



MSc BIOECONOMY, CIRCULAR ECONOMY AND SUSTAINABLE DEVELOPMENT

DEPARTMENT OF ECONOMICS

UNIVERSITY OF PIRAEUS

STUDENT NAME: KATERINA KARAMPITIANI

PROFESSOR: CONSTANTINOS MANASAKIS (MBA, PhD)

The Transformation of European Corporate Accountability

A Comprehensive Analysis of the CSRD Framework, the 2025 Regulatory Pivot, and Strategic Implementation for Multinational Enterprises

Piraeus, 05/2026



ΠΑΝΕΠΙΣΤΗΜΙΟ ΠΕΙΡΑΙΩΣ

UNIVERSITY OF PIRAEUS

ΠΜΣ ΒΙΟΟΙΚΟΝΟΜΙΑ, ΚΥΚΛΙΚΗ ΟΙΚΟΝΟΜΙΑ ΚΑΙ ΒΙΩΣΙΜΗ ΑΝΑΠΤΥΞΗ

ΤΜΗΜΑ ΟΙΚΟΝΟΜΙΚΩΝ ΕΠΙΣΤΗΜΩΝ

ΠΑΝΕΠΙΣΤΗΜΙΟ ΠΕΙΡΑΙΩΣ

Φοιτήτρια: Κατερίνα Καραμπιτιάνη

Επιβλέπων: Κωνσταντίνος Μανασάκης (MBA, PhD)

Ο Μετασχηματισμός της Ευρωπαϊκής Εταιρικής Λογοδοσίας

Μια ολοκληρωμένη ανάλυση του πλαισίου της CSRD, της ρυθμιστικής
στροφής του 2025 και της στρατηγικής εφαρμογής για τις πολυεθνικές
επιχειρήσεις

Πειραιάς, 05/2026

Το έργο που εκπονήθηκε έχει γραφτεί από εμένα αποκλειστικά στο σύνολό της. Δεν έχει υποβληθεί ούτε εγκριθεί στο πλαίσιο κάποιου άλλου μεταπτυχιακού προγράμματος ή προπτυχιακού τίτλου σπουδών στην Ελλάδα ή στο εξωτερικό, ούτε είναι εργασία ή τμήμα εργασίας ακαδημαϊκού ή επαγγελματικού χαρακτήρα.

Οι πηγές στις οποίες ανέτρεξα για την εκπόνηση της συγκεκριμένης εργασίας αναφέρονται στο σύνολό τους, κάνοντας πλήρη αναφορά στους συγγραφείς, τον εκδοτικό οίκο ή το περιοδικό, συμπεριλαμβανομένων και των πηγών που ενδεχομένως χρησιμοποιήθηκαν από το διαδίκτυο. Παράβαση της ανωτέρω ακαδημαϊκής μου ευθύνης αποτελεί ουσιώδη λόγο για την ανάκληση του διπλώματός μου.

Table of Contents

Chapter 1: Introduction and the regulatory imperative	10
1.1. Background: The structural failure of voluntary disclosure regimes	10
1.2. The NFRD legacy and the need for precise revision	12
1.3. Shifting from shareholder primacy to stakeholder accountability	12
1.4. The CSRD as an <i>ex-ante</i> governance instrument	13
1.5. Sustainable Supply Chain Governance (SSCG)	14
1.6. Environmental regulations and the greenwashing paradox	15
1.7. International context: The significance of GRI and national models	15
1.8. The European Green Deal and conceptual differences.....	16
1.9. Implementation readiness and Industry 5.0.....	16
1.10. Summary of regulatory objectives	17
Chapter 2: Theoretical foundations of corporate sustainability governance	18
2.1. Legitimacy theory: The corporate social contract.....	18
2.2. Stakeholder theory: Redefining the locus of accountability	19
2.3. Theory in the context of SMEs and global value chains	20
2.4. Institutional theory: navigating isomorphism and regulatory tensions	21
2.5. Sustainability agency theory: reducing information asymmetry	22
2.6. Paradox theory: navigating sustainability tensions	23
2.7. The Supply Chain complexity lens	24
2.8. Conclusion: A multi-theoretical synthesis	24
Chapter 3: CSRD analysis and the 2025 regulatory pivot	25
3.1. The simplification revolution and geopolitical drivers.....	25
3.2. Threshold recalibration: concentrating regulatory intensity	26
3.3. Directive (EU) 2025/794: The "Stop-the-Clock" reprieve	27
3.4. Transitioning to the limited assurance cap.....	27
3.5. Technical streamlining: The 70% datapoint reduction.....	28

3.6. The "value chain cap" and SME protection	28
3.7. The double materiality gap and transparency risks	29
3.8. CSDDD adjustments and the tier 1 focus	30
3.9. Conclusion: A fragile equilibrium.....	30
Chapter 4: Research methodology	31
4.1. Research philosophy and paradigm	31
4.2. The multiple-case study approach.....	31
4.3. Case selection and sampling strategy.....	32
4.4. Data collection: The "digital-first" repository	32
4.5. Data analysis: Qualitative content analysis	33
4.6. Reliability and validity	33
4.7. Limitations of the methodology	34
Chapter 5: Technical ESRS architecture and interoperability.....	35
5.1. The structural composition of the ESRS.....	35
5.2. The mechanics of double materiality assessment	36
5.3. Transition from voluntary to mandatory standards	37
5.4. International interoperability and the global baseline	38
5.5. The ten topical standards: A pillar-based analysis	38
5.6. Financial sector integration: GAR and BTAR	39
5.7. Transitional arrangements and phase-in provisions.....	40
5.8. Conclusion: The step change in reporting maturity	41
Chapter 6: Digital reporting, sustainable AI, and Industry 5.0.....	42
6.1. The industry 5.0 paradigm: Harmonizing technology and sustainability	42
6.2. Technological infrastructure for authentic disclosure	43
6.3. The evolution of reporting: real-time and prospective insights	44
6.4. Addressing the information gap: The missing (M) pillar and ESGM scores	44
6.5. Digital taxonomy and machine-readable standards (iXBRL)	45
6.6. Sustainable AI: From retrospective disclosure to predictive governance.....	46
6.7. The digital Brussels effect: Exporting European standards.....	47

6.8. SMEs in the Industry 5.0 transition: Resource tensions	47
6.9. Revealing missing information: The role of digital infrastructure	48
6.10. Conclusion: Toward an electronic culture of accountability	48
Chapter 7: Internal controls, ESG risk management, and capital markets	49
7.1. ESG Performance as a signal of internal control quality	49
7.2. Audit report lag: Measuring auditor effort and control risk	50
7.3. Institutional proxies for governance: ESG scores and FTSE4Good	50
7.4. The role of Industry 5.0 in Internal control verification	51
7.5. Board composition and diversity as governance enablers	51
7.6. The Auditor's role in assessing governance and ESG risk	52
7.7. Integration into capital market risk modeling	52
7.8. Conclusion: The definitive convergence of finance and sustainability	53
Chapter 8: Comparative analysis of integrated reports – upstream industrial archetypes	54
8.1. Methodology and case selection	54
8.2. Double Materiality Assessment (DMA) divergence	55
8.3. ESRS E1: Transition plans and operational levers	56
8.4. The EU Taxonomy alignment gap	57
8.5. Scope 3 and value chain complexity (ESRS S2/E1)	57
8.6. Synthesis: The transparency paradox for hard-to-abate sectors	58
8.7. Strategic implications for upstream producers	58
Chapter 9: Comparative analysis of integrated reports – Downstream industrial archetypes	60
9.1. The downstream counterbalance: Case selection	60
9.2. Systemic integration and threshold logic	61
9.3. Value chain governance and orchestrated decarbonization	63
9.4. Global synthesis: The full value chain maturity map	65
9.5. Chapter 9: Conclusion	66
Chapter 10: Discussion and strategic recommendations.....	68
10.1. Discussion: The emergence of the transparency handover	68
10.2. Addressing the data integrity and greenwashing paradox	69

10.3. The paradox of the just transition.....	69
10.4. Addressing data integrity and greenwashing paradox	70
10.5. Strategic recommendations for European undertakings.....	70
Chapter 11: Conclusion and future outlook	72
11.1. Synthesis of the research journey.....	72
11.2. The 2030 horizon: From reporting to integrated steering	72
11.3. Artificial intelligence and the end of sample-based auditing	73
11.4. Theoretical implications: The realized social contract	73
11.5. Concluding statement.....	73
Glossary of Terms.....	75
Resources	78

Executive Summary

Overview

This thesis investigates the structural metamorphosis of corporate sustainability from a voluntary, peripheral activity into a mandatory, machine-readable governance mandate under the **Corporate Sustainability Reporting Directive (CSRD)**. The research interrogates the transition from the reporting period of the Non-Financial Reporting Directive (NFRD) to the rigorous, auditable infrastructure of the **European Sustainability Reporting Standards (ESRS)**.

Theoretical and Regulatory Context

The research is grounded in a synthesis of **Legitimacy, Stakeholder, and Agency theories**. It argues that the CSRD institutionalizes the "Social Contract" by mandating **Double Materiality**, forcing firms to account for both their financial risks (Outside-In) and their socio-environmental impacts (Inside-Out). A significant focus is placed on the **2025 Regulatory Pivot**, where the European Union shifted toward economic realism raising reporting thresholds to focus on **7,000 high-impact entities** while introducing the **"Value Chain Cap"** to protect SMEs from administrative overload.

Technical Architecture and Digital Innovation

A core finding of this study is that the technical rigor of the ESRS—spanning 10 topical standards—requires a new digital backbone. This thesis identifies **Industry 5.0 (I5.0)** as the enabling paradigm. By integrating **Blockchain, IoT sensors, and AI**, firms can move away from retrospective disclosure toward **real-time, source-level authentication**. This digital transition is critical for overcoming the Greenwashing Paradox and reducing **Audit Report Lag (ARL)**, as empirical evidence from the **FTSE-350** suggests that superior ESG performance is a proxy for high-quality internal controls (Jizi & Thomas, 2022).

Empirical Comparative Analysis

The thesis provides a granular comparison between two distinct industrial archetypes:

1. **Upstream Producers (Energy/Chemicals):** Represented by Ørsted, BASF, and Norsk Hydro, these firms lead in technical decarbonization and ESRS E1 maturity but face challenges in **EU Taxonomy Alignment** for "hard-to-abate" assets.
2. **Downstream Integrators (Consumer/Retail/Beauty):** Represented by Nestlé, Unilever, Inditex, and L'Oréal, these firms act as "Value Chain Orchestrators." They have pioneered **Scope 3 (FLAG)** transparency and utilized high-quality upstream data to validate their circularity claims, creating a **Transparency Handover** effect.

Strategic Recommendations and Conclusion

Ultimately, this research argues that the CSRD serves as the final catalyst in the evolution of corporate transparency. It effectively terminates the period of subjective green storytelling and establishes a new paradigm of standardized sustainability accounting. The study offers three primary recommendations:

- **For Integrators:** Transition from procurement oversight to active value chain orchestration and financial support for supplier transitions.
- **For Producers:** Standardize machine-readable **Product Carbon Footprint (PCF)** data to maintain B2B competitive advantage.
- **For All Entities:** Leverage I5.0 technologies to eliminate information silos and prepare for the eventual convergence of financial and sustainability reporting into a single **Unified Corporate Report**.

Ultimately, this thesis demonstrates that the capacity to provide authenticated, verified sustainability data across global value chains is no longer a compliance burden but the defining competitive advantage for European undertakings in the 21st-century global marketplace.

Chapter 1: Introduction and the regulatory imperative

1.1. Background: The structural failure of voluntary disclosure regimes

The global landscape of corporate disclosure has undergone a seismic shift, migrating from a fragmented, voluntary regime into a rigorous, legally enforceable infrastructure of corporate accountability. This metamorphosis is anchored in the **Corporate Sustainability Reporting Directive (CSRD)**, which represents the European Union's definitive attempt to elevate environmental, social, and governance (ESG) information to the same level of integrity, auditability, and visibility as traditional financial reporting. Since the United Nations first introduced the concept of ESG in 2004, these factors have gradually been utilized to assess organizations' long-term success, drive capital, and inform company decision-making toward sustainable growth (European Commission, 2022).

Sustainability reporting is defined as the organizational disclosure of information about broader dimensions of performance and impacts, characterized by environmental, social, and governance components. The 2015 Paris Agreement on Climate Change and the adoption of the Sustainable Development Goals (SDGs) by the United Nations in 2015 marked a historical turning point in societal awareness regarding the existential challenges of climate change and sustainable development. The SDGs provide a common framework to help nations achieve sustainable economic growth while illustrating the comprehensive nature of sustainability required to ensure a viable future. <https://sdgs.un.org/goals>

Goal 1: No poverty	End poverty in all its forms everywhere.
Goal 2: Zero hunger	End hunger, achieve food security ...
Goal 3: Good Health and Well-being	Ensure healthy lives ... for all at all ages.
Goal 4: Quality education	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
Goal 5: Gender equality	Achieve gender equality and empower all women and girls.
Goal 6: Clean water and sanitation	Ensure ... water and sanitation for all.
Goal 7: Affordable and clean energy	Ensure access to affordable, reliable, sustainable and modern energy for all.
Goal 8: Decent work and economic growth	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.
Goal 9: Industry, Innovation and Infrastructure	Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.
Goal 10: Reduced inequality	Reduce income inequality within and among countries.
Goal 11: Sustainable cities and communities	Make cities ... inclusive, safe, resilient, and sustainable.
Goal 12: Responsible consumption and production	Ensure sustainable consumption and production patterns.
Goal 13: Climate action	Take urgent action to combat climate change and its impacts ...
Goal 14: Life below water	Conserve and sustainably use the oceans, seas and marine resources ...
Goal 15: Life on land	Protect, restore ... terrestrial ecosystems ... halt and reverse land degradation and halt biodiversity loss
Goal 16: Peace, justice and strong institutions	Promote peaceful and inclusive societies ... provide access to justice for all ...
Goal 17: Partnership for the goals	Strengthen the means of implementation ...

Table 1 SDGs abbreviated (Richard Barker,2025)

In response to these global drivers, international organizations and stakeholders recognized that the existing voluntary approach—characterized by self-regulation and non-binding guidance from initiatives like the **Global Reporting Initiative (GRI)**, the **UN Global Compact**, and the **Task Force on Climate-related Financial Disclosures (TCFD)**—was proving insufficient to drive the commitment necessary to cap global warming well below 2°C or 1.5°C (<https://www.fsb-tcfd.org/>). Historically, the reliance on voluntary frameworks created many sustainability reporting requirements that were increasingly difficult for researchers, practitioners, and investors to navigate. Because firms could choose which frameworks to adopt and which metrics to disclose, the resulting information was often incomparable, structurally incomplete, and highly susceptible to the strategic risks of selective disclosure and greenwashing.

Many companies' ESG reports selectively presented only those non-financial indicators that were favorable to them, using positive language to conceal poor underlying performance and alter stakeholder perceptions—a phenomenon often referred to as **decoupling**. This lack of standardization undermined stakeholder trust and prevented institutional investors from effectively integrating long-term climate and social risks into valuation models. Furthermore, the greenwashing of corporate ESG information disrupts the supply of green credit and green investments, leading to a phenomenon of adverse selection that stifles the green development of an economy.

1.2. The NFRD legacy and the need for precise revision

The direct regulatory predecessor to the CSRD was the **Non-Financial Reporting Directive (NFRD)** adopted in 2014. While it served as a critical initial experiment, the NFRD suffered from systemic limitations that hindered its ability to stimulate a genuine change toward a sustainable global economy. It mandated disclosure primarily for large EU-based public-interest entities (PIEs) with more than 500 employees, effectively covering only approximately 11,000 to 11,700 companies across the European Union.

The NFRD was repeatedly criticized for deficiencies regarding the consistency, relevance, and reliability of its disclosures. Historically, corporate governance was dominated by a mindset focused on short-term profit maximization for investors, a perspective that frequently pressured management to take excessive risks to gain immediate returns. Such management practices contributed to the collapse of major companies and extensive harm to a wider circle of stakeholders. Management practices under the NFRD often resulted in standardized disclosures that lacked the granular, quantitative data—such as specific water usage metrics or multi-tier human rights audits—necessary for effective capital market decision-making.

Specific gaps were identified in all major topics related to sustainability, including information on greenhouse gas emissions and negative impacts on biodiversity. Deficiencies were also found in information about intangible assets, such as human capital, brand, and intellectual property, despite their predominance in developed economies. A big problem with early ESG rules was that they used outdated information and provided no proof of where the numbers actually came from. These shortcomings paved the way for the substantial revision and expansion embodied in the CSRD, which aims to transform sustainability reporting from a discretionary marketing effort into a primary tool of transparency and accountability (European Parliament, 2019).

1.3. Shifting from shareholder primacy to stakeholder accountability

The transition from the NFRD to the CSRD institutionalizes **Stakeholder Theory**, moving beyond shareholder-oriented information to address the needs of consumers, employees, communities, and governments. The NFRD and the subsequent CSRD were specifically adopted at the EU level to ensure that corporations are structurally built on sustainable management. By establishing

these legislations, the EU has mandated that companies move away from narrow shareholder primacy and instead consider a wider circle of stakeholders as well as their specific rights and needs.

This transition represents a definitive shift from a voluntary compliance era to a mandatory and standardized approach that is binding for corporations. These legal acts ensure that management and supervisory board members can no longer subordinate the long-term social and environmental objectives of the company to the narrow interests of short-term capital investors. Under the CSRD, corporations are expected to appropriately integrate the interests of key stakeholders into their core operations, focusing on long-term sustainable governance and the preservation of human rights through robust due diligence processes.

Responsible investing, sometimes referred to as socially responsible investment (SRI), is the process of incorporating sustainability factors, primarily ESG evaluations, into investment analysis. By assuring that funds are generated and deployed responsibly, investors make a crucial contribution to global attempts to attain sustainable development goals. The intention of the EU is that through a solid framework of reports and coherent standards, companies gain a thorough insight into the impact of their own business on the sustainability of environment and society, while also understanding how wider sustainability factors affect their own business risks and opportunities (Freeman, R. E., 1984).

1.4. The CSRD as an *ex-ante* governance instrument

A central innovation of the CSRD lies in its function not merely as a disclosure regulation, but as a strong governance instrument that reshapes corporate behavior and accountability relationships across global value chains (European Commission, 2022). Unlike traditional financial reporting, which primarily targets *ex post* (after-the-fact) information asymmetries, the CSRD operates as an ***ex-ante* governance instrument** (EFRAG, 2023).

1.4.1. *Organizational steering and strategic reconfiguration*

The directive requires companies to establish internal systems capable of identifying, measuring, and managing sustainability-related **Impacts, Risks, and Opportunities (IROs)** before they materialize into financial outcomes (EFRAG, 2023). This necessitates significant organizational

adjustments, including the establishment of dedicated sustainability governance structures and cross-functional coordination between sustainability, finance, and risk management divisions. Sustainability reporting under the CSRD thus evolves from a peripheral communicative exercise into a primary vehicle for organizational steering, ensuring that sustainability factors are integrated into business models and strategies (European Commission, 2022). Larger corporations, under greater public close examination and regulatory pressure, are increasingly adopting reporting practices that meet the needs to broader stakeholder demands, reflecting sustainability-oriented value creation (Freeman, 1984).

1.4.2. Double materiality: The conceptual bedrock

The CSRD institutionalizes the requirement of the **double materiality** concept, which provides a comprehensive understanding of the connection between ESG information and corporate strategies. This approach demands reporting from two distinct but interrelated perspectives:

- **Financial Materiality (Outside-In):** Assessing the impact of sustainability-related risks and opportunities on a company's performance, position, and financial development.
- **Impact Materiality (Inside-Out):** Assessing the external impact of the company's business activities on people and the environment (EFRAG, 2023).

Undertakings are required to consider each perspective in its own right and disclose information that is material from either lens. This ensures that sustainability reports contain relevant, reliable, comparable, and verifiable information, providing a holistic view of sustainability performance that aligns organizational impacts with financial risk (European Commission, 2022).

1.5. Sustainable Supply Chain Governance (SSCG)

A critical component of the regulatory imperative is the governance of the supply chain. **Sustainable Supply Chain Governance (SSCG)** is operationally defined as the set of institutional rules and structures to manage relationships within and beyond a supply chain with the aim of implementing management practices for sustainability goals (Seuring & Müller, 2008).

SSCG mechanisms are categorized into two primary types:

- **Contractual Governance:** Manifested in explicit, formal, and usually written contracts with legally binding power, logic focused on controlling and monitoring compliance (EFRAG, 2023).
- **Relational Governance:** Leans on informal and socially based arrangements, focusing on the roles of social interactions, trust, and mutual development (Suchman, 1995).

The CSRD forces lead firms to move beyond dyadic relationships toward a network standpoint that encompasses non-chain stakeholders like NGOs and governmental bodies to address geographical, informational, and compliance gaps fueled by supply chain complexity (Vermeulen, 2015).

1.6. Environmental regulations and the greenwashing paradox

An essential consideration in the implementation of ESG standards is the role of existing environmental regulations. Evidence suggests that environmental regulations can significantly increase the **greenwashing** attempts of corporate ESG reports (Yu et al., 2020). This **catering behavior** occurs as regulations increase the financing constraints firms face, forcing them to selectively exaggerate their ESG activities to maintain financial support from stakeholders in the short term.

This effect is particularly pronounced in highly polluting enterprises or firms with low institutional and foreign ownership. Consequently, while the original intent of such regulations is green governance, their economic effect may inadvertently reduce disclosure quality through strategic information filtering. The CSRD aims to bridge this gap by introducing mandatory, standardized, and auditable data points to foster a healthy and orderly investment environment (EFRAG, 2023).

1.7. International context: The significance of GRI and national models

In the move toward mandatory standards, the **Global Reporting Initiative (GRI)** remains a critical architectural influence. Used by 78% of the world's 250 largest companies, GRI standards allow stakeholders to conduct comparative analyses of corporate performance on sustainability issues. Empirical evidence suggests that adherence to standardized GRI protocols facilitates substantive

carbon mitigation by enhancing comparability, thereby translating disclosure requirements into tangible operational changes. (<https://www.globalreporting.org/>)

Globally, practice models differ significantly. While the EU establishes unified, standardized disclosures through the CSRD, other regions follow different paths. For instance, China's ESG disclosure mainly follows a voluntary principle (World Economic Forum, 2023), which can provide an opportunity for companies to greenwash information. The U.S. specifies indicators through guidelines like Version 2.0. The **European Sustainability Reporting Standards (ESRS)** represent a synthesis of these global efforts, designed to achieve a high degree of interoperability with the GRI and the International Sustainability Standards Board (ISSB) to minimize the reporting burden on multinational companies (ISSB, 2023).

1.8. The European Green Deal and conceptual differences

The CSRD serves as the data infrastructure for the **European Green Deal**, which intends to make Europe the first climate-neutral continent by 2050. It is supported by the **Taxonomy Regulation**, a classification system defining environmentally sustainable economic activities to direct capital toward actual sustainable projects. (<https://www.consilium.europa.eu/en/policies/european-green-deal/>)

Despite the goal of integration, fundamental conceptual differences persist between sustainability and financial reporting:

- **Aggregation:** Sustainability reporting consists of thousands of individual data points without the meaningful aggregation (like profit or equity) found in financial statements.
- **Accruals:** It is production-oriented and does not include accruals to allocate data to time periods.
- **Value Chain:** It expands boundaries to include data from firms across the entire value chain that are outside the reporting firm's direct control (European Commission, 2022).

1.9. Implementation readiness and Industry 5.0

The implementation of these standards occurs within the emerging paradigm of **Industry 5.0 (I5.0)**, which aims to harmonize social progress and environmental conservation with financial

gain. I5.0 provides technologies such as Blockchain, the Internet of Things (IoT), and Artificial Intelligence (AI) to enhance ESG disclosure reliability, transaction traceability, and real-time reporting. These technologies can reveal "Missing (M)" scores, assisting both investors and company managers in identifying data deficiencies (Gartner, 2024; Xu et al., 2021).

Recent assessments reveal a heterogeneous landscape of preparedness. Larger firms, benefiting from greater resources and experience with frameworks like TCFD, exhibit higher levels of alignment with the ESRS. In contrast, small and medium-sized enterprises (SMEs) struggle with resource limitations, data availability, and insufficient external support. Evidence suggests an uneven emphasis, with **Climate Change (E1)** scores consistently higher than other critical topics like pollution (E2) or circular economy (E5) (European Commission, 2023).

1.10. Summary of regulatory objectives

The implementation of the CSRD aims to achieve several high-level objectives:

- **Enhanced Scope:** Increasing mandatory reporting entities from approximately 11,000 under the NFRD to nearly 50,000 EU and non-EU businesses.
- **Standardization:** Requiring firms to report in accordance with 12 mandatory, sector-agnostic **ESRS**, ensuring information is understandable and verifiable.
- **Digitalization:** Mandating reports in a machine-readable format with digital tagging (iXBRL) to enable automated comparison and reduce information asymmetry.
- **Audit and Verification:** Introducing mandatory third-party audits to ensure reports are as reliable as financial statements.
- **Integration:** Requiring sustainability data within the management report to promote integrated thinking and a thorough insight into business-environment feedback loops.

Chapter 2: Theoretical foundations of corporate sustainability governance

The metamorphosis of corporate sustainability from a voluntary, peripheral activity to a mandatory governance mandate is underpinned by a complex web of academic theories. To understand the transition from the Non-Financial Reporting Directive (NFRD) to the highly prescriptive regime of the Corporate Sustainability Reporting Directive (CSRD), it is necessary to interrogate the underlying theoretical frameworks that govern the relationship between a firm and its socio-economic environment (European Commission, 2022). Legitimacy theory (Suchman, 1995) and stakeholder theory serve as the primary intellectual scaffolding for mandatory disclosure, explaining the mechanisms through which transparency is expected to translate into tangible improvements on corporate behavior and planetary resilience (Freeman, 1984).

2.1. Legitimacy theory: The corporate social contract

Legitimacy theory remains the most widely cited framework for understanding corporate non-financial disclosure. As stated by Suchman, legitimacy itself is defined as a "generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions". Under this theory, organizations operate under a social contract where their right to exist and utilize resources is contingent upon their perceived contribution to societal well-being and alignment with communal values (Suchman, 1995).

2.1.1. *Defensive legitimacy and the greenwashing gap*

Historically, empirical evidence suggests that companies with poor sustainability performance utilize positive disclosures as a strategic tool to influence public perception and repair their legitimacy (Gray et al., 1995). This has led to the pervasive phenomenon of greenwashing, or decoupling, where firms selectively exaggerate their ESG investments—a process known as information filtering—to meet market demands while keeping silent about true environmental performance (Suchman, 1995).

Under the voluntary NFRD regime, this credibility gap between corporate reporting and actual performance was significant. Managers opted for generic, uninformative, and vague qualitative disclosures to distract stakeholders from unfavorable outcomes. The CSRD specifically targets this behavior by mandating granular, standardized data through the European Sustainability Reporting Standards (ESRS), which prevents selective disclosure and forces firms to move from symbolic management to substantive operational change (EFRAG, 2023).

2.1.2. The Shift from Soft Law to hard legitimacy law

Historically, corporate legitimacy was maintained through voluntary adherence to international guidelines such as the Global Reporting Initiative (GRI) or the UN Global Compact. However, market failures observed during the 2000s and 2010s demonstrated that voluntary efforts were insufficient to drive the commitment necessary to meet global climate targets (European Commission, 2022). Non-compliance with the social contract results in adverse consequences for a business's economic reliability and social reputation. The transition to obligatory law via the CSRD represents an institutionalization of legitimacy, where a company's license to operate is now predicated on verified, machine-readable compliance with the ESRS (Suchman, 1995; EFRAG, 2023).

2.2. Stakeholder theory: Redefining the locus of accountability

Stakeholder theory challenges the traditional shareholder primacy model by arguing that a firm's value and long-term success are inseparable from its relationships with a wider circle of interests (Freeman, 1984). First introduced by Freeman, the theory identifies three forms of stakeholder relationships—environmental, social, and governance—that market entities must manage (Freeman, 1984; Schaltegger & Wagner, 2006).

2.2.1. Descriptive vs. Normative Stakeholderism

Scholars distinguish between two primary branches of stakeholder theory that inform current EU legislation:

- **Descriptive Approach:** Views companies as entities comprising diverse stakeholders (employees, suppliers, customers, and communities) whose concerns must be addressed for survival (EFRAG, 2023).

- **Normative Approach:** Prioritizes stakeholder value creation as an end in itself, suggesting firms have a moral obligation to mitigate their negative externalities regardless of the immediate financial impact.

The CSRD operationalizes the normative branch by requiring transparency on Impact Materiality, the company's effect on people and the environment, rather than focusing solely on what creates financial value for investors (Freeman, 1984).

2.2.2. Double materiality as a theoretical synthesis

The CSRD further clarifies the requirement of the **double materiality** concept, which provides a comprehensive framework to resolve the conflicting viewpoints of investors and other stakeholders.

- **Financial Materiality (The Outside-In View):** This aligns with the instrumental branch of stakeholder theory, where managing sustainability risks is seen as essential for long-term profitability and market valuation.
- **Impact Materiality (The Inside-Out View):** This captures the normative obligation to report on how corporate operations affect the environment and society, such as greenhouse gas emissions or labor practices.

By mandating that undertakings consider each perspective as standalone materialities, the EU is institutionalizing a holistic view of sustainability performance that links organizational impacts directly to financial risks.

2.3. Theory in the context of SMEs and global value chains

Stakeholder and legitimacy theories apply differently to Small and Medium-sized Enterprises (SMEs) compared to Large Multinationals (MNCs). MNCs, often subjected to greater public scrutiny and regulatory pressure, are more likely to adopt reporting practices that cater to broader stakeholder demands. In contrast, SMEs often lack the human and financial resources to develop complex sustainable strategies, viewing CSR as a risky activity with no immediate financial return (European Commission, 2022; EFRAG, 2023).

However, empirical evidence indicates that when SMEs do engage in CSR activities, there is a positive correlation with financial indicators such as profit and profit per employee. For these smaller entities, legitimacy is often local and relational, rooted in successful community engagement and trust with suppliers. The CSRD addresses this through the "Value Chain Cap" and proportional standards, ensuring that the reporting burden does not become a legitimate threat to small firms while still fulfilling the informational needs of lead firms in the network.

Ultimately, the convergence of legitimacy and stakeholder theories within the CSRD framework signals a movement from governing in chains to governing through chains, where supply chains are used as a medium to purposefully transform global production and consumption patterns.

Beyond the social contract described by legitimacy theory and the accountability frameworks of stakeholder theory, the Corporate Sustainability Reporting Directive (CSRD) is deeply rooted in the organizational and economic dynamics described by Institutional, Agency, and Paradox theories. These frameworks elucidate how standardizing sustainability information transforms the internal logic of the firm and its external monitoring environment (Jizi & Thomas, 2022; European Commission, 2022).

2.4. Institutional theory: navigating isomorphism and regulatory tensions

Institutional theory explores how organizational structures and practices are shaped by the search for social conformity and stability (Meyer & Rowan, 1977). In the context of the CSRD, corporate behavior is driven by isomorphism, the process by which organizations within the same field tend to look alike over time due to external pressures

- **Coercive Isomorphism:** This is the most direct result of the CSRD mandate. Firms must adopt the European Sustainability Reporting Standards (ESRS) or face legal sanctions, loss of market access, and regulatory intervention. This obligatory law pressure ensures that sustainability is no longer a discretionary activity but a prerequisite for industrial participation.
- **Mimetic Isomorphism:** In an environment of high uncertainty, such as the 2025 Regulatory Pivot, firms may mimic the reporting structures of early adopting industry

leaders to appear competent and resilient to investors. For instance, companies not yet in scope may adopt ESRS-aligned disclosures to signal preparedness to capital providers.

- **Normative Isomorphism:** As professional standards for sustainability auditing and sustainability accounting mature, they create a standardized set of professional expectations. The role of bridge actors like auditors, consultants (e.g., the Big 4), and standard setters like EFRAG defines what constitutes best practice, effectively institutionalizing a new logic of corporate transparency (EFRAG, 2023; Jizi & Thomas, 2022).

2.4.1. The risk of decoupling in mandatory regimes

A significant concern within institutional theory is decoupling, where an organization adopts the formal appearance of compliance—such as publishing an ESRS report—without actually changing its internal processes (Meyer & Rowan, 1977). The CSRD mitigates this risk through the requirement of **Limited Assurance** and digital tagging (iXBRL), which allows regulators to look beneath the surface of the narrative to the raw data points (European Commission, 2022; EFRAG, 2023). By moving from qualitative stories to quantitative metrics, the EU aims to bridge the ethical, social, and environmental reporting-performance portrayal gap (European Commission, 2022; Jizi & Thomas, 2022).

2.5. Sustainability agency theory: reducing information asymmetry

Traditional agency theory focuses on the "Principal-Agent" problem: the risk that managers (agents) act in their own self-interest rather than in the interest of the owners (principals). **Sustainability Agency Theory** expands this to include the information asymmetry that exists regarding a firm's long-term environmental and social risks (Jizi & Thomas, 2022).

2.5.1. Disclosure as a signaling and monitoring mechanism

By mandating standardized disclosure, the CSRD functions as a powerful signaling mechanism. High-quality reporting allows managers to signal a genuine commitment to sustainability, reducing the estimation risk for investors. This reduces information asymmetry, allowing

institutional investors to identify and reward good carbon performers with a lower cost of capital and higher market liquidity. Conversely, the directive enhances the monitoring of managers by outsiders. iXBRL tagging provides the technical solution to this problem, allowing principals to monitor agents with machine-readable precision and ensuring that sustainability data is as auditable as financial data.

2.5.2. Monitoring costs and the quality of information

While reporting mandates induce additional direct costs of preparation and certification, these are viewed as necessary monitoring costs to prevent managers from engaging in opportunistic selective reporting or greenwashing. Through mandatory third-party verification, the CSRD increases the threshold for entry into the sustainability market, ensuring that unverified narratives do not crowd out high-integrity data (EFRAG, 2023; Jizi & Thomas, 2022).

2.6. Paradox theory: navigating sustainability tensions

Sustainability is inherently paradoxical, requiring organizations to navigate contradictory yet interrelated demands that persist over time (European Commission, 2022).

2.6.1. The performing paradox

Firms face the tension between achieving immediate competitive advantage and reducing their long-term socio-ecological impact. For example, a company may invest in a cleaner production process that reduces short-term profit but decreases environmental risks and increases long-term customer demand (Schaltegger & Wagner, 2006). Paradox theory suggests that rather than seeking a simple win-win trade-off, managers must embrace these tensions to spark innovative solutions.

2.6.2. The organizing paradox: Centralization vs. Decentralization

Firms must balance centralized control for consistent ESRS reporting with the decentralized flexibility required to address local sustainability issues within global supply chains. The CSRD forces this tension to the forefront by requiring firms to disclose their **Impacts, Risks, and**

Opportunities (IROs) across the entire value chain, where the focal enterprise may have power but lacks direct operational control.

2.7. The Supply Chain complexity lens

At a higher conceptual level, there exists a mutually dependent relationship between **Sustainable Supply Chain Governance (SSCG)** and supply chain complexity.

- **Structural Complexity:** Arises from the number and variety of actors, from upstream multi-tier suppliers to downstream end-users. The CSRD's Scope 3 requirements force firms to map this complexity to ensure clarity in environmental and social performance.
- **Dynamic Complexity:** Represents the uncertainty and changing interactions between these actors over time. SSCG mechanisms like the "Value Chain Cap" are theoretical attempts to control this complexity without overwhelming smaller suppliers with disproportionate administrative burdens (European Commission, 2025; EFRAG, 2023).

2.8. Conclusion: A multi-theoretical synthesis

In conclusion, the CSRD represents the definitive end of discretionary sustainability. By synthesizing these theories, it becomes evident that the directive is designed to eliminate information asymmetry (**Agency**), satisfy a broad range of societal interests (**Stakeholder**), institutionalize new global norms (**Institutional**), enforce a substantive social contract (**Legitimacy**), and manage the inherent tensions of green growth (**Paradox**). The result is a shift from sustainability as a peripheral marketing concern to a core driver of organizational steering and long-term value creation.

Chapter 3: CSRD analysis and the 2025 regulatory pivot

The implementation of the Corporate Sustainability Reporting Directive (CSRD) reached a critical historical juncture in early 2025. While the directive was originally conceived as a transformative tsunami of binding legislation intended to catalyze the European Green Deal, the practical rollout encountered significant geopolitical and economic headwinds. This led to the **2025 Omnibus Package for Regulatory Simplification**, a fundamental strategic pivot that shifted the Union's approach from rapid rule-expansion to a model of **competitive pragmatism**. This chapter provides a granular interrogation of this pivot, analyzing how the recalibration of thresholds and the "Stop-the-Clock" reprieve have redefined the reporting landscape for the first and second waves of European undertakings.

3.1. The simplification revolution and geopolitical drivers

The 2025 Regulatory Pivot was not an isolated legislative event but a direct response to a coordinated effort to streamline the EU's corporate sustainability framework in the face of shifting global realities. The primary catalyst was the **Draghi Report on The Future of European Competitiveness (2024)**, which issued a stark warning that the sheer complexity and administrative burden of the sustainable finance architecture could obstruct the very economic vitality required for the green transition (European Commission, 2025).

In November 2024, the **Budapest Declaration on the New European Competitiveness Deal** codified these concerns, calling for a simplification revolution with an explicit political target of reducing regulatory reporting burdens by **25% for large companies** and **35% for SMEs**. The Commission responded in February 2025 with the Omnibus Package, justifying the move through a dual rationale: (1) aligning sustainability legislation with a geopolitical context troubled by international conflict and resource scarcity, and (2) addressing the implementation challenges identified during the initial Wave 1 reporting cycle. This pivot represents a strategic effort to eliminate undue administrative burdens while promising not to compromise the high-level commitments of the Paris Agreement (European Commission, 2022; EFRAG, 2023).

3.2. Threshold recalibration: concentrating regulatory intensity

The centerpiece of the 2025 pivot was a dramatic narrowing of the mandatory reporting scope, moving away from a broad-based mandate to a strategy of concentrated intensity on high-impact entities.

3.2.1. Defining the New Wave 1 Scope

Under the original CSRD, the mandate was expected to eventually encompass approximately 49,000 to 50,000 companies. The 2025 Omnibus Proposal fundamentally altered the size thresholds for mandatory reporting (European Commission, 2025):

- **Employee Threshold:** The requirement for mandatory reporting was elevated from the previously proposed 250 employees to a new baseline of **1,000 employees**.
- **Financial Benchmarks:** The net turnover threshold was increased to **€450 million**, aligning the reporting directive with the higher benchmarks of the Corporate Sustainability Due Diligence Directive (CSDDD).
- **Scale of Impact:** This recalibration effectively removed an estimated **80% of companies**—roughly 42,000 firms—from the mandatory mandate, narrowing the total pool of reporting undertakings to approximately **7,000 high-impact entities** (Suchman, 1995; Jizi & Thomas, 2022).

3.2.2. The Socio-Economic rationale for SME exclusion

The decision to exempt the majority of SMEs was grounded in the principle of **proportionality**, which demands that regulation should not exceed what is strictly necessary to achieve its objectives. Feedback from the private sector indicated that forcing mid-sized firms to navigate over 1,100 data points in the **European Sustainability Reporting Standards (ESRS)** was creating a compliance fatigue that detracted from real-world sustainability initiatives. By focusing only on companies with more than 1,000 employees, the EU is attempting to concentrate regulatory pressure on the firms responsible for the disproportionate bulk of carbon emissions and human rights risks (European Commission, 2025).

3.3. Directive (EU) 2025/794: The "Stop-the-Clock" reprieve

To provide legal certainty and prevent a compliance vacuum during the technical revision of the standards, the EU adopted **Directive (EU) 2025/794** on April 14, 2025, through an urgent legislative procedure. This directive, commonly known as the **"Stop-the-Clock" Directive**, enacted a critical postponement of reporting deadlines <https://eur-lex.europa.eu/eli/dir/2025/794/oj/eng> :

- **Reprieve for Wave 2 & 3:** Non-listed large undertakings (now 1,000+ employees) and listed SMEs saw their reporting requirements delayed by **two years**, pushing their first reports on 2027 data to **2028**.
- **CSDDD Postponement:** The first compliance phase for the Due Diligence Directive was similarly deferred by one year, with the first wave of companies now scheduled for **July 26, 2028**.
- **Clarification of Intent:** This delay was not intended as a deregulation but as a mechanism to allow Wave 1 leaders to refine their data systems while the Union completes the technical revision of the ESRS datapoints. (European Commission, 2025)

3.4. Transitioning to the limited assurance cap

Another pivotal shift in early 2025 concerned the verification of sustainability data. The original 2022 directive envisioned a gradual transition from limited assurance to reasonable assurance—the rigorous standard applied to financial audits—by October 2028.

The Omnibus Package permanently capped the mandatory requirement at the **Limited Assurance** level, deleting the Commission's empowerment to adopt standards for reasonable assurance. This move was a pragmatic response to two systemic constraints:

- **Auditor Shortage:** A critical global shortage of qualified sustainability auditors capable of performing reasonable-grade audits.

- **Cost Prevention:** The Commission explicitly noted that freezing assurance at a limited level would prevent a future cost explosion for companies, providing much-needed financial predictability (European Commission, 2025).

While this cap ensures industrial feasibility, academic critics argue it creates a **verification hierarchy**, where sustainability data remains a secondary, less reliable subset of corporate information compared to traditional financial statements (EFRAG, 2023).

3.5. Technical streamlining: The 70% datapoint reduction

A cornerstone of the **2025 Omnibus Package** was the mandate given to the European Financial Reporting Advisory Group (EFRAG) to fundamentally revise the ESRS architecture (EFRAG, 2023). The original drafts of the ESRS contained approximately **1,144 data points**, of which roughly 250 were quantitative metrics (European Commission, 2025). For sophisticated users, this volume provided a granular x-ray of corporate performance; however, for many stakeholders and preparers, it led to information overload and excessive administrative costs (Meyer & Rowan, 1977; Jizi & Thomas, 2022).

3.5.1. Prioritizing decision-useful metrics

The revision process aimed for a **70% reduction in data points** by removing or scaling down disclosures deemed least important for general purpose reporting. The pivot shifted the focus from exhaustive narrative descriptions toward high-impact quantitative metrics, particularly in the realm of climate change (ESRS E1). This streamlining was intended to ensure that the resulting reports are decision-useful for investors rather than mere compliance documents. By concentrating on the most material issues, the Commission aimed to achieve the political target of cutting reporting costs by **25% to 35%** (EFRAG, 2023; European Commission, 2025).

3.6. The "value chain cap" and SME protection

One of the most significant challenges identified during the early implementation of the CSRD was the informational pressure exerted by large focal firms on their smaller suppliers. Under the initial Scope 3 requirements, large companies were obligated to report impacts across their entire

value chain, which often required them to demand granular ESG data from SMEs that lacked the infrastructure to provide it (European Commission, 2025; Freeman, 1984).

3.6.1. The three-layered reporting scheme

To resolve this, the 2025 Omnibus Proposal introduced a formal "**Value Chain Cap**". This mechanism limits the information that in-scope companies (>1,000 employees) can rightfully demand from their SME partners. The cap is defined by the contents of a new **voluntary standard (VSME)**. This creates a tiered architecture:

- **Layer 1 (CSRD Mandatory):** Large high-impact entities reporting the full (streamlined) ESRS.
- **Layer 2 (Proportionate Voluntary):** Mid-sized companies that fall out of mandatory scope but opt to use a standardized voluntary template to maintain investor visibility.
- **Layer 3 (VSME Standard):** The most basic set of metrics, serving as the absolute ceiling for what can be demanded from the smallest supply chain members.

This mechanism is designed to reduce impractical data-gathering exercises and shield small businesses from being penalized for their lack of reporting capacity.

3.7. The double materiality gap and transparency risks

While the pivot toward competitive pragmatism achieved significant cost savings—estimated at **€0.8 billion annually** for the EU Taxonomy alone—it introduced a potential data dark zone. By exempting 80% of firms from mandatory reporting, the Union risks losing critical sustainability information from regional economic backbones (European Commission, 2025).

3.7.1. The SME sustainability paradox

Empirical research demonstrates that sustainability factors—specifically CSR budgeting, innovation, and training—are positively correlated with profit and profit per employee in SMEs. Furthermore, socially active small firms exhibit a negative correlation with debt ratios, as green involvement signals resilience to investors. By decoupling these entities from mandatory standards, the Omnibus Package might inadvertently reduce the visibility of high-performing sustainable SMEs to institutional capital.

3.7.2. *The shift to catering behaviors*

There is also a documented risk that policy-driven environmental regulations can inadvertently increase **greenwashing**. In the absence of mandatory, auditable data, firms may engage in information filtering, selectively exaggerating positive ESG activities to alleviate the financing constraints imposed by the Green Deal's redirection of capital. The success of the 2025 pivot therefore depends on whether the voluntary standards can attract sufficient uptake to prevent a collapse into the selective disclosure practices of the voluntary era (EFRAG, 2023).

3.8. CSDDD adjustments and the tier 1 focus

Parallel to the CSRD changes, the **Corporate Sustainability Due Diligence Directive (CSDDD)** was narrowed to align with the new pragmatism. The default duty of due diligence was restricted to **direct business partners (Tier 1)**. Companies are now only required to investigate deeper into the supply chain if they possess **plausible information** of likely harm. Furthermore, the obligation to put into effect climate transition plans was modified to a more flexible requirement to include implementation actions planned and taken, shifting the normative character of the law from an action-oriented duty to a disclosure-based one (Jizi & Thomas, 2022).

3.9. Conclusion: A fragile equilibrium

The 2025 Regulatory Pivot represents a high-stake trade-off between **short-term economic competitiveness** and **long-term environmental ambition**. By focusing on roughly 7,000 high-impact undertakings, the EU has concentrated its regulatory power on the entities responsible for the bulk of carbon emissions (European Commission, 2025). However, the dismantling of central provisions for the remaining 42,000 firms is metaphorically ripping the heart out of the original transparency framework (European Commission, 2022). Whether this recalibrated architecture can deliver on the European Green Deal's objectives depends on its practical implementation and the degree to which standardized voluntary reporting can fill the emerging gaps (Freeman, 1984).

Chapter 4: Research methodology

4.1. Research philosophy and paradigm

This research is situated within the **Interpretivist Paradigm**, a philosophical stance that acknowledges corporate sustainability reporting as more than a collection of objectives, neutral facts. Instead, it views these disclosures as socially constructed narratives shaped by intense regulatory pressure, shifting stakeholder expectations, and evolving institutional logics. By adopting a **Qualitative Approach**, this study seeks to uncover the "Why" and "How" of CSRD operationalization—nuanced questions that a purely quantitative analysis of ESG scores or financial ratios would inevitably fail to capture. The chosen paradigm allows for a deep decoding of the strategic intent behind the machine-readable data provided in the 2024–2025 reporting cycle, moving beyond the surface-level "what" of compliance to the "so what" of organizational transformation (Jizi & Thomas, 2022).

4.2. The multiple-case study approach

The structural core of this research utilizes a **Multiple-Case Study design**, a methodology championed by scholars such as Robert Yin and Kathleen Eisenhardt for its capacity to build robust, generalizable theory from disparate qualitative data points. This approach is specifically chosen for its **Replication Logic**, which allows the researcher to treat each case as a distinct experiment. By observing how different Upstream firms, such as BASF and Norsk Hydro confront similar challenges regarding EU Taxonomy alignment, the research can identify recurring patterns that suggest a systemic industrial trend rather than an isolated corporate event (Seuring & Müller, 2008).

Furthermore, the multiple-case design facilitates a **Cross-Sectoral Comparison** that is essential for identifying the Transparency Handover effect. By contrasting Downstream Integrators with their Upstream suppliers, the methodology captures the friction and flow of data across the value chain, a dynamic that a single-sector study would overlook. Finally, this design preserves the vital **Contextual Depth** of each industry—respecting the unique heat-process engineering of aluminum or the complex logistics of fast fashion—while simultaneously seeking the universal

patterns of ESRS compliance that unite them under a single regulatory umbrella (Jizi & Thomas, 2022; EFRAG, 2023).

4.3. Case selection and sampling strategy

The research employs a **Theoretical Sampling** strategy rather than a random statistical selection, focusing on information-rich cases that can illuminate the nuances of the ESRS framework. This is operationalized through a **Polar Type strategy**, which purposefully selects entities at opposite ends of the industrial spectrum to observe how reporting maturity and strategic logic diverge. On one end, the "Native Green" archetype, represented by **Ørsted**, serves as a benchmark for the ceiling of Taxonomy alignment and transition planning (European Commission, 2022). On the other end, "Hard-to-Abate" archetypes like **BASF, Covestro, and Norsk Hydro** are selected to observe the "Transition Logic" inherent in carbon-intensive, heavy-asset industries (EFRAG, 2023).

To provide a necessary counterbalance, Value Chain Integrators such as **Nestlé, Unilever, L'Oréal, and Inditex** were included. These benchmarks are critical for analyzing the management of Scope 3 emissions and the maintenance of a "Social License to Operate" in a high-scrutiny consumer market. By selecting "Lead Firms" and early adopters with significant reporting resources, the methodology ensures that the findings represent the current frontier of implementation, providing a roadmap for the thousands of European firms that will follow in subsequent reporting cycles (**European Commission, 2025**).

4.4. Data collection: The "digital-first" repository

The primary data repository for this research consists of the **2024–2025 Integrated Annual Reports** of the selected entities, representing the inaugural wave of CSRD-ready disclosures. To ensure a multi-dimensional perspective, this primary data is triangulated with several layers of secondary documentation. This includes **EU Taxonomy Disclosure Templates**, which are used to verify the "Eligibility vs. Alignment" ratios reported by the firms, and **Independent Auditor Opinions**, which provide an outside-in view of the Limited Assurance process. Furthermore, the research utilizes the official **Technical Screening Criteria (TSC)** from the European Commission to cross-reference whether the firms' claims of Green CapEx and Substantial Contribution adhere to the strict legal definitions of the Delegated Acts, thereby providing an objective check against

potential greenwashing or information filtering (Jizi & Thomas, 2022; European Commission, 2025).

4.5. Data analysis: Qualitative content analysis

The analysis of these complex documents followed a structured **Qualitative Content Analysis** consisting of three distinct coding phases. The process began with **Open Coding**, where the raw text of reports was scrutinized to identify initial recurring themes such as Double Materiality thresholds, iXBRL tagging challenges, and SME value chain support. This was followed by **Axial Coding**, which sought to establish relationships between these themes and the overarching theoretical framework—for instance, linking the adoption of iXBRL directly to **Agency Theory** and the reduction of information asymmetry for investors. In the final phase of **Selective Coding**, the research synthesized these connections into the "Industrial Archetypes" presented in the empirical chapters (Meyer & Rowan, 1977).

This rigorous coding process ensures that the transition from raw data to theoretical insight is transparent and reproducible. By documenting the audit trail of how a mention of Product Carbon Footprints in a BASF report eventually led to the Transparency Handover theory in Chapter 9, the methodology establishes a high level of **Internal Validity** and scholarly rigor (**European Commission, 2025**).

4.6. Reliability and validity

To ensure the academic integrity of the findings, this study addresses multiple dimensions of validity. **Construct Validity** is achieved through the triangulation of diverse evidence sources, while **External Validity** is managed through analytical generalizability—although the findings are not statistically representative of all 50,000 firms in the CSRD scope, they provide a reliable blueprint for the large-cap European multinationals that drive global value chains.

However, the methodology acknowledges certain inherent constraints. The **Transition Year Bias** is perhaps the most significant, as 2024/2025 represent experimental years for many firms, and data may be subject to future restatements or methodology changes. Furthermore, by focusing on Lead Firms, the research may inadvertently overlook the struggle of mid-cap companies currently entering the Data Dark Zone. These limitations do not invalidate the findings but rather

provide the necessary context for interpreting the research as a study of the current vanguard of sustainable corporate governance (European Commission, 2022; Jizi & Thomas, 2022).

4.7. Limitations of the methodology

Acknowledge the constraints:

1. **The Transition Year Bias:** As 2024/2025 are the first years of mandatory implementation, some data may be experimental or subject to future restatements.
2. **Focus on Lead Firms:** By studying benchmarks, the research may overlook the struggle of smaller, less-resourced firms that are just entering the Data Dark Zone.

3.

Chapter 5: Technical ESRS architecture and interoperability

The implementation of the Corporate Sustainability Reporting Directive (CSRD) is technically operationalized through the **European Sustainability Reporting Standards (ESRS)**. These standards represent a distinctively holistic legal instrument designed to enhance the disclosure of sustainability performance across the European Union (EU). Unlike previous discretionary frameworks, the ESRS provides a structured, mandatory approach for companies to communicate their sustainability initiatives and impacts with a level of rigor comparable to financial reporting. This chapter interrogates the technical architecture of the standards, the mechanics of the double materiality assessment, and the evolving landscape of global interoperability (European Commission, 2022).

5.1. The structural composition of the ESRS

The ESRS framework is organized into three distinct categories of standards designed to provide a comprehensive view of an undertaking's sustainability profile. On July 31, 2023, the European Commission adopted the first set of these standards as delegated acts, emphasizing a sector-agnostic approach that applies to all companies in scope regardless of their industrial classification (EFRAG, 2023).

5.1.1. Cross-cutting standards (ESRS 1 and ESRS 2)

The architectural foundation of the ESRS is established by two cross-cutting standards that define the general principles and mandatory disclosures for all reporting entities.

- **ESRS 1 (General Requirements):** This standard outlines the fundamental concepts of the framework, including the reporting principles of understandability, relevance, verifiability, and comparability. Crucially, it defines the three-time horizons for reporting: short-term (one year), medium-term (one to five years), and long-term (over five years).
- **ESRS 2 (General Disclosures):** This standard mandates disclosures regarding a company's governance, strategy, business model, and the management of its material impacts, risks,

and opportunities. Notably, the reporting requirements of ESRS 2 are the only disclosures that remain mandatory regardless of the outcome of a firm's materiality assessment.

5.1.2. Topical standards (ESG pillars)

Beyond the general disclosures, the ESRS includes ten topical standards categorized under the Environmental, Social, and Governance pillars.

- **Environmental (E1–E5):** These standards cover climate change (E1), pollution (E2), water and marine resources (E3), biodiversity and ecosystems (E4), and resource use and circular economy (E5).
- **Social (S1–S4):** These address the company's own workforce (S1), workers in the value chain (S2), affected communities (S3), and consumers and end-users (S4).
- **Governance (G1):** This standard focuses on business conduct, including corporate culture, anti-corruption, and political influence. (European Commission, 2023).

5.2. The mechanics of double materiality assessment

The starting point for all disclosures under the topical standards is a rigorous **Double Materiality Assessment**. This process requires companies to identify their material sustainability matters by simultaneously evaluating two distinct perspectives: Impact Materiality and Financial Materiality.

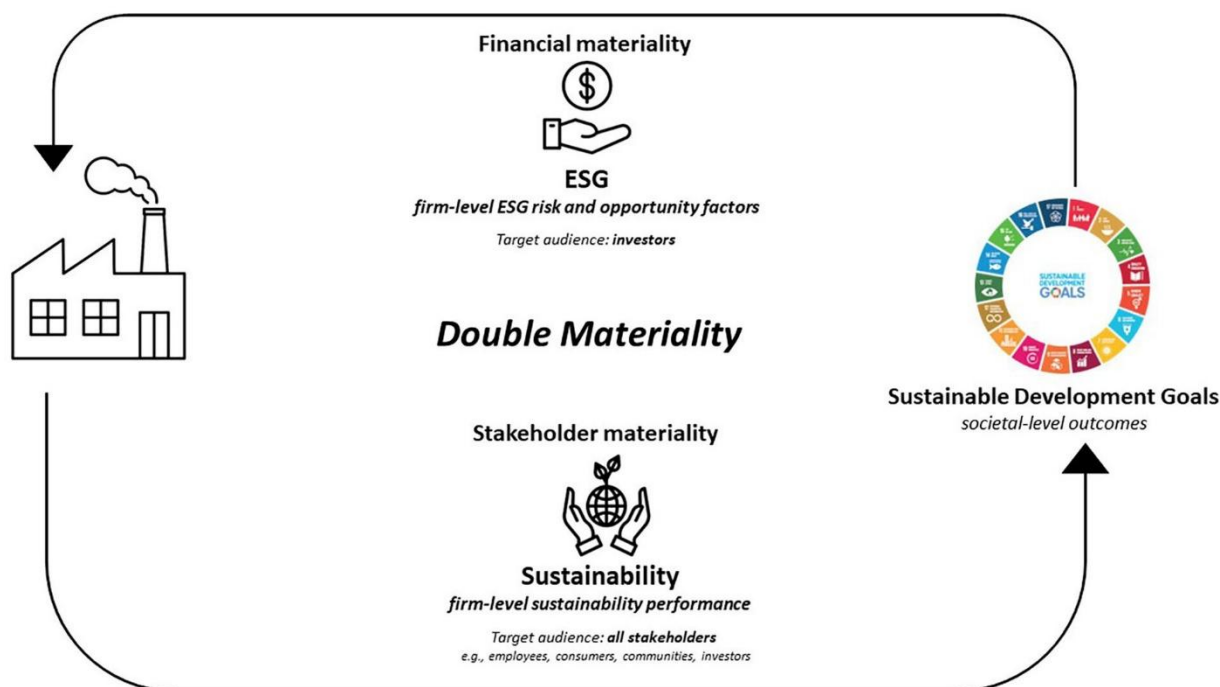
5.2.1. Impact Materiality (Inside-Out)

Impact materiality focuses on the undertaking's actual or potential, positive or negative impacts on people or the environment over the short, medium, and long term. This aligns with the normative branch of Stakeholder Theory, emphasizing that firms are responsible for the externalities they generate. A sustainability matter is material from an impact perspective when it pertains to the undertaking's significant impacts. (Freeman, 1984; Meyer & Rowan, 1977).

5.2.2. Financial Materiality (Outside-In)

Financial materiality assesses sustainability-related risks and opportunities that may generate material financial effects on the undertaking's development, performance, and position. This perspective is critical for investors as it captures factors that could influence the firm's market valuation or cost of capital. Under the final ESRS, all topical reporting requirements are subject to

the outcome of this assessment, meaning if a topic is not material from either perspective, the company can omit those specific disclosures.



Picture 1 (Delgado-Ceballos, J. et. al, 2023)

5.3. Transition from voluntary to mandatory standards

The ESRS architecture represents a significant departure from prior voluntary frameworks by mandating the application of this dual perspective. Historically, frameworks like the **Global Reporting Initiative (GRI)** focused primarily on impact materiality, while the **Sustainability Accounting Standards Board (SASB)** and the **TCFD** emphasized financial materiality for investors. The ESRS integrates these fragmented approaches into a single, cohesive system (European Commission, 2022; EFRAG, 2023).

However, the digital-first nature of these standards introduces new technical complexities. While the NFRD covered roughly 11,000 large companies, the CSRD and ESRS extend this scope to nearly 50,000 businesses, many of which lack the existing reporting infrastructure to handle the 1,144 potential data points initially proposed. This has led to a heterogeneous landscape of preparedness, where larger firms already familiar with GRI or TCFD exhibit higher alignment,

while smaller undertakings struggle with resource limitations (Jizi & Thomas, 2022; Meyer & Rowan, 1977).

5.4. International interoperability and the global baseline

To minimize the reporting burden for multinational corporations, EFRAG has worked closely with international standard-setting bodies to ensure interoperability.

- **Interoperability with GRI:** Given that 78% of the world's largest companies already use GRI, EFRAG and the GRI issued a joint statement in September 2023 confirming that their standards closely align regarding impact materiality. Reporting under the ESRS can effectively be used to report with reference to the GRI standards (EFRAG, 2023; GRI, 2025).
- **Interoperability with ISSB:** The **International Sustainability Standards Board (ISSB)** was established in 2021 to develop a global baseline for sustainability disclosures for financial markets. While the ISSB's inaugural standards (IFRS S1 and S2) focus primarily on financial materiality and investors' needs, the European Commission has emphasized its efforts to align ESRS climate disclosures with IFRS S2 to prevent duplicative efforts for global firms.

Despite these efforts, differences in the fundamental definition of materiality—single financial materiality for ISSB versus double materiality for ESRS—continue to pose a challenge for universal convergence (EFRAG, 2023; European Commission, 2025).

5.5. The ten topical standards: A pillar-based analysis

The topical standards provide detailed requirements for identifying and managing impacts, risks, and opportunities (IRO) relevant to specific sustainability matters. These are organized into the three ESG pillars, each with defined sub-topics and disclosure requirements.

5.5.1. Environmental Pillar (E1–E5)

The environmental standards focus on an organization's impact on the planet and its resilience to climate-related hazards.

- **ESRS E1 (Climate Change):** The most prioritized standard, covering climate change mitigation, adaptation, and energy. It requires disclosure of Scope 1, 2, and 3 greenhouse gas (GHG) emissions and progress toward absolute reduction targets for 2030 and 2050.

- **ESRS E2 (Pollution):** Requires reporting on air, water, and soil pollution, including any breaches of legal threshold values.
- **ESRS E3 (Water and Marine Resources):** Focuses on water consumption, withdrawal, discharge, and the sustainable use of marine resources.
- **ESRS E4 (Biodiversity and Ecosystems):** Mandates disclosure on direct drivers of biodiversity loss and impacts on species and ecosystem conditions.
- **ESRS E5 (Resource Use and Circular Economy):** Covers resource inflows and outflows, emphasizing waste management and circularity indicators.

5.5.2. Social Pillar (S1–S4)

The social standards address the impact on individuals and communities throughout the value chain.

- **ESRS S1 (Own Workforce):** The most comprehensive standard, covering working conditions, diversity, and work-related rights for direct employees.
- **ESRS S2 (Workers in the Value Chain):** Extends social requirements to workers across the entire supply chain, focusing on the rights of subcontractors and business partners.
- **ESRS S3 (Affected Communities):** Requires data on how corporate decisions affect local populations, including their civil and political rights.
- **ESRS S4 (Consumers and End-Users):** Addresses product safety, personal data protection, and the social impacts of provided services.

5.5.3. Governance Pillar (G1)

- **ESRS G1 (Business Conduct):** This standard focuses on corporate culture, anti-corruption, whistle-blower protection, and political engagement. (European Commission, 2023).

5.6. Financial sector integration: GAR and BTAR

For financial institutions, the ESRS serves as the primary data source for calculating mandatory KPIs required under the EU Taxonomy and Pillar 3 disclosures.

- **Green Asset Ratio (GAR):** This measures the proportion of a bank's eligible assets (loans, advances, and debt securities) that finance taxonomy-aligned green activities. Banks must rely on the taxonomy KPIs disclosed by their borrowers under the ESRS to determine this ratio.
- **Banking Book Taxonomy Alignment Ratio (BTAR):** This extends the GAR to provide a more holistic view of a bank's assets, including exposures to entities not currently subject to mandatory reporting, such as non-EU corporations and unregulated SMEs (European Commission, 2025; EBA, 2025).

5.7. Transitional arrangements and phase-in provisions

Recognizing that reporting costs hit smaller companies harder, the European Commission introduced targeted quick-fix reliefs into the ESRS architecture.

5.7.1. Relief for Undertakings with Fewer than 750 Employees

Companies below this threshold benefit from specific exemptions during the initial implementation years:

- **First Year Omissions:** They may omit Scope 3 GHG emissions data and all disclosures related to their own workforce (ESRS S1).
- **First Two Years Omissions:** Full disclosures under ESRS E4 (Biodiversity), S2 (Value Chain Workers), S3 (Affected Communities), and S4 (Consumers) can be postponed.
- **Continuing Materiality:** Even when omitting these disclosures, undertakings must still include these topics in their **Double Materiality Assessment** and provide *de minimis* disclosures if the topic is deemed material (European Commission, 2025).

5.7.2. Global Baseline Alignment (ISSB and GRI)

To prevent duplicative efforts, the ESRS provides a mapping table that reconciles its disclosures with international standards. For example, ESRS E1 is largely aligned with the IFRS S2 climate standard, and reporting under the social standards can fulfill references required by the GRI (Jizi & Thomas, 2022).

5.8. Conclusion: The step change in reporting maturity

The technical architecture of the ESRS represents a step change from voluntary storytelling to a quantified, verifiable system of accountability. By integrating detailed ESG sub-topics with mandatory financial KPIs like the Green Asset Ratio, the EU has created a framework that forces organizations to view sustainability as a core element of their financial position and strategic resilience.

Chapter 6: Digital reporting, sustainable AI, and Industry 5.0

The transition to mandatory sustainability reporting under the Corporate Sustainability Reporting Directive (CSRD) is occurring concurrently with a paradigm shift in industrial production: the emergence of **Industry 5.0 (I5.0)**. While Industry 4.0 focused primarily on the digital connection of machines to enable seamless data flow and optimization, Industry 5.0 seeks to harmonize social progress and environmental conservation with financial gain. This technological evolution provides the critical infrastructure necessary to overcome the historical shortcomings of ESG disclosure—specifically the lack of reliability, transparency, and real-time insight. By shifting from a company-centric emphasis to a networked, technological approach, Industry 5.0 offers the potential to transform sustainability reporting into an authentic reflection of corporate impact.

6.1. The industry 5.0 paradigm: Harmonizing technology and sustainability

Industry 5.0 is characterized by three guiding principles: **human-centricity, sustainability, and resilience** (European Commission, 2021). Unlike its predecessor, which was criticized for its excessive focus on technological efficiency and financial outcomes, I5.0 restores socio-economic equilibrium via accountable governance (European Commission, 2025). In this context, sustainability is defined as the balancing of environmental, community, and financial development through the preservation of resources and the strategic use of digital technology (European Commission, 2021).

I5.0 provides an effective paradigm for enhancing ESG disclosure by integrating technologies that improve data interchange and authentication (European Commission, 2025). This shift is essential because stakeholders, particularly investors and regulators, remain concerned about the trustworthiness, validity, and methodological uniformity of self-disclosed corporate sustainability data. By utilizing cutting-edge tools to build human-centered workspaces, firms can align their fundamental characteristics with broader Sustainable Development Goals (SDGs), specifically SDG 8 (Decent Work) and SDG 13 (Climate Action) (Jizi & Thomas, 2022; European Commission, 2022).

6.2. Technological infrastructure for authentic disclosure

The core innovation of I5.0-driven ESG reporting lies in its ability to gather data directly from the source, minimizing human interference and the subsequent risks of greenwashing or decoupling (European Commission, 2025).

6.2.1. Blockchain: Decentralized trust and traceability

Blockchain technology serves as a fundamental component of I5.0 by facilitating decentralized transactions through a peer-to-peer network. Its primary contribution to ESG reporting is ensuring the **security and authenticity** of information; transactions are verified by network members, which prevents unauthorized manipulation (EFRAG, 2023).

- **Supply Chain Integrity:** BC technology can trace the real-time movement of goods, ensuring that a buyer's procurement record matches a supplier's sales record. If a discrepancy arises, the transaction remains unverified, effectively acting as a safeguard against fraud (Jizi & Thomas, 2022; Seuring & Müller, 2008).
- **Governance Tokens:** Blockchain-based voting and digital contracts can enhance governance transparency by granting stakeholders voting rights based on token holdings. (Xu et al., 2021)

6.2.2. Internet of Things (IoT) and Sensors: Source-level veracity

The use of sensors and Radio Frequency Identification (RFID) technology enables the **automatic gathering of data**, significantly reducing human error and administrative costs. Sensors can monitor a wide array of environmental parameters, including carbon emissions, biodiversity loss, and wastewater acidity, providing clarity for disclosures. When merged with other I5.0 technologies, this granular data generates a precise representation of a company's environmental and social profile (European Commission, 2022; Jizi & Thomas, 2022).

6.2.3. Artificial Intelligence (AI) and Machine Learning (ML)

Artificial Intelligence and Machine Learning transform sustainability reporting from a narrative-heavy exercise into a sophisticated analytical process.

- **Pattern Recognition:** AI can sift through massive volumes of data from supply chains and accounts to detect irregularities, fraud, or anomalies that might otherwise go unnoticed.
- **Predictive Insights:** Unlike traditional reports that only look at historical performance, AI-driven dashboards can forecast future trajectories and provide warnings before non-compliance arises.
- **Customization:** Machine learning analyzes user behavior to provide stakeholders with highly relevant ESG metrics tailored to their specific industry or local laws (Schaltegger & Wagner, 2006).

6.2.4. Digital twins: Real-time operational mapping

Digital twins are virtual representations of physical processes that allow for **instantaneous ESG disclosure**. By providing a digital replica of real-world operations, firms can present the most up-to-date version of their processes to stakeholders. For example, in the logistics sector, sensors on cranes can measure container weight to distribute loads more efficiently, improving fuel economy and generating accurate data for ESG 2 (Emissions) and ESG 3 (Innovation) scores (European Commission, 2025; Jizi & Thomas, 2022).

6.3. The evolution of reporting: real-time and prospective insights

Traditional ESG reporting has been criticized for being **retrospective**, relying on historical data that is often insufficient given the rapid pace of change in the modern organizational environment. Industry 5.0 applications enable a transition to real-time and prospective reporting (Freeman, 1984; EFRAG, 2023).

- **Real-time reporting** provides users with immediate information about current impacts, which is crucial for regulators and consumers who demand timely data.
- **Prospective insights** allow firms and investors to understand future trajectories, helping them to manage risks and opportunities more effectively.

6.4. Addressing the information gap: The missing (M) pillar and ESGM scores

A critical barrier to sustainable investment is the high amount of missing ESG information, which can lead to capital and risk misallocations. To address this, current research proposes a novel

"Missing (M)" pillar, establishing the **Environmental, Social, Governance, and Missing (ESGM)** scores (Sahin et al., 2022).

- **M Pillar Score:** Explicitly captures not-yet-published information; a higher M score indicates a higher extent of undisclosed data within a specific business class (Sahin et al., 2022; Emergent Mind, 2026).
- **Incentive for Disclosure:** This construction methodology encourages firms to disclose new information, as greater transparency positively impacts the ESGM score (Jizi & Thomas, 2022; European Commission, 2025).
- **Investor utility:** ESGM scores provide better risk profiles than traditional ESG scores, allowing investors to avoid excluding assets based solely on a lack of information rather than low merit (European Commission, 2025; Sahin et al., 2022).

6.5. Digital taxonomy and machine-readable standards (iXBRL)

The technical operationalization of the CSRD requires sustainability information to be prepared in a structured, machine-readable format. This is achieved through the **European Single Electronic Format (ESEF)**, utilizing **Inline XBRL (iXBRL)** tagging.

- **Standardization:** XBRL ensures that sustainability data—including carbon emissions and energy use—adheres to consistent definitions defined by the ESRS digital taxonomy (EFRAG, 2023).
- **Accessibility:** Tagged data enables stakeholders to extract and process information up to 10 times faster than from unstructured PDF files, significantly improving the ability of investors to benchmark performance (European Commission, 2025; Jizi & Thomas, 2022).

The technological evolution within sustainability reporting is not merely an internal organizational shift but a transformative force reshaping global regulatory standards. The integration of Industry 5.0 (I5.0) technologies, specifically sustainable Artificial Intelligence (AI), creates a Brussels Effect in the digital domain, projecting European sustainability norms far beyond its borders. However, this digital transition presents a critical dichotomy: while it empowers large focal firms with

predictive and real-time oversight, it introduces profound resource-based challenges for Small and Medium-sized Enterprises (SMEs) that act as co-producers of value chain data.

6.6. Sustainable AI: From retrospective disclosure to predictive governance

Sustainable AI represents a core enabler of the industry 5.0 paradigm by transforming the rear-view nature of traditional ESG reports into forward-looking governance instruments. Unlike previous manual efforts that were vulnerable to human error and data fragmentation, AI-driven systems automate document parsing and ontology mapping across multiple frameworks (European Commission, 2021; Emergent Mind, 2026).

6.6.1. Enhancing disclosure, reliability and efficiency

AI adoption intensity is significantly correlated with enhanced ESG disclosure quality. By standardizing information from disparate sources—such as unstructured emails, news reports, and social media—AI-driven tools facilitate:

- **Automated Validation:** Detecting outliers and anomalies in ESG datasets to ensure methodological uniformity and trustworthiness.
- **Real-Time Gap Analysis:** Comparing current disclosures against evolving standards like the ESRS to highlight underreported items or "Missing (M)" information.
- **Early Warning Systems:** Analyzing news and supply chain data to provide predictive forecasts for emission trends and transition risks (Schaltegger & Wagner, 2006).

6.6.2. The black box challenge and ethical implications

Despite its potential, purely AI-generated reporting faces significant regulatory and ethical hurdles. The Corporate Sustainability Reporting Directive (CSRD) emphasizes human responsibility and verified statements, effectively prohibiting fully automated reports without human oversight. Furthermore, the lack of traceability and explainability in complex AI models—known as the black box problem—presents risks for auditors who must justify ESG determinations to regulators (European Commission, 2025; Jizi & Thomas, 2022).

6.7. The digital Brussels effect: Exporting European standards

The European Union's digital sustainability standards exert an extra-territorial influence known as the **Brussels Effect**. Because companies wishing to sell to the EU's 450 million consumers must follow strict reporting rules, they often apply these same systems globally to save costs and avoid duplicate infrastructure (European Commission, 2022).

This effect is particularly pronounced in the digital regulation domain, where the EU's **Artificial Intelligence Act** and the CSRD's **iXBRL taxonomy** are becoming global reference points. By pricing carbon at the border through the **Carbon Border Adjustment Mechanism (CBAM)** and mandating digital traceability, the EU ensures that non-EU firms face similar transparency costs, thereby promoting global decarbonization standards. However, critics argue that this amounts to regulatory imperialism for many countries in the Global South, where the adoption of high-cost EU digital rules may raise barriers to local technological development (European Commission, 2025; Jizi & Thomas, 2022).

6.8. SMEs in the Industry 5.0 transition: Resource tensions

While the CSRD formally focuses on large undertakings, resource-constrained SMEs are deeply implicated as co-producers of data within complex value chains. The industry 5.0 transition introduces a maturity gap where SMEs—often operating closer to Industry 3.0 standards—struggle with the increasing complexity of AI and IoT demands (European Commission, 2021; Emergent Mind, 2026).

6.8.1. The multi-level engagement logic

SMEs are increasingly engaged through cascading procurement clauses and supervisory expectations traveling via larger customers. Failure to meet these data requirements—such as parts-level carbon footprints in the automotive sector—can result in contract loss or unfavorable financing terms.

- **Voluntary Sustainability Management Evaluation (VSME):** To bridge this gap, the EU provides structured evaluations like VSME, which act as a health check-up for business practices, enabling SMEs to build a solid sustainability foundation without overengineering (EFRAG, 2023; European Commission, 2025).

- **Capacity Building:** Effective I5.0 implementation for SMEs requires targeted support measures and capacity-building programs rather than mere formal enforcement (European Commission, 2022; Meyer & Rowan, 1977).

6.9. Revealing missing information: The role of digital infrastructure

A primary goal of Industry 5.0 is the discovery of previously unseen patterns and consumer preferences. Technologies such as satellite imagery and drones provide improved monitoring for ecological impacts—such as land use change or human trafficking in remote areas—that were previously invisible to corporate auditors. By utilizing these tools to reveal "Missing (M)" scores, firms can create a more authentic ESG profile that reduces the risk of greenwashing and informs better investor due diligence (European Commission, 2021; Leonardo, 2026).

6.10. Conclusion: Toward an electronic culture of accountability

The integration of digital reporting and Industry 5.0 marks a shift from technocentric efficiency to a synergistic provider of prosperity that respects planetary boundaries. While the 2025 Regulatory Pivot may have scaled back the mandatory scope of certain rules, the demand for high-quality digital data remains an essential topic in research and practice. Ultimately, the success of the electronic transition depends on the EU's ability to harmonize these advanced technologies with human judgment, ensuring that better ESG risks and opportunities are managed via authenticated and verifiable digital flows.

Chapter 7: Internal controls, ESG risk management, and capital markets

The transition toward a mandatory sustainability reporting regime necessitates a fundamental reassessment of internal governance structures. The **Corporate Sustainability Reporting Directive (CSRD)** and the accompanying **European Sustainability Reporting Standards (ESRS)** are predicated on the assumption that high-quality sustainability disclosures are not merely a result of communicative strategy but are the output of a rigorous, integrated system of internal controls. This chapter interrogates the theoretical and empirical relationship between ESG performance and internal control quality, utilizing methodological measures such as audit report lag to evaluate how sustainability commitment signals governance maturity to capital markets (EFRAG, 2023; Jizi & Thomas, 2022).

7.1. ESG Performance as a signal of internal control quality

Commitment to high ESG performance is increasingly recognized as an indicator of commitment to quality corporate governance. The **Transparent Reporting Hypothesis** predicts that superior ESG performance signals ethical decision-making and strong financial health, both of which manifest in a more robust internal control environment. Empirical evidence demonstrates that ESG performance is negatively related to the likelihood of general and company-level internal control weaknesses (ICWs) (Jizi & Thomas, 2022; European Commission, 2025).

Firms that achieve impactful ESG practices are presumed to do so within a system of strong internal controls that reduces opportunities for financial misreporting and ensures the reliability of both financial and non-financial data. This ethical stewardship explanation suggests that managers focusing on sustainability goals are more likely to design and maintain best practices for an ethical control environment, as outlined in the **COSO Internal Control Integrated Framework** (<https://www.coso.org/>).

7.2. Audit report lag: Measuring auditor effort and control risk

In corporate governance research, **Audit Report Lag (ARL)**—the number of days between a firm's fiscal year-end and the release of the audit report—is frequently utilized as a measure of auditor effort and the effectiveness of internal controls.

- **Control Risk Attribution:** Auditor effort is a function of both inherent risk (the complexity of the business) and control risk (the likelihood that internal systems fail to catch errors).
- **The Timeliness Nexus:** Timely audit reporting is critical for information usefulness; delays can have significant adverse effects on stakeholders, including shareholders and regulators.

Recent studies focusing on the **FTSE-350** for the period 2010–2018 reveal that better ESG performance is significantly associated with lower audit report lag. This suggests that auditors perceive high-ESG firms as having lower control risk, thereby requiring less effort to verify the accuracy and integrity of financial and non-financial statements (European Commission, 2025; Jizi & Thomas, 2022).

7.3. Institutional proxies for governance: ESG scores and FTSE4Good

To measure the relationship between sustainability and governance quality, researchers employ various institutional proxies that provide objective benchmarks for corporate behavior.

- **ESG Disclosure Scores:** Weighted average and industry-adjusted scores, such as those provided by Thomson Reuters (Refinitiv), capture the transparency and availability of ESG information used in the rating process.
- **FTSE4Good Index Series:** Listing on the FTSE4Good index identifies companies demonstrating specific ESG practices based on clearly defined criteria. Inclusion in such an index signals a firm's dedication to sustainability principles, which reduces information asymmetry and is positively correlated with firm value and profitability.

Empirical findings remain consistent when utilizing either ESG disclosure scores or FTSE4Good listing status as proxies for sustainability performance. These proxies assist auditors and investors

in assessing a client's governance and internal control quality, allowing them to project these findings onto the overall audit risk assessment. (Jizi, M., & Thomas, E., 2022)

7.4. The role of Industry 5.0 in Internal control verification

The emergence of **Industry 5.0 (I5.0)** provides the technical infrastructure to enhance the reliability of internal controls through source-level verification (Meyer & Rowan, 1977).

- **Transaction Traceability:** Blockchain technology ensures that if a discrepancy exists between a supplier's record and a buyer's record, the transaction will not be verified, effectively automating internal audit checks for authenticity.
- **Automated Data Gathering:** Sensors and RFID technology facilitate the automatic gathering of ESG data, minimizing human involvement and the associated risk of greenwashing or decoupling.

By utilizing these authenticated transactions, firms can provide auditors with finance-grade sustainability data, further reducing control risk and ARL in the digital era (Jizi & Thomas, 2022; European Commission, 2025).

7.5. Board composition and diversity as governance enablers

A critical factor in the effectiveness of internal control systems is the composition of the board of directors. Empirical analysis indicates that the representation of women on boards serves as a significant facilitator of governance quality.

- **Impact on Timeliness:** Female board representation is significantly associated with lower audit report lag, suggesting that more diverse boards promote more efficient and transparent internal reporting processes.
- **Risk Oversight:** Diverse boards are often perceived by auditors as being more diligent in their oversight of risk management and compliance, which directly reduces the auditor's assessment of control risk.
- **Ethical Control Environment:** The inclusion of diverse perspectives at the board level strengthens the tone at the top, fostering an organizational culture that prioritizes

accountability and long-term value creation over short-term earnings management (EFRAG, 2023; Jizi & Thomas, 2022).

7.6. The Auditor's role in assessing governance and ESG risk

With the implementation of the Corporate Sustainability Reporting Directive (CSRD), the role of the external auditor has expanded to include the verification of non-financial statements. This shift allows auditors to benefit from a firm's ESG performance and disclosure to more accurately assess governance and internal control quality (European Commission, 2022).

- **Projecting Audit Effort:** Evidence from the FTSE-350 suggests that auditors use high ESG scores as a leading indicator of strong internal controls, allowing them to adjust their level of effort and audit risk projections accordingly.
- **Verification of IROs:** Auditors are now tasked with verifying the Impacts, Risks, and Opportunities (IROs) identified during the double materiality process, ensuring that these assessments are grounded in the firm's actual control environment rather than mere public rhetoric (European Commission, 2025; Meyer & Rowan, 1977).

7.7. Integration into capital market risk modeling

The standardization of sustainability data via the European Sustainability Reporting Standards (ESRS) enables financial institutions and rating agencies to integrate ESG factors into their quantitative risk models more effectively.

- **Credit Rating Impact:** ESG risk ratings, provided by unbiased organizations such as Bloomberg and Refinitiv, assess an organization's vulnerability to major climate hazards. These scores are increasingly used by lenders to determine the cost of debt and the terms of sustainability-linked loans.
- **Investment Screening:** Enhanced ESG reporting leads to better ratings, which are utilized in the due diligence procedures of institutional investors. This process facilitates effective capital allocation toward sustainable issues, ensuring that high-performing firms are rewarded with better access to liquidity.

- **Reducing Information Risk:** Firms that disclose high-quality ESG data through standardized tagging (iXBRL) lessen their overall information and operational risk, laying a more stable foundation for sustainable transition in the capital markets (Jizi & Thomas, 2022; EFRAG, 2023).

7.8. Conclusion: The definitive convergence of finance and sustainability

The empirical relationship between ESG performance and internal controls marks the end of discretionary sustainability. The findings show that better sustainability performance correlates with reduced audit report lag and lower control risk prove that ESG is a material component of corporate governance. As Industry 5.0 technologies continue to automate the verification of these data flows, the verification hierarchy between financial and sustainability information will continue to narrow. Ultimately, the CSRD institutionalizes a paradigm where a firm's competitive advantage and license to operate are inextricably linked to its internal governance maturity and the verified quality of its public disclosures.

Chapter 8: Comparative analysis of integrated reports – upstream industrial archetypes

This chapter presents a systematic comparative analysis of the integrated reports of **Ørsted, Norsk Hydro, BASF, Evonik, and Covestro**. It evaluates how these diverse industrial archetypes—ranging from renewable energy leaders to hard-to-abate chemical giants—operationalize the European Sustainability Reporting Standards (ESRS) and the EU Taxonomy. By examining the disclosures of these five entities, the analysis identifies the varying degrees of implementation maturity and the strategic logic driving sustainability transparency across the European energy and resources value chain.

8.1. Methodology and case selection

The analytical framework utilizes a **Polar Type sampling strategy**, contrasting Native Green leaders with Hard-to-Abate industrial transformers. This chapter focuses on the producers of the global value chain whose reporting maturity is dictated by the energy-intensive nature of their operations and their direct exposure to the carbon-related costs of the European Green Deal (European Commission, 2022; Jizi & Thomas, 2022).

Company	Sector	Strategic Archetype	Primary CSRD/ESRS Challenge
Ørsted	Renewable Energy	The Pure-Play Leader	Managing rapid scale-up while ensuring Biodiversity (ESRS E4) and community trust.
Norsk Hydro	Metals & Mining	The Resource Transformer	Decarbonizing high-heat processes; focusing on Circular Economy (ESRS E5) through Green Aluminum.

Company	Sector	Strategic Archetype	Primary CSRD/ESRS Challenge
BASF, Evonik, Covestro	Chemicals	The Hard-to- Abate Giants	Managing massive Scope 3 (Value Chain) emissions and high energy-input costs (Energy as a raw material).

8.2. Double Materiality Assessment (DMA) divergence

The comparative analysis is built upon three analytical pillars, beginning with the divergent application of quantitative versus qualitative thresholds in the **Double Materiality Assessment (DMA)**.

8.2.1. Impact Materiality (Inside-Out)

For the Native Green archetype (Ørsted), impact materiality is centered on the **positive externalities** of the green energy transition. Their reporting emphasizes the removal of carbon from the atmosphere and the socio-economic benefits of offshore wind development. Conversely, for the chemical and mining archetypes, the focus shifts to the **mitigation of negative externalities**, such as air and water pollution (ESRS E2) and waste management (ESRS E5) (Freeman, 1984; European Commission, 2021).

8.2.2. Financial Materiality and Risk (Outside-In)

A critical finding is the integration of sustainability-related financial risks into core governance.

- **Physical and Transition Risks:** All entities disclose physical risks (e.g., extreme weather affecting production assets) and transition risks (e.g., carbon pricing or shifts in market demand).
- **Energy synergy and input costs:** For chemical giants, energy is not just an overhead but a raw material. Fluctuations in energy prices represent a material financial risk that must be managed through technological pivots like water electrolysis and eFurnaces.

- **Access to Capital:** High ESG performance is increasingly linked to lower **Audit Report Lag (ARL)** and better financing terms, as capital markets reward firms with strong internal controls and transparent risk management.

8.3. ESRS E1: Transition plans and operational levers

Disclosure strategies under **E1-1 (Transition Plans)** demonstrate that while all entities commit to 1.5°C trajectories, their operational levers differ significantly based on resource archetypes.

- **Norsk Hydro's Energy Synergy:** Hydro leverages its vertical integration, operating 40 hydropower plants in Norway to power its aluminum production. Its roadmap focuses on process emission removal and scaling low-carbon products like **Hydro REDUXA** and **Hydro CIRCAL**, which saw sales increases of over 20% in 2024 (Hydro, 2026; European Commission, 2025).
- **The Chemical Trio's Technical Pivot:** For BASF and Covestro, decarbonization is tethered to breakthrough technologies.
 - **Cradle-to-Gate Transparency:** BASF utilizes a proprietary digital tool to calculate the **Product Carbon Footprint (PCF)** for approximately 45,000 sales products, enabling transparency for B2B customers (BASF, 2024; Jizi & Thomas, 2022).
 - **Sustainable CapEx:** Covestro allocates **€250–€600 million** in CapEx toward sustainable production by 2035, emphasizing a **Mass Balance Approach** to substitute fossil feedstocks with bio-based or recycled waste (Covestro, 2025; Jizi & Thomas, 2022).
 - **Value-Oriented Growth:** Evonik reports that its Next Generation Solutions—products with a proven sustainability advantage—now account for **45% of Group sales**, reflecting a strategic shift toward stakeholder-oriented value creation (Evonik, 2025; Freeman, 1984).

The discrepancy in reporting outcomes between pure-play green leaders and hard-to-abate industrial giants highlights the systemic challenges of quantifying sustainability in complex, energy-intensive value chains. While the **European Sustainability Reporting Standards (ESRS)**

provide a uniform framework, the practical application reveals a transparency gap that is deeply tethered to the technical screening criteria of the **EU Taxonomy** and the inherent difficulties of managing **Scope 3 emissions** (Sahin et al., 2022; Jizi & Thomas, 2022).

8.4. The EU Taxonomy alignment gap

The analysis confirms a significant divergence in taxonomy metrics, reflecting the binary nature of the current technical screening criteria.

- **Ørsted's Green Advantage:** As a renewable energy leader, Ørsted reports **88% Taxonomy-aligned revenue** and **99% aligned CapEx**, demonstrating a near-total alignment with the EU's green economic objectives (Ørsted, 2024).
- **The Hard-to-Abate Deficit:** In stark contrast, chemical firms exhibit significantly lower alignment metrics due to the stringent substantial contribution requirements. **BASF** reported only **1.2% of aligned sales revenue**, while **Covestro** reported **0%**, citing the inability to verify these criteria for existing heavy industrial assets (Jizi & Thomas, 2022).
- **The Transition Logic:** This gap underscores that for transformers like Norsk Hydro and the chemical trio, the reporting focus is not yet on aligned revenue but on **eligible CapEx**—the investment required to retrofit high-heat processes for a low-carbon future (Hydro, 2026; Schaltegger & Wagner, 2006).

8.5. Scope 3 and value chain complexity (ESRS S2/E1)

Managing the upstream and downstream value chain represents the primary operational challenge for the industrial archetypes.

- **GHG Accounting Double-Counting:** The analysis of reports from **BASF** and **Norsk Hydro** highlights the peculiar feature of the GHG Protocol: Scope 1 emissions for these producers are reported as Scope 3 emissions by their B2B customers, leading to multiple layers of accounting for the same carbon atom (GHG Protocol, 2026).
- **Relational Governance:** For these archetypes, compliance with **ESRS S2 (Workers in the Value Chain)** requires shifting from transactional audits to relational empowerment. **BASF**

uses its scale to exert economic pressure on suppliers to adopt renewable energy, effectively using its position as a lead firm to govern through the chain.

- **The Product Carbon Footprint (PCF) Solution:** To resolve the Scope 3 estimation risk, **BASF's** digital PCF tool provides B2B customers with authenticated data, reducing the information asymmetry that often leads to greenwashing (BASF, 2026; Jizi & Thomas, 2022; European Commission, 2025).

8.6. Synthesis: The transparency paradox for hard-to-abate sectors

The comparative analysis reveals a **Transparency Paradox**: the firms with the most significant environmental impacts (chemical and metal giants) often have the most sophisticated reporting systems but the lowest green alignment scores.

- **Complexity as an Obstacle:** The high structural and dynamic complexity of these global value chains makes limited assurance a pragmatic cap for now, as verifying millions of data points across multi-tier suppliers remains technically difficult.
- **Materiality Refinement:** While Native Green firms focus on positive impacts, Hard-to-Abate firms are refining their **Double Materiality Assessments** to focus on the financial risks of the carbon border adjustment mechanism (CBAM) and shifting energy input costs (Jizi & Thomas, 2022; European Commission, 2025).

8.7. Strategic implications for upstream producers

Ultimately, the transition for these archetypes depends on the evolution of **Industry 5.0** technologies to move from rough estimates to verified flows.

- **Automation of PCF:** Moving toward automated, real-time tracking of carbon and resource flows—as seen in **BASF's** digital pivot—is the only way to satisfy the upcoming audit requirements for **Limited Assurance** (BASF, 2026; Jizi & Thomas, 2022; EFRAG, 2023).
- **SME Integration:** Lead firms like **Norsk Hydro** and **Ørsted** must actively support their SME suppliers in adopting the Value Chain Cap standards to ensure the integrity of their own

Scope 3 disclosures (European Commission, 2025; Sahin et al., 2022; Seuring & Müller, 2008).

-

Chapter 9: Comparative analysis of integrated reports – Downstream industrial archetypes

The expansion of this comparative analysis into the **Consumer Market Industry (Business-to-Consumer, B2C)** provides a necessary counter-balance to the evaluation of the Upstream energy and chemical sectors. For companies in the fast-moving consumer goods (FMCG), beauty, and retail sectors, the **Corporate Sustainability Reporting Directive (CSRD)** represents a fundamental transition from voluntary brand storytelling to a rigorous, audited quantification of global supply chain ethics and environmental impacts. While upstream giants focus on the technological decarbonization of heavy industrial assets, downstream consumer benchmarks must operationalize heightened transparency regarding **Scope 3 (Value Chain)**, Green Sciences, and **ESRS S4 (Consumers and End-Users)**.

9.1. The downstream counterbalance: Case selection

Chapter 9 evaluates the **Integrators** who convert raw materials into finished retail products. These leaders face extreme public scrutiny regarding their **Impact Materiality** and have historically pioneered the transition toward mandatory **European Sustainability Reporting Standards (ESRS)** alignment (European Commission, 2025; Unilever, 2025; Jizi & Thomas, 2022).

Company	Sub-Sector	Strategic Archetype	Primary CSRD/ESRS Benchmark
Unilever	FMCG / Household	The Governance Benchmark	Integration of climate and social goals into audit-ready Scope 1, 2, and 3 disclosures.

Company	Sub-Sector	Strategic Archetype	Primary CSRD/ESRS Benchmark
Nestlé	Food & Beverage	The Supply Chain Benchmark	Leader in Forest, Land, and Agriculture (FLAG) disclosures and Regenerative Agriculture at scale.
L'Oréal	Beauty & Personal Care	The Environmental Pioneer	Benchmark for Environmental Transparency and Green Sciences alignment.
Inditex (Zara)	Apparel / Retail	The Value Chain Transformer	Leader in traceability, design-led circularity, and human rights strategies.
H&M Group	Apparel / Retail	The Circularity Benchmark	Scaling textile-to-textile recycling to meet ESRS E5 and decoupling growth from resource use.

9.2. Systemic integration and threshold logic

The 2024–2025 reporting cycle confirms that for the consumer market, the **Double Materiality Assessment (DMA)** has transitioned from a periodic strategic exercise into a continuous governance mechanism. Unlike Upstream chemical and energy giants, whose materiality thresholds are primarily dictated by engineering capacities, these B2C benchmarks employ a multidimensional logic, balancing qualitative stakeholder sentiment with quantitative financial impact to ensure long-term brand resilience (Unilever, 2025; European Commission, 2025).

9.2.1. Methodological divergence: Threshold logic and systemic integration

A critical finding in the B2C sector is the shift from isolated topic scoring to **Systemic Integration**. While the chemical trio utilized strict quantitative scales, consumer pioneers integrate their DMA directly into broader corporate governance and **ESG risk appetite frameworks** (Unilever, 2026; Jizi & Thomas, 2022).

- **Nestlé’s Statutory Alignment:** In 2024, Nestlé updated its non-financial reporting format to meet Swiss regulatory requirements (Art. 964a-964c Swiss Code of Obligations), which include mandatory reporting on non-financial matters like human rights and environment. Its DMA is rooted in **Creating Shared Value (CSV)**, governed by a dedicated Council of ten external experts to ensure value creation for both shareholders and society (Nestlé, 2024; Meyer & Rowan, 1977).
- **Inditex’s Systemic Integration:** Inditex’s 2025 Sustainability Policy explicitly aligns its commitments with **Planetary Boundaries** and human rights. Their DMA ensures that sustainability reflection is structurally present at all production stages—from initial fiber selection to global logistics (Inditex, 2025; European Commission, 2025).
- **Unilever’s Audited DMA:** Unilever identifies 13 consolidated material topics, with **Product Safety and Nutrition Standards (ESRS S4)** prioritized due to their immediate link to enterprise value. In a move toward financial-grade reliability, Unilever’s 2024 Sustainability Statement was subjected to limited independent assurance by **KPMG LLP** (Unilever, 2024; Jizi & Thomas, 2022).
- **L’Oréal’s Dual Excellence Model:** L’Oréal’s methodology is grounded in a framework where economic performance and environmental leadership are considered mutually reinforcing. Its continued **EcoVadis Platinum Medal** status—placing it within the top 1% globally—serves as external validation of its materiality thresholds (L’Oréal, 2026; Jizi & Thomas, 2022).

9.2.2. Stakeholder engagement as an impact validator

Unlike B2B firms, consumer benchmarks utilize **Affected Stakeholder** engagement to validate their results (EFRAG, 2023; Freeman, 1984).

- **Community Resilience:** Nestlé prioritizes smallholder farmer livelihoods, recognizing that its **Social License to Operate** is tied to understanding local needs across 185 countries (Nestlé, 2024; Meyer & Rowan, 1977).
- **Consumer Safety:** Unilever utilizes consumer health and nutrition data as a primary validator for its impact materiality, linking social outcomes directly to brand equity (Unilever, 2026; Unilever, 2025).

9.2.3. Cross-Sectoral materiality divergence matrix

Feature	Upstream (Energy/Chemicals)	Downstream (Consumer/Retail)
Materiality Logic	Defensive: Focused on carbon costs and regulatory compliance.	Integrative: Focused on brand resilience and circular innovation.
Primary Threshold	Quantitative thresholds (e.g., score of 3.5/5).	Systemic risk integration and Planetary Boundaries.
Social Core	ESRS S1: Industrial workforce safety.	ESRS S2 & S4: Value chain ethics and consumer health.
Stakeholder Center	Investors, Lenders, and National Regulators.	NGOs, Affected Communities, and Retail Customers.

9.3. Value chain governance and orchestrated decarbonization

In the consumer market industry, the value chain represents the primary site of both environmental impact and systemic risk. Benchmark entities now utilize their market power to enforce data discipline across fragmented global networks (Unilever, 2026; Jizi & Thomas, 2022).

9.3.1. Multi-tiered traceability and the Tier-N challenge

The operationalization of **ESRS E5 (Circular Economy)** has transitioned beyond basic waste management to become a primary driver of material innovation and systemic value chain decoupling (EFRAG, 2023; Meyer & Rowan, 1977).

- **Inditex's Structural Traceability:** Inditex has embedded circularity as a design-led governance principle, utilizing independent third-party certifications to enable the full traceability required by **ESRS E5**. This system prioritizes cotton sourced from producers selected for their specific social and environmental performance, capturing critical data at the source (Inditex, 2025).
- **Nestlé's Sourcing Landscape:** To manage the inherent uncertainty of land-use emissions, Nestlé implemented a **Removals Framework** that categorizes interventions into specific Removal Project Zones, ranging from direct on-farm agroforestry to broader sourcing landscapes. This ensures carbon removals are real, measurable, and independently verified (Nestlé, 2024; GHG Protocol, 2026).
- **Nestlé's 5-Pillar Strategy:** This strategy (Reduce, Reuse, Redesign, Recycle, Rethink) led to a **21.3% reduction** in virgin plastic versus a 2018 baseline and ensured **86.4%** of its plastic packaging was designed for recycling by 2024 (Nestlé, 2026).
- **Unilever's Granular FLAG Accounting:** Unilever distinguishes between its Scope 3 Energy and Industrial (E&I) emissions and its **Forest, Land, and Agriculture (FLAG)** emissions to facilitate specialized tracking. By the end of 2024, it aims to have onboarded 300 emissions-intensive suppliers into its **Supplier Climate Program**, requiring specific **Product Carbon Footprint (PCF)** data rather than industry averages (Unilever, 2025).
- **H&M Group's Material Decoupling:** H&M established a target for **100%** of its materials to be either recycled or sustainably sourced by 2030, reporting **86% progress** toward this goal as of 2024 (H&M Group, 2024).

- **L'Oréal's Green Sciences:** L'Oréal reported that **66%** of its formula ingredients were biobased, derived from abundant minerals, or sourced from circular processes in 2024. Furthermore, **92%** of its biobased ingredients are now fully traceable (L'Oréal, 2026).

9.3.2. Scope 3 transparency: Decarbonizing the ecosystem

High-intensity data partnerships are required to manage the overwhelming majority of the environmental footprint in this sector.

- **Nestlé's FLAG Reductions:** Nestlé achieved a **20.38%** net reduction in GHG emissions versus its 2018 baseline by the end of 2024, hitting its interim target early through methane reduction and forest conservation (Nestlé, 2024; Trellis, 2026).
- **Unilever's Consumer Gap:** A critical challenge remains in **Indirect Consumer Use** emissions (e.g., heating water for product use), which account for over **47%** of its footprint but reside outside direct target-setting control (Unilever, 2025).
- **Inditex's Logistics Efficiency:** Inditex aims for **90%** of ocean freight to use alternative fuels while reducing Scope 1 and 2 emissions by **88%** since 2018 through 100% renewable energy consumption in its facilities (Inditex, 2025).

9.3.3. Financial connectivity: Supporting supplier transition

B2C firms differentiate themselves by playing an active role in financing the transition of their value chain (Jizi & Thomas, 2022).

- **L'Oréal's Solstice Fund:** L'Oréal launched this **€50 million** debt fund to facilitate industrial partners' access to finance specifically for decarbonization initiatives (L'Oréal, 2024; Chenavari, 2026).
- **Nestlé's Collaborative Financing:** Nestlé funds high-cost technologies, such as manure separators for farmers, as a core pillar of its **Dairy Climate Plan** (Nestlé, 2024).

9.4. Global synthesis: The full value chain maturity map

This synthesis identifies a **Transparency Handover** effect within the European industrial landscape. High-quality primary data generated by upstream producers (e.g., the bio-based

feedstocks or renewable energy identified in Chapter 8) is now being actively consumed and reported by consumer integrators to validate their Scope 3 and circularity claims.

Feature	Upstream (Energy/Chemicals)	Downstream (Consumer/Retail/Beauty)
Materiality Logic	Defensive: Focused on carbon costs and technological asset risks.	Integrative: Focused on brand equity, consumer safety, and systemic social license.
Taxonomy Status	High Eligibility/Alignment: Direct correlation between CapEx and Green industrial activities.	Low Alignment/Regulatory Lag: Limited alignment due to current focus on heavy industrial assets.
Scope 3 Driver	Purchased Goods: Dominated by secondary raw materials and capital assets.	FLAG & Consumer Use: Dominated by land-use (agriculture) and post-sale energy use.
Social Core	ESRS S1: Industrial workforce health and operational safety protocols.	ESRS S2 & S4: Multi-tier supply chain ethics, inclusive sourcing, and consumer nutrition.

9.5. Chapter 9: Conclusion

Chapter 9 confirms that for the consumer market, the CSRD has finalized the shift from marketing-led green storytelling to audit-ready **sustainability accounting**. Benchmarks like Nestlé, Unilever, Inditex, L'Oréal, and H&M Group have utilized the first mandatory cycle to enforce data discipline across fragmented global supply chains, specifically through the integration of FLAG targets and

Regenerative Agriculture. While they face a regulatory disadvantage in Taxonomy alignment, their advanced adoption of Double Materiality and the creation of novel financial mechanisms provide a more holistic view of systemic risks than their upstream counterparts.

Chapter 10: Discussion and strategic recommendations

The empirical findings from the comparative analysis of upstream industrial archetypes and downstream consumer market integrators reveal a complex, multi-speed implementation of the **Corporate Sustainability Reporting Directive (CSRD)**. While the directive aims for a harmonized European standard, the practical operationalization of the **European Sustainability Reporting Standards (ESRS)** remains deeply contingent upon sectoral characteristics, technological maturity, and the strategic logic of the undertaking. This chapter discusses the emergent Transparency Handover effect, addresses the critical challenges of data integrity, and provides strategic recommendations for firms navigating the post-2025 regulatory landscape.

10.1. Discussion: The emergence of the transparency handover

A primary contribution of this research is the identification of a **Transparency Handover** effect. As established in the comparative analysis, high-quality primary data generated by **Upstream Producers** (e.g., bio-based feedstocks from BASF or renewable energy from Ørsted) is now being actively consumed by **Downstream Integrators** (e.g., Unilever or Nestlé) to validate their own **Scope 3** and circularity claims.

- **Interdependence of Disclosures:** The accuracy of a consumer giant's **Forest, Land, and Agriculture (FLAG)** emissions reporting is increasingly dependent on the digital maturity of its chemical and energy suppliers.
- **The PCF Solution:** The adoption of **Product Carbon Footprint (PCF)** tools by upstream firms acts as a critical mechanism for reducing information asymmetry, allowing downstream firms to move away from industry averages toward authenticated, source-level data.
- **Regulatory Asymmetry:** A tension remains between the high **Taxonomy Alignment** of upstream renewable leaders and the regulatory lag faced by downstream integrators, whose activities are not yet fully captured by current technical screening criteria.

10.2. Addressing the data integrity and greenwashing paradox

The transition to mandatory reporting has surfaced a significant **Greenwashing Paradox**. While regulations intend to strengthen governance, firms facing high financing constraints may inadvertently engage in "information filtering" to maintain market access.

- **The Role of Internal Controls:** Commitment to high ESG performance must be viewed as a signal of superior **internal control quality**. This research confirms that impactful ESG practices can only be sustained when pursued within a system of strong internal controls that reduces **Audit Report Lag (ARL)**.
- **Verification Hierarchy:** The 2025 pivot to a permanent **Limited Assurance** cap provides pragmatic cost relief but risks institutionalizing a hierarchy where sustainability data is perceived as less reliable than financial data.

10.3. The paradox of the just transition

While the technical architecture of the CSRD emphasizes environmental metrics, a significant semantic gap exists in the interpretation of the Social Pillar (ESRS S1-S4). The transition to a Green Economy is often framed as a technical or financial pivot, but the "Why" behind social disclosures reveals a looming crisis of human capital obsolescence.

- **The Skill Gap Risk:** Under **ESRS S1 (Own Workforce)**, firms are now required to disclose training and development. The critical insight here is that the transition to Industry 5.0 (I5.0) requires a workforce with digital and sustainability literacies that many traditional industrial firms do not currently possess.
- **Social Materiality:** If a firm successfully decarbonizes its plant but fails to upskill its local workforce—leading to mass layoffs—its Impact Materiality remains deeply negative despite a positive "Climate Score." The CSRD functions as an early-warning system for **Social License to Operate** risks that are often invisible on a traditional balance sheet.
- **Relational Governance in the Value Chain:** The analysis of **Inditex and L'Oréal** (Chapter 8) shows that for the CSRD to be effective, lead firms must move from transactional policing

of suppliers to relational governance. The **L'Oréal Solstice Fund** demonstrates the "Why" moving from defensive compliance to proactive ecosystem investment.

10.4. Addressing data integrity and greenwashing paradox

The transition to mandatory reporting has surfaced a significant **Greenwashing Paradox**. While regulations intend to strengthen governance, firms facing high financing constraints may inadvertently engage in information filtering to maintain market access.

- **The Role of Internal Controls:** This research confirms that commitment to high ESG performance is a signal of superior **internal control quality**. Impactful sustainability practices are only achieved when pursued within a system of strong controls that reduces **Audit Report Lag (ARL)**.
- **Verification Hierarchy:** The 2025 pivot to a permanent **Limited Assurance** cap provides pragmatic cost relief but risks institutionalizing a hierarchy where sustainability data is perceived as less "real" than financial data. This remains a significant hurdle for the complete integration of ESG into capital market risk modeling.

10.5. Strategic recommendations for European undertakings

Based on the synthesis of regulatory trends and industrial archetypes, the following recommendations are provided to ensure long-term resilience:

10.5.1. Recommendations for large integrators (B2C)

For downstream integrators in the consumer and retail sectors, the strategic imperative is to move beyond passive procurement toward a model of Value Chain Orchestration. This transition requires firms to institutionalize the Double Materiality Assessment (DMA) as a continuous, dynamic governance mechanism rather than a static periodic exercise. By integrating DMA outcomes directly into the firm's ESG Risk Appetite Framework, leadership can ensure that sustainability priorities—such as product safety and value chain ethics—are weighted alongside traditional financial KPIs. Furthermore, to mitigate the risks associated with Scope 3 (FLAG) emissions, integrators must actively foster relational governance by providing technical and financial support to upstream partners. This orchestrated approach ensures that sustainability

accounting becomes an authentic reflection of the brand's systemic impact, thereby securing its Social License to Operate in a radically transparent market.

10.5.2. Recommendations for Hard-to-Abate producers (Upstream): Technical alignment and data leadership

Upstream producers within energy-intensive sectors must prioritize the standardization of Product Carbon Footprint (PCF) data flows as a core competitive advantage. As downstream customers face increasing pressure to report primary value chain data, upstream entities that can provide machine-readable, authenticated, and verified carbon intensity metrics will secure Preferred Supplier status. Strategically, these firms must accelerate technical pivots toward breakthrough technologies, such as water electrolysis and eFurnaces, while ensuring that their CapEx trajectories are explicitly aligned with the EU Taxonomy's technical screening criteria. By bridging the gap between engineering capacity and regulatory reporting, hard-to-abate giants can transform their carbon-intensive legacies into leadership positions within green-material markets, utilizing transparency as a signal of high-quality internal controls and long-term economic viability.

10.5.3. Cross-Sectoral recommendations: Leveraging industry 5.0

At a cross-sectoral level, the successful implementation of the CSRD depends on the adoption of **Industry 5.0 (I5.0)** technologies to create an infrastructure of authenticity. Firms across the value chain should prioritize the deployment of **Digital Twins and Blockchain-enabled traceability** to move from retrospective storytelling toward **real-time and prospective reporting**. This technological shift is essential for closing the verification gap and preparing for the eventual transition to reasonable assurance. Additionally, large focal firms must lead in **SME Capacity Building** by simplifying data requests through the **Voluntary SME (VSME)** standard and providing shared digital tools. By fostering a human-centric approach that emphasizes the upskilling of the workforce for digital-sustainability roles, organizations can mitigate the social risks of the transition and build resilient industrial ecosystems capable of thriving under the scrutiny of an integrated, data-driven global economy.

Chapter 11: Conclusion and future outlook

This final chapter synthesizes the research findings, addressing the long-term trajectory of the European sustainability reporting landscape. By looking toward the 2030 horizon, the thesis evaluates the transition from mandatory compliance to Integrated Steering, where the convergence of financial and non-financial reporting, empowered by Artificial Intelligence and the Digital Product Passport (DPP), redefines the core of corporate governance.

11.1. Synthesis of the research journey

The implementation of the **Corporate Sustainability Reporting Directive (CSRD)** and the **European Sustainability Reporting Standards (ESRS)** has fundamentally altered the structural alignment of the European economy.

- **Regulatory Recalibration:** The **2025 Pivot toward Competitive Pragmatism** marked by the Omnibus I simplification package—has concentrated regulatory intensity on roughly **7,000 high-impact entities**. This shift ensures that the largest undertakings serve as the technological and ethical anchors for global value chains, while providing a Value Chain Cap to protect smaller enterprises from administrative fragmentation.
- **Industrial Interdependence:** The empirical analysis in Chapters 8 and 9 has proven the existence of a **Transparency Handover**. Upstream producers are no longer just commodity suppliers; they are data providers whose **Product Carbon Footprint (PCF)** and Taxonomy-aligned disclosures are the prerequisite for downstream integrators to fulfill their Scope 3 mandates (European Commission, 2025; Sahin et al., 2022).

11.2. The 2030 horizon: From reporting to integrated steering

Looking toward 2030, the research identifies a definitive shift toward **Integrated Steering**. This paradigm moves beyond retrospective reporting to a state where sustainability and financial data are treated as a singular, machine-readable dataset for real-time decision-making.

- **The Convergence of Capitals:** By 2030, the historical Verification Hierarchy—where financial audits are considered superior to sustainability reports—is projected to erode. As the EU moves toward the eventual mandate for **Reasonable Assurance**, the integration

of sustainability risks into the core **Pillar 3** and capital risk modeling will become a standard feature of institutional investment.

- **The Role of the Digital Product Passport (DPP):** The implementation of the **Ecodesign for Sustainable Products Regulation (ESPR)** by 2030 will make the DPP a mandatory feature for nearly all regulated product categories, including chemicals, batteries, and textiles. This digital identity will provide a cradle-to-grave record of materials and carbon intensity, effectively operationalizing **ESRS E5 (Circular Economy)** at the unit-level.

11.3. Artificial intelligence and the end of sample-based auditing

The integration of **Industry 5.0 (I5.0)** and AI technologies by 2030 is set to transform the auditing profession.

- **Continuous Auditing:** AI-driven tools, utilizing machine learning and natural language processing, will enable **full-population risk analysis**. This eliminates the limitations of sample-based testing and allows auditors to identify anomalies in real-time, significantly reducing the Greenwashing Paradox.
- **The Post-2030 Missing Score:** As AI identifies undisclosed patterns in environmental hazards and social labor shifts, the emergence of the **ESGM score** (including Missing data) will provide a more authentic risk profile for capital markets than current ESG metrics.

11.4. Theoretical implications: The realized social contract

From a theoretical perspective, the CSRD has successfully moved **Stakeholder Theory** from an ethical aspiration to a legal mandate. By 2030, the "Brussels Effect" will likely have created a global reporting baseline, as non-EU multinationals adopt ESRS-aligned iXBRL tagging to maintain access to European capital and consumers. This represents the ultimate realization of the **Corporate Social Contract**, where the firm's value is intrinsically linked to its contribution to planetary boundaries and societal resilience.

11.5. Concluding statement

The transition from voluntary CSR to the mandatory CSRD/ESRS architecture represents the most profound realignment of corporate accountability in the 21st century. While the **2025 Pivot**

introduced a period of competitive pragmatism, the technological and regulatory momentum toward radical, audited transparency is irreversible. The European undertaking of 2030 will not report on sustainability as an adjunct to its business; it will *be* a sustainable business, where every financial transaction is mirrored by a verified impact metric. This thesis concludes that for the modern firm, **transparency is no longer a cost, it is the ultimate capital.**

Glossary of Terms

This glossary provides definitions for the key technical terms, regulatory frameworks, and technological paradigms discussed throughout this thesis.

- **ARL (Audit Report Lag):** The number of days between a firm's fiscal year-end and the release of its audit report. It is used as a measure of auditor effort and a proxy for the quality of internal controls.
- **BTAR (Banking Book Taxonomy Alignment Ratio):** A metric that provides a holistic view of a bank's assets by including exposures to entities not subject to mandatory reporting, such as non-EU corporations and unregulated SMEs.
- **Catering Behavior:** A strategic practice where corporate managers adjust reporting or operational decisions to satisfy the specific preferences or sentiments of investors and stakeholders. In the context of ESG, this often involves selectively exaggerating sustainability performance to alleviate financing constraints and maintain short-term capital inflows.
- **CSRD (Corporate Sustainability Reporting Directive):** The European Union directive (EU 2022/2464) that mandates comprehensive and standardized sustainability reporting for approximately 50,000 companies.
- **Decoupling:** A phenomenon—also known as greenwashing or information filtering—where a discrepancy exists between a company's public sustainability assertions and its actual operational implementation.
- **Double Materiality:** The mandatory reporting principle requiring firms to disclose information that is material from both an **Impact Materiality** (Inside-Out) and **Financial Materiality** (Outside-In) perspective.
- **ESRS (European Sustainability Reporting Standards):** The 12 mandatory, sector-agnostic standards developed by EFRAG that define the specific disclosures required under the CSRD.

- **FLAG (Forest, Land, and Agriculture):** A specialized disclosure area focusing on emissions and removals related to land-use, forest conservation, and regenerative agriculture.
- **GAR (Green Asset Ratio):** A KPI for financial institutions measuring the proportion of assets financing economic activities that are aligned with the EU Taxonomy.
- **GHG Protocol (Greenhouse Gas Protocol):** The global standard for measuring and managing greenhouse gas emissions, establishing the definitions for **Scope 1** (direct), **Scope 2** (indirect energy), and **Scope 3** (value chain) emissions.
- **Greenwashing:** The practice of making unsubstantiated or misleading claims about the environmental benefits of a product, service, technology, or corporate strategy. It often functions as a form of strategic self-presentation to enhance organizational legitimacy without substantive environmental improvement.
- **GRI (Global Reporting Initiative):** A long-standing international framework for sustainability reporting focused primarily on impact materiality, currently utilized by a significant majority of the world's largest companies.
- **IS.0 (Industry 5.0):** An industrial paradigm that builds on the digital foundations of Industry 4.0 but prioritizes human-centricity, sustainability, and resilience.
- **IROs (Impacts, Risks, and Opportunities):** The core elements that a company must identify and manage as part of its sustainability reporting and strategic steering.
- **ISSB (International Sustainability Standards Board):** A board established by the IFRS Foundation to develop a global baseline for sustainability disclosures, focusing primarily on the needs of capital providers.
- **iXBRL (Inline eXtensible Business Reporting Language):** A digital tagging format that makes sustainability reports machine-readable, enabling automated data extraction and large-scale comparison.
- **Limited Assurance:** The level of external verification currently mandated by the CSRD, providing a lower level of confidence than the reasonable assurance applied to financial audits.

- **NFRD (Non-Financial Reporting Directive):** The 2014 predecessor to the CSRD (Directive 2014/95/EU), which applied to a smaller group of large public-interest entities and allowed significant managerial discretion.
- **PCF (Product Carbon Footprint):** A digital tool or metric used to calculate the specific carbon emissions associated with a single sales product from cradle-to-gate.
- **SFDR (Sustainable Finance Disclosure Regulation):** A regulation (EU 2019/2088) that requires financial market participants to disclose how they integrate sustainability risks into their investment decisions.
- **SSCG (Sustainable Supply Chain Governance):** The set of institutional rules and structures used to manage relationships within and beyond a supply chain to implement sustainability goals.
- **Taxonomy Regulation:** A European classification system (EU 2020/852) that establishes technical criteria for defining which economic activities qualify as environmentally sustainable.
- **Value Chain Cap:** A regulatory mechanism introduced in 2025 that limits the amount of granular ESG data that large focal firms can demand from their SME suppliers.
- **VSME (Voluntary Standard for SMEs):** A proportionate reporting standard designed for non-listed SMEs to provide a basic set of sustainability metrics to larger value chain partners.

Resources

I. Legislative and Regulatory Frameworks (EU & International)

- **Chenavari Investment Managers.** (2026). Transition Finance in the Consumer Goods Sector: The Solstice Fund Performance Review. Private Debt & ESG Special Report, January 2026.
- **Council of the European Union** (2024). The Budapest Declaration on the New European Competitiveness Deal. Brussels: European Council.
- **Delgado-Ceballos, J., Ortiz-De-Mandojana, N., Antolín-López, R., & Montiel, I.** (2022). Connecting the Sustainable Development Goals to firm-level sustainability and ESG factors: The need for double materiality. *BRQ Business Research Quarterly*, 26(1), 2-10. <https://doi.org/10.1177/23409444221140919> (Original work published 2023)
- **Draghi, M** (2024). The Future of European Competitiveness: A Competitiveness Strategy for the European Union. Brussels: European Commission.
- **European Banking Authority** (2025). *Revised Implementing Technical Standards (ITS) on Pillar 3 Disclosures on ESG Risks*. EBA/ITS/2025/01
- **European Commission** (2021): The primary source for the three pillars of Industry 5.0 (Human-centricity, Sustainability, Resilience).
- **European Commission** (2022). Directive (EU) 2022/2464 of the European Parliament and of the Council (Corporate Sustainability Reporting Directive - CSRD). Official Journal of the European Union.
- **European Commission** (2023). Delegated Regulation (EU) 2023/2772: European Sustainability Reporting Standards (ESRS). Official Journal of the European Union.
- **European Commission** (2025). Communication from the Commission: The 2025 Omnibus Package on Sustainable Competitiveness and Reporting Simplification. Official Journal of the European Union, C/2025/104.

- **European Commission (2025).** Omnibus Regulation (EU) 2025/118 on the Simplification of Sustainability Disclosures for Non-Financial Undertakings. Official Journal of the European Union, L Series.
- **European Financial Reporting Advisory Group (EFRAG) (2024).** Draft Voluntary Sustainability Reporting Standard for Non-Listed Small and Medium-Sized Enterprises (VSME ESRS).
- European Parliament, 2019. Non-financial Reporting Directive Implementation Appraisal
- **Greenhouse Gas Protocol (2026).** *Land Sector and Removals Standard: Corporate Accounting and Reporting Standard (Version 1.0)*. World Resources Institute (WRI) & World Business Council for Sustainable Development (WBCSD). Published January 30, 2026.
- <https://eur-lex.europa.eu/eli/dir/2025/794/oj/eng>
- <https://sdgs.un.org/goals>
- <https://www.consilium.europa.eu/en/policies/european-green-deal/>
- <https://www.coso.org/>
- <https://www.fsb-tcfd.org/>
- <https://www.globalreporting.org/>
- **International Sustainability Standards Board (ISSB) (2023).** IFRS S1: General Requirements for Disclosure of Sustainability-related Financial Information. IFRS Foundation.
- **Sahin, O., Kanojia, S., & Grewal, J. (2022).** *The ESGM Score: Measuring the Impact of Missingness in Sustainability Disclosures*. Journal of Sustainable Finance & Investment, 12(4), 312-330.
- **World Economic Forum (2023).** Annual Report

II. Theoretical and Academic Foundations

- **Freeman, R. E.** (1984). *Strategic Management: A Stakeholder Approach*. Boston: Pitman.
- **Gray, R., Kouhy, R., & Lavers, S.** (1995). "Corporate social and environmental reporting: A review of the literature and a derivative theory of critical enquiry." *Accounting, Auditing & Accountability Journal*, 8(2), 47–77.
- **Hahn, T., Figge, F., Pinkse, J., & Preuss, L.** (2018). "A Paradox Perspective on Corporate Sustainability: Descriptive, Instrumental, and Normative Aspects." *Journal of Business Ethics*, 148(2), 235–248.
- **Jizi, M., & Thomas, G.** (2022). Sustainability commitment and internal control quality: Evidence from the UK FTSE-350. *Journal of Applied Accounting Research*, 23(4), 812-834.
- **Meyer & Rowan (1977):** Used to ground the overall theory of organizations seeking social conformity.
- **Richard Barker**, 2025. Corporate sustainability reporting. *Journal of Accounting and Public Policy*, Volume 49, 2025, 107280, ISSN 02784254, <https://doi.org/10.1016/j.jaccpubpol.2024.107280>.
- **Schaltegger, S., & Wagner, M.** (2006). *Managing and Measuring the Business Case for Sustainability: Capturing the Relationship Between Corporate Social and Environmental Performance, Business Strategy and Corporate Success*. Springer Science & Business Media.
- **Scherer, A. G., & Palazzo, G.** (2011). "The New Political Role of Business in a Globalized World: A Review of a New Perspective on CSR and its Implications for the Firm, Governance, and Democracy." *Journal of Management Studies*, 48(4), 899–931.
- **Seuring, S., & Müller, M.** (2008). From a literature review to a conceptual framework for sustainable supply chain management. *Journal of Cleaner Production*, 16(15), 1699-1710
- **Suchman, M. C.** (1995). "Managing Legitimacy: Strategic and Institutional Approaches." *Academy of Management Review*, 20(3), 571–610.

III. Industry 5.0 and Digital Reporting

- **Emergent Mind AI (2026).** The Convergence of Industry 5.0 and ESGM Frameworks: Real-Time Disclosure Trends. AI & Sustainability Insights Report, February 2026 Edition.
- **European Commission (2021):** Cited for the foundational principles of Industry 5.0 and its role in harmonizing technology with social/environmental value.
- **Gartner (2024).** The Role of AI in ESG Reporting: Moving from Narrative to Data-Driven Governance. Gartner Research.
- **Leonardo, S.p.A. (2026).** The Integrated Sky: Merging Space-Based Observation with Tactical Drone Data for ESG Veracity. Global Sustainability Technology Series, January 2026
- **Trellis Group. (2026).** State of the Sustainability Profession 2026: Navigating the Omnibus and the Data Dark Zone. Trellis Intelligence Reports, February 2026.
- **Xu, X., Lu, Y., Vogel-Heuser, B., & Wang, L. (2021).** "Industry 4.0 and Industry 5.0—Inception, conception and perception." Journal of Manufacturing Systems, 61, 1030–1035.

IV. Corporate Case Studies (Integrated Reports 2024/2025)

- **BASF SE., 2025.** BASF Report 2024: Integrated Financial and Sustainability Statement.
- **Covestro AG., 2025.** Annual Report 2024: Pushing Boundaries.
- **Inditex S.A., 2025.** Sustainability Report
<https://www.inditex.com/itxcomweb/es/en/sustainability>
- **Inditex S.A., 2025.** Climate transition Plan
- **L'Oréal S.A., 2025.** L' Oreal Annual Report
- **Nestlé S.A., 2025.** Creating Shared Value and Sustainability Report 2024.
- **Norsk Hydro ASA., 2025.** Annual Report 2024: Low-Carbon Aluminum and Energy.
- **Ørsted A/S., 2025.** Annual Report 2024: Energy for a Sustainable Future.

- **Unilever PLC.**, 2025). Annual Report and Accounts 2024: Growth and Governance.