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Article

Beyond compliance: Multi-dimensional text mining analysis of corporate sustainability reporting

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BEYOND COMPLIANCE: MULTI-DIMENSIONAL TEXT MINING ANALYSIS OF CORPORATE SUSTAINABILITY REPORTINGİrge Şener^{1*}  and Ahmet Anıl Karapolatgil² ¹⁾Çankaya University, Ankara, Türkiye²⁾Azerbaijan State University of Economics, Baku, Azerbaijan

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Abstract

This study investigates how organisations respond to Corporate Sustainability Reporting Directive (CSRD) requirements through systematic analysis of corporate communications and sustainability reports. We employ multi-dimensional text mining analysis of 500 companies across 12 industries, using lexical analysis, sentiment analysis, and network analysis of sustainability reports (2022-2024) and corporate communications (1.200 documents) from TIME's Most Sustainable Companies ranking. Three distinct organisational response patterns emerge: compliance-oriented positioning (35%), transformation-oriented positioning (42%), and value-creation positioning (23%). Service-oriented sectors demonstrate positive sentiment (+0.67) toward CSRD implementation, while resource-intensive industries show negative sentiment (-0.14). The cross-country analysis reveals distinct national approaches reflecting institutional contexts. This study contributes the first large-scale text mining analysis of CSRD implementation responses, providing empirical evidence of heterogeneous organisational approaches to sustainability reporting beyond simple compliance frameworks. The multi-dimensional methodology enables systematic comparison across industries and countries, revealing sector-specific implementation patterns previously unidentified in sustainability reporting literature. Findings inform policymakers about industry-specific implementation challenges and demonstrate that regulatory framing significantly influences organisational strategic positioning toward sustainability reporting.

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Keywords: sustainability reporting, text-mining, lexical analysis, sentiment analysis, network analysis, topic modelling.

JEL Classification: M14, Q56, C55

Introduction

The large-scale natural disasters of the 1980s and the global corruption scandals of the 1990s were milestones for organisations to start preparing sustainability reports. In the process leading up to the new millennium, sustainability reports began to be considered as a symbol of social responsibility and as a way to improve corporate performance. Stakeholders, including governments, public institutions and civil society organisations, began to voice their demands from business organisations on a global scale. These demands, which were based on fundamental human rights, environmentally protective standards and anti-corruption policies, were reflected in sustainability reports as organisational strategies and practices (Christofi, Christofi and Sisaye, 2012). In the mid-2000s, two-thirds of the Fortune 500 organisations published sustainability reports, and in those years, more than 80% of large-scale US-based companies began to include sustainability-oriented practices in their organisational visions (White, 2005). Despite the rapid developments and radical innovations about the sustainability concept and the reports prepared within its scope, a universal consensus on a method or standards accepted by everyone could not be reached (Christofi, Christofi and Sisaye, 2012). Although increasing global awareness of the sustainability concept has now made sustainability reports a routine process, the situation that sustainability can be interpreted differently according to the specific needs continues today with the effects of the Brundtland Report (Langhelle, 1999). Today, “Corporate Sustainability Reporting Directive” (CSRD), effective January 5, 2023, represents the most comprehensive corporate sustainability reporting mandate globally, affecting approximately 50.000 companies across the European Union (EU) and multinational corporations with EU operations (European Commission, 2024). Unlike its predecessor the “Non-Financial Reporting Directive” (NFRD), the CSRD introduces mandatory European Sustainability Reporting Standards (ESRS) requiring comprehensive Environmental-Social-Governance (ESG) data integration based on “double materiality” principles.

Existing CSRD literature focuses predominantly on compliance frameworks rather than strategic organisational responses. While studies demonstrate regulatory frameworks can reduce greenwashing (Luu et al., 2025) and support green transformation (Xu, Sun and Kong, 2024), critical gaps remain. First, existing research examines regulatory compliance rather than strategic positioning within organisational narratives. Second, cross-industry comparative analysis remains unexplored despite significant sectoral variation. Third, limited empirical evidence exists regarding strategic framing across different institutional contexts. Focusing on these gaps, this study investigates organisational strategic positioning toward CSRD implementation through systematic analysis of sustainability reports and corporate communications, examining; how organisations frame CSRD requirements, industry-specific positioning variations, and cross-country implementation differences. Unlike recent studies that examine compliance preparation (Bauer and Greiling, 2024) or disclosure quality metrics (Tahat and Hassanein, 2024), this research analyses authentic organisational discourse, through multi-dimensional text mining of 500 companies’ corporate

communications between 2022-2024; capturing the critical CSRD implementation period. After this introductory part, this study proceeds as follows. The first part reviews the literature on sustainability reporting evolution and CSRD implementation; the second part details the multi-dimensional text mining methodology; the third part presents findings on strategic positioning patterns and industry variations; and the fourth part discusses theoretical and practical implications. The final part concludes with limitations and recommendations for future studies.

1. Literature review

1.1. Traces of sustainability reporting

The emergence of sustainability concept dates back to the time when civilisation developed; initially discussed by philosophers like Plato and Strabo (Post, 2023). Today, the development that positioned sustainability as a key element of the global agenda is “Our Common Future” report prepared by the “World Commission on Environment and Development” (WCED) in 1987. Known as the “Brundtland Report”, this report examined the concept of sustainability within the framework of sustainable development (Mitcham, 1995). Following the publication of the Brundtland Report, the sustainability concept gained significant popularity. The report asserted that sustainable development could be realised through a comprehensive strategic approach implemented after achieving global consensus, while also recognising that the interpretation of sustainability may vary across countries, cultures, or generations.

In addition to the report’s success in identifying specific goals and designing common practices, this opened opportunities for the concept of sustainability to be assessed according to diverse needs or perspectives (Langhelle, 1999). Following the Brundtland Report, numerous symposiums, conferences, and meetings were held locally and globally on sustainability. Studies related to the UN, such as the Agenda 21 Action Plan from 1992, the Kyoto Protocol signed in 1997, and ongoing programmes like those of the European Community Environment, have kept sustainability at the forefront of the global agenda and enriched its content. Theoretical and practical implications of research have shown that achieving sustainability is linked to fulfilling various types of development, especially in social, economic, ecological, institutional, and spatial orders (Zielinska, 2013).

1.2. Corporate Sustainability Reporting in the context of Sustainable Development Goals

The evolution of the sustainability concept and its global popularity has also influenced organisational life, prompting organisations to begin publishing sustainability reports. Just as the concept has undergone changes and developments, sustainability reports have also evolved over time in terms of their scope and content. The era between 1999 and 2016 emphasises the institutionalisation of sustainability reporting, particularly through the Global Reporting Initiative (GRI) established in 1997. A significant development during this period was the UN incorporating GRI guidelines as a standard component of sustainability reports in 2010 (Gokten, Ozerhan and Gokten 2020). The adoption of UN “Sustainable Development Goals” (SDGs) in 2015 transformed corporate sustainability reporting from voluntary disclosure to strategic frameworks for achieving global targets by 2030 (Raman et al., 2023).

Bibliometric analysis (Donthu et al., 2021) reveals exponential growth in sustainability reporting publications post-2015, with three critical clusters linking reporting to SDG achievement: stakeholder engagement, climate change, and global reporting initiatives. SDGs 8 (decent work), 9 (industry innovation), and 12 (responsible consumption) are most frequently addressed in corporate reports. Low et al. (2023) identified six fundamental themes in corporate SDG reporting as, engagement levels, reporting quality, determining factors, consequences, legitimisation approaches, and institutional pressures. Organisations increasingly view SDG reporting as demonstrating genuine contribution rather than mere compliance. Since, a primary focus for companies when publishing their sustainability reports is their investors who recognised that an organisation's environmental, social, and corporate governance activities influence the company's value and future as much as financial reports, leading them to demand information in these areas as well (Kräussl et al., 2024).

Furthermore, the growing interest of investors and stakeholders in non-financial reporting has prompted companies to consider not only their financial results but also non-financial issues to achieve better financial outcomes and promote growth. This trend has necessitated the incorporation of new perspectives beyond the guidelines or standards typically used in sustainability reports. At this juncture, Environmental-Social-Governance (ESG) performance positively influences investors' decisions regarding organisations and enhances the value relationship (Mervelskemper and Streit, 2017). Organisations implementing comprehensive sustainability reporting aligned with the SDG principles experience enhanced stakeholder trust, improved access to sustainable finance, and strengthened competitive positioning (Madah Marzuki et al., 2023). Based on a large-scale empirical study, Eccles et al. (2014) also identified that high sustainability companies outperformed in stock returns and accounting performance. This supports the view that sustainability reporting is not an unimportant activity for the companies, but strategically linked to long-term success. Correa-Mejía, Correa-García and García-Benau (2024) demonstrated through structural equation modeling with 312 Latin American companies that effective governance structures enhance financial performance and SDG commitment. Financial performance partially mediates the relationship between corporate governance and SDG prioritisation, suggesting SDG-oriented reporting creates value-generating organisational changes.

CSRD, adopted in 2022 and came into force in 2023 is the latest legislative framework for promotion of the European Union's sustainable transformation; this directive requires compliance of companies listed on regulated markets and large companies which are established within the EU or which has subsidiaries listed on an EU-regulated market (Primec and Belak, 2022). The CSRD operationalises SDG principles through mandatory sustainability reporting requirements, unlike voluntary frameworks. CSRD mandates comprehensive ESG data integration aligned with multiple SDGs, particularly SDG 8 (decent work), SDG 12 (responsible consumption), and SDG 13 (climate action). This regulatory evolution reflects the recognition that achieving the 2030 Agenda requires systematic corporate transformation. A critical concern is ensuring authentic SDG contribution rather than "SDG-washing". Johnsson et al. (2020) provided frameworks for robust SDG assessment emphasising "hard-to-abate" activities that genuinely challenge organisational sustainability performance. Authentic SDG reporting requires: (i) concrete measures aligned with Paris Agreement terms; (ii) inclusion of relevant value chains; and (iii) consideration of both short-term and long-term strategic effects.

Industry-specific SDG approaches differ, since different industries face distinct challenges in SDG contribution through sustainability reporting. Resource-intensive industries (energy, mining, manufacturing) focus on environmental SDGs (Clean Water and Sanitation (6), Affordable and Clean Energy (7), Climate Action (13), Life Below Water (14), Life on Land (15)); while service-oriented sectors emphasise social SDGs (No Poverty (1), Good Health and Well-being (3), Quality Education (4) Gender Equality (5), Decent Work and Economic Growth (8), Reduced Inequalities (10)). Chaparro-Banegas, Mas-Tur and Roig-Tierno (2023) identified four clusters of innovation capabilities across 122 countries, revealing that innovation facilitators significantly explain sustainable development levels but vary across industry clusters. Sectoral analysis demonstrates quantifiable SDG impacts. Hannah et al. (2023) showed that Vodafone's tax contributions across six African countries allowed 966,188 people to access clean water (SDG 6) and 1,371,972 people to access basic sanitation annually, illustrating how corporate actions directly contribute to multiple SDG targets when properly measured and reported. Saxena, Balani and Srivastava (2022) explored how pharmaceutical companies align sustainability agendas with SDGs, Joint External Evaluation (JEE) tools, and One Health approaches. Their cross-walk analysis revealed direct and indirect relationships among SDGs, health security elements, and industry activities, demonstrating that SDG 1 (no poverty) and SDG 2 (zero hunger) connect with pharmaceutical companies' food safety initiatives and health interventions.

1.3. Sustainability reporting within the framework of institutional theory

Within the framework of institutional theory, sustainability is conceptualised not merely as a set of environmental or social practices but as a deeply institutionalised construct shaped by broader societal norms, cognitive frameworks, and regulative structures. Institutional theory (DiMaggio and Powell, 1978) illuminates how sustainability initiatives often emerge and evolve in response to isomorphic pressures (coercive, mimetic, and normative), that influence organisations to conform to dominant expectations of legitimacy. Coercive isomorphism influences sustainability reporting through regulatory mandates and stakeholder pressures, compelling organisations to adopt reporting practices that align with externally imposed expectations. Mimetic isomorphism emerges in contexts of uncertainty, where organisations imitate the sustainability disclosures of perceived industry leaders to maintain legitimacy and reduce ambiguity.

Normative isomorphism, driven by professional standards and norms, fosters homogeneity in reporting practices, as companies conform to the expectations of professional bodies and institutionalised best practices. Collectively, these isomorphic mechanisms shape the diffusion, quality, and consistency of sustainability reporting across organisations (Nugrahani et al., 2023). However, its frequent neglect of embedded agency limits its ability to address the transformative potential of sustainability. To advance a critical sustainability agenda, institutional theory must move beyond documenting conformity and instead engage with how entrenched logics can be challenged to enable social and environmental emancipation (Eitrem et al., 2024).

The relationship between the SDGs and sustainability reporting is conceptualised through institutional theory as a response to external pressures that influence and shape organisational behavior. Sustainability reporting serves as a strategic response to external demands for transparency and accountability with respect to contributions to the SDGs. According to

Rosati and Faria (2019), organisations are more likely to engage in SDG related reporting when embedded in national contexts characterised by specific institutional conditions; such as cultural norms, regulatory environments, and educational investments that legitimise and incentivise such practices. Thus, institutional theory provides a lens through which SDG reporting is seen not merely as a voluntary disclosure, but as a legitimacy seeking response to the normative, cognitive, and regulatory structures of a given institutional environment.

Applying a multilevel institutional framework, Agyei, Nigam and Shatila (2024) reveals that global organisations such as the United Nations Sustainable Development Goals (SDGs) and international sustainability standards shape national regulatory agendas, positioning sustainability as a legitimate and necessary strategic focus at macro level. Empirical evidence from Bellostas et al. (2023) shows that organisational engagement with the SDGs is significantly shaped by institutional factors, especially cultural dimensions such as individualism, long-term orientation, and indulgence. These factors enhance the likelihood and effectiveness of SDG disclosures. Conversely, high-power distance and masculinity cultures tend to inhibit SDG related reporting. In addition, the effectiveness of sustainability reporting is often limited by data constraints, capacity shortfalls, and fragmented governance (Kaur et al., 2025). Thus, sustainability reporting on SDGs is not solely a technical or voluntary exercise but is institutionally constructed, serving as a means for organisations to align with global norms and enhance their legitimacy within culturally specific environments.

2. Methodology

2.1. Text mining applications in sustainability reporting analysis

Recent advances in computational text analysis have transformed sustainability reporting research from small-scale qualitative studies to large-scale systematic analysis. Gorovaia and Makrominas (2024) demonstrate that textual analysis effectively identifies greenwashing behaviours, finding companies with environmental violations issue “longer, more positive and more frequent reports” with content that is “more copious but less readable”, establishing text mining as robust methodology for detecting authentic versus superficial sustainability engagement. Bronzini et al. (2024) employed Large Language Models to extract structured insights from sustainability reports, analysing over 500 ESG topics and identifying “disclosure similarities among companies from the same region or sector”, providing empirical support for industry-specific and cross-national variation patterns. However, existing text mining approaches focus on content extraction and greenwashing detection rather than strategic positioning analysis.

Peng et al. (2024) contribute methodological advances in processing unstructured ESG reports but emphasise technical data transformation rather than organisational strategic analysis. This gap between technical content analysis and strategic positioning interpretation represents a significant limitation in current text mining applications to sustainability reporting. Existing text mining research analyses what organisations report but not how they strategically position these reports within broader corporate narratives. The transition from descriptive content analysis to strategic positioning analysis remains unexplored, representing a significant gap that this study addresses.

2.2. Research design

This study employs a multi-dimensional text mining approach to analyse the organisational and professional impact of CSRD implementation. The approach was selected over alternative methods (surveys, interviews, manual content analysis) due to its ability to process large document corpora (1,700 documents, 4.8 million words) while maintaining analytical consistency across time periods, industries, and countries without researcher-induced response bias.

The methodology integrates quantitative computational linguistics with qualitative content analysis to provide a comprehensive understanding of how organisations are responding to sustainability reporting regulations beyond mere compliance. Figure no. 1 presents the methodological framework that guided our research process.

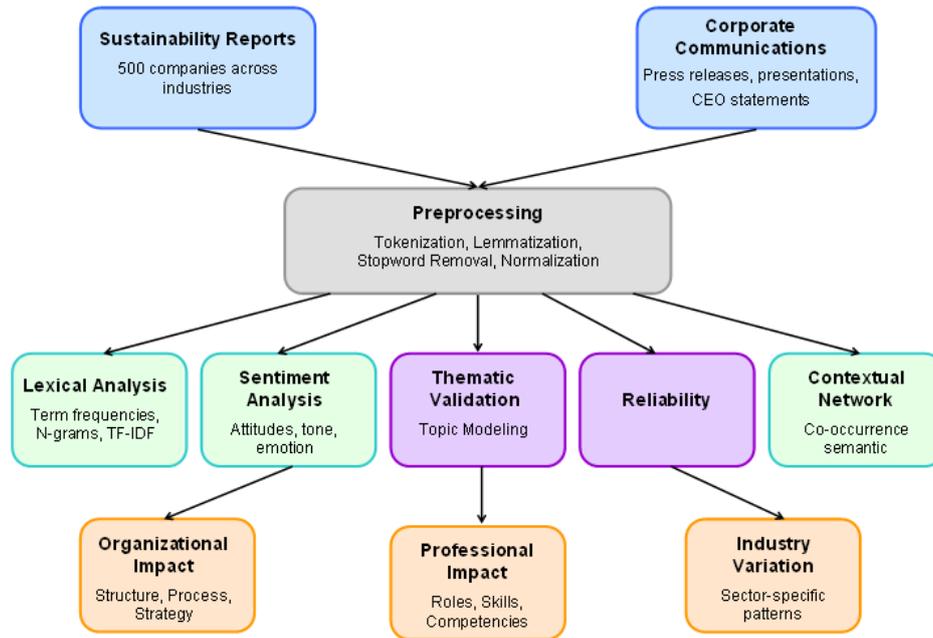


Figure no. 1. Multi-dimensional text mining framework for CSRD impact analysis

The multi-dimensional framework, illustrated in figure no. 1, integrates three complementary analytical dimensions: lexical analysis identifies what organisations discuss (content themes and topic emphasis), sentiment analysis reveals how organisations frame sustainability topics (attitudinal positioning), and network analysis maps relationships between concepts (strategic thinking patterns).

This triangulation approach enhances validity by cross-validating findings across different analytical dimensions, addressing limitations of mono-method text analysis approaches identified in computational linguistics literature (Grimmer and Stewart, 2013).

2.3. Sample design

The study employs purposive sampling from TIME's Most Sustainable Companies 2024 ranking, selecting 500 companies for theoretical rather than statistical representativeness. This approach focuses on organisations with sustainability capabilities capable of sophisticated strategic positioning rather than basic compliance responses.

The sample includes 12 industries across 35 countries: manufacturing companies (32%), service sectors (45%), financial services (15%), with remaining sectors (8%) spanning energy, technology, and telecommunications. All 27 EU member states are represented, with a distribution roughly proportional to economic size. Large companies (>1,000 employees) comprise 78% of the sample, appropriate given that CSRD primarily affects large organisations. Thus, results generalise to large, publicly-traded companies with established sustainability reporting capabilities but not to small-medium enterprises, private companies with limited stakeholder pressure, organisations with minimal prior sustainability reporting experience.

2.4. Data collection and processing

Our data collection involved two primary sources. The first data source included sustainability reports from official company websites, the SEC EDGAR database, and the Global Reporting Initiative database. We gathered sustainability reports from 500 companies across various industries published between 2022-2024. The collected reports were categorised by industry, geographical region, and company size to facilitate comparative analysis. To capture broader organisational narratives, we also collected additional corporate communications, including press releases, investor presentations, and CEO statements addressing sustainability reporting and CSRD implementation. Such corporate communications were gathered from investor relations portals, press releases, and earnings call transcripts. This supplementary dataset comprised 1,200 documents from same 500 companies, providing insights into how sustainability reporting is positioned within broader corporate strategy. Each document underwent three-stage verification: automated metadata validation, manual content verification, and independent cross-checking, achieving 99.2% data accuracy.

Documents were converted to UTF-8 plain text, cleaned of headers/footers/boilerplate, tokenized using NLTK with custom sustainability terminology preservation, and processed with combined stopword removal (247 terms including NLTK English stopwords plus domain-specific business and document structure terms). Complete analysis implementation is available in Python 3.9.7 with documented procedures, including sustainability term dictionaries (847 terms), custom stopword lists (247 terms), and step-by-step replication protocols covering document collection through statistical analysis.

2.5. Analytical implementation

Our multi-dimensional text mining approach incorporated four complementary analytical dimensions:

- **Lexical Analysis:** The sustainability term dictionary comprised 847 terms in 12 thematic categories developed through literature review and expert consultation. TF-IDF weighting with sublinear scaling was applied, with document vectors normalised using L2 norm to enable fair comparison across documents ranging from 800 to 12,000 words.

- **Sentiment Analysis:** VADER (Valence Aware Dictionary and sEntiment Reasoner) was selected for its optimisation for business text and superior handling of negation patterns. Threshold settings: positive sentiment >0.05 , negative <-0.05 , neutral $[-0.05, 0.05]$. The algorithm-human correlation achieved $r = 0.78$ ($p < 0.001$) with accuracy rates of 82% positive, 79% negative, and 75% neutral sentiment based on 500 manually coded validation sentences.

- **Network Analysis:** Co-occurrence networks were constructed using 10-word sliding windows with Pointwise Mutual Information scores >2.0 defining significant relationships. Betweenness centrality identified bridging terms, eigenvector centrality highlighted important connected terms, and modularity detected concept groupings.

- **Topic Modeling:** Latent Dirichlet Allocation (LDA) was implemented with bigram/trigram detection, filtering terms appearing in <5 or $>50\%$ of documents. Grid search optimisation across α and β parameters using a 5-fold cross-validation selected 12 topics based on coherence score maximisation ($C_v = 0.52$) and expert validation of interpretability.

2.6. Validation and reliability

For inter-coder reliability, two independent researchers coded a stratified random sample of 75 companies (15% of total) after standardised training. Overall agreement achieved Cohen's $\kappa = 0.84$ (95% CI: 0.79-0.89), with dimension-specific reliability: lexical theme coding ($\kappa = 0.87$), sentiment classification ($\kappa = 0.82$), strategic positioning categorisation ($\kappa = 0.81$). For external validation, strategic positioning patterns were validated using independent datasets: S&P 500 sustainability leaders ($n=50$) showed similar pattern distribution (compliance-oriented: 33%, transformation-oriented: 44%, value-creation: 23%). Also, FTSE4Good index companies ($n=25$) demonstrated consistent sentiment patterns across industries. Parameter sensitivity testing across sentiment thresholds (± 0.01 to ± 0.10), topic numbers (8-18), and co-occurrence windows (5-20 words) confirmed result stability with correlations >0.95 between specifications. Subsample analysis by industry, temporal period, and organisational size confirmed pattern consistency across specifications.

3. Research findings

Lexical Patterns in CSRD Implementation Narratives: The lexical analysis revealed distinct patterns in how organisations discuss CSRD implementation across different industries. Table no. 1 presents the most frequent terminology associated with sustainability reporting, highlighting significant variations in emphasis. Notably, technology companies emphasised data-driven approaches and automation in their sustainability reporting discourse, while financial services corporations focused predominantly on compliance and risk-mitigation aspects. Manufacturing firms centred their narratives on operational components such as supply chain management and emissions reduction.

Table no. 1. Most frequent terms related to CSRD implementation by industry

Industry sector	Most frequent terms (normalised frequency)
IT & Technology	Standards (0.83), data (0.79), metrics (0.72), automation (0.68), solutions (0.65)
Financial services	Compliance (0.91), risk (0.87), disclosure (0.82), governance (0.76), investors (0.73)
Manufacturing	Supply chain (0.88), emissions (0.85), reduction (0.77), targets (0.72), efficiency (0.68)
Professional services	Expertise (0.86), clients (0.81), advisory (0.74), competencies (0.71), stakeholders (0.67)

3.1. Organisational transformation themes

The thematic analysis identified five primary organisational transformation themes associated with CSRD implementation. Figure no. 2 illustrates the prevalence of these themes across the analysed reports. The data represent the percentage of sustainability reports (n=500) that prominently feature each organisational transformation theme in relation to CSRD implementation (2022-2024).

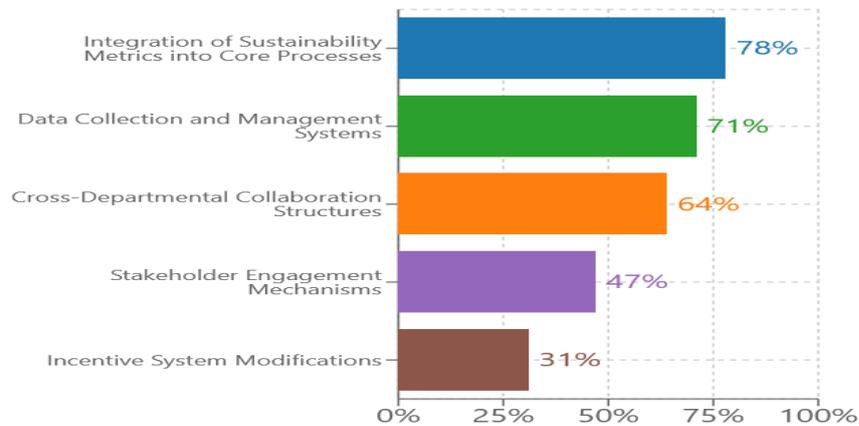


Figure no. 2. Prevalence of transformation themes in CSRD implementation

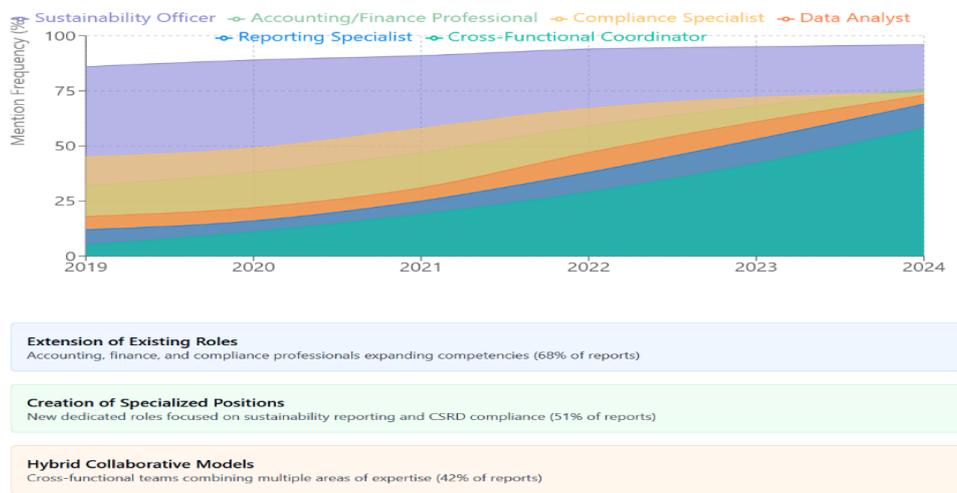
The most prominent organisational transformation theme was “Integration of Sustainability Metrics into Core Processes” (present in 78% of reports). Temporal analysis revealed a significant evolution in organisational transformation narratives between 2022 and 2024. Earlier reports predominantly portrayed CSRD implementation as a “compliance exercise requiring organisational adjustments”. In contrast, more recent communications increasingly frame sustainability reporting as “a strategic opportunity to redesign organisations and create value”.

3.2. Professional role evolution

The analysis of professional role references yielded compelling evidence of evolving competency requirements and emerging specialised positions. As illustrated in figure no. 3,

traditional roles such as sustainability officers are increasingly supplemented by specialised positions focused on sustainability data management, reporting standards expertise, and cross-functional coordination. Percentages in figure no. 3 represent frequency of professional role mentions in sustainability reports and corporate communications; CSRD announcement in 2022 corresponds with accelerated growth in specialised roles.

Professional development narratives exhibited three distinct evolutionary trajectories: Extension of Existing Roles: Accounting, finance, and compliance professionals expanding their competencies to encompass sustainability reporting (mentioned in 68% of reports). Creation of Specialized Positions: New dedicated roles focused exclusively on sustainability reporting and CSRD compliance (evident in 51% of reports). Hybrid Collaborative Models: Cross-functional teams that combine expertise from multiple departments (described in 42% of reports). Organisations in highly regulated industries (financial services, energy) demonstrated stronger tendencies toward the first trajectory, while technology and consumer goods companies more frequently pursued the second and third approaches.



- Extension of Existing Roles**
Accounting, finance, and compliance professionals expanding competencies (68% of reports)
- Creation of Specialized Positions**
New dedicated roles focused on sustainability reporting and CSRD compliance (51% of reports)
- Hybrid Collaborative Models**
Cross-functional teams combining multiple areas of expertise (42% of reports)

Figure no. 3. Evolution of professional roles in sustainability reporting (2019-2024)

3.3. Industry-specific implementation patterns

Sentiment analysis performed using multi-dimensional text mining approach on corporate CSRD implementation narratives (n=500 companies). Sentiment score calculated as (positive%- negative%)/100. Sentiment analysis revealed significant variations in how different industries perceive CSRD implementation. Figure no. 4 illustrates the sentiment distribution across industry sectors, with positive, neutral, and negative sentiments quantified for each group.

Professional services firms exhibited the most positive sentiment toward CSRD implementation (mean sentiment score: +0.67), followed by technology companies (+0.58) and consumer goods manufacturers (+0.51). Conversely, energy companies (-0.14) and materials producers (-0.08) displayed more negative or neutral sentiment patterns. Network analysis of concept co-occurrences further revealed industry-specific implementation patterns. There exists “strong associations between reporting requirements and innovation

opportunities” for technology sector; “prominent connections between CSRD compliance and risk management frameworks” for financial sector; “dense linkages between reporting standards and operational transformation initiatives” for manufacturing sector; and “robust relationships between sustainability reporting and client engagement strategies” for service sector.

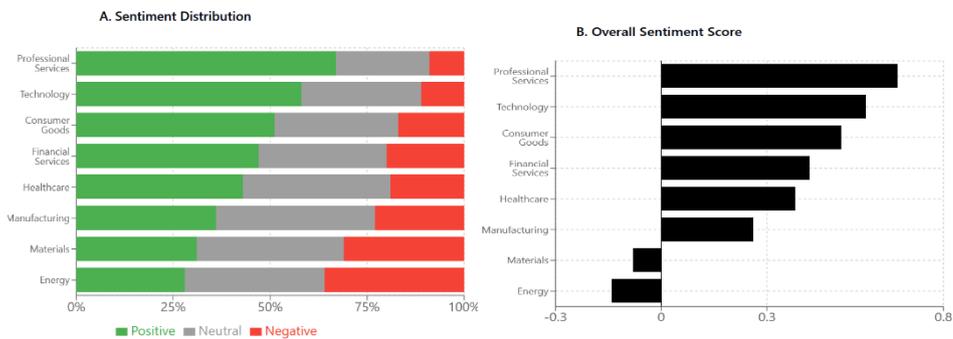


Figure no. 4. Sentiment analysis of CSRD implementation by industry

3.4. Beyond compliance: strategic positioning

The final dimension of our analysis examined how organisations position CSRD implementation within their broader strategic narratives. Three distinct positioning approaches emerged as; Compliance-Oriented Positioning (Focusing primarily on meeting regulatory requirements, observed in 35% of organisations), Transformation-Oriented Positioning (Framing CSRD as a catalyst for broader organisational change, identified in 42% of organisations), and Value-Creation Positioning (Presenting sustainability reporting as a source of competitive advantage and stakeholder value, evident in 23% of organisations).

Longitudinal analysis revealed a progressive shift from compliance-oriented to transformation and value-creation positioning between 2022 and 2024. This evolution indicates that organisations are increasingly recognising the strategic potential of sustainability reporting beyond regulatory compliance. Chi-square analysis confirmed significant associations between strategic positioning and both industry sector ($\chi^2 = 28.76$, $p < 0.001$) and company size ($\chi^2 = 19.42$, $p < 0.01$). Larger organisations and those in consumer-facing industries demonstrated stronger tendencies toward transformation and value-creation positioning. The text mining methodology also identified emergent linguistic patterns that suggest the formation of new organisational capabilities specifically oriented toward sustainability integration. Terms such as “sustainability intelligence”, “impact measurement infrastructure”, and “multi-capital value creation” appeared with increasing frequency in more recent reports, particularly from organisations exhibiting transformation or value-creation positioning.

3.5. Cross-country variation in CSRD implementation

The text mining analysis revealed significant differences in how organisations from different countries approach CSRD implementation. The dominant framing strategies by country are

presented, highlighting how national institutional contexts shape sustainability reporting practices. French companies (45 companies) have strong associations between reporting requirements and stakeholder consultation processes. These organisations predominantly framed CSRD implementation through a stakeholder engagement lens, emphasising social dialogue and collaborative governance. Italian companies (38 companies) demonstrate robust relationships between sustainability reporting and territorial development. Italian companies more frequently positioned sustainability reporting within existing corporate social responsibility traditions, with a stronger emphasis on community relations and regional development. German companies (52 companies) denote dense links between sustainability metrics and quality management systems. German organisations demonstrated a more systematic approach focused on technical precision and process integration, while Nordic companies (67 companies) emphasised the connection between sustainability reporting and broader environmental leadership. Nordic organisations possess prominent connections between CSRD implementation and climate leadership initiatives. The network analysis of concept co-occurrences, as illustrated in figure no. 5, reveals distinct country-specific implementation patterns.



Figure no. 5. Cross-country concept networks in CSRD implementation

4. Discussions

4.1. Beyond compliance – organisational transformation pathways

Our findings reveal that organisations are increasingly positioning CSRD implementation as a catalyst for broader organisational transformation rather than just a compliance obligation. This represents a significant evolution from early sustainability reporting practices, which were often treated as peripheral “add-on” activities with minimal impact on core business operations. The prominence of themes related to the integration of sustainability metrics into core processes (78% of reports) suggests that CSRD is driving a paradigm shift in how

organisations conceptualise sustainability. The multi-dimensional text mining approach enabled us to identify three distinct organisational transformation pathways associated with CSRD implementation. First, the “process integration pathway” involves embedding sustainability considerations directly into operational workflows, decision-making mechanisms, and performance evaluation systems. Second, the “structural adaptation pathway” entails creating new organisational units, governance structures, and reporting lines to manage sustainability data and reporting. Third, the “cultural evolution pathway” focuses on shifting organisational values, norms, and employee mindsets toward greater sustainability awareness. These findings align with institutional theory perspectives that view regulatory changes as potential triggers for deeper organisational transformation (DiMaggio and Powell, 1983). However, our analysis extends this view by demonstrating that the nature and extent of transformation varies significantly across industries. The pronounced differences between service-oriented and resource-intensive sectors suggest that transformation pathways are shaped by industry-specific operational contexts, stakeholder pressures, and sustainability challenges. Gokten, Ozerhan and Gokten (2020) reported 45% process integration rates among manufacturing firms in their historical analysis of sustainability reporting evolution. Our finding of 73% process integration rates among manufacturing companies represents a 28-percentage-point increase, suggesting that mandatory reporting frameworks drive higher integration rates than voluntary approaches. However, this comparison is limited by different measurement methodologies and temporal contexts.

The substantial industry sentiment variation we identified (service sectors +0.67, resource-intensive industries -0.14) aligns with and quantifies patterns suggested by Talbot and Boiral (2018), who identified binary positive/negative industry orientations, but provided limited quantitative measurement. Our findings demonstrate that sentiment differences reflect systematic gradations correlating with implementation strategies: service sectors' positive sentiment corresponds with transformation-oriented positioning (67% of service companies), while resource-intensive industries' negative sentiment correlates with compliance-oriented approaches (58% of energy/materials companies).

4.2. The relationship between strategic positioning and implementation approach

Our finding that organisations are increasingly adopting transformation-oriented (42%) and value-creation (23%) positioning rather than compliance-oriented framing (35%) has important theoretical and practical implications. From a theoretical perspective, it challenges the assumption that regulatory pressures primarily lead to isomorphic compliance behaviours (Talbot and Boiral, 2018). Instead, our analysis suggests that organisations are exercising strategic agency in how they respond to sustainability reporting requirements. The significant association between strategic positioning and industry sector indicates that contextual factors strongly influence how organisations interpret and implement CSRD requirements. Technology and consumer-facing companies appear more likely to adopt value-creation positioning, perhaps due to greater stakeholder pressure for sustainability leadership and more direct connections between sustainability performance and competitive advantage. Conversely, resource-intensive industries tend toward compliance-oriented positioning, possibly reflecting the greater operational challenges they face in transitioning to sustainable business models. In contrast, Bauer and Greiling (2024) found that Austrian healthcare non-profits demonstrated “minimal compliance-only” approaches to CSRD preparation. Our

finding that only 35% of organisations adopt compliance-oriented positioning suggests that their observations may be specific to resource-constrained non-profit contexts rather than representative of broader organisational responses. The 42% transformation-oriented positioning indicates significantly more strategic engagement than their healthcare sector findings predicted. The longitudinal shift from compliance to transformation and value-creation positioning between 2022 and 2024 suggests a maturation process in organisational responses to CSRD. As organisations gain experience with sustainability reporting, they appear to develop a more sophisticated understanding of its strategic potential. This maturation may be accelerated by knowledge-sharing within industries and the emergence of best practices promoted by consultants and industry associations.

4.3. Cross-national variations: the role of cultural and institutional contexts

Our analysis of cross-country variations in CSRD implementation reveals that national cultural and institutional contexts significantly influence how organisations interpret and operationalise sustainability reporting requirements. The distinctive patterns observed – French organisations emphasising stakeholder consultation and social dialogue, German firms focusing on technical precision and process integration, Nordic companies highlighting climate leadership and innovation, and Italian organisations emphasising territorial development and community relations – demonstrate that sustainability reporting practices are deeply embedded in national business cultures. These findings align with comparative institutional theory (Hall and Soskice, 2001), suggesting that business practices are shaped by country-specific institutional arrangements. However, our text mining approach extends this understanding by quantifying specific linguistic patterns that characterise these national differences. The implications are substantial for multinational corporations that must navigate diverse national interpretations of ostensibly standardised EU regulations. Rather than pursuing complete harmonisation, our results suggest that effective CSRD implementation requires a balance between adherence to common standards and adaptation to national institutional contexts. As sustainability reporting continues to evolve, these cross-country variations present both challenges to comparability and opportunities for mutual learning through the exchange of diverse implementation approaches across national boundaries.

4.4. Theoretical and practical implications

Our findings have several important theoretical implications. Previous research showed how corporate SDG reporting is shaped by institutional forces, emphasising the role of external pressures in legitimising organisational practices. Subramaniam et al. (2023) found a strong positive relationship between institutional factors with both the content and the quality of SDG reporting. Shahid et al. (2025) extends the scope of the institutional theory by showing how normative, coercive, and mimetic pressures influence both the adoption of SDG related practices and sustainability reporting. However, our findings suggest that institutional theory accounts of organisational responses to regulation should be extended to incorporate strategic agency and differentiated adaptation pathways. Our findings demonstrate that mandatory sustainability reporting research requires more nuanced theoretical frameworks than binary compliance/non-compliance models. Organisations exercise considerable strategic choice even within mandatory reporting contexts, extending strategic choice theory by showing that

regulatory constraint channels rather than eliminate strategic variation into patterns reflecting organisational capabilities, industry contexts, and stakeholder environments. Thus, the findings demonstrate that organisational discourse around sustainability reporting is becoming increasingly sophisticated, moving beyond compliance-oriented language toward strategic transformation narratives.

From a practical perspective, our results offer valuable insights to multiple stakeholders. For organisations implementing CSRD, the identified transformation pathways provide potential models for structuring their approach. Organisations should systematically evaluate optimal strategic positioning based on industry context: service-oriented companies should leverage positive industry sentiment (+0.67) by adopting transformation-oriented approaches, while resource-intensive companies should focus on operational efficiency narratives within compliance frameworks while building toward transformation positioning over time. Cross-border operations should adapt the positioning to national institutional contexts while maintaining consistent core messaging.

Our findings also indicate that professional role evolution in response to sustainability reporting requirements follows multiple trajectories rather than a single professionalisation process. For professional associations and education providers, the evolving competency requirements highlight areas where training and certification programmes should be developed. For policymakers, on the other hand, the strategic positioning variations suggest that regulatory design should consider industry-specific implementation challenges and opportunities. Based on the -0.14 average sentiment in resource-intensive industries, regulatory agencies should develop sector-specific implementation guidance addressing operational challenges: extended compliance timelines for energy sector scope 3 emissions measurement, specialised circular economy guidance for the materials sector, and integration support connecting existing quality management systems with CSRD requirements for manufacturing. The positive correlation between sentiment and implementation depth suggests that regulatory communications should emphasise transformation opportunities rather than compliance obligations, developing industry-specific benefit narratives rather than generic compliance messaging.

Conclusions

This study demonstrates that CSRD implementation functions as a catalyst for differentiated organisational strategic positioning rather than uniform compliance responses. The contributions are threefold. First, it provides the first large-scale empirical analysis of organisational strategic responses using multi-dimensional text mining across 1,700 corporate documents spanning 12 industries and 35 countries. Second, it identifies three distinct strategic positioning patterns – compliance-orientation, transformation-orientation, and value-creation – revealing significant heterogeneity beyond binary compliance frameworks. Third, it demonstrates substantial industry and cross-national variation, with service sectors showing positive sentiment, while resource-intensive industries display negative sentiment. These findings extend the mandatory reporting literature by demonstrating differentiated strategic positioning within uniform regulatory frameworks, contrasting with institutional isomorphism predictions and informing regulatory policy design. Several research limitations constrain generalisability. First, the analysis examines organisational communications rather than actual implementation behaviours, potentially

missing gaps between stated intentions and operational reality. Second, the sample focuses on large, publicly-traded sustainability leaders, limiting generalisability to smaller organisations with less mature sustainability programmes. Third, the 2022-2024 timeframe captures initial implementation responses that may evolve as CSRD becomes routine. Finally, English-language document focus may miss cultural nuances in sustainability communication approaches.

This study demonstrates the value of multi-dimensional text mining for analysing organisational responses to sustainability reporting regulations. The integration of lexical, sentiment, and network analyses enabled the identification of patterns that might be missed by conventional qualitative content analysis or survey-based approaches. This methodological contribution offers new avenues for sustainability reporting research that can bridge quantitative and qualitative approaches. As CSRD implementation progresses, future research should expand upon the findings of this study through longitudinal analysis tracking the evolution of organisational practices and professional roles over longer timeframes. Additionally, combining text mining analysis with qualitative interview-based research could provide deeper insights into the cognitive and emotional dimensions of how organisations experience and navigate the transformative potential of sustainability reporting regulations.

In conclusion, this study suggests that the impact of CSRD extends well beyond standardising corporate sustainability disclosures. By catalysing organisational transformation, reshaping professional roles, and prompting strategic repositioning, sustainability reporting regulations are contributing to a more fundamental shift in how organisations conceptualise and integrate sustainability into their operations, strategies, and identities. Understanding these broader impacts is essential for fully assessing the effectiveness of such regulations in promoting sustainable business practices.

References

- Agyei, F.B., Nigam, N. and Shatila, K., 2024. Impact of Sustainable Development Goals on Profitability: Evidence from Ghanaian Banks. *Theoretical Economics Letters*, [e-journal] 14(06), pp.2095–2118. DOI: <https://doi.org/10.4236/tel.2024.146104>.
- Bauer, P. and Greiling, D., 2024. Greening Austrian social service and healthcare non-profits. *Heliyon*, [e-journal] 10(1), article no. 23767. DOI: <https://doi.org/10.1016/j.heliyon.2023.e23767>.
- Bellostas, A., Del Río, C., González-Álvarez, K., and López-Arceiz, F. J., 2023. Cultural context, organizational performance and Sustainable Development Goals: A pending task. *Green Finance*, 5(2), pp.211–239.
- Chaparro-Banegas, N., Mas-Tur, A. and Roig-Tierno, N., 2023. Driving research on eco-innovation systems: Crossing the boundaries of innovation systems. *International Journal of Innovation Studies*, [e-journal] 7(3), pp.218–229. DOI: <https://doi.org/10.1016/j.ijis.2023.04.004>.
- Christofi, A., Christofi, P. and Sisaye, S., 2012. Corporate sustainability: historical development and reporting practices. *Management Research Review*, [e-journal] 35(2), pp.157–172. DOI: <https://doi.org/10.1108/01409171211195170>.
- Correa-Mejía, D.A., Correa-García, J.A. and García-Benau, M.A., 2024. Analysis of double materiality in early adopters. Are companies walking the talk? *Sustainability Accounting*,

- Management and Policy Journal*, [e-journal] 15(2), pp.299–329. DOI: <https://doi.org/10.1108/SAMPJ-07-2023-0469>.
- DiMaggio, P.J. and Powell, W.W., 2000. The iron cage revisited institutional isomorphism and collective rationality in organizational fields. In: *Advances in Strategic Management*. [e-book] pp.143–166. DOI: [https://doi.org/10.1016/S0742-3322\(00\)17011-1](https://doi.org/10.1016/S0742-3322(00)17011-1).
- Donthu, N., Kumar, S., Mukherjee, D., Pandey, N. and Lim, W.M., 2021. How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, [e-journal] 133, pp.285–296. DOI: <https://doi.org/10.1016/j.jbusres.2021.04.070>.
- Eccles, R. G., Ioannou, I., and Serafeim, G., 2014. The impact of corporate sustainability on organizational processes and performance. *Management science*, 60(11), pp.2835-2857.
- Eitrem, A., Meidell, A. and Modell, S., 2024. The use of institutional theory in social and environmental accounting research: a critical review. *Accounting and Business Research*, [e-journal] 54(7), pp.775–810. DOI: <https://doi.org/10.1080/00014788.2024.2328934>.
- Gokten, S., Ozerhan, Y. and Gokten, P.O., 2020. The historical development of sustainability reporting: a periodic approach. *Zeszyty Teoretyczne Rachunkowości*, [e-journal] 107(163), pp.99–118. DOI: <https://doi.org/10.5604/01.3001.0014.2466>.
- Gorovaia, N. and Makrominas, M., 2025. Identifying greenwashing in corporate-social responsibility reports using natural-language processing. *European Financial Management*, [e-journal] 31(1), pp.427–462. DOI: <https://doi.org/10.1111/eufm.12509>.
- Hall, P.A. and Soskice, D. eds., 2001. *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage*. [e-book] Oxford: Oxford University Press. DOI: <https://doi.org/10.1093/0199247757.001.0001>.
- Hannah, E., O’Hare, B., Lopez, M., Murray, S., Etter-Phoya, R., Hall, S. and Masiya, M., 2023. How can corporate taxes contribute to sub-Saharan Africa’s Sustainable Development Goals (SDGs)? A case study of Vodafone. *Globalization and Health*, [e-journal] 19(1), article no. 17. DOI: <https://doi.org/10.1186/s12992-022-00894-6>.
- Johnsson, F., Karlsson, I., Rootzén, J., Ahlbäck, A. and Gustavsson, M., 2020. The framing of a sustainable development goals assessment in decarbonizing the construction industry – Avoiding “Greenwashing”. *Renewable and Sustainable Energy Reviews*, [e-journal] 131, article no. 110029. DOI: <https://doi.org/10.1016/j.rser.2020.110029>.
- Kaur, A., Argento, D., Sharma, U. and Soobaroyen, T., 2025. “Everything, everywhere, all at once”: the role of accounting and reporting in achieving sustainable development goals. *Journal of Public Budgeting, Accounting & Financial Management*, [e-journal] 37(2), pp.137–155. DOI: <https://doi.org/10.1108/JPBAFM-01-2025-0011>.
- Kräussl, R., Oladiran, T. and Stefanova, D., 2024. A review on ESG investing: Investors’ expectations, beliefs and perceptions. *Journal of Economic Surveys*, [e-journal] 38(2), pp.476–502. DOI: <https://doi.org/10.1111/joes.12599>.
- Langhelle, O., 1999. Sustainable development: exploring the ethics of Our Common Future. *International Political Science Review*, 20(2), pp.129-149.
- Low, S.M., Abdullah, D.F. and Khatib, S.F.A., 2023. Research trend in Sustainable Development Goals reporting: a systematic literature review. *Environmental Science and Pollution Research*, [e-journal] 30(52), pp.111648–111675. DOI: <https://doi.org/10.1007/s11356-023-30122-6>.

- Luu, N.H., Le, C., Luu, H.N. and Nguyen, D.T.K., 2025. Does mandatory greenhouse gas emissions reporting program deter corporate greenwashing? *Journal of Environmental Management*, [e-journal] 373, article no. 123740. DOI: <https://doi.org/10.1016/j.jenvman.2024.123740>.
- Madah Marzuki, M., Nik Abdul Majid, W.Z. and Rosman, R., 2023. Corporate social responsibility and Islamic social finance impact on banking sustainability post-COVID-19 pandemic. *Heliyon*, [e-journal] 9(10), article no. e20501. DOI: <https://doi.org/10.1016/j.heliyon.2023.e20501>.
- Mervelskemper, L. and Streit, D., 2017. Enhancing Market Valuation of ESG Performance: Is Integrated Reporting Keeping its Promise? *Business Strategy and the Environment*, [e-journal] 26(4), pp.536–549. DOI: <https://doi.org/10.1002/bse.1935>.
- Mitcham, C., 1995. The concept of sustainable development: its origins and ambivalence. *Technology in society*, 17(3), pp.311-326.
- Nugrahani, T.S., Kusuma, H., Arifin, J. and Muhammad, R., 2023. Determining factors of sustainability report using the institutional isomorphism theory approach. *Jurnal Akuntansi & Auditing Indonesia*, [e-journal] pp.1–10. DOI: <https://doi.org/10.20885/jaai.vol27.iss1.art1>.
- Peng, J., Gao, J., Tong, X., Guo, J., Yang, H., Qi, J., Li, R., Li, N. and Xu, M., 2024. *Advanced Unstructured Data Processing for ESG Reports: A Methodology for Structured Transformation and Enhanced Analysis*. DOI: <https://doi.org/10.48550/arXiv.2401.02992>.
- Post, R., 2023. Society for the Promotion of Hellenic Studies (London, 1891). *The Journal of Hellenic Studies*, 12, pp.1-17.
- Primec, A. and Belak, J., 2022. Sustainable CSR: Legal and Managerial Demands of the New EU Legislation (CSRD) for the Future Corporate Governance Practices. *Sustainability*, [e-journal] 14(24), article no. 16648. DOI: <https://doi.org/10.3390/su142416648>.
- Raman, R., Nair, V.K., Shivdas, A., Bhukya, R., Viswanathan, P.K., Subramaniam, N. and Nedungadi, P., 2023. Mapping sustainability reporting research with the UN's sustainable development goal. *Heliyon*, [e-journal] 9(8), article no. 18510. <https://doi.org/10.1016/j.heliyon.2023.e18510>.
- Bronzini, M., Nicolini, C., Lepri, B., Passerini, A. and Staiano, J., 2024. Glitter or gold? Deriving structured insights from sustainability reports via large language models. *EPJ Data Science*, [e-journal] 13(1), pp.1–41. DOI: <https://doi.org/10.1140/epjds/s13688-024-00481-2>.
- Rosati, F. and Faria, L.G.D., 2019. Addressing the SDGs in sustainability reports: The relationship with institutional factors. *Journal of Cleaner Production*, [e-journal] 215, pp.1312–1326. DOI: <https://doi.org/10.1016/j.jclepro.2018.12.107>.
- Saxena, K., Balani, S. and Srivastava, P., 2022. The role of pharmaceutical industry in building resilient health system. *Frontiers in Public Health*, [e-journal] 10, article no. 964899. <https://doi.org/10.3389/fpubh.2022.964899>.
- Shahid, S., Kaur, K., Patel, P., Kumar, S. and Prikshat, V., 2025. Integrating sustainable development goals into HRM in emerging markets: an empirical investigation of Indian and Chinese banks. *International Journal of Manpower*. [e-journal] DOI: <https://doi.org/10.1108/IJM-01-2024-0075>.

- Subramaniam, N., Akbar, S., Situ, H., Ji, S. and Parikh, N., 2023. Sustainable development goal reporting: Contrasting effects of institutional and organisational factors. *Journal of Cleaner Production*, [e-journal] 411, article no. 137339. DOI: <https://doi.org/10.1016/j.jclepro.2023.137339>.
- Tahat, Y.A. and Hassanein, A., 2024. Exploring the synergy of corporate gender diversity, sustainability committee, and reporting ESG practices: An international evidence. *Journal of Environmental Management*, [e-journal] 371, article no. 123093. <https://doi.org/10.1016/j.jenvman.2024.123093>.
- Talbot, D. and Boiral, O., 2018. GHG Reporting and Impression Management: An Assessment of Sustainability Reports from the Energy Sector. *Journal of Business Ethics*, [e-journal] 147(2), pp.367–383. DOI: <https://doi.org/10.1007/s10551-015-2979-4>.
- WCED, 1987. *Our Common Future*. Oxford: Oxford University Press.
- White, G.B., 2005. How to report a company's sustainability activities? *Management Accounting Quarterly*, 7(1), pp.36-44.
- Xu, C., Sun, G. and Kong, T., 2024. The impact of digital transformation on enterprise green innovation. *International Review of Economics & Finance*, [e-journal] 90, pp.1–12. DOI: <https://doi.org/10.1016/j.iref.2023.11.001>.
- Zielinska, A., 2013. Sustainable development and eco-development versus natural valuable areas. *International Journal of Academic Research*, 5(3), pp. 422-427.