Operationalising sustainable corporate governance: A cluster analysis of environmental sustainability practices in Italian service-sector SMEs[1] [2]

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Abstract

Frame of the research: *Sustainable Corporate Governance (SCG) increasingly calls for understanding how sustainability is operationalised through everyday organisational practices, particularly in SMEs where governance is often enacted through operational routines rather than formal structures. However, evidence on how environmental practices are configured across service-sector SMEs remains limited.*

Purpose of the paper: *The paper investigates how environmental sustainability is enacted within SMEs through the multidimensional adoption of environmental practices, identifying distinct behavioural profiles associated with different levels of environmental maturity. The study develops a governance-sensitive interpretative framework to explore how such profiles may be associated with different organisational conditions and potential governance orientations.*

Methodology*: Using a dataset of Italian service-sector SMEs engaged in the Imprendigreen program (2022-2024), we aggregate 172 environmental practices into nine domains and perform a year-specific cluster analysis. This approach identifies recurring patterns of environmental practice adoption and compares their distribution across yearly samples.*

Findings*: Four clusters consistently emerge, reflecting heterogeneous levels of environmental maturity and different configurations of practices. While some companies display broad and structured adoption, others focus on basic or compliance-oriented actions. Cross-year comparisons suggest variations in the distribution of profiles across samples, alongside persistent heterogeneity within the certified population.*

Research limits: *The study draws on Italian SMEs adopting a voluntary certification scheme, which may introduce self-selection bias and limits the generalisability of the findings. Moreover, the dataset does not include social or formal governance variables and is cross-sectional in structure. This prevents causal inference regarding governance-practice relationships. Additionally, the analysis relies on declared practice adoption rather than verified implementation.*

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Practical implications: *While remaining exploratory in nature, the study proposes governance-sensitive recommendations tailored to different maturity profiles, supporting decision-makers and sectoral associations in designing targeted interventions for capacity-building and sustainability progression.*

Originality of the paper*: The paper contributes to SCG research by providing granular empirical evidence on how environmental practices are configured among service-sector SMEs and by linking behavioural differentiation to governance-oriented lines of inquiry within a certification context.*

Key words: *sustainable corporate governance; environmental practices; environmental certification; SMEs; cluster analysis.*

1. Introduction

Businesses today operate in a context marked by increasing environmental and societal pressures, which have heightened expectations for companies to integrate sustainability into their strategic and organisational choices. In response, the concept of Sustainable Corporate Governance (SCG) has gained prominence. SCG extends corporate governance beyond traditional mechanisms of control and compliance, emphasising accountability, transparency, inclusivity, and long-term orientation as foundations for sustainable value creation (Khan, 2019; Kavadis and Thomsen, 2023). In this view, SCG is not confined to board oversight; it permeates organisational purpose, culture, policies, managerial practices, and day-to-day behaviours.

However, while SCG research has largely focused on formal governance structures, board characteristics, and ESG outcomes, comparatively less attention has been devoted to how sustainability-oriented governance is enacted in everyday organisational practices. This gap is particularly relevant in small and medium-sized enterprises (SMEs), where governance structures are often less formalised and sustainability integration may occur through operational routines rather than structural reforms.

Recently, scholars have increasingly called for greater attention to the micro-level processes through which sustainability orientations are embedded in everyday business conduct (Aguinis and Glavas, 2012). Environmental management routines, resource efficiency initiatives, supplier assessment procedures, waste reduction practices, and employee training programmes represent concrete actions through which sustainability commitments may become operational. At the same time, prior research has also shown that formal sustainability systems and certifications can involve both substantive and symbolic elements (Boiral, 2007; Heras-Saizarbitoria and Boiral, 2013), highlighting the need for empirical investigation of how sustainability practices are structured and combined in practice.

Voluntary certification schemes provide a relevant empirical context in this regard. By defining structured criteria and assessment mechanisms, they function as mechanisms of private governance that promote accountability, provide monitoring structures, and signal responsible

behaviour to stakeholders, regulators, and markets (Delmas and Montes-Sancho, 2011; Potoski and Prakash, 2005). However, studies have documented variation in how organisations internalise and implement these standards, suggesting that certification does not automatically imply homogeneous sustainability trajectories (Heras-Saizarbitoria and Boiral, 2013).

This gap is highly relevant in the Italian context, where SMEs constitute the backbone of the economy and tend to lag behind larger companies in the adoption of structured sustainability practices, formal environmental management systems, and long-term strategic approaches to environmental performance (OECD, 2022; OECD 2023). Understanding how these companies adopt and combine environmental practices within a certification framework can therefore provide insight into the operational dimension of sustainability engagement.

This study contributes to this agenda by examining the environmental practices adopted by Italian SMEs affiliated with Confcommercio through *Imprendigreen*, a voluntary environmental certification scheme that evaluates companies across a broad portfolio of sustainability domains. Drawing on three years of certification data (2022-2024), the analysis identifies recurring configurations of declared environmental practices and documents heterogeneous sustainability maturity profiles within a large sample of companies.

The paper makes three main contributions.

First, it provides granular empirical evidence on how environmental practices are configured across SMEs within a structured certification framework, offering a behavioural mapping of sustainability engagement.

Second, it enriches the underexplored context of service-based SMEs, offering evidence on heterogeneous sustainability engagement profiles within the tertiary sector - an area where empirical research remains limited despite growing policy attention.

Third, we develop a governance-sensitive interpretative framework that translates observed maturity profiles into structured lines of inquiry for future research on the relationship between sustainability practices and governance dynamics.

The remainder of the paper is as follows. The next section reviews the theoretical foundations connecting SCG and operational practices. Section 3 describes the methodology. Empirical results are presented in Section 4. Section 5 discusses the findings, future research avenues and limitations. Finally, Section 6 addresses the study's conclusion.

2. Theoretical background

Sustainable Corporate Governance (SCG) has emerged as a response to the need for more accountable, transparent, and future-oriented governance systems capable of supporting the transition toward sustainable development (Kavadis and Thomsen, 2023). Rather than limiting governance to formal oversight structures, SCG positions environmental

and social considerations as a foundational element of organisational purpose, guiding the alignment between corporate strategies, stakeholder expectations, and long-term value creation (Lynn, 2021; Mayer, 2021; Collevecchio and Gionfriddo, 2023).

Much of the existing literature focuses on formal governance structures and measurable outcomes, such as board composition, incentive systems, or ESG performance indicators (Konadu *et al.*, 2021). While these structural elements are central to understanding governance architecture, it can also be understood as a broader system through which organisational priorities are defined, coordinated, and enacted. From this perspective, its influence should become visible not only in formal structures but also in recurring organisational practices.

To clarify this distinction, SCG can be analytically viewed across three interrelated dimensions.

First, a structural dimension concerns formal governance arrangements that define authority, accountability, and oversight (Kavadis and Thomsen, 2023). Second, a strategic integration dimension refers to how sustainability considerations are embedded into corporate purpose and strategic responses to stakeholder and institutional pressures (Aguilera *et al.*, 2007; Oliver, 1991). Third, an operational enactment dimension captures how sustainability commitments are translated into recurring patterns of action within organisations.

While the structural and strategic dimensions have received considerable scholarly attention, the operational enactment dimension remains comparatively underexplored, particularly in SME contexts. Calls in the CSR and sustainability literature emphasise the importance of examining micro-level processes and organisational behaviours (Aguinis and Glavas, 2012). Extending this reasoning to SCG suggests that operational practices - such as waste reduction, energy efficiency, sustainable procurement, and employee training - may serve as observable expressions of sustainability-oriented governance. These practices do not measure governance structures directly - nor should they be interpreted as proxies -; rather, they capture observable configurations of sustainability engagement that may reflect underlying organisational orientations.

At the same time, prior research has cautioned against equating the presence of formal systems or certifications with substantive organisational change. Studies on environmental management systems show that adoption may involve both substantive implementation and symbolic or ceremonial elements (Boiral, 2007; Heras-Saizarbitoria and Boiral, 2013). Accordingly, analyses of practice adoption patterns should be interpreted as evidence of behavioural configurations rather than direct indicators of governance quality or verified environmental performance.

Within this landscape, voluntary environmental certification schemes play an increasingly significant role by providing governance infrastructures for sustainability adoption. Certifications such as ISO 14001 or EMAS impose standardised criteria, monitoring processes, and documentation requirements that formalise environmental practices. Literature shows that these schemes contribute to organisational learning, enhance transparency, and strengthen accountability - three attributes strongly

associated with SCG (Delmas and Montes-Sancho, 2011; Potoski and Prakash, 2005; Heras-Saizarbitoria and Boiral, 2013). However, empirical evidence shows that organisations vary significantly in how they internalise such frameworks, leading to heterogeneous sustainability trajectories even under shared institutional templates (Heras-Saizarbitoria and Boiral, 2013; Greenwood *et al.*, 2011). Understanding this heterogeneity is particularly relevant in SME contexts. Institutional pressures rarely produce uniform organisational responses; companies differ in capabilities, resource availability, strategic positioning, and exposure to stakeholder demands (Oliver, 1991; Greenwood *et al.*, 2011). Sustainability engagement in SMEs is therefore unlikely to follow a linear or homogeneous path. Instead, it may manifest through distinct configurations of practices that reflect different stages of maturity and different underlying organisational conditions, including potential governance-related factors.

Despite these considerations, empirical research on how SMEs adopt and combine environmental practices remains limited, as most studies examine individual practices or single domains rather than multidimensional patterns of adoption. Yet, recent scholarship increasingly shows that sustainability behaviours are best understood not as isolated actions but as configurations of mutually reinforcing practices (Stål *et al.*, 2023; Salvador *et al.*, 2023; Annunziata *et al.*, 2018). Configurational approaches thus provide a more suitable lens to capture the complexity of sustainability engagement, by focusing on how different practices co-occur and combine within companies. This perspective has recently gained empirical support through large-scale, cluster-based analyses identifying recurring bundles of practices across SMEs in Europe (Andrade *et al.*, 2025). This study emphasises the multidimensional nature of sustainability behaviours, showing that companies tend to adopt internally coherent - yet heterogeneous - sets of sustainability actions rather than isolated initiatives. At the same time, such evidence remains primarily focused on identifying patterns of adoption, offering more limited insights into how these configurations may relate to underlying organisational and governance conditions.

Building on this reasoning, the present study focuses on the operational enactment dimension of Sustainable Corporate Governance. By analysing how SMEs adopt and combine environmental practices within a structured certification framework, we examine recurring behavioural configurations as observable expressions of sustainability engagement. Adopting a cluster-based approach as our analytical lens, we document heterogeneity in practice adoption and develop an interpretative governance-sensitive framework to explore how different patterns of operational enactment may relate to broader debates on accountability, capability development, and long-term orientation within SCG. Without inferring direct governance effects, our framework offers inferential and propositional reflections on the potential governance-related conditions under which such patterns emerge.

3. Methodology

This study adopts a quantitative empirical design to map the implementation of environmental sustainability practices among Italian SMEs operating in the service sector and awarded with the Imprendigreen certification promoted by Confcommercio

In line with calls for greater attention to the micro-level foundations of corporate sustainability (Aguinis and Glavas, 2012), we interpret these practices as behavioural manifestations that may reflect how sustainability-oriented governance materialises in daily routines. The study does not measure governance mechanisms per se; instead, it maps patterns of practice adoption within a structured certification context.

To pursue this goal, we developed a quantitative survey-based approach, which is particularly suited to capturing the operational dimension of sustainability governance. First, it enables the measurement of concrete practices rather than strategic narratives or reporting-based commitments. Second, it allows for the exploration of heterogeneity across a large number of SMEs. The analysis is exploratory and configurational in nature, aiming to identify recurring profiles of practice adoption rather than to establish causal relationships.

3.1 Data sample

The analysis relies on an original dataset of 919 valid questionnaires completed by more than 700 SMEs across Italy. Data was collected continuously from 2022 to June 2024, corresponding to the initial years of implementation and diffusion of the Imprendigreen initiative. Because companies may update their practices or request recertification across years, the dataset includes repeated observations for several enterprises. However, the distribution of company participation across waves indicates that the dataset primarily reflects repeated cross-sectional observations rather than a balanced longitudinal panel. Specifically, 59.4% of companies appear in only one year, 24.7% in two years, and 16.0% in all three years (see Appendix A3). Accordingly, temporal comparisons should be interpreted as cross-sectional configurations of participating companies rather than company-level transitions. Participating companies belong exclusively to the tertiary sector, reflecting the composition of Confcommercio's membership. The sample covers a wide variety of industries, including hospitality, food and beverage, tourism services, retail trade, transport and logistics, cultural activities, healthcare services, and other commercial activities. Geographical coverage spans all Italian regions, offering a broad representation of sustainability practices within the national service economy - a domain that remains understudied in environmental management research. This sample is therefore not representative of the full population of Italian SMEs but captures heterogeneity within a subpopulation of companies that voluntarily engaged in a sustainability-oriented certification scheme. As such, results should be interpreted as differentiating patterns within a proactive SME population rather than across the entire SME spectrum.

To conduct sectoral analyses, activities were reclassified into ten NACE-inspired macro-sectors, including Accommodation, Wholesale and Retail trade, Transportation, Online, Health and Wellbeing, Sport, B2B Services, Vehicles and Tourism. Aggregation was necessary because several original activity categories were too small to support meaningful descriptive comparisons. Working with a reduced number of conceptually coherent macro-sectors ensures more stable means and reduces noise in descriptive profiling, in line with guidance on composite indicators and minimum cell sizes for robust comparisons (OECD/JRC, 2008).

Tab. 1: Classification of companies

NACE sector	Type of activity (from the questionnaire)	Total no. of observations over the years
I - Accommodation and food service activities	Travel agencies Hotels, holiday villages, resorts B&Bs, guesthouses Bars Restaurants Other tourist activities	263
Q - Human health and social work activities	Diagnostic centres Clinics Other health services	16
G47 - Retail trade	Clothing/footwear shops Food shops Furniture shops Electronics/appliance shops Hardware shops, plumbing and heating supplies Newsagents and stationery shops, bookshops Other Retail Street vendors Supermarkets, organised distribution	350
G46 - Wholesale trade	Food wholesaler Non-food wholesaler Food intermediary/agent Non-food intermediary/agent	100
H - Transportation and storage	Logistics Transport Fuel distribution	9
G45 - Sale, maintenance and repair of motor vehicles	Car/motorbike repair shops Car/motorbike dealership	11
R90-91 - Arts and entertainment	Museum Other cultural activities	15
R93 - Sports activities	Sports associations Other sports Gyms	9
M-N - Professional, scientific, technical, administrative support	B2B services	119
J - E-commerce	Online (exclusive)	23

Source: Authors' elaboration.

3.2 Data collection

The Imprendigreen certification system is grounded in a structured questionnaire comprising 172 items, each corresponding to a specific sustainability practice. The instrument covers nine environmental

domains applicable to service-sector companies, namely waste management, resource and material management, water management, external areas management, energy, procurement, logistics and transport, communication and training, and other environmental aspects. Each item is scored from 1 to 5 based on the practice's technical complexity, effort, and environmental relevance. Importantly, this score reflects the intrinsic difficulty of the practice, not the degree of implementation by the company. Certification is awarded to companies that surpass a cumulative threshold based on these weighted practices.

The questionnaire was administered electronically through a web survey platform. Prior to full deployment, a pilot test was conducted with a select group of participants belonging to the target population. Participants reviewed the clarity, structure, and interpretability of the questions. Their feedback led to refinements aimed at simplifying wording and reducing potential ambiguities. This iterative validation enhanced internal consistency and alignment with the operational context of SMEs participating in the scheme.

Tab. 2: General practices

Type of general practice	Description	N items
Waste management	Correct waste sorting, reuse practices, and responsible disposal	11
Resources and materials management	Paper reduction, reuse, use of recycled materials, and circularity actions	19
Water management	Conservation technologies and reuse systems	9
Management of external areas	Sustainable management and maintenance of outdoor spaces, efficient plants, responsible irrigation, noise and lighting mitigation.	18
Energy	Energy efficiency, lighting, heating/cooling systems, and low-impact technologies	54
Procurement	Sustainable sourcing, preference for suppliers with environmental commitments, and reductions in packaging	19
Logistics and transport	Efficiency of mobility choices, vehicle fleet, optimization of routes, and reduction of emissions	25
Communication and training	Actions to inform customers or suppliers and internal training on environmental issues	12
Other aspects	Environmental values embedded in corporate culture, environmental policies, and participation in environmental projects	5

Source: Authors' elaboration.

3.3 Data preparation and variable transformation

Before conducting statistical analyses, the dataset underwent a structured cleaning process. We removed twenty-five observations associated with the pilot-test phase, and a small number of questionnaires were excluded due to incomplete metadata (e.g., unreadable identifiers or dates). No observations were dropped due to missing practice variables, as the dataset contained no true missing values.

Two parallel data transformations were performed, reflecting the different analytical purposes of the study.

For the radar analysis, we retained the original practice scores (1 - 5). These scores reflect the technical complexity attributed to each practice within the Imprendigreen scheme and allow the computation of continuous additive scores for each of the nine environmental domains. To ensure comparability across domains with different numbers of practices, each domain score was normalised by its theoretical maximum, yielding values between 0 and 1.

For the cluster analysis, however, using these scores would conflate practice complexity with company behaviour. To address the high dimensionality of the dataset - 172 practices - and to isolate adoption behaviour, each practice was transformed into a binary indicator (1 = adopted; 0 = not adopted). Binarization reduces noise and enhances interpretability when identifying patterns of sustainability behaviour. This approach aligns with methodological recommendations for formative indicators and for reducing sensitivity to scoring assumptions (Diamantopoulos and Winklhofer, 2001; Henseler *et al.*, 2014). Using the binary dataset, we computed nine domain-level aggregate measures by summing the number of adopted practices within each environmental area. Because domains differ greatly in size (e.g., 54 items in energy vs. 5 in "other aspects"), we converted these aggregates into proportional variables by dividing by the total number of practices in each domain (Everitt *et al.*, 2011). These proportions capture relative engagement and avoid overweighting domains with more items. For each annual subsample, all proportional variables were standardised using z-scores before clustering. Standardisation is recommended for Euclidean-based clustering when variables differ in range and variance (Kaufman and Rousseeuw, 2005; Milligan and Cooper, 1988), ensuring no domain disproportionately influences the identification of clusters.

3.4 Data analysis

The analytical strategy consists of two complementary components: descriptive profiling and cluster analysis.

For the descriptive characterisation of companies and sectors, we relied on continuous normalised scores capturing the intensity of adoption across the nine environmental domains. These enable visualisation of domain-level patterns through radar charts and comparing distributions across annual cross-sections. Because domains are normalised by their maximum theoretical score, differences across sectors reflect variation in relative engagement rather than structural differences in the number of items per domain.

The cluster analysis identified recurring configurational patterns of environmental practice adoption and is based on binary indicators of implementation. Clustering was conducted independently for each year (2022, 2023, 2024) to avoid dependence created by repeated observations of the same companies and to ensure that cluster solutions reflect the cross-sectional configuration of each period rather than longitudinal trajectories

(Ketchen and Shook, 1996). Following a consolidated two-stage procedure (Punj and Stewart, 1983; Ketchen and Shook, 1996), we first applied hierarchical clustering using Ward's method and Euclidean (L2) distance to obtain preliminary groupings and to inspect natural breaks in the data. This step allows inspection of the dendrogram structure and provides an initial assessment of plausible cluster solutions. Ward's method minimises within-cluster variance at each step of the agglomeration process and is frequently used in behavioural and management research.

In the second stage, we used non-hierarchical k-means clustering to refine cluster membership, following recommendations from prior studies (Corsini *et al.*, 2024; Gusmerotti *et al.*, 2019; Zomer *et al.*, 2024). K-means is well-suited for identifying homogeneous groups of companies based on multivariate similarity, maximising within-cluster cohesion while ensuring between-cluster differentiation (Hair, 2011). The algorithm assigns companies to clusters based on proximity to centroid values, and its effectiveness has been demonstrated in applications where behavioural heterogeneity is expected among companies.

The number of clusters was determined through a combination of dendrogram inspection and the Calinski-Harabasz pseudo-F index. Although the index does not identify a unique optimal solution, the four-cluster configuration provided a parsimonious and interpretable segmentation. These criteria were used to identify a plausible range of cluster solutions. Within this range, the four-cluster configuration was retained as it provided an interpretable and analytically meaningful segmentation across all three years (see Appendix A1, A2). Given the exploratory objective of the study, clusters are interpreted as analytical profiles rather than definitive or universally generalisable groupings.

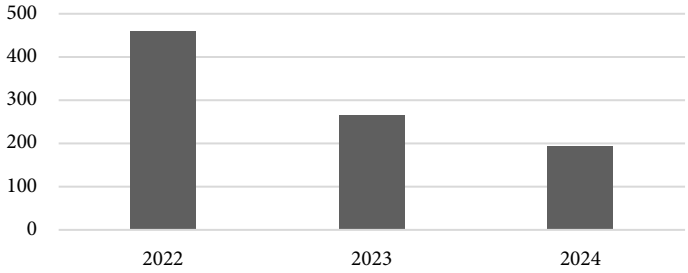
4. Results

This section presents the descriptive evidence on the adoption of the Imprendigreen label and the distribution of environmental practices among Italian SMEs affiliated with Confcommercio from 2022 to mid 2024.

4.1 Descriptive Patterns of Imprendigreen Adoption

The following results are structured around four dimensions: temporal evolution, sectoral and regional distribution, and the intensity of adoption across environmental domains. Figure 1 reports the annual evolution of certified companies between 2022 and 2024. The number of adopters is highest in 2022 and declines thereafter. This pattern does not necessarily indicate a reduction in interest but primarily reflects how the dataset is constructed. Companies may enter or leave the sample across years, and the 2024 observation window is shorter. Following standard practice in SME sustainability surveys, temporal patterns are therefore interpreted descriptively rather than causally (OECD, 2022; OECD, 2023). The key implication is that the label has engaged several hundred companies over three years, enabling robust segmentation across sectors and regions.

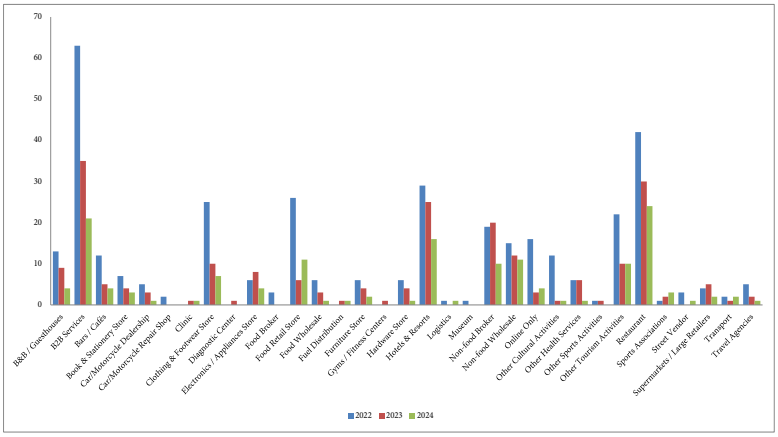
Fig. 1: Distribution of Imprendigreen label over the years



Source: Authors' elaboration

As shown by Figure 2, the adoption is unevenly distributed across sectors, with a limited set of commercial and service activities that account for most certified companies, while many specialised niches include only a few adopters. This skewness aligns with prior evidence indicating that environmental certifications and eco-innovations tend to cluster in consumer-facing sectors - such as retail and hospitality - where environmental reputation is strategically valuable and adoption costs are comparatively lower (Iraldo *et al.*, 2017; OECD, 2023; OECD, 2022).

Fig. 2: Distribution of Imprendigreen label per type of activity

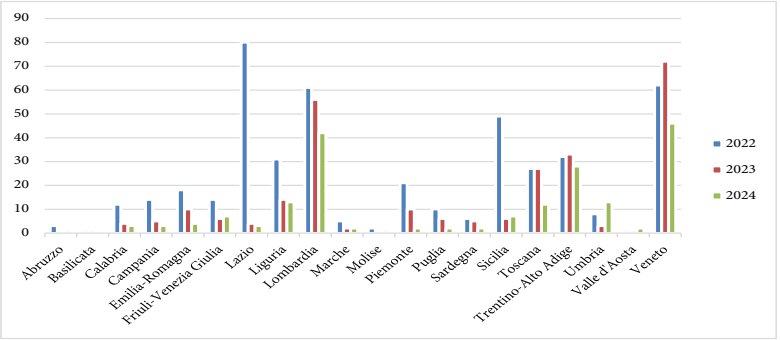


Source: Authors' elaboration

The regional distribution of adopters (Figure 3) confirms the presence of strong territorial heterogeneity. Northern and Central regions account for a substantial share of certified companies, while adoption remains limited in several Southern regions. These territorial patterns mirror broader evidence on Italy's regional disparities in SME sustainability engagement, which reflect underlying differences in productive structures, ecosystem support, and infrastructural capacity (OECD, 2022; OECD, 2023). Because our data cover only Confcommercio-affiliated companies, the distribution reflects both the underlying population of member companies

and their propensity to participate. Consequently, these results should be interpreted as a mapping of where the scheme has gained traction so far, not as population-level estimates of sustainability engagement.

Fig. 3: Distribution of Imprendigreen label per region

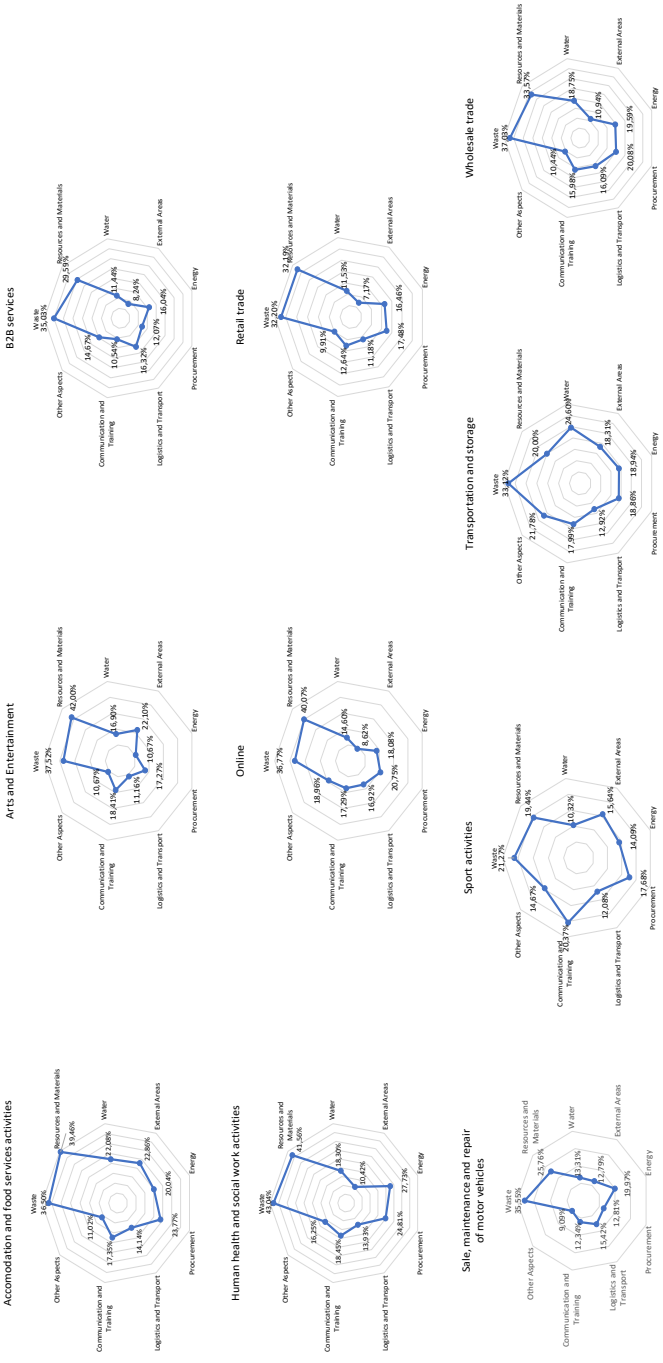


Source: Authors' elaboration

To examine the content of sustainability engagement, we computed domain-specific environmental practice scores based on the Imprendigreen checklist. For each company, we constructed nine additive scores (waste management, resource and materials management, water management, external areas management, energy, procurement, logistics and transport, communication and training, and other aspects) by summing the items within each domain under equal weights. Equal weighting is appropriate for formative constructs - where indicators collectively form the domain rather than reflecting an underlying latent factor - and is widely recommended when theoretical or empirical grounds for differential weighting are lacking (Diamantopoulos and Winklhofer, 2001; OECD/JRC, 2008). Since domains contain different numbers of items and scores, we normalised each score by dividing it by the theoretical maximum achievable in that domain. This transformation produces values between 0 and 1 and ensures cross-domain comparability, consistent with standard procedures in composite environmental performance measurement (Nardo *et al.*, 2005; OECD/JRC, 2008; Singh *et al.*, 2012). We then averaged these normalised scores across companies within each macro-sector. All companies were weighted equally, consistent with recommended practices in composite indicator methodology (OECD/JRC, 2008) and with SME-level sustainability assessments where the analytical unit is the company rather than its economic output (OECD, 2023). The resulting radar charts (Figure 4) reveal clear patterns. Waste management and resource and materials management practices consistently achieve the highest relative scores, suggesting that companies prioritise visible and operationally accessible improvements - such as waste sorting, packaging reduction, and the use of recycled materials. By contrast, logistics and transport, communication and training, and management of external areas tend to have lower scores. These domains often require more complex organisational adjustments or coordination with suppliers and customers, which the literature

identifies as common barriers for SMEs (Triguero *et al.*, 2013; Johnson and Schaltegger, 2016).

Fig. 4: Sectoral distribution of environmental scores across the different domains of practices



Source: Authors' elaboration

4.2 Cluster analysis

This section presents the results of the cluster analysis on the adoption of sustainability practices by Italian service-sector SMEs in 2022 - 2024, enabling the identification of recurrent behavioural profiles in the diffusion of such practices across the above-mentioned nine domains. Each year was analysed separately to avoid dependence across repeated observations and to ensure that cluster structures reflect the cross-sectional configuration of practices in that specific year, in line with established methodological guidance (Ketchen and Shook, 1996). The number of clusters was selected by combining multiple criteria, namely: (i) Calinski-Harabasz pseudo-F index, one of the most widely used indicators for cluster validity (Milligan and Cooper, 1985); (ii) interpretability and parsimony, as recommended by Späth (1985) and Ketchen and Shook (1996); and (iii) stability across years, assessing whether similar structural patterns emerged. Across all years, the Calinski-Harabasz index favoured more parsimonious solutions (particularly k = 2), while the dendrograms indicated the presence of additional sub-structures beyond the primary split. In line with the exploratory and configurational aim of the study, the four-cluster solution was retained as it provided the most interpretable and analytically meaningful differentiation of sustainability practice configurations, while ensuring comparability across the three annual cross-sections (See Appendix A). Alternative specifications (k = 3 and k = 5) were tested but rejected as k = 3 resulted in a loss of conceptual distinctiveness by collapsing substantively different profiles, whereas k = 5 generated smaller and less stable clusters, a limitation frequently noted when forcing partitions beyond natural groupings (Ketchen and Shook, 1996).

Across the three periods of interest, the four clusters consistently mapped onto a stable conceptual structure comprising highly engaged companies ("Frontrunners"), companies with structured but not systematic practice portfolios ("Eco-Improvers"), companies implementing only foundational actions ("Basic Adopters"), and companies with minimal or sporadic sustainability engagement ("Late Adopters"). These clusters should be interpreted as exploratory configurational profiles within the certification scheme rather than as fixed categories of the broader SME population. Although clustering was performed each year independently, the profiles proved analytically stable, suggesting a degree of structural consistency in the configuration of practices across cross-sectional samples.

The results of the 2022 analysis display a clear gradient of sustainability maturity. A small set of companies emerged as Frontrunners (7.6% of the sample), with high adoption across nearly all domains and peaks in resources, materials, energy, and procurement. Eco-Improvers (22%) showed above-average but less comprehensive engagement, particularly in resource efficiency and energy management. Basic Adopters (41%) represented the largest group and demonstrated moderate adoption of fundamental practices, notably in waste management, but lacked broader integration. Late Adopters (29%) showed minimal uptake across domains, suggesting early-stage engagement or structural limitations, representing the lowest-performing companies within the certification scheme rather

than the baseline of the overall SME economy. This stratification is consistent with evidence that SMEs differ markedly in sustainability performance and maturity, reflecting heterogeneous managerial capabilities and resource constraints (Aragón-Correa *et al.*, 2008; Salvador *et al.*, 2023).

In 2023 the overall structure persisted showing a higher degree of polarisation across clusters. Frontrunners represented a larger share of the sample (17%), and displayed higher levels of adoption in resources, energy, procurement, and communication. Eco-Improvers (17%) split into two distinct profiles, one more balanced and one more selective in practice domains, indicating heterogeneity in intermediate adoption pathways. Basic Adopters maintained levels similar to the previous year, representing the 29% of the sample. Late Adopters cluster represented the 37% of the sample and exhibited consistently low adoption. These differences reflect variations reflect changes in the cross-sectional distribution of practice portfolios among participating companies rather than verified within-company transitions. The observed differentiation between leaders and laggards is consistent with patterns observed in sustainability transitions under heterogeneous capability conditions (Annunziata *et al.*, 2018; Aragón-Correa *et al.*, 2008; Salvador *et al.*, 2023).

Finally, the 2024 result show a recomposition of cluster structures into a more hierarchical profile configuration. Frontrunners, although only 9% of the sample, recorded the highest adoption levels observed across the three years, with multiple domains exceeding 0.60. Given the limited absolute size of this cluster, interpretations for this group should be considered with caution. Eco-Improvers (22%) are characterised by greater coherence and performed strongly in energy, procurement, communication, and resource management. Basic Adopters (27%) continued to adopt a limited range of practices, while Late Adopters became the largest group (41%), with persistently low engagement. These proportions describe the internal composition of the certification scheme in 2024 and should not be generalised beyond this context. Cross-sectional comparisons indicate the persistence of a small leadership segment and the growth of laggards, which is consistent with patterns documented in studies indicating that many SMEs remain locked into low levels of sustainability engagement due to structural capability constraints, resulting in limited progression over time (Johnson and Schaltegger, 2016; Salvador *et al.*, 2023). Table 3 summarizes the results across the three years of observation.

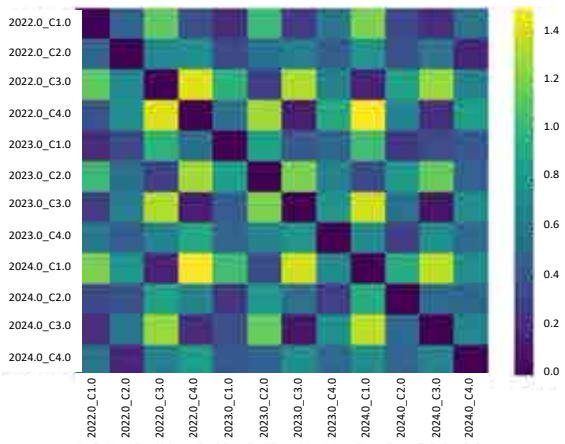
Because companies were not tracked across years in the clustering procedure, numerical cluster labels do not correspond longitudinally. Accordingly, observed differences across years should be interpreted as changes in the distribution of profiles across independent cross-sectional samples, rather than as longitudinal transitions of individual companies. To ensure interpretability, clusters were mapped ex-post to the four conceptual profiles described above. A heatmap of Euclidean distances across all cluster centroids (Fig. 5) provides additional support for their conceptual consistency: Frontrunners consistently appeared close to one another and distant from Late Adopters, while intermediate groups varied more across years (See Appendix A for further details).

Tab. 3: Centroid values of the four conceptual profiles across the nine domains

Year	*Cluster*	*Waste*	*Resources and Materials*	*Water*	*Ext. Areas*	*Energy*	*Procurement*	*Logistics*	*Comm. And Training*	*Other Aspects*
2022	C1	.405	.370	.179	.091	.173	.117	.073	.053	.055
	C2	.446	.467	.221	.181	.255	.369	.202	.316	.293
	C3	.610	.702	.502	.530	.421	.607	.418	.540	.480
	C4	.212	.116	.051	.024	.047	.033	.018	.050	.037
2023	C1	.467	.448	.220	.104	.232	.197	.115	.091	.164
	C2	.541	.636	.390	.296	.439	.563	.423	.548	.538
	C3	.263	.203	.097	.052	.105	.056	.043	.040	.041
	C4	.477	.533	.449	.448	.381	.294	.212	.200	.129
2024	C1	.662	.684	.611	.503	.477	.629	.460	.560	.467
	C2	.467	.491	.336	.272	.286	.252	.114	.096	.073
	C3	.325	.241	.103	.040	.107	.068	.048	.050	.078
	C4	.480	.506	.204	.145	.301	.344	.275	.343	.400

Source: Authors' elaboration

Fig. 5: Cluster Distance Heatmap (Euclidean)



The heatmap shows pairwise dissimilarity between clusters identified in each year based on their configuration of declared environmental practices. Darker colours indicate greater similarity between two clusters, while lighter colours indicate stronger differences. Cross-year comparisons illustrate that advanced clusters remain conceptually similar over time, despite fluctuations in their relative size.

Source: Authors' elaboration

5. Discussion

5.1 Empirical differentiation within voluntary certification

The cluster analysis maps a differentiated landscape of declared environmental practice adoption among Italian service-sector SMEs participating in the Imprendigreen voluntary certification scheme. The results provide an empirical configuration of heterogeneous sustainability

profiles within a formally structured assessment framework. Three broad tiers emerge: a small group of highly committed companies (Frontrunners), a larger set of companies adopting a moderate portfolio of practices (Eco-Improvers and Basic Adopters), and a growing segment of Late Adopters performing at minimal levels. Across the three years of observation, the relative size of these profiles fluctuates: Frontrunners represent 7.6% of companies in 2022, rise to 17% in 2023, and fall again to 9% in 2024. At first glance, these oscillations may suggest instability in company behaviour or inconsistency in the clustering solution. However, these changes are methodologically interpretable and theoretically plausible. First, each cluster solution is computed independently for each annual cross-section. Cluster analysis captures the variance-covariance structure of the dataset at a specific point in time; as such, identical partitions across years should not be expected in rotating samples (Ketchen and Shook, 1996; Everitt *et al.*, 2011). Accordingly, changes in cluster shares reflect variations in the cross-sectional distribution of environmental practices among participating companies rather than observed within-company transitions. The higher share of Frontrunners in 2023 may be interpreted as consistent with a greater differentiation of advanced companies into two high-performing groups characterised by domain-specific strengths. This phenomenon - commonly referred to as cluster splitting - occurs when heterogeneity among top performers increases (Späth, 1985; Milligan and Cooper, 1987). The decline in Frontrunners in 2024 may be interpreted as consistent with a re-composition of advanced companies into a unified and more homogeneous high-performing cluster. Notably, the 2024 Frontrunners show the highest overall levels of practice adoption across the entire period, suggesting greater internal consistency in practice adoption rather than a weakening of performance level. Importantly, the presence of differentiated sustainability profiles within a voluntary certification scheme is itself a substantive empirical finding. Certification does not produce homogeneity. Even under shared standards and evaluation criteria, SMEs display markedly different breadth and intensity of declared practice adoption. This pattern is consistent with recent European evidence identifying distinct clusters of SMEs ranging from minimal to advanced sustainability engagement (e.g., de Andrade *et al.*, 2025). Together, these findings reinforce the idea that SMEs occupy different positions along a sustainability continuum rather than converging toward a uniform model (Salvador *et al.*, 2023).

Second, differences in the relative share of Late Adopters across yearly samples - from 29% in 2022 to 41% in 2024 - further highlight structural heterogeneity. In samples with a higher relative share of Late Adopters, the distribution of adoption appears more skewed toward companies with limited practice portfolios.

Prior research shows that many SMEs face persistent constraints - such as limited managerial expertise, resource scarcity, and uneven access to sustainability knowledge - that hinder environmental advancement (Aragón-Correa *et al.*, 2008; Johnson and Schaltegger, 2016). The observed polarisation may reflect capability asymmetries within the SME population rather than methodological artefacts.

Third, year-to-year differences in sample composition also naturally contribute to fluctuations in cluster shares. Participation in the certification scheme varies annually, with some companies appearing in multiple waves and others only once (see Appendix A3). In rotating samples, differences in company characteristics across periods can legitimately shift the distribution of responses and thus influence the resulting clusters (Everitt *et al.*, 2011).

Finally, it is important to clarify the nature of the data. The analysis captures structured and certified declarations of environmental practices. It does not measure depth of implementation, routinisation, or environmental outcomes. As noted in the literature on environmental management systems, formal adoption does not necessarily imply substantive operational transformation (Boiral, 2007). The clusters therefore reflect configurations of declared practice adoption within a certification framework, not direct observation of embedded sustainability routines.

5.2 Governance-sensitive interpretation

From a theoretical perspective, the markedly different configurations of environmental practices across the years allow us to reflect on the potential governance conditions that may be associated with such patterns. The governance considerations discussed below should be understood as interpretative and propositional reflections derived from behavioural patterns, rather than empirically validated governance mechanisms since this study does not measure governance structures directly.

The heterogeneity observed in the clusters suggests that companies participating in the same voluntary certification framework nonetheless follow distinct patterns of sustainability engagement. Such divergence is consistent with the broader literature indicating that sustainability outcomes are often shaped by internal organisational conditions, including the coherence of strategic orientation, the allocation of resources, managerial commitment, and internal engagement structures.

Governance systems characterised by long-term orientation, resource provision, and effective oversight have been associated with more proactive environmental strategies (Aragón-Correa *et al.*, 2008; De Villiers *et al.*, 2011; Renwick *et al.*, 2013). Conversely, short planning horizons, capability constraints, or limited oversight are often linked to more reactive or compliance-oriented outcomes (Delmas and Toffel, 2008; Johnson and Schaltegger, 2016).

Building on these insights and drawing on Aguilera *et al.* (2021), we propose a governance-sensitive interpretative framework that translates maturity profiles into structured lines of inquiry for future investigation (Fig. 6). The framework should be read as a heuristic device rather than as an explanatory model. The variation in practice breadth across clusters may be consistent with differences in how sustainability is prioritised and coordinated internally, but such associations remain to be tested empirically.

Front-Runners, for instance, exhibit a multi-domain adoption of environmental practices that may reflect governance environments that enable strategic integration of environmental goals. For these companies, the governance challenge may lie in consolidation: investing in board expertise, strengthening long-term incentives for management, and maintaining employee engagement to prevent capability erosion or decoupling.

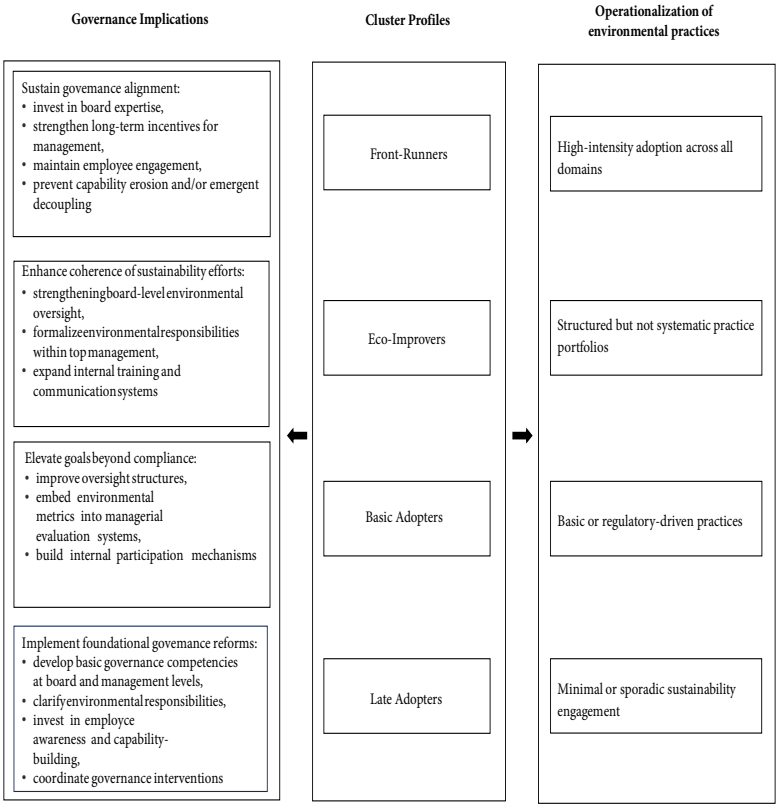
Eco-Improvers, which exhibit substantial but uneven adoption, may benefit from governance interventions aimed at enhancing the coherence of their environmental efforts. Strengthening board-level environmental oversight, formalizing environmental responsibilities within top management, and expanding internal training and communication systems may support their progression toward more holistic environmental performance.

Basic Adopters, whose adoption is concentrated in low-complexity practices, may need governance systems that elevate environmental goals beyond minimum legal requirements. These companies could benefit from improving oversight structures, embedding environmental metrics into managerial evaluation systems, and building internal participation mechanisms.

Finally, Late Adopters, which consistently show the lowest levels of adoption, may require more foundational governance reforms, including the development of basic environmental competencies at board and management levels, clarifying environmental responsibilities, and investing in employee awareness and capability-building. As suggested in prior work on SMEs' environmental transitions, overcoming structural constraints often requires coordinated governance interventions capable of mobilizing attention, resources, and organisational commitment (Johnson and Schaltegger, 2016).

Importantly, the adoption of environmental practices is not equated here with the presence of Sustainable Corporate Governance per se. Rather, the interpretative framework (Fig. 6) should be understood as a propositional device that translates observed behavioural configurations into governance-sensitive hypotheses. Because governance variables were not directly measured, the relationships suggested between sustainability maturity profiles and internal governance-related conditions remain inferential. This opens a clear agenda for empirical validation, which will be discussed in the following sub-section.

Fig. 6: Governance-sensitive interpretative framework of sustainability maturity profiles



The framework translates empirically observed maturity profiles into governance-sensitive propositions intended for future empirical testing. Arrows indicate interpretative alignment rather than causal inference.

Source: Authors' elaboration.

5.3 Future empirical research directions

A first avenue concerns the direct measurement of governance attributes across maturity profiles. Future research could test whether companies in higher-maturity clusters differ systematically in observable governance characteristics, such as sustainability oversight structures, board-level expertise, dedicated managerial roles, or incentive systems aligned with long-term objectives. Similarly, lower-maturity profiles could be analysed in relation to informal governance arrangements or limited strategic integration of sustainability.

A second line of inquiry concerns the nature of practice adoption itself. Building on the distinction between symbolic and substantive adoption (Boiral, 2007), future research could assess whether clusters differ not only in breadth of declared practices but also in depth of implementation and

performance outcomes. Mixed-method and longitudinal designs would be particularly valuable in this regard.

In line with this, the expansion of the Late Adopter cluster raises a theoretically relevant question. The findings show that a substantial proportion of companies voluntarily enter a certification scheme while maintaining minimal practice portfolios. Several streams of literature offer alternative explanations that warrant empirical investigation. Institutional theory suggests that organisations may adopt formal structures or certifications to gain legitimacy without fully internalising associated practices (Meyer and Rowan, 1977; Oliver, 1991).

Alternatively, capability-based explanations suggest that these companies may be at an early stage of development, using certification as a learning platform under resource constraints (Aragón-Correa *et al.*, 2008; Johnson and Schaltegger, 2016). A third possibility derives from strategic response theory, which recognises heterogeneous reactions to institutional pressures (Oliver, 1991). These explanations are not mutually exclusive and warrant empirical investigation.

Together, these directions outline a broader research programme aimed at testing whether sustainability maturity profiles correspond to identifiable governance configurations, represent transitional capability stages, or reflect differentiated strategic responses.

5.4 Implications for certification design and policy considerations

The differentiated maturity tiers identified within the Imprendigreen scheme suggest that a single-level certification may not fully capture the heterogeneity of SME sustainability positioning. Research on sustainability maturity highlights that companies operate at different developmental stages, requiring differentiated capabilities and governance arrangements (Baumgartner and Ebner, 2010). Introducing tiered certification levels or progressive recognition mechanisms could therefore better acknowledge advanced performers while creating structured incentives for companies at earlier stages to progress.

The clustering results may also inform the design of more targeted accompaniment pathways. Beyond assessment, the certification scheme could function as a capability-building platform through cluster-specific roadmaps, peer-learning initiatives, and modular training. Such active support may reduce the risk of symbolic or decoupled adoption highlighted in the environmental management literature (Boiral, 2007; Meyer and Rowan, 1977), reinforcing alignment between declared practices and operational routines.

The steady growth of the Late Adopter cluster further underscores the need for differentiated support, as limited practice breadth may reflect either capability constraints or legitimacy-driven participation. Extending the mapping logic to social and governance dimensions would additionally enable a more integrated sustainability assessment and better align the scheme with broader sustainable corporate governance frameworks. Regional disparities, where present, may also inform more targeted territorial outreach strategies.

5.5 Limitations

The study is subject to limitations that should inform the interpretation of findings. First, the dataset captures only environmental practices and does not include social or governance dimensions. In addition, governance variables such as board composition, ownership structure, or incentive systems are not directly measured. As a result, the study does not assess the full scope of Sustainable Corporate Governance and cannot empirically test relationships between governance structures and practice adoption. The governance-sensitive framework proposed in the paper should therefore be understood as interpretative and propositional.

Second, generalisability is constrained by the nature of the sample: the analysis draws on Italian SMEs in the tertiary sector voluntarily participating in a sustainability certification scheme. This introduces both self-selection bias and contextual specificity, limiting applicability to broader populations. Moreover, the voluntary nature of the certification scheme means that the observed population consists of relatively proactive companies, which may not reflect the full distribution of sustainability engagement in the Italian service economy.

Third, the study relies on declared and assessed adoption within a certification framework. As highlighted in prior research (Boiral, 2007), formal adoption does not necessarily imply substantive transformation.

Fourth, the annual datasets are cross-sectional. While year-specific comparisons allow the identification of recurring configurations, the design does not permit causal inference or the tracking of company-level trajectories over time.

Finally, the methodological choice to aggregate sustainability practices into broader dimensions - in order to improve the stability, interpretability, and replicability of the analysis - comes with an inherent trade-off. While aggregation allows for clearer comparisons across sectors and facilitates the identification of macro-level trends, it also entails a partial loss of granularity. Despite this, the dataset provides a rare and valuable empirical observation of how environmental sustainability is operationalised in SMEs of the Italian tertiary sector, offering meaningful insights for both research and practice.

6. Conclusion

This study investigates how environmental sustainability is enacted within SMEs through the adoption of environmental practices, addressing a gap in the Sustainable Corporate Governance (SCG) literature, which remains fragmented and often focused on isolated drivers, individual mechanisms, or specific governance structures. Rather than analysing formal governance structures, the study focuses on the configuration of declared environmental practices across multiple domains, offering an empirical mapping of heterogeneous sustainability maturity profiles within a certification framework.

The findings identify persistent differentiation among SMEs. A relatively small group of Frontrunners - between 7% and 17% across the

observed years - consistently displays broad and high-intensity adoption of practices. In contrast, the proportion of Late Adopters is higher in the most recent observation, reaching 41% in 2024, while intermediate profiles show variations in their relative distribution across years. Given the repeated cross-sectional nature of the data, these patterns reflect changes in the distribution of practice portfolios within the certification scheme rather than verified company-level transitions. Such heterogeneity aligns with recent research documenting substantial variation in SME sustainability engagement and maturity (Salvador *et al.*, 2023, de Andrade *et al.*, 2025) and with studies emphasising the role of resource constraints and capability asymmetries in shaping environmental strategies (Aragón-Correa *et al.*, 2008).

Importantly, the findings do not demonstrate how governance structures directly produce these outcomes. Instead, they provide a structured behavioural basis for interpreting how sustainability engagement may vary across companies operating within the same certification infrastructure. Building on this, the study proposes a framework linking the observed maturity tiers to propositional, governance-relevant lines of inquiry for future empirical investigation.

The contribution of the paper lies primarily in three areas. First, it provides granular empirical evidence on the multidimensional configuration of environmental practice adoption among service-sector SMEs, an underexplored context in sustainability research. Second, it demonstrates that voluntary certification does not eliminate heterogeneity; even within shared standards, companies exhibit differentiated maturity profiles. Third, it offers a structured interpretative lens that connects behavioural differentiation to governance-relevant lines of inquiry, thereby opening avenues for testing governance-practice alignment in future research.

From a practical perspective, the results may inform the design of differentiated support mechanisms within certification schemes and policy initiatives. The observed maturity tiers suggest that uniform interventions are unlikely to address the diverse capability conditions characterising SMEs.

The originality of the study lies in integrating empirical evidence on the configuration of environmental practices among certified SMEs with current debates on Sustainable Corporate Governance. By examining how sustainability-related practices are enacted across different maturity profiles, the analysis provides a structured basis for exploring how governance principles may plausibly be associated with day-to-day organisational behaviour and outlines a research agenda.

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Appendix A – Supplementary Material

Preliminary information
The study relies on two complementary datasets derived from the Imprendigreen assessment: (i) a binary dataset reporting the adoption (1) or non-adoption (0) of each environmental practice, used to compute domain-level scores and perform the cluster analysis; and (ii) an aggregated score-based dataset employed for the descriptive sectoral comparison and the radar charts. The cluster analysis is solely based on the binary dataset to ensure full alignment between the unit of analysis, the construction of domain indicators, and the clustering variables.

A1. Dendrograms
Hierarchical agglomerative clustering using Ward's linkage and Euclidean (L2) distance was performed separately for each year (2022, 2023, 2024). The following figures report the resulting dendrograms.

Fig. A1.1: Dendrogram for 2022 (Ward's method)

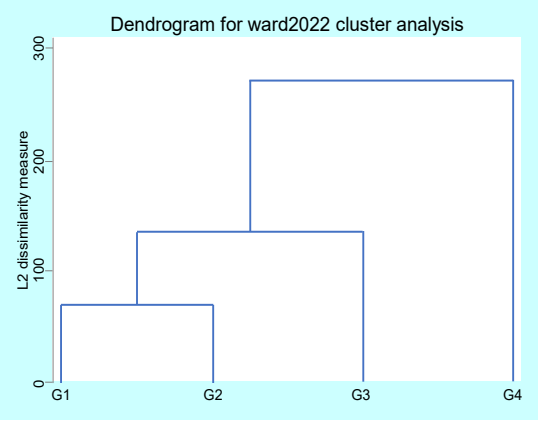


Fig. A1.2 Dendrogram for 2023 (Ward's method)

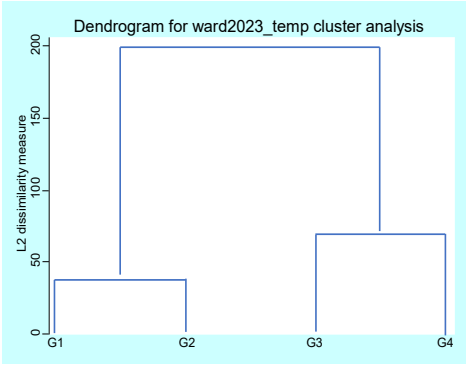
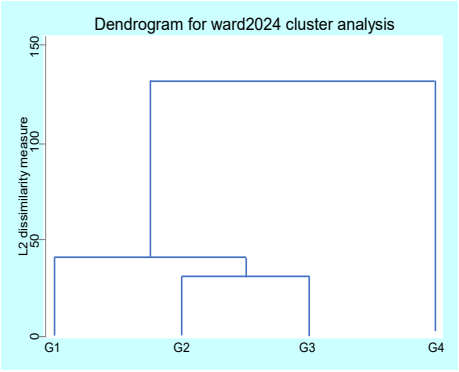


Fig. A1.3: Dendrogram for 2024 (Ward's method)



A2. Cluster Validation: Calinski–Harabasz Index

Table A2 reports the Calinski–Harabasz pseudo-F values for alternative numbers of clusters (k = 2–15) .

Number of clusters	2022	2023	2024
2	222.69	148.4	89.96
3	158.76	100.51	67.52
4	125.16	85.52	62.3
5	114.56	76.33	53.85
6	114.08	67.14	49.73
7	103.85	63.71	47.26
8	100.03	59.51	43.5
9	90.68	55.24	40.6
10	84.49	51.16	38.69
11	78.64	49.1	35.94
12	74.15	46.86	34.71
13	69.67	43.86	33.39
14	67.05	42.09	32.42
15	65.53	40.09	30.81

A3. Company presence across years

To assess the extent to which companies appear repeatedly across the three annual waves (2022–2024), we computed, for each enterprise, the number of distinct years in which a valid questionnaire was submitted. Company identifiers were cleaned to remove minor formatting inconsistencies, and one duplicated company-year observation was excluded during this validation process.

Table A3 reports the distribution of company participation across years. The majority of companies (59.4%) appear in only one year, while 24.7% are observed in two years and 16.0% in all three years.

This distribution confirms that the dataset primarily reflects repeated cross-sectional observations rather than a balanced longitudinal panel. Consequently, cluster analyses were conducted independently for each year, and temporal comparisons should be interpreted as changes in cross-sectional configurations rather than company-level transitions.

Number of years observed	Companies	%
1	547	59.4
2	227	24.7
3	147	16.0

A4. Cluster Membership by Year

Table A4 summarises the number of companies assigned to each cluster for the three years analysed.

Year	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Total
2022	190 (41.30%)	101 (21.96%)	35 (7.61%)	134 (29.13%)	460
2023	78 (29.32%)	45 (16.92%)	98 (36.84%)	45 (16.92%)	266
2024	18 (9.33%)	52 (26.94%)	80 (41.45%)	43 (22.28%)	193

Numerical cluster labels (C1–C4) are purely technical identifiers and do not carry an intrinsic ordinal meaning. For each year, conceptual labels (High adopters, Medium-high adopters, Medium adopters, Low adopters) are assigned ex post on the basis of the centroid patterns reported in Table A4. As a result, the correspondence between numerical clusters and conceptual categories is not fixed over time. Table A3b summarises the mapping between cluster IDs and conceptual profiles for each year.

Table A4b – Mapping between numerical clusters and conceptual categories

Year	Cluster ID	Conceptual Category
2022	C3	Front-Runners (High adopters)
	C2	Eco-Improvers (Medium-high adopters)
	C1	Basic Adopters (Medium adopters)
	C4	Late adopters
2023	C2	Front-Runners (High adopters)
	C4	Eco-Improvers (Medium-high adopters)
	C1	Basic Adopters (Medium adopters)
	C3	Late adopters
2024	C1	Front-Runners (High adopters)
	C4	Eco-Improvers (Medium-high adopters)
	C2	Basic Adopters (Medium adopters)
	C3	Late adopters

A5. Descriptive Statistics of Domain Variables

Table A5 reports the mean, standard deviation, minimum and maximum of the normalised percentage scores for the nine environmental domains used in the cluster analysis, for each year.

Year	Domain	Mean	SD	Min	Max
2022	Waste	0.373	0.177	0	1
2022	Resources	0.343	0.213	0	1
2022	Water	0.175	0.181	0	0.8889
2022	External areas	0.125	0.187	0	0.8333
2022	Energy	0.173	0.150	0	0.7037
2022	Procurement	0.185	0.212	0	1
2022	Logistics	0.112	0.151	0	0.88
2022	Communication	0.147	0.218	0	1
2022	Other aspects	0.134	0.225	0	1
2023	Waste	0.406	0.190	0	1
2023	Resources	0.404	0.220	0	1
2023	Water	0.242	0.208	0	1
2023	External areas	0.175	0.221	0	0.8333
2023	Energy	0.246	0.164	0	0.7407
2023	Procurement	0.223	0.224	0	1
2023	Logistics	0.157	0.176	0	1
2023	Communication	0.168	0.232	0	1
2023	Other aspects	0.176	0.258	0	1
2024	Waste	0.429	0.178	0	1
2024	Resources	0.408	0.209	0	0.9474
2024	Water	0.235	0.197	0	0.8889
2024	External areas	0.169	0.213	0	0.8333
2024	Energy	0.233	0.157	0	0.8148
2024	Procurement	0.231	0.223	0	1
2024	Logistics	0.155	0.171	0	0.96
2024	Communication	0.175	0.237	0	1
2024	Other aspects	0.184	0.251	0	1

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