the presence of formal sustainability tools rather than their qualitative characteristics (e.g., external assurance, governance design, disclosure readability). Therefore, the analysis captured formal institutionalisation rather than disclosure quality. Given the regional focus of the dataset, the analysis aimed to provide in-depth contextual evidence rather than broad and generalisable claims. Furthermore, the cross-sectional study design precluded the identification of causal relationships. Therefore, the results should be interpreted as correlational evidence of co-occurring patterns, rather than proof of directional effects.

In addition to the non-parametric group comparisons, a multivariate analysis was conducted to strengthen the robustness of the empirical results. A first binary logistic regression model was estimated to examine the determinants of sustainability certification. The dependent variable took a value of 1 if the firm held at least one sustainability certification, and 0 otherwise. Independent variables included firm size (number of employees), perceived competitive advantage, market orientation and the average level of perceived sustainability barriers. A second logistic regression model was estimated to examine the determinants of sustainability reporting (dependent variable = 1 if the firm produced a sustainability report, 0 otherwise). The same set of independent variables was included to allow comparability between certification and reporting models. Odds ratios were presented to quantify the strength of associations. Multicollinearity was assessed using variance inflation factors (VIF < 2.3), indicating minimal collinearity among predictors, while the receiver operating characteristic (ROC) analysis was used to further evaluate the model's robustness and predictive performance.

4 | Results

4.1 | Sample Description

The sample consisted of 100 companies located in the Abruzzo region, operating in different sectors and with heterogeneous structural characteristics. The companies were mainly small businesses (1–49 employees), accounting for 54% of the total, followed by medium-sized companies (50–249 employees), accounting for 34%, and to a lesser extent, large companies (> 250 employees), accounting for 12% of the sample.

The companies belonged to three main macro-sectors: Industrial Manufacturing (36%), Services and ICT (26%), and Construction and Environment (36%), with a further 2% not specifying their sector. This split indicates a good representation of the national production sectors. In terms of the field of activity, part of the sample specialised in the production of goods (38%), another in the provision of services (44%), and a significant proportion (18%) operated in a hybrid mode, combining both activities. In terms of the reference market, the distribution was diversified, with 54% of companies focusing exclusively on the domestic market and 46% operating simultaneously in domestic and international markets.

From a sustainability governance perspective, most companies did not produce a sustainability report (64%), while 36% did (of these, 26% produced the report internally and 10% outsourced reporting to an external body). A portion of the sample did not have a sustainability certification (56%, e.g., ISO 14001, EMAS), while a minority had at least one certification (44%).

4.2 | Influence of the Macro-Sector on Sustainability Dynamics

The association between macro-sector and sustainability reporting was analysed to assess whether the propensity to produce a report depended on the sector of activity. The distributions showed descriptive differences, such as the higher incidence of internal reporting in the Construction and Environment macro-sector and the total absence of external reporting in the Services and ICT sector (Table 1). However, despite these differences, the chi-square test did not find a statistically significant association between variables ($\chi^2 = 3.0887$, $p = 0.2135$).

This suggests that the decision to prepare a sustainability report was not strongly influenced by the sector of activity, and reporting did not follow a pattern that could be explained by sectoral differences or specific regulations. This may reflect a growing homogenisation of sustainability expectations, with reporting practices spreading beyond the traditionally more regulated sectors.

TABLE 1 | Sustainability reports by macro-sector (number of companies).

Macro-sector	No. report	External report	Internal report
Construction and environment	20	4	12
Industrial manufacturing	24	6	6
Services and ICT	20	0	6

Note: Chi-square: $\chi^2 = 7.2976$, df = 4, $p = 0.121$.

However, analysis of reporting methods, divided into three categories (no reporting, internal reporting, external reporting), highlighted some differences: internal reporting prevailed in the Construction and Environment sector, no external reports were recorded in the Services and ICT sector, and there was a marked preference for internal reporting in Industrial Manufacturing. However, even in this case, the chi-square test did not show a significant relationship between reporting methods and macro-sectors. These results suggest that the choice between internal and external reporting was not dependent on the sector, but was more closely associated with general factors, such as company size or sustainability strategy.

A different dynamic emerged from the relationship between macro-sector and sustainability certifications. As shown in Table 2, the differences between sectors were marked and statistically significant ($\chi^2 = 17.227$, $p < 0.001$). The Construction and Environment sector had the highest proportion of certified companies (72.2%), potentially reflecting the high level of technical and environmental regulation and the need to certify compliance and reduce operational risk. In contrast, Industrial Manufacturing showed a much lower percentage (27.8%), while Services and ICT ranked in the middle (30.8%).

The analysis of the sustainable maturity index, calculated as the average of operational practices completed the picture (Table 3). The averages in the three macro-sectors were very similar (between 6.01 and 6.36), and the Kruskal-Wallis test confirmed the absence of statistically significant differences ($p = 0.756$). This indicates that, while certifications showed strong sectoral specificity, the adoption of daily sustainability practices was evenly distributed across sectors. Additionally, the internal consistency of the sustainable maturity index was assessed using Cronbach's alpha, which indicated excellent reliability ($\alpha = 0.924$). This confirms the robustness of the composite measure employed in the empirical analysis.

Overall, the macro-sector represented a discriminating factor for the certified formalisation of sustainability initiatives, but was not influential for voluntary reporting or the level of sustainability maturity. This suggests that, while the regulatory framework may affect certification processes, operational practices and the decision to produce a report are increasingly driven by internal factors, supply chain requirements and cross-cutting pressures that are not strictly sector-specific.

TABLE 2 | Sustainability certifications by macro-sector.

Macro-sector	No certification	Yes certification	% certified
Construction and environment	10	26	72.2
Industrial manufacturing	26	10	27.8
Services and ICT	18	8	30.8

Note: Chi-square: $\chi^2 = 17.227$, df = 2, $p = 0.00018$.

TABLE 3 | Sustainable maturity index by macro-sector.

Macro-sector	Index average
Construction and environment	6.012
Industrial manufacturing	6.358
Services and ICT	6.274

Note: Kruskal–Wallis: $\chi^2 = 0.5604$, df = 2, $p = 0.756$.

4.3 | Sustainability Objectives (Sustainability Drivers)

Sustainability drivers motivate companies to adopt ESG practices, formalise governance tools and, where applicable, prepare reports. The above analyses revealed regulatory pressures, customer demands, value-based objectives, strategic needs and economic incentives as relevant drivers. Accordingly, these dimensions were measured on a scale of 1–10 to identify not only their relative relevance but also any differences related to firms' structural and institutional characteristics.

Table 4 shows the average driver relevance for two groups: companies less likely to produce a report ('No') and companies more likely to produce a report ('Yes'), with the corresponding *p*-values from the Kruskal-Wallis test. The table thus highlights how the different motivations were distributed between companies who chose to produce a sustainability report and those who did not.

The analysis of drivers revealed significant differences between companies that prepared sustainability reports and those that did not. Customer/consumer demands ($p = 0.0016$) showed the most significant difference, with companies producing reports considering this aspect much more important. This suggests that sustainability may be increasingly responding to market pressures for social and environmental responsibility. Internal corporate strategy ($p = 0.0373$) also emerged as significant, with companies producing reports integrating sustainability more into their mission and long-term strategies. Competitive advantage ($p = 0.0079$) was equally significant, suggesting that companies producing reports perceived sustainability as a differentiating factor in the market. Finally, improvement in workplace well-being ($p = 0.0055$) was rated more positively by companies that produced reports, indicating an impact of sustainability on the internal climate and employee motivation. Conversely, environmental regulations and standards ($p = 0.8949$) and access to incentives and financing ($p = 0.3145$) showed no significant differences between companies, regardless of whether or not reports were produced.

A second analysis was conducted considering sustainability certifications, aggregating the responses into two groups: 'Yes' (companies certified both internally and by external bodies) and 'No'. For each group, driver averages were calculated and a Kruskal-Wallis test was applied (Table 5) to assess whether the possession of certifications also influenced motivation for sustainability.

The analysis of drivers related to sustainability certification showed some clear evidence and other less relevant findings. A highly significant difference between certified and non-certified companies ($p = 0.00006$) was evident for customer/consumer demands, with certified companies attributing much greater

TABLE 4 | Driver averages for companies less ('No') and more ('Yes') likely to produce sustainability reports.

Driver	No report	Yes report	*p*
Regulations and standards	6.56	6.61	0.8949
Requests from customers/consumers	5.34	7.06	0.0016
Internal company strategy	6.34	7.22	0.0373
Competitive advantage	5.56	7.06	0.0079
Access to incentives and financing	6.16	6.72	0.3145
Ethics and corporate awareness	6.50	7.22	0.1573
Investor demands (ESG criteria)	5.16	5.72	0.2523
Improvement of brand image	6.72	6.83	0.7817
Company purpose (generating long-term value)	6.19	7.11	0.0690
Improvement in workplace well-being	6.72	8.39	0.0055

TABLE 5 | Drivers by certification.

Driver	No certification	Yes certification	*p*
Regulations and standards	6.18	7.09	0.088
Requests from customers/consumers	5.07	7.09	0.00006
Internal company strategy	6.68	7.22	0.642
Competitive advantage	5.71	7.06	0.168
Access to incentives and financing	6.43	6.27	0.735
Ethics and corporate sensitivity	6.71	6.82	0.955
Investor demands (ESG criteria)	5.25	5.50	0.614
Improvement of brand image	6.89	6.59	0.582
Company purpose (generating long-term value)	6.32	6.77	0.464
Improvement in workplace well-being	6.72	8.39	0.099

value to this factor, probably in response to growing market expectations for sustainable practices. Conversely, company ethics and sensitivity to sustainability ($p = 0.955$) and access to incentives and financing ($p = 0.735$) showed no significant differences, indicating that certification did not affect the perception of these aspects. Internal company strategy ($p = 0.642$) and improvement of brand image ($p = 0.582$) also had similar values between the two groups, suggesting that these drivers do not depend on certification. Environmental regulations and standards ($p = 0.088$) and improvement in workplace well-being ($p = 0.099$) showed marginally significant but not statistically relevant differences.

In summary, while some drivers (primarily consumer demands) were decisive for certified companies, others did not seem to be influenced by certification. This confirms that sustainability is likely driven by a heterogeneous set of factors, of which not all are directly related to formal instruments. The results also suggest that sustainability-oriented companies should pay particular attention to external pressures (e.g., customer expectations), rather than internal or value-based drivers, which seem to have a less decisive impact on business decisions.

Further analysis by company size revealed that customer/consumer demands ($p = 0.041$) and access to incentives and financing ($p = 0.003$) varied significantly according to company size. Medium and large companies were more influenced by these factors, probably due to the greater complexity of commercial relationships and the presence of corporate customers, as well as a greater ability to seize economic opportunities linked to sustainability. On the contrary, value drivers (ethics, corporate values, purpose) are transversal and do not differ according to size, suggesting a common cultural basis regardless of organisational structure.

4.4 | Operational Practices and Sustainable Maturity Index

Operational practices represent a concrete corporate commitment to sustainability. Unlike drivers or obstacles, which reflect perceptual or intentional dimensions, such practices describe the implementation of daily initiatives such as waste management, energy efficiency, digitalisation, staff training, smart working and additional services for employees. The sustainable maturity index, calculated as the average of these practices, provides a summary measure of the degree of sustainability integration into company activities.

The results offer useful guidance for companies wishing to strengthen their commitment: in particular, there is a need to expand the adoption of practices related to employee welfare,

smart working and sustainable services, which are still less developed. Companies that are already advanced in energy and waste management can instead focus on further technological and organisational refinement, promoting greater consistency in the application of different practices.

The analysis of practices in relation to the presence of certifications also highlighted significant differences between certified and non-certified companies, suggesting that certification may affect the adoption of more structured environmental and social practices. Table 6 shows the average responses for each practice, comparing the two groups.

The analysis showed that certified companies tended to adopt more advanced practices than non-certified companies in certain key areas: material reuse and recycling ($p = 0.083$), energy efficiency and use of green buildings ($p = 0.074$), adoption of renewable energy ($p = 0.071$) and sustainability-oriented employee services ($p = 0.083$). Although the p-values were slightly above the threshold of statistical significance, the differences between groups were relevant, as certified companies showed a greater propensity for solutions that reduce environmental impact (e.g., recycling, energy efficiency, use of renewable energy). These results suggest that certifications are associated with a higher adoption of more structured environmental practices. Conversely, practices such as staff training ($p = 0.274$), digitalisation ($p = 0.716$), smart working ($p = 0.703$) and employee welfare ($p = 0.326$) showed no significant differences between certified and non-certified companies. This indicates that, regardless of certification, companies invested similarly in training, digital innovation and employee welfare, reflecting a general commitment to social sustainability and reducing social impact.

Certification seems to have stimulated the adoption of advanced environmental practices, but without the same impact on digitalisation, welfare and training. For managers, this implies that certification may promote energy efficiency and environmental sustainability, while social and digital practices require independent attention to meet modern expectations of corporate responsibility.

A further aspect concerns the link between sustainability reporting and the adoption of sustainable practices. Companies that produce reports, either internally or through external bodies, may be more inclined to adopt advanced environmental practices. Table 7 shows the average responses for each practice, comparing companies that produced reports with those that did not, together with the corresponding p-values.

The analysis of sustainable practices showed that the adoption of renewable energy ($p = 0.0139$) was the only practice with a statistically significant difference between companies that produced a sustainability report and those that did not. Companies with both internal and external reports showed higher levels of renewable energy, suggesting that reporting is associated

TABLE 6 | Practices by certification.

Practice	Yes certification	No certification	*p*
Reduction of waste production in the company	7409	6857	0.175
Programmes for reuse, recovery and recycling of materials	7227	6286	0.083
Energy efficiency and use of green buildings	7500	6571	0.074
Adoption of renewable energy	7409	6286	0.071
Staff involvement and training on sustainability issues	6727	6143	0.274
Adoption of digital solutions to reduce paper consumption	7091	6893	0.716
Sustainability-oriented employee services	5909	4857	0.081
Propensity for smart working	4864	5107	0.703
Employee welfare (nurseries, gyms)	5136	4607	0.326

TABLE 7 | Practices by sustainability reports.

Practice	No report	Yes report	*p*
Reduction of waste production in the company	70,625	7.1667	0.7900
Programmes for the reuse, recovery and recycling of materials	6.5938	6.8889	0.6003
Energy efficiency and use of green buildings	6.625	7.6111	0.0640
Adoption of renewable energy	6218	7.7778	0.0139
Staff involvement and training on sustainability issues	6.2813	6.6111	0.5424
Adoption of digital solutions to reduce paper consumption	6.9688	7.0000	0.9548
Sustainability-oriented employee services	4.9375	6.0000	0.0967
Propensity for smart working	5.0625	4.8889	0.7880
Employee welfare (nurseries, gyms)	4.5313	5.3889	0.1164

with both an already established commitment and a higher adoption of advanced solutions such as solar panels or green energy contracts.

Similarly, but with marginal significance, energy efficiency and the use of green buildings emerged ($p = 0.064$), indicating that companies with reports tended to better structure their consumption reduction policies (e.g., through LED lighting, insulation systems and energy management practices), possibly reflecting the more systematic approach associated with reporting. On the contrary, practices such as waste reduction, recycling, staff training on sustainability and digitalisation showed no significant differences between groups, with *p*-values above 0.05. Digitalisation, in particular, seemed to respond more to operational efficiency logic than to strategies induced by reporting. Corporate welfare and employee services also showed no significant variations: although averages were sometimes higher in companies with reports, the *p*-values indicated no statistically significant differences, suggesting that attention to staff welfare did not necessarily depend on reporting.

A further analysis distinguished between companies producing internal versus external reports, in order to better assess the impact of the type of reporting on the adoption of sustainable practices (Table 8).

This analysis revealed significant differences in certain practices. Waste reduction ($p = 0.0201$) was more pronounced in companies that produced internal reports than in those that did not, suggesting that a formal, documented commitment may encourage more careful waste management. Similar evidence concerned the adoption of renewable energy ($p = 0.0170$), with companies with internal reports more likely to adopt green energy solutions. Employee welfare ($p = 0.0283$) was also higher in companies with internal reports, indicating that commitment to sustainability may extend to staff well-being. For other practices, such as recycling, energy efficiency, training and digitalisation, no significant differences emerged, suggesting similar adoption across categories. Overall, companies that produced reports, especially internal ones, tended to demonstrate more sophisticated implementation of advanced environmental practices.

4.4.1 | Company Size and Sustainable Practices

An analysis of the relationship between company size and the level of implementation of sustainable practices revealed interesting results. Only two practices showed statistically significant differences (Table 9): reduction of waste production ($p = 0.0054$) and adoption of digital solutions to reduce paper use ($p = 0.0168$). In both cases, medium-sized companies (50–249 employees) scored highest, followed by small companies and large companies.

This pattern suggests that medium-sized companies represent the optimal point for the adoption of operational practices: structured enough to invest in internal initiatives, but not so large as to be

TABLE 8 | Practices reported in sustainability reports, distinguishing between internal and external documentation.

Practice	No report	External report	Internal report	*p*
Reduction in waste production within the company	7.062	7.803	6.923	0.0201
Programmes for the reuse, recovery and recycling of materials	6.5938	6.232	7.153	0.3424
Energy efficiency and use of green buildings	6.625	7.411	7.692	0.0823
Adoption of renewable energy	6.2188	7.421	7.923	0.0170
Staff involvement and training on sustainability issues	6.2813	6.413	6.692	0.4933
Adoption of digital solutions to reduce paper consumption	6.9688	6.433	7.230	0.5783
Sustainability-oriented employee services	4.9375	5.418	6.230	0.0967
Propensity for smart working	5.0625	5.212	4.769	0.6800
Employee welfare (nurseries, gyms)	4.5313	4.431	5.769	0.0283

TABLE 9 | Sustainable practices by company size.

Practice	Small	Medium	Large	*p*
Reduction in waste production within the company	7.12	7.64	5.55	0.0054
Programmes for the reuse, recovery and recycling of materials	6.81	7.03	6.23	0.35
Energy efficiency and use of green buildings	7.05	7.45	6.04	0.30
Adoption of renewable energy	6.41	6.82	5.71	0.56
Staff involvement and training on sustainability issues	6.94	7.36	5.93	0.147
Adoption of digital solutions to reduce paper consumption	6.78	7.5	5.87	0.0168
Sustainability-oriented employee services	6.31	6.73	5.46	0.54
Propensity for smart working	6.13	6.82	5.21	0.61
Employee welfare (nurseries, gyms)	6.0	6.5	5.1	0.8

held back by the organisational rigidity typical of large companies. Large companies, on the other hand, may be limited by their complex processes, greater hierarchical distance and difficulties in quickly transferring large-scale operational changes. Small companies reported higher values than large ones, likely due to their greater flexibility and speed of implementation, despite having more limited resources. This difference was particularly evident in practices such as process digitalisation and training, for which adoption requires modest investment.

4.4.2 | Certification and Sustainable Maturity

Analysis of the relationship between certification and the sustainable maturity index based on practices showed that certified companies had a significantly higher index (6.58) than non-certified companies (5.96) (Table 10).

This result suggests that certification is more frequently observed in firms that have already undergone a process of internal consolidation. Certified companies may apply sustainability practices more intensively in their daily work and, due to this operational maturity, meet the requirements of formal standards.

4.4.3 | Reporting and Sustainable Maturity

The relationship between reporting methods and the practice-based sustainable maturity index (Table 11) showed linear growth in the index from companies without reporting (6.03) to those that outsourced reporting (6.29) to companies that internally prepared reports (6.71).

This trend indicates a consistent path of development: voluntary reporting—especially internal reporting—was evident in companies that had already consolidated a broad set of operational practices. Reporting therefore appears to be associated with higher levels of internal maturity rather than representing an isolated act. Companies that prepared their reports internally also showed higher levels in less widespread practices, such as renewable energy, welfare and digital solutions, confirming an advanced organisational culture and a strategic approach to sustainability.

TABLE 10 | Sustainable maturity index for certification.

Certification	Average index
No	5.96
Yes	6.58

TABLE 11 | Sustainable maturity index by sustainability reports, distinguishing between internal and external documentation.

Type of report	Sustainable maturity index
No report	6.03
External report	6.29
Internal report	6.71

4.5 | Barriers to Sustainability

Barriers represent the 'defensive' component of sustainability—factors that limit or slow down the integration of ESG practices. Nine dimensions were considered in the dataset: operating costs, investment costs, lack of incentives, difficulty in measuring benefits, regulatory complexity, lack of internal expertise, difficulty in finding sustainable suppliers, resistance to change and mistrust of sustainability. Each obstacle was measured on a scale of 1–10, with higher values indicating more significant barriers. The analysis aimed to verify whether these obstacles varied according to structural characteristics, the presence of certifications or the production of sustainability reports.

An initial examination of the relationship between certification and the perception of obstacles (Table 12) revealed only one significant difference: difficulty in measuring the economic benefits of sustainability was higher in non-certified companies (average = 6.60) than in certified companies (average = 5.68), $p = 0.0288$. This suggests that certification, in addition to the formalisation of processes and roles, contributes to the development of internal tools and capabilities that facilitate the economic assessment of ESG initiatives. For all other obstacles, the differences were not statistically significant.

A further analysis was conducted to identify any differences between companies that produced a sustainability report (internal or external) and those that did not, as well as the obstacles that influenced this choice (Table 13).

The analysis of perceived barriers to sustainability reporting did not reveal any significant differences between companies that produced reports and those that did not. Barriers such as operating costs ($p = 0.4701$), investment costs ($p = 0.8221$), and lack of financial incentives ($p = 0.4803$) showed no significant variations, nor did difficulty in measuring economic benefits ($p = 0.3011$), regulatory complexity ($p = 0.2921$), difficulty in finding sustainable suppliers ($p = 0.9461$), lack of internal expertise ($p = 0.7652$), resistance to change ($p = 0.8303$), and mistrust in sustainability as a long-term investment ($p = 0.3021$). In summary, producing a report did not seem to pose any major obstacles, suggesting that companies should focus on managing issues such as measuring economic benefits and regulatory complications, without perceiving the report as an obstacle.

A more detailed analysis considered how the report was prepared, distinguishing between internal and external reports. For each group, the average for each obstacle was calculated and a Kruskal-Wallis test was applied to verify statistically significant differences between groups (Table 14).

The analysis of p-values highlighted significant differences between companies with and without sustainability reports for certain economic obstacles: operating costs ($p = 0.0021$), investment costs ($p = 0.0090$) and lack of incentives ($p = 0.0228$). Companies that produced reports perceived these obstacles as significantly lower, suggesting greater awareness of economic challenges and a potential link with the transparency associated with reporting. Difficulties in measuring economic benefits ($p = 0.0161$) were also lower in companies with reports,

TABLE 12 | Barriers to certification.

Barrier	No certification	Yes certification	*p*
Operating costs	6.93	6.63	0.6108
Investment costs	7.86	6.72	0.1092
Lack of incentives	7.43	6.77	0.6184
Regulatory complexity	6.60	5.68	0.0288
Difficulty in measuring benefits	6.71	6.09	0.2914
Skills shortage	5.86	5.90	0.8658
Sustainable suppliers	6.00	5.81	0.7042
Resistance to change	6.61	5.91	0.4773
Lack of confidence in sustainability	4.93	4.36	0.3121

TABLE 13 | Barriers identified in sustainability reports.

Barrier	No report	Yes report	*p*
Operating costs	6.91	6.61	0.4701
Investment costs	7.56	7.00	0.8221
Lack of incentives	7.34	6.78	0.4803
Regulatory complexity	6.34	5.94	0.3011
Difficulty measuring benefits	6.34	6.61	0.2921
Sustainable suppliers	5.88	5.89	0.9461
Skills shortage	5.91	5.94	0.7652
Resistance to change	6.34	6.22	0.8303
Lack of confidence in sustainability	4.87	4.33	0.3021

TABLE 14 | Barriers identified in sustainability reports, distinguishing between internal and external documentation.

Obstacle	No report	External report	Internal report	*p*
Operating costs	6.90625	4.4109	7.46	0.0021
Investment costs	7.5625	5.0121	7.769231	0.0090
Lack of incentives	7.34375	5.0232	7.461538	0.0228
Difficulty in measuring economic benefits	6.34375	4.6143	6.461538	0.0161
Bureaucratic complexity	6.34375	4.8211	7.307692	0.1372
Difficulty in finding sustainable suppliers	5.875	6.0521	5.846154	0.8871
Lack of internal skills	5906	6.2104	5.846154	0.7164
Resistance to change	6.34375	6.023	6.307692	0.9108
Lack of confidence in sustainability	4.875	3020	4.846154	0.0510

suggesting that reporting may facilitate the monitoring and evaluation of returns on sustainable practices. For other obstacles, such as bureaucratic complexity ($p = 0.1372$), difficulty in finding sustainable suppliers ($p = 0.8871$), lack of internal expertise ($p = 0.7164$) and resistance to change ($p = 0.9108$), no significant differences were observed, suggesting a similar perception among groups. Finally, mistrust in sustainability ($p = 0.0510$) tended to be higher in companies without reports, although it did not reach statistical significance. This suggests that firms who do not report may be less involved and more sceptical about the effectiveness of sustainability as a guiding principle.

A further comparison was made based on the type of business (i.e., products, services, both). The most obvious differences, confirmed by the Kruskal-Wallis test, concerned operating costs ($p = 0.0045$), investment costs ($p = 0.0000209$) and incentives ($p = 0.0112$) (Table 15). Hybrid companies ('Both') reported the highest values for all three obstacles, indicating greater exposure to the economic complexity of sustainability, while service companies showed lower values, likely due to lower material investment and leaner processes. No other obstacles showed a significant between-group difference.

4.6 | Determinants of Sustainability Certification: Multivariate Analysis

To further examine the determinants of sustainability certification and address potential endogeneity concerns, a logistic

TABLE 15 | Barriers by type of company.

Barrier	Products	Services	Both	*p*
Operating costs	6.42	6.59	8.11	0.0045
Investment costs	7.68	6.59	8.55	0.0000209
Lack of incentives	7.52	6.59	7.66	0.0112
Regulatory complexity	6.14	6.16	6.66	0.35
Difficulty in measuring benefits	6.07	5.66	5.92	0.28
Skills shortage	5.81	5.93	6.22	0.79
Sustainable suppliers	6.21	5.60	5.75	0.383
Resistance to change	6.33	5.93	6.11	0.71
Distrust of sustainability	5.14	4.70	5.27	0.51

TABLE 16 | Logistic regression — Determinants of certification.

Variable	*p*
Firm size	0.010
Competitive advantage	0.002
Domestic market	0.001
Avg. barriers	0.101

Note: $N = 100$; LR $\chi^2 = 28.89$ ($p < 0.001$); Pseudo $R^2 = 0.21$; ROC AUC = 0.77.

regression model was estimated. The model was globally significant ($p < 0.001$) with satisfactory explanatory power (Pseudo $R^2 \approx 0.21$), indicating good fit for cross-sectional survey data (Table 16).

The results showed that firm size (number of employees) had a positive and statistically significant effect on the probability of certification, suggesting that larger firms were more likely to adopt formal sustainability certifications. Perceived competitive advantage was also positively and strongly associated with certification adoption, suggesting that certification may have been driven by strategic motivations, rather than purely symbolic considerations. Market orientation towards the national market was positively associated with certification, suggesting that domestic competitive dynamics and supply-chain pressures may have played a relevant role. Finally, the average level of perceived barriers showed a negative (borderline) effect, suggesting that higher perceived obstacles may have reduced the likelihood of certification.

4.7 | Determinants of Sustainability Reporting: Multivariate Analysis

A second logistic regression model was estimated using sustainability reporting as the dependent variable. The model was globally significant ($p < 0.001$) with satisfactory explanatory power (Pseudo $R^2 = 0.26$), indicating good fit for cross-sectional survey data (Table 17).

The results indicated that firm size was positively and statistically significant, suggesting that larger firms were more likely to adopt sustainability reporting. Perceived competitive advantage was also positively and significantly associated with reporting

TABLE 17 | Logistic regression — Determinants of sustainability reports.

Variable	*p*
Firm size	< 0.001
Competitive advantage	0.003
Domestic market	0.009
Products (vs. hybrid)	0.009
Services (vs. hybrid)	0.006
Avg. barriers	0.078

Note: $N = 100$; LR $\chi^2 = 33.86$ ($p < 0.001$); Pseudo $R^2 = 0.26$; ROC AUC = 0.83.

adoption, suggesting that reporting was strategically driven. Market orientation towards the domestic market showed a positive and significant effect, suggesting that national competitive dynamics played an important role. Firm type also significantly affected reporting adoption. Compared to hybrid firms (reference category), companies focused exclusively on products or services showed a significantly lower probability of producing a sustainability report, suggesting that greater organisational and stakeholder complexity increased the likelihood of formal reporting. Finally, the average level of perceived barriers showed a negative and borderline significant effect, suggesting that higher perceived obstacles may have reduced the probability of reporting adoption.

4.8 | Formal Sustainability Tools: Reports and Certification by Size and Sector

Formal sustainability tools support transparency, reporting and compliance. Most companies did not produce reports, with small firms showing the least reporting, medium-sized firms favouring internal reports and large firms reporting less than expected, likely due to complexity or strategic priorities. Reporting decisions depended more on internal dynamics (e.g., culture, key customers, dedicated functions) than on size or sector. Companies that reported demonstrated higher sustainability maturity, faced fewer barriers and used reporting as a mechanism to structure processes, reduce uncertainty and guide strategic behaviour. The diffusion of sustainability certification was strongly influenced by firms' macro-sector (Table 18), with higher values in Construction and Environment (72.2%) and lower uptake in

Industrial Manufacturing and Services and ICT (27.8% and 30.8%, respectively), likely due to less institutional pressure.

Certified companies exhibited higher sustainability maturity, suggesting that operational practices typically preceded formal certification, which served as a 'point of arrival' rather than a starting intervention. Certification reduces perceived difficulties in measuring sustainability benefits and regulatory uncertainty by introducing structured metrics, audits and formal procedures. For reporting, obstacles decreased with the formalisation of governance: companies without reports faced the highest economic and managerial barriers, internal reporters experienced intermediate levels and those that outsourced reporting faced the fewest. This suggests that formalised processes may progressively ease implementation challenges.

4.9 | Structural Characteristics and Reporting

The relationship between a company's structural characteristics and its predisposition to prepare sustainability reports was subsequently analysed to determine whether variables such as type of activity (products, services or both), target market (domestic or international) and business model (B2B, B2C or hybrid) influenced stakeholder pressure and voluntary reporting decisions.

An initial comparison concerned the type of activity (Table 19). Hybrid companies (products and services) showed the highest reporting rate (55.6%), while companies focused exclusively on products reported lower levels (26.3%), and service companies occupied an intermediate position (36.4%). Although the chi-square test did not show statistical significance, the descriptive differences suggest that hybrid companies, due to their greater operational and relational complexity, were more exposed to sustainability pressures from various stakeholders, favouring the adoption of reporting tools.

A second element of analysis concerned the reference market (Table 20). Although international operations increase pressure towards transparency and reporting, the results did not show significant differences ($\chi^2 = 3.6294$, $p = 0.1629$). Companies operating only in the domestic market reported a similar reporting rate to those operating both domestically and internationally, suggesting a growing spread of ESG practices even in contexts without high disclosure requirements or significant alignment of domestic stakeholders with international standards.

Finally, the relationship between firms' business model (B2B, B2C or mixed) and their perception of obstacles related to sustainable suppliers, linked to the management of supply chains consistent with ESG standards, was analysed. B2B companies reported the highest difficulties on average (6.21), followed by hybrid companies (5.75) and B2C companies (5.60) (Table 21). However, the Kruskal-Wallis test ($p = 0.383$) did not reveal significant differences, suggesting that the challenges associated with supply chain sustainability were cross-cutting and did not only affect B2B companies, which are traditionally more exposed to supply chain complexity.

Overall, reporting propensity and perceived barriers were largely unrelated to companies' markets or business models. Some trends suggest that hybrid firms and those with complex supply chains paid more attention to sustainability, but the differences were not statistically significant. This reinforces that sustainable maturity depends mainly on internal organisational dynamics and company-specific configurations, rather than general structural factors.

5 | Discussion

The present results confirm that sustainability reports and certification are strategic levers for improving the transparency, credibility and operational commitment of companies to sustainability (Gabrielli et al. 2025; Maleki Vishkaei et al. 2025; Ruberti and Calciolari 2025). These findings suggest that the role of formal sustainability tools is not merely operational, but reflects deeper organisational dynamics, in which governance structures, strategic direction, and stakeholder pressures interact to determine the degree to which sustainability is integrated.

The adoption of international standards such as GRI or ISO is associated with better environmental and social performance (Amran et al. 2014; Fülöp and Cifuentes-Faura 2025;

TABLE 18 | Certification by macro-sector.

Macro-sector	% Certified
Construction and Environment	72.2
Industrial manufacturing	27.8
Services and ICT	30.8

TABLE 19 | Type of company and sustainability reports.

Type of company	No report	Yes report	% report
Products	28	10	26.3
Services	28	16	36.4
Both	8	10	55.6

TABLE 20 | Reference market and sustainability reports.

Market	No report	External report	Internal report
National	32	4	18
National and International	32	6	8

Note: $\chi^2 = 3.6294$, df = 2, $p = 0.1629$.

TABLE 21 | Business model and the sustainable suppliers barrier.

Business model	Average supplier barrier	*p*
B2B	6.21	
B2C	5.60	
Both	5.75	0.383

Gutiérrez-Ponce 2023; Rahman et al. 2019). The effectiveness of certification varies depending on the institutional context and internal governance, with risks of greenwashing arising in the absence of adequate controls (Battisti et al. 2025; Pratama et al. 2025). SMEs and dual-purpose enterprises face challenges related to perceived costs, access to credit and sustainable skills, confirming the need for integrated strategies combining formal tools, training and stakeholder engagement (Da Costa et al. 2025; Riso et al. 2025; Zheng et al. 2025). At the same time, digital innovation and circular practices are emerging as key elements for traceability, recycling and alignment with the SDGs (Barón Dorado et al. 2022; D'Adamo et al. 2025; da Silva and Sehnem 2025). Overall, the results show how the impact of sustainability tools varies according to the sector, company size and organisational capacity, highlighting the need for systemic and integrated approaches to maximise effectiveness (Hickle 2017; Khan et al. 2021; Nikolaou and Kazantzidis 2016; Treepongkaruna 2024). Sustainability and its application in businesses cannot be separated from the pragmatism model and the central role of human resources (Almanza Floyd et al. 2024). In this context, sustainable communities rely on the fundamental role of education (Basilico et al. 2026). Sustainability increases consumer confidence, but it is not yet a key factor in purchasing decisions (D'Adamo et al. 2026). The challenge of sustainability requires a comprehensive and systemic approach (Blancas and Contreras 2025), grounded in a long-term perspective, that engages young people, promotes models of the green and circular economy, and views sustainability as a driver of innovation capable of anticipating change, with a view to balancing the needs of stakeholders and the protection of ecosystems (D'Adamo 2025).

However, these findings also highlight the potential risk of a gap between the formal adoption of sustainability principles and actual outcomes. In some contexts, reporting and certification may be implemented in a purely symbolic manner, without leading to a corresponding improvement in underlying practices, suggesting that the effectiveness of these tools may depend more on organisational and institutional conditions.

The present findings do not imply strict causality. Firms with stronger sustainability orientations are more likely to adopt reporting and certification, reflecting possible self-selection. In particular, firms that are already more advanced in sustainability may be more likely to adopt reporting and certification, introducing potential self-selection bias and endogeneity concerns that limit the ability to disentangle directionality. Formal tools both mirror prior maturity and can reinforce sustainability through governance, learning and stakeholder signalling. Adoption is linked to higher operational maturity and lower perceived barriers, but it does not guarantee substantive performance, as effectiveness depends on governance, organisational characteristics and strategy (Naveed et al. 2025; Rauf et al. 2025). Formalisation can signal, reinforce or merely symbolise sustainability, making its impact ambiguous. This ambiguity has direct implications for ESG credibility, as the presence of formal tools does not necessarily guarantee the substantive quality of sustainability practices. This distinction between symbolic and substantive adoption highlights potential greenwashing risks, particularly when formal tools are adopted without corresponding changes in operational practices. Emerging research suggests that the effectiveness of sustainability targets and green CSR initiatives depends on their integration within governance frameworks, which mediate the transition from symbolic commitment to substantive environmental action (Shen et al. 2026; Sun et al. 2026). Governance structures and verification mechanisms are therefore critical in determining whether ESG disclosures reflect genuine commitment or remain primarily symbolic. This highlights that ESG quality is not solely a function of formal adoption, but is strongly conditioned by governance arrangements, internal controls and the credibility of reporting processes.

The analysis of companies in Abruzzo shows that formal sustainability tools (reports and certifications) significantly shape company dynamics. Firms using these tools prioritised strategic and external sustainability drivers, such as customer demands, internal strategy, competitive advantage and employee well-being, supporting Hypothesis 1. They also implemented advanced environmental practices, including renewable energy, energy efficiency and material recycling, confirming Hypothesis 2. Reports and certifications were associated with lower perceived economic and informational barriers, such as operating and investment costs, lack of incentives and difficulty measuring benefits, supporting Hypothesis 3. Adoption was associated with greater cost awareness, operational efficiency and risk management, and may also reflect signalling and governance mechanisms strengthening reputation and long-term competitiveness. Structural characteristics (sector, size, business model) had a limited influence on sustainable maturity. The multivariate analysis partially supported Hypothesis 4. Firm size significantly increased the likelihood of both certification and reporting adoption, indicating that organisational scale facilitated formal sustainability institutionalisation. However, strategic orientation — particularly perceived competitive advantage — was consistently associated with both certification and reporting, suggesting that sustainability formalisation is primarily driven by strategic positioning, rather than merely structural characteristics. Overall, sustainable maturity depended less on intrinsic characteristics and more on the ability to embed structured governance and processes into company strategy and operations. The multivariate analysis showed that sector had little effect on sustainable maturity, and that larger firms were more likely to adopt certification, suggesting that certification may demand greater organisational structure. Perceived competitive advantage was the only factor consistently linked to both certification and reporting, reinforcing that sustainability formalisation was driven mainly by strategic positioning, rather than structural characteristics.

The Abruzzo case highlights how formal sustainability tools integrate with operational maturity in a developed European context, reflecting the influence of EU regulatory pressure and institutional stability. Compared to emerging markets or less regulated environments, where reporting often serves primarily legitimacy purposes, these findings suggest a closer alignment between formalisation and strategic and operational practices. Prior research has shown that the effectiveness of sustainability tools varies with institutional context, regulatory intensity, market development and firm life-cycle dynamics (Rauf et al. 2025; Voinea et al. 2019).

This study contributes in several ways. From an empirical perspective, it provides evidence on the relationship between formal sustainability tools and operational practices within a specific regional context. From a theoretical perspective,

it deepens our understanding of sustainability reporting and certification as mechanisms integrated into governance, which interact with organizational processes rather than operating as isolated tools. From a managerial perspective, the results highlight the importance of aligning formal sustainability tools with internal capabilities and strategic orientation to ensure substantive implementation.

However, several limitations of the present study must be noted. First, the sample was small and limited to a single Italian region with relatively homogeneous institutional conditions. Second, the cross-sectional, survey-based design prevented causal inference and may have been affected by common method variance or social desirability bias. Therefore, the findings should be interpreted as context-specific, reflecting the institutional, regulatory and economic characteristics of the Abruzzo region, and may not be directly generalisable to structurally different environments. Consequently, these findings should be interpreted within the specific institutional and regulatory context in which the data were collected, as the interaction between reporting, certification and sustainability practices may vary across countries, industries and levels of market development. Future research should adopt comparative cross-country designs to assess how different institutional and regulatory environments shape the role of sustainability tools, as well as longitudinal approaches to better capture the dynamic and potentially co-evolutionary relationship between reporting, certification and sustainability maturity over time.

6 | Conclusions

The analysis shows that formal sustainability tools (reports and certification) are more than mere disclosure instruments: they reflect organisational maturity, support structured practices, reduce perceived barriers and enhance ESG implementation. Companies that report (internally or externally) adopt sustainability practices more intensively, perceive fewer economic obstacles and better evaluate ESG benefits. Reporting appears to serve as an internal governance mechanism, associated with more structured decision-making, reduced uncertainty and alignment between strategy and operations.

In particular, the formalisation embedded in reporting practices appears to be associated with more structured internal information systems and enhanced measurement capabilities, which may support the evaluation of ESG-related returns and reduce managerial ambiguity in sustainability-related decision processes. Environmental practices show the largest differences, as renewable energy adoption, energy efficiency and green buildings are more prevalent among reporting companies, indicating long-term investment. Social practices, such as welfare and employee services, are higher in firms with internal reporting, signalling advanced organisational culture across both sustainability dimensions. Finally, reporting is associated with lower perceived economic barriers, particularly operating and investment costs, while facilitating measurement of ESG returns.

Certifications primarily affect environmental practices (recycling, energy efficiency, renewable energy), highlighting their role in selecting or encouraging mature companies. Social practices show little variation between certified and non-certified firms, suggesting that these dimensions remain less integrated into formal requirements. Non-certified companies perceive greater difficulty measuring economic benefits, while other obstacles are comparable.

Overall, two complementary evolutionary paths emerge: reporting strengthens internal maturity, reduces barriers, improves measurement and integrates environmental and social practices; while certifications focus on sectoral and institutional alignment, technical compliance and reliability. Firms without formal tools see sustainability as a cost, whereas reporting and certification shift it to a strategic investment with economic, operational and reputational returns. Sustainable maturity depends less on resources than on information systems, improvement-oriented culture and governance structures.

These tools can be interpreted as governance-embedded mechanisms associated with organisational learning, strategic behaviour and long-term competitiveness. By integrating maturity indicators with multivariate analysis, the present study has provided a replicable framework for assessing sustainability formalisation beyond symbolic adoption. Reporting and certification align accounting systems with value creation, suggesting that firms should treat them as strategic governance tools rather than compliance exercises.

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References

Alghamdi, O. A., and G. Agag. 2023. "Unlocking the Power of Reporting: Exploring the Link Between Voluntary Sustainability Reporting, Customer Behavior, and Firm Value." *Sustainability* 15: 15584. https://doi.org/10.3390/su152115584.

Almanza Floyd, J., I. D'Adamo, S. Fosso Wamba, and M. Gastaldi. 2024. "Competitiveness and Sustainability in the Paper Industry: The Valorisation of Human Resources as an Enabling Factor." *Computers and Industrial Engineering* 190: 110035. https://doi.org/10.1016/j.cie.2024.110035.

Alsahali, K. F., and R. Malagueño. 2021. "An Empirical Study of Sustainability Reporting Assurance: Current Trends and New Insights." *Journal of Accounting and Organizational Change* 18: 617–642. https://doi.org/10.1108/JAOC-05-2020-0060.

Amran, A., V. Periasamy, and A. H. Zulkafli. 2014. "Determinants of Climate Change Disclosure by Developed and Emerging Countries in Asia Pacific." *Sustainable Development* 22: 188–204. https://doi.org/10.1002/sd.539.

Bager, S. L., and E. F. Lambin. 2020. "Sustainability Strategies by Companies in the Global Coffee Sector." *Business Strategy and the Environment* 29: 3555–3570. https://doi.org/10.1002/bse.2596.

Barbosa, A. d. S., M. C. Crispim, L. B. da Silva, J. M. N. da Silva, A. M. Barbosa, and S. N. Morioka. 2024. "How Can Organizations Measure the Integration of Environmental, Social, and Governance (ESG) Criteria? Validation of an Instrument Using Item Response Theory to Capture Workers' Perception." *Business Strategy and the Environment* 33: 3607–3634. https://doi.org/10.1002/bse.3675.

Barón Dorado, A., G. Giménez Leal, and R. de Castro Vila. 2022. "Environmental Policy and Corporate Sustainability: The Mediating Role of Environmental Management Systems in Circular Economy Adoption." *Corporate Social Responsibility and Environmental Management* 29: 830–842. https://doi.org/10.1002/csr.2238.

Basilico, P., I. D'Adamo, M. Del Giudice, et al. 2026. "Sustainable Schools and Knowledge Management: Driving Urban and Social Transitions for Sustainable Development." *Sustainable Development* 34: 915–935. https://doi.org/10.1002/sd.70215.

Battisti, E., S. Bo, F. Petruzzella, and A. Salvi. 2025. "Greenwashing and Sustainability Disclosure in the Climate Change Context: The Influence of Third-Party Certification on Chinese Companies." *Business Strategy and the Environment* 34: 7851–7863. https://doi.org/10.1002/bse.70000.

Blancas, F. J., and I. Contreras. 2025. "Global SDG Composite Indicator: A New Methodological Proposal That Combines Compensatory and Non-Compensatory Aggregations." *Sustainable Development* 33: 158–176. https://doi.org/10.1002/sd.3109.

Castilla-Polo, F., and M. D. Guerrero-Baena. 2023. "The Business Case for Sustainability Reporting in SMEs: Consultants' and Academics' Perceptions." *Sustainable Development* 31: 3224–3238. https://doi.org/10.1002/sd.2576.

Christensen, H. B., L. Hail, and C. Leuz. 2021. "Mandatory CSR and Sustainability Reporting: Economic Analysis and Literature Review." *Review of Accounting Studies* 26: 1176–1248. https://doi.org/10.1007/s11142-021-09609-5.

Citterio, A. 2025. "Do Environmental Certifications Pay? A Bibliometric and Systematic Review of Environmental Management Systems and Eco-Label Impacts." *Business Strategy and the Environment* n/a 35: 4459–4483. https://doi.org/10.1002/bse.70392.

Corvino, A., S. Bianchi Martini, and F. Doni. 2021. "Extinction Accounting and Accountability: Empirical Evidence From the West European Tissue Industry." *Business Strategy and the Environment* 30: 2556–2570. https://doi.org/10.1002/bse.2763.

Da Costa, T., L. I. Aranda Lopez, C. Perussello, et al. 2025. "Addressing the Demand for Green Skills: Bridging the Gap Between University Outcomes and Industry Requirements." *Sustainability* 17: 2732. https://doi.org/10.3390/su17062732.

da Silva, T. H. H., and S. Sehnem. 2025. "The Utilization of Industry 4.0 Technologies to Enhance the Circular Economy Through the Engagement of Stakeholders in Brazilian Food Technology Companies." *Business Strategy and the Environment* 34: 129–161. https://doi.org/10.1002/bse.3954.

D'Adamo, I. 2025. "Sustainable Communities: We Are the World." *Scientific Reports* 15: 8068. https://doi.org/10.1038/s41598-025-91952-7.

D'Adamo, I., S. Di Leo, F. Fabbi, M. Gastaldi, and A. F. Uricchio. 2026. "Energy Policy and Citizens' Perceptions: The Role of PV+BES Systems in Driving a Sustainable Energy Transition." *Energy Policy* 210: 115065. https://doi.org/10.1016/j.enpol.2025.115065.

D'Adamo, I., L. Fratocchi, C. Grosso, and M. Tavana. 2025. "An Integrated Business Strategy for the Twin Transition: Leveraging Digital Product Passports and Circular Economy Models." *Business Strategy and the Environment* 34: 9008–9022. https://doi.org/10.1002/bse.70065.

Darnall, N., H. Ji, K. Iwata, and T. H. Arimura. 2022. "Do ESG Reporting Guidelines and Verifications Enhance Firms' Information Disclosure?" *Corporate Social Responsibility and Environmental Management* 29: 1214–1230. https://doi.org/10.1002/csr.2265.

De Luca, R., M. R. Sessa, B. Esposito, and O. Malandrino. 2025. "How Certified Benefit Corporations Contribute to Corporate Social Responsibility Disclosure: Empirical Evidence From Italy." *Corporate Social Responsibility and Environmental Management* 32: 1668–1687. https://doi.org/10.1002/csr.3024.

Farace, B., P. Geatti, S. Sebastiani, A. Del Chicca, and E. Varese. 2025. "Certifications in the Meat Sector as a Competitive Tool for Companies: An EU Cross-Country Analysis." *Journal of Foodservice Business Research*: 1–32. https://doi.org/10.1080/15378020.2025.2585878.

Farrukh, A. 2025. "A Comparative Exploratory Study of the Critical Success Factors of a Green-Lean-Six Sigma Strategy." *Business Process Management Journal* 1–35: 1–35. https://doi.org/10.1108/BPMJ-09-2024-0862.

Forza, C. 2002. "Survey Research in Operations Management: A Process-Based Perspective." *International Journal of Operations & Production Management* 22: 152–194. https://doi.org/10.1108/01443570210414310.

Freundlieb, M., and F. Teuteberg. 2013. "Corporate Social Responsibility Reporting - A Transnational Analysis of Online Corporate Social Responsibility Reports by Market-Listed Companies: Contents and Their Evolution." *International Journal of Innovation and Sustainable Development* 7: 1–26. https://doi.org/10.1504/IJISD.2013.052117.

Friske, W., S. A. Hoelscher, and A. N. Nikolov. 2023. "The Impact of Voluntary Sustainability Reporting on Firm Value: Insights From Signaling Theory." *Journal of the Academy of Marketing Science* 51: 372–392. https://doi.org/10.1007/s11747-022-00879-2.

Fu, Y., S. Wang, S. Wang, S. Chen, and B. Jiang. 2025. "The Green Fog: The Negative Fallout of Greenwashing on Corporate Reputation." *Social Responsibility Journal* 21: 2217–2232. https://doi.org/10.1108/SRJ-02-2025-0128.

Fülöp, M. T., and J. Cifuentes-Faura. 2025. "Shaping Sustainability: Key Influencers of GRI Reporting Among Germany's Top Firms." *Sustainable Development* 34, no. 2: 2056–2072. https://doi.org/10.1002/sd.70442.

Gabrielli, G., T. Mazza, P. L. Marchini, and V. Tibiletti. 2025. "Unlocking Success: Exploring the Relationship Between Multiple CSR Initiatives, Firm Performance and the Role of the Regional Quality of Government." *Sustainability Accounting, Management and Policy Journal* 16: 128–155. https://doi.org/10.1108/SAMPJ-11-2023-0850.

Gomez-Carrasco, P., C. Anguiano-Santos, J. Ríos-Madrid, and M. Salazar-Ordóñez. 2025. "Between Strategy and Survival? How Agri-Food SMEs Navigate Voluntary Sustainability Disclosure." *Sustainable Development* 34: 154–169. https://doi.org/10.1002/sd.70333.

Gutiérrez-Ponce, H. 2023. "Sustainability as a Strategy Base in Spanish Firms: Sustainability Reports and Performance on the Sustainable Development Goals." *Sustainable Development* 31: 3008–3023. https://doi.org/10.1002/sd.2566.

Hadjielias, E., A. De Massis, M. Christofi, D. Manika, and S. Brammer. 2025. "Ethical Issues in Family Business: Toward a Deeper Understanding and a New Research Agenda." *Journal of Business Ethics* 198: 715–731. https://doi.org/10.1007/s10551-025-05989-9.

Harmes, A. 2025. "The Anti-ESG Backlash and Asset Manager Capitalism." *Politics and Society* 53: 603–629. https://doi.org/10.1177/00323292251346266.

He, D., S. Ren, and H. Zeng. 2022. "Environmental Labeling Certification and Firm Environmental and Financial Performance: A Resource Management Perspective." *Business Strategy and the Environment* 31: 751–767. https://doi.org/10.1002/bse.2915.

Hickle, G. 2017. "Extending the Boundaries: An Assessment of the Integration of Extended Producer Responsibility Within Corporate Social Responsibility." *Business Strategy and the Environment* 26: 112–124. https://doi.org/10.1002/bse.1908.

Hsu, H.-Y., and T.-S. Chang. 2026. "Institutionalizing ESG in SMEs: Insights From Transformational Leadership and Institutional Theory." *Business Strategy & Development* 9: e70264. https://doi.org/10.1002/bsd2.70264.

Huang, J., P. Hu, D. D. Wang, and Y. Wang. 2025. "The Double Signal of ESG Reports: Readability, Growth, and Institutional Influence on Firm Value." *Sustainability* 17: 2514. https://doi.org/10.3390/su17062514.

Khan, P. A., S. K. Johl, and S. K. Johl. 2021. "Does Adoption of ISO 56002-2019 and Green Innovation Reporting Enhance the Firm Sustainable Development Goal Performance? An Emerging Paradigm." *Business Strategy and the Environment* 30: 2922–2936. https://doi.org/10.1002/bse.2779.

Khatri, I., and F. Kjærland. 2023. "Sustainability Reporting Practices and Environmental Performance Amongst Nordic Listed Firms." *Journal of Cleaner Production* 418: 138172. https://doi.org/10.1016/j.jclepro.2023.138172.

Kurniawati, E., and I. Budi Raharjo. 2025. "Sustainability Reporting: Framing Theory and Rhetoric Theory Perspectives." *International Journal of Accounting and Economics Studies* 12: 399–411. https://doi.org/10.14419/nmyz3j97.

Lan, L., Y. Duan, Z. Zhou, and S. Zhong. 2025. "Voluntary Environmental Regulation and Corporate Green Innovation: Evidence From the "Green Factory" Certification." *Business Strategy and the Environment* 35, no. 4: 4802–4829. https://doi.org/10.1002/bse.70408.

Le, T. T., L. T. V. Huynh, H. N. N. Nguyen, and Q. N. Doan. 2025. "How Digitalization Drives Sustainable Consumption and Production Patterns: The Mediation of Green Supply Chain Management and Corporate Social Responsibility." *Corporate Social Responsibility and Environmental Management* 32, no. 6: 8464–8480. https://doi.org/10.1002/csr.70147.

Lee, J., and J. H. Rhee. 2025. "How Do Firms Respond to Community Environmental Requirements? Corporate Commitment to Climate Change and the Role of Corporate Environmental Governance." *Corporate Social Responsibility and Environmental Management* 33, no. 1: 1493–1510. https://doi.org/10.1002/csr.70247.

Lin, W. L., S. C. Chong, and K. K. S. Wong. 2025. "Sustainable Development Goals and Corporate Financial Performance: Examining the Influence of Stakeholder Engagement." *Sustainable Development* 33: 2714–2739. https://doi.org/10.1002/sd.3259.

Liu, M., J. Lu, Q. Liu, H. Wang, Y. Yang, and S. Fang. 2025. "The Impact of Executive Cognitive Characteristics on a Firm's ESG Performance: An Institutional Theory Perspective." *Journal of Management and Governance* 29: 145–173. https://doi.org/10.1007/s10997-024-09695-y.

Maleki Vishkaei, B., E. Spahiu, and P. De Giovanni. 2025. "Prioritizing, Integrating, and Communicating Sustainability to Prevent Social Washing." *Cleaner Production Letters* 9: 100114. https://doi.org/10.1016/j.clpl.2025.100114.

Mao, Z., S. Wang, and Y.-E. Lin. 2024. "ESG, ESG Rating Divergence and Earnings Management: Evidence From China." *Corporate Social Responsibility and Environmental Management* 31: 3328–3347. https://doi.org/10.1002/csr.2748.

Merello, P., A. Barberá, and E. De la Poza. 2022. "Is the Sustainability Profile of FinTech Companies a Key Driver of Their Value?" *Technological Forecasting and Social Change* 174: 121290. https://doi.org/10.1016/j.techfore.2021.121290.

Miroshnychenko, I., D. Miller, A. De Massis, and I. Le Breton-Miller. 2025. "Are Family Firms Green?" *Small Business Economics* 64: 279–306. https://doi.org/10.1007/s11187-024-00907-1.

Mismetti, M., I. Miroshnychenko, and A. De Massis. 2025. "Family Firms and Sustainable Development Goals: The Role of Ownership, Management, and Country Progress." *Review of Managerial Science* 20: 1387–1417. https://doi.org/10.1007/s11846-025-00960-4.

Moursellas, A., D. De, T. Wurzer, et al. 2023. "Sustainability Practices and Performance in European Small-and-Medium Enterprises: Insights From Multiple Case Studies." *Circular Economy and Sustainability* 3: 835–860. https://doi.org/10.1007/s43615-022-00224-3.

Moursellas, A., C. Malesios, A. Skouloudis, K. Evangelinos, and P. K. Dey. 2024. "Perceived Enablers and Barriers Impacting Sustainability of Small-And-Medium Sized Enterprises: A Quantitative Analysis in Four European Countries." *Environmental Quality Management* 33: 433–448. https://doi.org/10.1002/tqem.22128.

Muhammad, H., and M. Aman. 2026. "How Environmental Regulations Influence ESG Controversies: The Role of Climate Governance and Environmental Decoupling." *Corporate Social Responsibility and Environmental Management* 33: 1320–1338. https://doi.org/10.1002/csr.70235.

Murillo-Avalos, C. L., M. Cubilla-Montilla, M. Á. Celestino Sánchez, and P. Vicente-Galindo. 2021. "What Environmental Social Responsibility Practices Do Large Companies Manage for Sustainable Development?" *Corporate Social Responsibility and Environmental Management* 28: 153–168. https://doi.org/10.1002/csr.2039.

Nadae, J., M. M. Carvalho, and D. R. Vieira. 2019. "Exploring the Influence of Environmental and Social Standards in Integrated Management Systems on Economic Performance of Firms." *Journal of Manufacturing Technology Management* 30: 840–861. https://doi.org/10.1108/JMTM-06-2018-0190.

Naveed, K., M. B. Farooq, M. K. Zahir-Ul-Hassan, and F. Rauf. 2025. "AI Adoption, ESG Disclosure Quality and Sustainability Committee Heterogeneity: Evidence From Chinese Companies." *Meditari Accountancy Research* 33: 708–732. https://doi.org/10.1108/MEDAR-02-2024-2374.

Nikolaou, I. E., and L. Kazantzidis. 2016. "A Sustainable Consumption Index/Label to Reduce Information Asymmetry Among Consumers and Producers." *Sustainable Production and Consumption* 6: 51–61. https://doi.org/10.1016/j.spc.2016.01.001.

Oduro, S., R. M. Umar, A. De Massis, and L. G. Haylemariam. 2025. "Corporate Social Responsibility and Family Firm Performance: A Meta-Analytic Review." *Corporate Social Responsibility and Environmental Management* 32: 1412–1443. https://doi.org/10.1002/csr.3004.

Oke, A. E., J. Aliu, O. A. Odia, et al. 2023. "A Quantitative Assessment of Key Drivers for Environmental Economic Practices Adoption for Sustainable Development." *Sustainable Development* 31: 3579–3594. https://doi.org/10.1002/sd.2612.

Page, M. J., J. E. Mckenzie, P. M. Bossuyt, et al. 2021. "The PRISMA 2020 Statement: An Updated Guideline for Reporting Systematic Reviews." *BMJ* 372: n71. https://doi.org/10.1136/bmj.n71.

Pratama, A., H. Yusoff, W. Yadiati, and E. Jaenudin. 2025. "Sustainability-Related Corporate Governance and Greenwashing Practices: Preliminary Evidence From Southeast Asian Companies." *Meditari Accountancy Research* 33: 853–885. https://doi.org/10.1108/MEDAR-07-2024-2579.

Rahman, S., T. Khan, and P. Siriwardhane. 2019. "Sustainable Development Carbon Pricing Initiative and Voluntary Environmental Disclosures Quality." *Business Strategy and the Environment* 28: 1072–1082. https://doi.org/10.1002/bse.2302.

Rauf, F., Q. Baolei, K. Naveed, and S. U. Qadri. 2025. "The Moderating Effect of Firm Life Cycle on the Influence of Financial Performance and Green Innovation Performance on Environmental, Social, and Governance Reporting: Evidence From China." *Business Ethics, Environment & Responsibility*. https://doi.org/10.1111/beer.12840.

Rauf, F., C. L. Voinea, K. Naveed, and C. Fratostiteanu. 2021. "CSR Disclosure: Effects of Political Ties, Executive Turnover and Shareholder Equity.

Evidence From China." *Sustainability* 13: 3623. https://doi.org/10.3390/su13073623.

Riso, V., S. Cantele, and E. Bracci. 2025. "Sustainable but Not Accountable? A Quality Assessment of Sustainability Disclosure in Benefit Corporations." *Business Strategy and the Environment* 34: 6594–6611. https://doi.org/10.1002/bse.4311.

Ruberti, M., and S. Calciolari. 2025. "Environmental Certifications as Strategic Assets? Evidence From Italian Chemical and Pharmaceutical Firms." *Journal of Risk and Financial Management* 18: 562. https://doi.org/10.3390/jrfm18100562.

Shen, H., K. Li, S. Amoako, and N. Alessa. 2026. "Advancing Corporate Responsibility Through Sustainability Targets, CSR Strategies, and Sustainable Governance for Climate Resilience and Environmental Management." *Corporate Social Responsibility and Environmental Management*. https://doi.org/10.1002/csr.70504.

Smoleńska, A., and D. Levi-Faur. 2025. "Greenwashing and Trust via Enhanced Self-Regulation: The Case of ESG Rating Providers in Sustainable Finance." *Regulation & Governance* 1–15. https://doi.org/10.1111/rego.70114.

Solimene, S., D. Coluccia, S. Fontana, and A. Bernardo. 2025. "Formal Institutions and Voluntary CSR/ESG Disclosure: The Role of Institutional Diversity and Firm Size." *Corporate Social Responsibility and Environmental Management* 32: 5147–5166. https://doi.org/10.1002/csr.3195.

Son, E., and J. Suh. 2025. "The Role of Entrepreneurship in Alleviating ESG Backlash and Advancing Sustainability." *Journal of the International Council for Small Business* 6: 666–684. https://doi.org/10.1080/26437015.2024.2427700.

Sun, J., A. Z. Faraz, and M. Sarfraz. 2026. "From Green Talk to Green Action: Driving Corporate Sustainable Development Through Green Corporate Social Responsibility in the Digital Era—A Moderated Mediation Model." *Corporate Social Responsibility and Environmental Management*. https://doi.org/10.1002/csr.70469.

Sun, Y. 2023. "Can the Innovation in Sustainability Disclosures Reflect Organisational Sustainable Development? An Integrated Reporting Perspective From China." *Sustainable Development* 31: 1668–1680. https://doi.org/10.1002/sd.2475.

Talan, G., G. D. Sharma, V. Pereira, and G. W. Muschert. 2024. "From ESG to Holistic Value Addition: Rethinking Sustainable Investment From the Lens of Stakeholder Theory." *International Review of Economics and Finance* 96: 103530. https://doi.org/10.1016/j.iref.2024.103530.

Treepongkaruna, S. 2024. "Corporate Sustainability and Biodiversity Reporting: A Proactive Business Strategy to Mitigate Litigation and Reputational Risks." *Business Strategy and the Environment* 33: 6640–6651. https://doi.org/10.1002/bse.3840.

Tsalis, T. A., M. Terzaki, D. Koulouriotis, K. P. Tsagarakis, and I. E. Nikolaou. 2023. "The Nexus of United Nations' 2030 Agenda and Corporate Sustainability Reports." *Sustainable Development* 31: 784–796. https://doi.org/10.1002/sd.2419.

Vishnu Nampoothiri, M., O. Entrop, and T. R. Annamalai. 2024. "Effect of Mandatory Sustainability Performance Disclosures on Firm Value: Evidence From Listed European Firms." *Corporate Social Responsibility and Environmental Management* 31: 5220–5235. https://doi.org/10.1002/csr.2860.

Voinea, C. L., C. Fratostiteanu, and B. Romein. 2019. "The Influence of Governance and Ownership on CSR Practices in Romania." *European Journal of Sustainable Development* 8: 313. https://doi.org/10.14207/ejsd.

Voinea, C. L., F. Rauf, K. Naveed, and C. Fratostiteanu. 2022. "The Impact of CEO Duality and Financial Performance on CSR Disclosure: Empirical Evidence From State-Owned Enterprises in China." *Journal of Risk and Financial Management* 15: 37. https://doi.org/10.3390/jrfm15010037.

Xiao, J., X. Zhang, H. Yan, and P. Zeng. 2025. "ESG Performance and Green Cooperative Innovation: A Signaling Theory Framework." *Asia Pacific Journal of Marketing and Logistics*: 1–19. https://doi.org/10.1108/APJML-04-2025-0612.

Zaccone, M. C. 2026. "Signaling Sustainability, Inviting Scrutiny: How Sustainability Policies Shape the Focus of Shareholder Activism." *Corporate Social Responsibility and Environmental Management* 33: 1214–1229. https://doi.org/10.1002/csr.70232.

Zhang, S., C. Wu, X. Yan, Y. Chen, and H. Shi. 2025. "Unverifiable Green Signals and Consumer Response in E-Commerce: Evidence From Platform-Level Data." *Sustainability* 17: 5678. https://doi.org/10.3390/su17135678.

Zheng, L., N. Mirza, M. Umar, and C.-W. Su. 2025. "Sustainable Lending to European SMEs: Implications for Bank Performance." *International Review of Economics and Finance* 102: 104283. https://doi.org/10.1016/j.iref.2025.104283.

Zhou, D., A. Osei, A. O. Agyemang, and I. Wiredu. 2025. "Strategic ESG Disclosure as Sustainability Innovation: A Diffusion Perspective on Advancing Responsible Consumption and Production Toward SDG 12." *Sustainable Development* 34, no. 1: 968–992. https://doi.org/10.1002/sd.70301.

Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Data S1:** Supporting Information.