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Brief Report

An ESG Memorandum for Europe: Sustainable Investment Governance Between Information Manipulation Governance and EU Regulatory Framework

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Abstract

The present Brief Report examines the role of data governance and regulatory complexity in shaping the integration of Environmental, Social, and Governance (ESG) factors in asset management and corporate reporting within the European Union. As sustainable finance expands, ensuring the transparency, comparability, and reliability of ESG information remains a key challenge. The study adopts a qualitative and analytical approach, drawing on academic literature, institutional reports, and EU regulatory frameworks, including the Corporate Sustainability Reporting Directive (CSRD), the Sustainable Finance Disclosure Regulation (SFDR), the EU Taxonomy, and the European Sustainability Reporting Standards (ESRS). Through a documentary and comparative analysis, it assesses the consistency and interoperability of European and international sustainability frameworks. The findings highlight persistent challenges such as data fragmentation, lack of standardization, and regulatory complexity, while emphasizing the role of ESRS and robust data governance in enhancing data quality and transparency. The present Brief Report therefore provides potentially useful insights for stakeholders such as policymakers and regulators, managers and institutional investors, corporate issuers and academicians. Strengthening governance structures and regulatory alignment is hence essential not only to foster investor trust and improve access to sustainable finance, but also to support evidence-based policy reform and long-term creation across European capital markets.

Keywords: data governance; data transparency; digital transformation; environmental; social; and governance (ESG); european union regulatory framework; sustainable finance

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1. Introduction

Sustainable investing has emerged as one of the most significant transformations in contemporary financial markets. Yet, despite its rapid growth, investors continue to question whether sustainability-oriented strategies can consistently deliver stable and reliable returns [1]. These concerns are reinforced by the 2025 KPI Report of Invest Europe, which documents persistent risks associated with weak sustainability credentials across investment portfolios [2]. Nevertheless, the scale of sustainable finance continues to expand at an unprecedented pace: global sustainable investments are projected to surpass 40 trillion U.S. dollars by 2030, with sustainability-focused assets potentially accounting for up to

25% of total global assets under management [3,4] as highlighted in Figure 1 presenting the Compound Annual Growth Rate (CAGR) projections for different world regions scaled upward or downward to respectively compare pessimistic and optimistic scenarios.

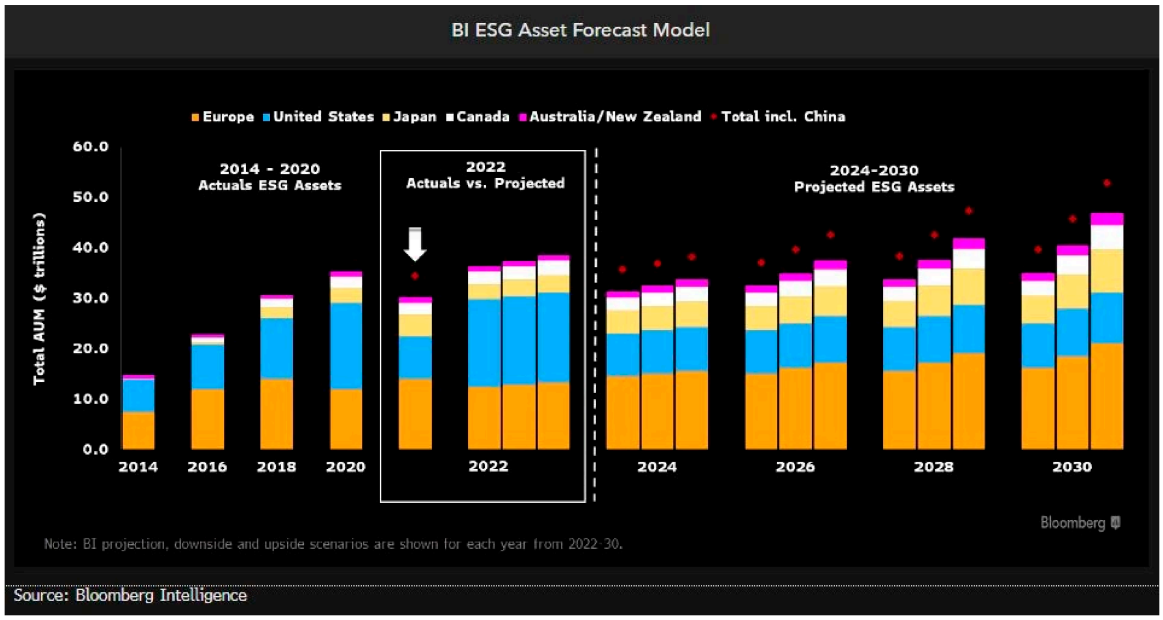

Figure 1. ESG assets growth projections (2022–2030). Source: [3]. Starting from 2022, estimations were differentiated in terms of more pessimistic (left bar), optimistic (right bar) and standard (central bar) scenarios. In 2022, assets under management (AUM) declined globally by 20% (see white arrow) because of the Global Sustainable Investment Alliance's (GSIA) decision to exclude investments with vague ESG standards.

Within the European Union, this growth is underpinned by one of the most ambitious regulatory frameworks for sustainable finance globally. The EU Taxonomy Regulation (EU 2020/852), the Corporate Sustainability Reporting Directive (CSRD), the European Sustainability Reporting Standards (ESRS), and the Sustainable Finance Disclosure Regulation (SFDR) collectively define the boundaries of sustainable economic activity, mandate standardized disclosure, and promote greater transparency across financial and corporate systems [5–7]. Together, these instruments represent a deliberate policy effort to redirect capital flows toward environmentally and socially responsible activities, while establishing a common language for sustainability reporting across EU member states.

A critical and persistent challenge within this evolving landscape is greenwashing—the practice of making misleading or unsubstantiated environmental claims to misrepresent the sustainability profile of products, services, or corporate strategies. Greenwashing not only distorts investor decision-making but also undermines market integrity and public trust in sustainable finance. In response, the Directive on Empowering Consumers for the Green Transition (ECGT), expected to enter into force in 2026, introduces stricter requirements for environmental claims and seeks to limit deceptive practices. However, important gaps remain unaddressed, particularly regarding product durability, lifecycle assessments, and the verification of sustainability credentials across supply chains [8–10].

Furthermore, greenwashing is not merely a communication issue, but often a structural consequence of weak Environmental, Social and Governance (ESG) data management and inconsistent verification mechanisms. For instance, ESG rating systems are characterized significant inconsistencies in sustainability assessments caused by divergent methodologies, incomplete datasets, and selective indicator construction, raising concerns about the reliability of ESG-labelled financial products and underlying sustainability data [11,12]. In parallel,

firms may strategically adjust reporting boundaries, methodologies or indicator selection in ways that improve perceived sustainability performance without necessarily altering underlying corporate practices [13]. Hence, ESG credibility problems originate upstream in the data generation and validation process while fragmentation, lack of standardization, and weak assurance mechanisms create systemic vulnerabilities in sustainability reporting systems [14].

At the heart of these challenges lies a fundamental problem of data quality. The credibility of ESG integration depends on the availability of accurate, comparable, and verifiable sustainability information. Yet the absence of universally accepted metrics, widespread inconsistencies in corporate reporting practices, and the limited reliability of ESG ratings assigned by third-party agencies continue to impair effective decision-making for both investors and corporations [15]. These structural data deficiencies not only reduce the efficiency of capital allocation but also expose organizations to reputational, regulatory, and financial risks. Without robust data governance frameworks capable of ensuring the integrity and traceability of sustainability information, the transition toward credible and impactful ESG integration remains incomplete.

2. Theoretical Framework, Materials and Methods

This Brief Report investigates how structured data governance shapes investor trust, operational efficiency, and access to sustainable finance within the European Union. Building on this premise, the study addresses the following research question: *How do challenges related to data governance and regulatory complexity affect the integration of sustainability factors in asset management and corporate reporting within the European Union?*

The study is grounded in a qualitative and analytical framework, drawing on three interconnected theoretical perspectives. First, stakeholder theory provides a lens through which to examine how ESG disclosure practices respond to the informational needs of diverse stakeholder groups, including investors, regulators, and civil society. Second, institutional theory informs the analysis of regulatory convergence, explaining how coercive, normative, and mimetic pressures drive the adoption of harmonized sustainability frameworks across EU member states. Third, an information quality perspective underpins the focus on data governance, highlighting how the accuracy, comparability, and traceability of ESG data determine the credibility and usability of sustainability disclosures.

The present Brief Report also contributes to the growing body of knowledge on sustainable finance governance and provides actionable insights for practitioners, regulators, and researchers within the European regulatory context in the following ways. On the one hand, it advances a conceptual framework of Sustainable Investment Governance that links ESG integration to data governance, regulatory interoperability, and digital verification mechanisms. On the other, it develops a structured analysis of the interaction between the CSRD, SFDR, ESRS, and international sustainability standards, identifying regulatory and operational gaps affecting effective implementation. Finally, it proposes a legal-tech perspective on ESG governance by examining how digital tools, including artificial intelligence and traceability technologies, may support the assurance, reliability, and credibility of sustainability disclosures.

2.1. Key Conceptual Definitions

In this Brief Report, data governance is interpreted in a broader analytical sense as *information manipulation governance*, referring not only to technical data management but also to the institutional and organizational mechanisms shaping the production, verification, and distortion of ESG-related information, such as greenwashing and selective disclosure.

Furthermore, for the purposes of the present analysis, ESG integration refers to the systematic incorporation of environmental, social, and governance factors into corporate governance, investment decision-making, and risk assessment processes [16,17]. Data governance is also understood as the set of institutional, technical, and organizational mechanisms ensuring the quality, traceability, standardization, and accountability of sustainability-related information [18,19]. Finally, Sustainable Investment Governance refers to the regulatory and organizational architecture through which sustainability objectives are operationalized, monitored and verified within financial and corporate systems. Further recent empirical and industry evidence suggests that ESG information has become increasingly central to capital markets and investment decision-making, with ESG-related assets projected to reach substantial global volumes in the coming years despite persistent methodological and regulatory challenges [1,3,4]. At the same time, this rapid expansion has intensified concerns regarding the reliability, consistency, and comparability of ESG data, particularly due to heterogeneous disclosure practices, inconsistent reporting standards, and varying interpretations of ESG metrics across firms and jurisdictions [2].

The literature on greenwashing and ESG information manipulation further demonstrates that ESG disclosure is not neutral but may be strategically shaped by firms. Practices such as selective disclosure, symbolic compliance, and metric manipulation can distort the representation of corporate sustainability performance and contribute to information asymmetries in financial markets [8]. These dynamics are exacerbated by fragmented ESG frameworks and limited verification mechanisms, which reduce transparency and make it difficult for investors and regulators to assess the true sustainability impact of firms.

From a regulatory perspective, the European Union has progressively strengthened its sustainability disclosure framework in response to these challenges, introducing key instruments such as the Sustainable Finance Disclosure Regulation (EU) 2019/2088 [20], the EU Taxonomy Regulation (EU) 2020/852 [5], the Corporate Sustainability Reporting Directive (EU) 2022/2464 [6], and the European Sustainability Reporting Standards (ESRS) [7]. These frameworks aim to improve the consistency, comparability, and reliability of ESG information while reducing the risk of misleading sustainability claims and enhancing market transparency.

Concrete manifestations of these issues can be observed in practice across corporate ESG reporting and rating systems. For instance, firms may highlight positive environmental indicators while omitting or underreporting negative externalities in other areas, thereby creating an imbalanced representation of overall ESG performance. In addition, divergence across ESG rating providers has been widely documented, with the same company receiving significantly different ESG scores depending on the methodology applied, further illustrating the lack of standardization and the potential for inconsistent sustainability assessments [12,13]. These discrepancies reinforce concerns that ESG ratings and disclosures may reflect methodological choices as much as underlying corporate sustainability performance.

2.2. Materials

The empirical basis of the study consists of four categories of sources, selected according to their relevance to the research questions and complementary contribution to the analytical framework.

First, academic and policy research on ESG integration and data governance establishes the analysis within pre-existing scholarly debates on sustainability reporting and regulatory governance [16–18]. These contributions were selected on the basis of their direct engagement with the conceptual and operational dimensions of ESG disclosure frameworks. Second, primary EU regulatory documents (i.e., the CSRD, SFDR, EU Tax-

onomy Regulation, and ESRS [5–7]) represent the core normative corpus of the analysis. Their inclusion is essential to mapping the current European regulatory landscape and identifying the governance obligations and implementation challenges that form the central object of inquiry.

Third, reports from international organizations such as the International Sustainability Standards Board (ISSB), European Financial Reporting Advisory Group (EFRAG), and European Commission [19] enable a comparative assessment of the alignment between EU frameworks and global sustainability standards and for evaluating interoperability and regulatory coherence. Fourth, industry and consultancy analyses from sources such as Deloitte, KPMG, and MSCI [21–23] aim at complementing the regulatory and academic dimensions with empirical insights into corporate ESG practices and market-level implementation trends.

2.3. Methods

The Brief Report follows a documentary, comparative research design, which appears to be particularly appropriate in analyzing multi-layered regulatory frameworks and assessing coherence across jurisdictions and institutional contexts. For instance, a systematic review of the selected sources was first conducted to map the European regulatory landscape at the basis of sustainability reporting and to identify key governance challenges. This involved a structured analysis of the primary regulatory documents and academic literature, organized around the three analytical dimensions hereafter.

Furthermore, the Brief Report is characterized by a qualitative content analysis aimed at identifying recurring themes, governance patterns, and implementation gaps across European and international sustainability frameworks. The coding process was also guided by four analytical criteria structuring the comparative dimension of the present research: (i) *regulatory coherence*, namely the assessment of internal consistency among EU sustainability instruments; (ii) *interoperability*, namely the analysis of the alignment between European and international standards such as the Global Reporting Initiative (GRI) [24], ISSB [25], and the Task Force on Climate-related Financial Disclosures (TCFD) [26]; (iii) *assurance and verifiability*, namely the evaluation of the mechanisms to ensure data quality and auditability; and (iv) *technological enablement*, namely the assessment of the role of digital tools and artificial intelligence in supporting compliance and transparency.

In this specific regard, our findings are organized around three analytical dimensions: (i) ESG integration and its associated challenges; (ii) sustainability reporting frameworks, with a focus on the ESRS and their alignment with international standards; and (iii) data governance for sustainability, encompassing the role of digital transformation and AI in enhancing regulatory compliance and transparency. These dimensions were derived inductively from the documentary analysis and deductively from the existing literature to make sure that the framework adopted is both empirically grounded and theoretically informed.

3. Results

This section presents the findings of the comparative and content-based analysis of European and international sustainability frameworks. The results are organized around three interconnected dimensions: the current state of ESG integration across the European corporate and financial landscape; the architecture and alignment of EU sustainability reporting frameworks; and the role of data governance and digital technologies in enabling credible and comparable ESG disclosures. Together, these findings illuminate the complex interaction between regulatory developments, organizational capabilities, and technological innovation in shaping the European sustainability transition. Overall, the analysis is grounded in the view that ESG integration operates as a data-intensive governance system

in which regulatory design, institutional capacity, and information quality jointly determine the credibility of sustainability disclosures. In line with the literature on sustainability reporting and information asymmetry, ESG frameworks do not merely transmit information but actively shape market behavior by structuring what can be measured, compared, and verified [27].

3.1. From Regulatory Convergence to Data Governance: Challenges in ESG Reporting Systems

The integration of ESG principles has expanded considerably across the European corporate and financial landscape over the past decade. Institutional investors increasingly incorporate ESG metrics into portfolio construction, risk assessment, and stewardship activities, reflecting both regulatory pressure and growing stakeholder expectations. Nevertheless, significant gaps persist between regulatory ambitions and firms' operational capabilities, and the pace of integration remains uneven across sectors and organizational sizes. From a thematic perspective, environmental indicators, such as greenhouse gas emissions, energy consumption, and climate-related risks, are relatively well standardized, benefiting from established measurement methodologies and international frameworks such as the TCFD [26] or the ESRS [22] for the European Union. By contrast, social and governance dimensions continue to display greater variability and interpretive ambiguity, reflecting the inherent complexity of measuring human capital, labor practices, board diversity, and stakeholder engagement in a consistent and comparable manner.

From an institutional theory perspective, the European ESG regulatory architecture can be interpreted as a coercive institutional mechanism aimed at harmonizing corporate sustainability behavior through mandatory disclosure obligations [28,29]. However, the persistence of implementation gaps suggests that regulatory coercion alone is insufficient to ensure substantive convergence, particularly in contexts where organizational capabilities and data infrastructures remain heterogeneous.

These challenges are particularly acute for small and medium-sized enterprises (SMEs), which often lack the financial resources, technical infrastructure, and internal expertise required to meet evolving reporting obligations. For many SMEs, ESG compliance represents a significant administrative burden rather than a strategic opportunity, limiting their ability to compete for sustainable finance and engage with institutional investors on equal terms. These asymmetries are also consistent with prior findings in sustainability governance literature, which highlight that compliance-intensive regulatory regies tend to generate disproportionate burdens for smaller firms and to reinforce structural inequalities in access to sustainable finance [14,30].

More broadly, sustainability governance across European firms is still frequently approached as a compliance-driven exercise rather than as a strategic, value-creating process. The absence of universally accepted ESG metrics reinforces data fragmentation and encourages selective disclosure practices, in turn amplifying the risk of greenwashing. While the EU regulatory framework, particularly the CSRD and SFDR [23], has introduced strong incentives for deeper ESG integration, achieving genuine compliance requires substantial organizational transformation. This includes the development of robust internal audit mechanisms, the cultivation of sustainability expertise across business functions, and the deployment of digital infrastructures capable of ensuring data accuracy, traceability, and interoperability. Although many firms have initiated ESG data collection processes, aligning internal methodologies with external standards and third-party assurance requirements remains a formidable challenge, making the transition toward fully integrated ESG governance both ongoing and structurally uneven.

3.2. ESG Trends, Challenges, and Data Governance Opportunities

Within this evolving landscape, the European Union has progressively constructed one of the most comprehensive and coherent sustainability reporting architectures in the world. Three regulatory instruments are central to this framework.

The CSRD represents the cornerstone of EU sustainability disclosure policy. By significantly expanding the scope of previous non-financial reporting obligations under the Non-Financial Reporting Directive (NFRD), the CSRD now requires a much broader universe of companies, including large-listed firms, financial institutions, and, progressively, SMEs, to produce standardized, audited, and digitally accessible sustainability information [6]. Crucially, the CSRD introduces the principle of double materiality, requiring companies to disclose not only how sustainability risks affect their financial performance, but also how their activities impact society and the environment.

The SFDR complements the CSRD by focusing specifically on financial market participants, including asset managers, insurers, and pension funds. The SFDR mandates disclosures on how sustainability risks and principal adverse impacts are integrated into investment decision-making processes, thereby enhancing transparency and comparability at the financial product level [21].

The emergence of the CSRD-SFDR-ESRS architecture reflects—therefore—a broader shift toward regulatory datafication, where sustainability governance is increasingly structured around standardized, machine-readable datasets designed to enhance comparability and auditability [6,13]. More specifically, the ESRS, developed by the EFRAG, operationalize the CSRD by providing a detailed and structured set of reporting requirements [19]. These encompass cross-cutting standards applicable to all sectors, as well as thematic standards covering environmental, social, and governance topics, and sector-specific standards tailored to the specific sustainability challenges of individual industries. By translating high-level regulatory obligations into concrete disclosure indicators, the ESRS play a pivotal role in ensuring the consistency, granularity, and comparability of sustainability information across European firms. Therefore, the ESRS function not only as reporting standards but also an infrastructure for ESG data governance while aligning European disclosure practices with global initiatives (e.g., the ISSB baseline standards and GRI framework) [31,32].

The patterns summarized in Table 1 are consistent with the broader literature on sustainability reporting systems, which emphasizes that ESG effectiveness depends on the integration of standardization, verifiability, and interoperability [33,34]. Hence, ESG reporting challenges are not merely technical but structural and arise from misalignments between regulatory ambition and organizational data capabilities.

Table 1. Comparative characteristics of the three reporting frameworks.

Challenges	Outcomes	Solutions
Complex ESG data integration across multi-tier supply chains making data collection, verification, and harmonization difficult	Enhanced visibility of ESG risks across multiple supply chain levels through improved analytical capabilities	Advanced ESG risk assessment module using standardized EU metrics
Lack of standardized ESG metrics resulting in inconsistent risk evaluations and poor comparability between suppliers	Standardized ESG risk indicators aligned with EU frameworks enabling consistent and measurable assessments	Harmonized indicators and integration with EU sustainability frameworks (CSRD and CSDDD)
Limited supply chain transparency and traceability hindering the understanding of upstream environmental and social impacts	Improved data reliability through integration of verified and multisource datasets	Data from public databases, supplier disclosures, and third-party verifications

Table 1. *Cont.*

Challenges	Outcomes	Solutions
Frequent regulatory update in EU sustainability policies creating compliance challenges	Better alignment with evolving EU compliance and reporting requirements	Automated updates reflecting new EU directives and sustainability standards
Difficulty in visualizing and communicating ESG risks effectively to stakeholders	User-friendly dashboards enabling real-time monitoring and decision-making	Visualization tools and dashboards for dynamic ESG risk tracking

Source: own elaboration based on the findings summarized above.

Importantly, the EU framework does not operate in isolation. The ESRS are increasingly aligned with major international sustainability initiatives, including the GRI, ISSB, and TCFD [24–26]. This convergence between European and global standards reduces duplication of reporting efforts for multinational firms, promotes cross-jurisdictional comparability, and contributes to the gradual emergence of a more unified global baseline for sustainability disclosure practices. Table 1 summarizes the main characteristics of the three reporting frameworks.

3.3. Summary of Findings

The analysis reveals that the European Union has developed a robust and progressively coherent regulatory framework for sustainability integration. The CSRD, SFDR, and ESRS collectively form a structured reporting architecture that is increasingly aligned with global sustainability standards, reflecting a deliberate policy commitment to transparency, comparability, and long-term value creation. This regulatory convergence represents a significant step forward in establishing a common language for ESG disclosure across European firms and financial markets.

At the same time, the findings underscore that regulatory design alone is insufficient to guarantee effective sustainability integration. Data governance emerges as the central operational pillar of this transformation, directly shaping the quality, reliability, and auditability of ESG disclosures and, by extension, investor confidence and market integrity. Organizations that invest in robust data governance structures—encompassing standardized data collection processes, cross-functional accountability mechanisms, and digital verification systems—are demonstrably better positioned to meet regulatory requirements and to communicate credible sustainability performance to stakeholders.

The transition toward digital and AI-driven reporting infrastructures further amplifies both the opportunities and the risks associated with ESG integration. On one hand, automation, predictive analytics, and blockchain-based traceability systems enhance the efficiency, accuracy, and real-time accessibility of sustainability data. On the other hand, these technologies introduce new challenges related to algorithmic accountability, data ethics, and the risk of over-reliance on AI-generated outputs that lack sufficient human oversight and independent verification. Ensuring the integrity of AI-assisted ESG reporting therefore requires not only technical safeguards but also clear governance protocols and regulatory guidance. A persistent structural tension also emerges between the ambitions of the EU regulatory framework and the operational realities faced by smaller firms. In particular, SMEs continue to encounter disproportionate compliance burdens due to resource constraints, limited technical capacity, and the complexity of navigating multiple overlapping regulatory obligations simultaneously. Addressing this asymmetry will require targeted policy interventions, including proportionality mechanisms within the ESRS, expanded access to digital reporting tools, and dedicated capacity-building initiatives at the national and European level. Overall, the findings point to a fundamental shift in the nature of

sustainability governance in Europe: from a phase of policy design—characterized by the proliferation of regulatory instruments and voluntary frameworks—toward a phase of data-driven implementation, in which the quality, accessibility, and assurance of ESG data have become the primary determinants of the credibility and impact of sustainable finance. This transition demands not only technical and organizational adaptation but also a deeper cultural reorientation within firms, positioning sustainability as a strategic driver of long-term resilience rather than a compliance obligation.

The findings converge on the conclusion that ESG integration within the European Union is increasingly transitioning from a disclosure-based model to a data-governance-driven regulatory system, where the quality and structure of underlying information are as important as the disclosure obligations themselves [5,35]. This shift reflects a broader transformation in sustainability governance, where transparency is no longer achieved solely through disclosure, but reliability, traceability, and interoperability of ESG data across institutional layers as also highlighted by [36].

3.4. Toward an ESG Data Governance Assurance Model

Building on the findings, the Brief Report proposes an ESG Data Governance Assurance Model structured around five interrelated layers that collectively support credible and effective sustainable investment governance. The first layer is the data collection layer, which forms the foundation of the model and concerns the generation, standardization, and management of ESG metrics through internal reporting systems and data infrastructures. Because the quality of sustainability disclosures depends fundamentally on the reliability of underlying inputs, this layer constitutes the basis for all subsequent governance functions.

The second layer is the verification layer, which encompasses assurance mechanisms, internal controls, audit procedures, and validation processes designed to ensure the integrity, traceability, and credibility of collected data. Building upon this, the third layer consists of the regulatory compliance layer, within which firms align reporting processes with applicable obligations under the CSRD, SFDR, ESRS, and related regulatory frameworks. This layer links internal governance practices to external legal requirements.

The fourth layer is the digital assurance layer, referring to the use of technological tools—including artificial intelligence, blockchain-based traceability systems, and automated compliance monitoring—to strengthen transparency, efficiency, and real-time oversight in ESG reporting. These technologies do not substitute governance structures but operate as enabling mechanisms within them. Finally, the fifth layer is the trust outcome layer, representing the broader governance outcomes generated by the interaction of the preceding layers, including enhanced investor confidence, improved market integrity, and greater access to sustainable finance. The model assumes a cumulative relationship among these layers, such that weaknesses at foundational levels, particularly in data quality or verification, may undermine the effectiveness of higher-order outcomes. Conversely, strengthened governance across layers reinforces the credibility and impact of ESG integration.

The growing fragmentation of ESG reporting practices [37], combined with increasing reliance on digital technologies for sustainability assessment, has led scholars to call for integrated governance frameworks capable of linking regulatory compliance, data assurance, and technological verification [13,38]. The proposed ESG Data Governance Assurance Model aligns with emerging approaches in sustainability accounting literature, which conceptualize ESG reporting as a multi-layered socio-technical system rather than a purely regulatory exercise.

4. Discussion

The findings of the Brief Report advance the understanding of ESG integration within the European regulatory context, offering a nuanced interpretation of the interplay between data governance, regulatory complexity as highlighted by [12], and organizational transformation. The results confirm that organizations adopting structured ESG frameworks are better positioned to identify sustainability-related risks and opportunities, thereby supporting long-term resilience, operational efficiency, and stakeholder trust. Yet the analysis also reveals that the mere existence of regulatory obligations is insufficient to guarantee meaningful ESG integration: the quality, governance, and verifiability of sustainability data emerge as the decisive factors separating genuine sustainability performance from superficial compliance.

More specifically, the Brief Report identifies that effective ESG integration is inseparable from the quality of underlying data governance structures. As the transition from voluntary to mandatory disclosure accelerates—most notably through the CSRD—organizations are increasingly required to manage complex, heterogeneous datasets spanning environmental performance, supply chain operations, labor practices, and governance structures [6]. In this context, data accuracy, integrity, and traceability are no longer peripheral concerns but core organizational competencies. High-quality sustainability data now play a decisive role in corporate valuation, investor decision-making [39], and regulatory compliance, reinforcing the view that data governance constitutes a strategic asset rather than a technical obligation [16,17]. These findings are consistent with the double materiality principle embedded in the ESRS, which requires organizations to assess both the financial implications of sustainability risks for the firm (outside-in materiality) and the broader impacts of corporate activities on society and the environment (inside-out materiality) [35]. Integrating this dual perspective into governance structures enhances the strategic relevance of ESG decision-making and supports a more proactive and comprehensive approach to risk management.

The study further highlights the transformative potential of digital technologies in advancing ESG data governance. Artificial intelligence, blockchain, and Internet of Things platforms are increasingly deployed to automate data collection, enable real-time sustainability monitoring, and produce audit-ready reports, thereby reducing administrative burdens and improving the reliability of disclosed information [40,41]. Blockchain-based systems strengthen supply chain transparency and provide immutable records of sustainability claims, directly mitigating greenwashing risks. AI-driven analytics, meanwhile, support predictive risk assessment, scenario modeling, and resource optimization, enabling organizations to move beyond retrospective reporting toward forward-looking sustainability management. However, the effectiveness of these tools is contingent on the robustness of the underlying governance frameworks within which they operate. Weak data governance structures amplify rather than mitigate risks: AI systems trained on fragmented or inconsistent data can produce unreliable outputs, while blockchain solutions require standardized data inputs to deliver meaningful traceability. Moreover, the growing reliance on algorithmic systems raises substantive concerns related to data ethics, transparency, and accountability that existing regulatory frameworks have yet to fully address [42]. These findings underscore the importance of developing robust assurance mechanisms for AI-generated ESG data, combining digital verification tools with independent human oversight and clear institutional accountability.

The implications of these findings are particularly significant for small and medium-sized enterprises, which occupy a structurally disadvantaged position within the current ESG governance landscape. Resource constraints, but also limited technical capacity, and the complexity of navigating multiple overlapping regulatory obligations simultaneously

create disproportionate compliance burdens for smaller firms [43]. Yet the analysis also suggests that these challenges are not insurmountable. Structured governance frameworks, phased implementation approaches, and scalable digital reporting tools can meaningfully reduce the barriers to ESG adoption for SMEs, enabling them to achieve regulatory alignment while simultaneously improving access to sustainable finance, enhancing operational efficiency, and strengthening stakeholder engagement. These findings reinforce the view that sustainability represents a strategic opportunity for smaller firms rather than merely a compliance requirement, provided that appropriate institutional support—including proportionality mechanisms within the ESRS, targeted capacity-building initiatives, and accessible digital infrastructure—is made available at the national and European level [44].

Beyond their organizational dimensions, the findings carry broader strategic and societal implications. Organizations with strong ESG practices and robust data governance demonstrate greater resilience to environmental and social shocks, contributing to systemic financial stability and long-term competitiveness [21,22]. The integration of ESG principles into core business processes also drives innovation in areas such as circular economy models, carbon reduction strategies, and sustainable supply chain management, generating positive externalities that extend well beyond individual firm performance [45]. In this respect, ESG governance contributes directly to the achievement of global sustainability objectives, including the United Nations Sustainable Development Goals (SDGs), positioning corporate sustainability not merely as a regulatory requirement but as a meaningful contribution to broader societal transformation [46].

The present is not without limitations. The reliance on secondary sources—academic literature, institutional reports, and regulatory documents—restricts the ability to capture firm-level heterogeneity and the lived organizational experience of ESG implementation. The findings are also primarily anchored in the European regulatory context, which limits their direct transferability to other jurisdictions characterized by different institutional environments, regulatory traditions, and levels of sustainability market maturity. Furthermore, the rapid pace of regulatory change in the EU sustainable finance landscape means that some findings may require reassessment as new provisions of the CSRD, ESRS, and related instruments enter into force.

Future research should address these limitations by pursuing several complementary directions. Longitudinal studies examining the impact of ESG integration on financial performance and organizational resilience over extended time horizons would provide empirical grounding for the strategic claims advanced in this and related literature. Comparative analyses of global sustainability reporting frameworks—particularly the evolving relationship between the ESRS and the ISSB standards—would illuminate pathways toward greater international convergence. Research specifically focused on AI-driven ESG analytics, including their reliability, governance implications, and ethical dimensions, represents a particularly urgent priority given the pace of technological adoption in sustainability reporting. Finally, studies examining the social and environmental outcomes of ESG-driven supply chain practices in emerging markets would extend the geographic and thematic scope of the current literature, generating insights with significant policy relevance for both developed and developing economies.

At the same time, critical scholarship cautions against viewing ESG disclosure as inherently transformative. Some authors argue that ESG may risk functioning as a managerial compliance exercise or soft-law legitimacy mechanism rather than producing substantive sustainability outcomes. These critiques reinforce the importance of coupling disclosure obligations with robust verification and accountability structures.

Policy Implications

From a policy perspective, the findings support three priorities: (i) strengthening proportionality mechanisms for SMEs, (ii) developing assurance standards for AI-assisted ESG reporting and (iii) promoting greater convergence between European and international sustainability reporting frameworks.

First, strengthening proportionality mechanisms for SMEs is essential to ensure that sustainability reporting obligations under the CSRD and ESRS do not generate disproportionate compliance burdens. While SMEs play a critical role in European value chains, their limited technical capacity and data infrastructure often hinder effective ESG reporting. Policy responses should therefore include simplified reporting templates, phased implementation timelines, and the development of EU-supported digital reporting infrastructures designed to reduce administrative costs while preserving data quality and comparability [6,19].

Second, the increasing reliance on digital tools, including artificial intelligence, automation and algorithmic ESG scoring systems, requires the development of dedicated assurance standards for AI-assisted sustainability reporting. Current regulatory frameworks primarily address traditional auditing practices and are not sufficiently able to govern machine-generated ESG data. In line with the Organization for Economic Co-operation and Development (OECD) and ISSB recommendations on data reliability and decision-useful information, policymakers should establish harmonized verification protocols, mandatory auditability requirements for AI-generated ESG outputs, and clear accountability frameworks for algorithmic decision-support systems [13,25].

Third, promoting greater convergence between European and international sustainability reporting frameworks remains a strategic priority. Although instruments such as the CSRD, ESRS, ISSB standards, and GRI framework show increasing alignment, differences persist in materiality approaches, scope of disclosure, and assurance requirements. Enhancing interoperability would reduce reporting fragmentation, but also improve comparability for multinational firms as well as support the emergence of a global baseline for sustainability disclosure [19,25,32]. Furthermore, the European model of sustainability regulation is increasingly characterized by a shift from disclosure-based compliance toward a data-centric regulatory architecture in which ESG information functions as infrastructure for financial and corporate decision-making. However, the transferability of this model outside the EU depends on institutional capacity, enforcement mechanisms, and digital maturity. In this specific regard, the OECD evidence suggests that many non-EU jurisdictions face significant structural constraints in implementing comparable systems, particularly in relation to data availability and regulatory enforcement capacity [30]. As a result, international cooperation, regulatory dialogue, and capacity-building initiatives will be essential to ensure that sustainability governance develops in a coherent and globally inclusive manner.

5. Conclusions

The present Brief Report has examined the integration of ESG factors within the European regulatory and organizational landscape, demonstrating that sustainability governance has undergone a fundamental transformation: from a peripheral, compliance-driven activity to a core strategic imperative that shapes corporate decision-making, investor behavior, and market dynamics at a systemic level. The findings contribute to the growing body of scholarship on sustainable finance by offering a structured analysis of the regulatory, operational, and technological dimensions of ESG integration, with particular emphasis on the role of data governance as the foundational enabler of credible and impactful sustainability practices [16,17,22].

More specifically, the findings of this Brief Report contribute to at least the following stakeholders:

1. *policymakers and regulators:* the need for continued harmonization of EU sustainability frameworks and greater interoperability with international standards to reduce compliance burdens and reporting inconsistencies remain crucial;
2. *managers and institutional investors:* improved data governance and standardized ESG disclosures can directly enhance portfolio screening, but also risk assessment, and sustainable investment decision-making;
3. *corporate issuers:* aligning internal report systems with ESRS requirements offers a pathway to increased credibility and access to sustainable capital;
4. *academicians:* data fragmentation and regulatory misalignment are priority areas for further empirical investigation, especially with specific regard to the real-world effects of CSRD implementation.

A central conclusion is hence that the effectiveness of ESG integration is inseparable from the quality, accessibility, and reliability of sustainability data. Robust data governance frameworks—encompassing standardized data collection processes, independent verification mechanisms, and digitally accessible reporting infrastructures—ensure that ESG metrics are accurate, auditable, and comparable across organizations, sectors, and jurisdictions. In doing so, they mitigate the risks of greenwashing, strengthen stakeholder confidence, and support informed, data-driven decision-making by investors, regulators, and corporate actors alike. The progressive adoption of European and international reporting standards, including the ESRS, the CSRD, and the EU Taxonomy for Sustainable Activities, contributes to the establishment of a more harmonized and transparent regulatory baseline, reducing information asymmetries and fostering greater accountability across the sustainable finance ecosystem [5–7,19]. The growing global relevance of ESG is further evidenced by measurable shifts in public and institutional attention. As illustrated in Figure 2, the popularity of the term "ESG" in global web searches—as measured by Google Trends—reached its peak in October 2025, reflecting the consolidation of sustainability as a central component of contemporary economic and financial discourse. This visibility, however, also carries risks: heightened public scrutiny intensifies the reputational consequences of greenwashing and selective disclosure, reinforcing the urgency of robust data governance as a safeguard against both regulatory and reputational exposure.

Digital technologies are playing an increasingly transformative role in addressing these challenges. Artificial intelligence, blockchain, and Internet of Things platforms enable organizations to automate data collection, monitor sustainability performance in real time, and produce audit-ready reports with greater efficiency and lower administrative costs [25,26]. Blockchain-based traceability systems strengthen supply chain transparency and the integrity of sustainability claims, while AI-driven analytics support predictive risk assessment, scenario modeling, and resource optimization. When embedded within strong governance structures, these technologies represent powerful instruments for improving ESG performance and reinforcing strategic resilience. Their deployment, however, must be accompanied by clear accountability frameworks, ethical guidelines, and assurance mechanisms to prevent the risks of algorithmic opacity and AI-generated data of insufficient quality [19].

The study also pays attention to the structural challenges faced by small and medium-sized enterprises in navigating this evolving landscape. Resource constraints, limited technological capacity, and the complexity of overlapping regulatory obligations create disproportionate compliance burdens for smaller firms [43]. Yet the evidence suggests that these barriers can be meaningfully reduced through structured governance frameworks, phased implementation strategies, and scalable digital reporting tools. When ESG

principles are integrated into core business processes—procurement, human resources, financial planning—SMEs can not only achieve regulatory alignment but also improve access to sustainable finance, strengthen stakeholder relationships, and build long-term competitive advantage. These findings confirm that ESG integration functions not merely as a regulatory requirement but as a strategic driver of competitiveness, innovation, and organizational resilience [35,40].

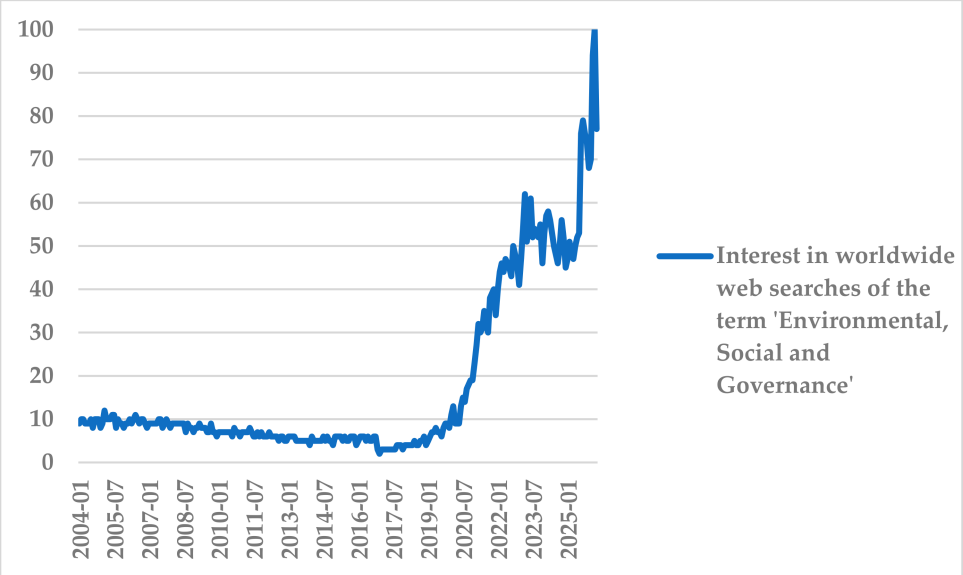

Figure 2. Popularity of the term "Environmental, Social and Governance" in worldwide web searches (1 = lowest/100 = highest) (2004–April 2026). Source: [47].

Beyond their organizational dimensions, the findings of the Brief Report carry broader societal implications. By embedding the principle of double materiality—as promoted by the ESRS—into corporate governance structures, organizations are encouraged to adopt a more comprehensive and responsible approach to value creation: one that accounts simultaneously for the financial implications of sustainability risks and for the impacts of corporate activities on society and the natural environment [19]. This dual orientation positions ESG integration as a meaningful contribution to the achievement of global sustainability objectives, including the United Nations Sustainable Development Goals, and to the broader transition toward a low-carbon, socially equitable economy. Several challenges nonetheless remain. Data fragmentation, inconsistent reporting standards, technological limitations, and persistent resource asymmetries continue to hinder effective ESG integration, particularly among smaller firms and across jurisdictions characterized by different levels of regulatory maturity. Addressing these structural barriers will require coordinated policy action, including the strengthening of proportionality mechanisms within the ESRS, expanded investment in digital public infrastructure for sustainability reporting, and enhanced international regulatory cooperation to promote convergence between European and global sustainability frameworks. Future research should build on these findings by pursuing longitudinal analyses of the relationship between ESG integration and long-term financial performance, comparative studies of international reporting frameworks and their convergence trajectories, and empirical investigations of AI-driven ESG analytics in both large firms and SMEs. Further inquiry into the social and environmental outcomes of ESG-driven supply chain practices—particularly in emerging markets—would extend the geographic scope of the current literature and generate insights with significant policy relevance [48,49]. Equally important is research examining stakeholder perceptions of ESG transparency and the mechanisms through which data quality influences investment

decisions and market behavior. In conclusion, ESG integration—underpinned by robust data governance, digital innovation, and a coherent regulatory architecture—represents not merely a compliance obligation but a transformative strategic and ethical imperative for organizations of all sizes. The European regulatory framework, with its emphasis on transparency, double materiality, and digital accessibility, provides a sophisticated foundation for this transition. Realizing its full potential, however, demands continuous organizational adaptation, sustained institutional commitment, and a genuine cultural reorientation that positions sustainability not as a peripheral constraint but as a core driver of long-term value, resilience, and societal responsibility.

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