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A MAXQDA-Based Content Analysis of Sustainability Reporting: Cross-Company Keyword Frequency and Visualization in Annual Reports of Five European Corporations

Elham Eslami¹ & Tohid Joudi²

Abstract

This article introduces a methodological strategy for quantitative content analysis of corporate sustainability reports using MAXQDA software. Corporate reports are typically extensive and heterogeneous in terminology, making cross-sectoral comparison challenging. To address this problem, we randomly selected 2024 annual reports of five European companies from the steel, packaging, flooring, banking, and textile sectors to ensure sectoral diversity ($N = 5$). Reports were filtered for relevance, transferred to MAXQDA, and subjected to keyword-in-context and frequency analyses. For each firm, the 50 most frequently occurring sustainability-related keywords were identified, providing an empirical and replicable basis for analysis rather than subjective judgment of importance. A cross-case comparison yielded a consolidated list of 100 unique keywords. Word-frequency weights were then computed and mapped via MAXMaps and Word Tree visualizations, producing a figure that illustrates relative keyword salience across firms. Consistent with Shaw et al.'s (2019) three-pillar model, results show that environmental terms such as “carbon emissions,” “circular economy,” and “biodiversity” dominate, alongside social codes such as “safety,” “diversity,” and “community,” and governance terms including “ESG transparency” and “stakeholder engagement.” This technique provides a replicable and theory-informed approach for analyzing large-scale qualitative disclosures and for visualizing sustainability priorities at both corporate and sectoral levels.

Keywords: Sustainability Reporting, ESG Analysis, MAXQDA, Content Analysis, Corporate Responsibility, SDGs, Visual Data Analytics

Introduction

Corporate sustainability reporting has emerged as a key mechanism for disclosing environmental, social, and governance (ESG) activities to stakeholders and for enhancing transparency and accountability in the private sector (Clark and Harley, 2020; Ramakrishna, 2022). With the rise of both compulsory and voluntary disclosure requirements—such as the EU Corporate Sustainability Reporting Directive (CSRD) and the Global Reporting Initiative (GRI)—companies now publish detailed annual reports that often extend to several hundred pages (Ruggerio, 2021). While these reports provide rich information, their sheer volume and unstructured content pose significant challenges for systematic analysis, making it difficult to identify patterns, compare across sectors, or distill strategic priorities (Joaquin and Biana, 2020). The main challenge lies in the fragmented and inconsistent use of sustainability terminology across industries. Firms often frame similar practices with different keywords, which complicates cross-company benchmarking and weakens the interpretability of sustainability narratives. This study addresses this gap by employing a structured keyword-based

¹ Department of Business Administration, Graduate School of Social Science, OSTİM Technical University, elhameslammi@gmail.com, 0009-0005-8226-8610

² Department of International Business Management, Graduate School of Social Science, OSTİM Technical University, tohidjoudi95@gmail.com, 0009-0004-6403-5971

content analysis to uncover both shared and sector-specific priorities. By focusing on the most frequently occurring sustainability-related keywords rather than researcher-selected terms, the study ensures that the analysis reflects actual reporting practices rather than subjective judgments. To guide the interpretation of emerging themes, we build on Shaw et al.'s (2019) three-pillar model of sustainability, which distinguishes environmental, social, and governance (ESG) dimensions. This model provides the theoretical lens for categorizing and interpreting the extracted keywords, allowing us to examine not only the relative prominence of each pillar but also the sectoral variations in how companies communicate sustainability. To capture sectoral diversity, we analyze the 2024 annual reports of five European companies from the steel, packaging, flooring, banking, and textile industries. This selection represents both resource-intensive and service-oriented sectors, enabling cross-case comparison of sustainability communication. Using MAXQDA's text search, autocode, and visualization modules (MAXDictio, Keyword-in-Context, and MAXMaps), our method involves systematic report screening, keyword extraction, frequency coding, and the generation of word-frequency visualizations. This approach provides a transparent and replicable model for sustainability content analysis.

Literature Review

Sustainability

Sustainability has been articulated in a broad sense as progress that satisfies contemporary needs without harming future generations' ability to provide for their own (Førsund, 2001). Contemporary sustainability science recognizes human–nature relations as complex adaptive systems, such that resilience, equity, and governance interact and shape sustainable paths (Clark and Harley, 2020). Komiyama and Takeuchi (2006) argue that sustainability science must be a standalone discipline integrating natural and social sciences in addressing global environmental issues (Damico et al., 2022). Virtanen, Siragusa, and Guttorm (2020) further emphasize circular economy and systems thinking principles for maintaining environmental integrity while promoting transdisciplinary approaches across environmental, economic, and social spheres.

Shaw et al. (2019) trace the evolution of the widely applied *three pillars* model—environmental, social, and economic—highlighting both its theoretical foundations and its limitations. The environmental pillar concerns the responsible use of natural resources, reduction of emissions, biodiversity protection, and resilience of ecosystems. The social pillar focuses on equity, human rights, labor conditions, workplace safety, diversity, and community well-being. The economic (or governance) pillar relates to the structures, regulations, and management practices that ensure transparency, accountability, ethical conduct, and stakeholder engagement. While critics argue that this model can oversimplify complex interactions between sustainability dimensions, it remains a dominant framework for analyzing corporate disclosures because it provides a clear and comparable structure.

In this study, Shaw et al.'s (2019) model provides the conceptual lens for categorizing and interpreting the sustainability keywords extracted from corporate reports. Mapping terms such as “*carbon emissions*” and “*circular economy*” under the environmental pillar, “*safety*” and “*diversity*” under the social pillar, and “*transparency*” and “*stakeholder engagement*” under the governance/economic pillar enriches the interpretation of emerging themes. By grounding the analysis in this model, the study not only identifies frequently reported keywords but also highlights how corporate language reflects broader sustainability priorities across the three interrelated dimensions.

Sustainable Development Goals (SDGs)

The United Nations' Sustainable Development Goals (SDGs) provide an international framework for aligning corporate strategies with societal challenges, encompassing 17 goals and 169 targets (Rasche, 2020). Recent content-analytic studies show that business reporting often emphasizes a subset of goals—such as responsible consumption (SDG 12), climate action (SDG 13), and industrial innovation (SDG 9)—while giving less attention to others like reduced inequalities (SDG 10) and peace, justice, and strong institutions (SDG 16) (Galeazzo et al., 2024). Research further demonstrates that institutional pressures and geographic context strongly shape SDG disclosure practices (Massaro et al., 2023; Awuah et al., 2024). While firms sometimes use SDG alignment strategically to enhance legitimacy and reputation, the economic returns are inconsistent (Friedrich et al., 2023; Urbieto, 2024). This reflects a key challenge: companies selectively highlight goals that fit their industry focus and stakeholder expectations, leaving important areas underreported.

Corporate Sustainability Reporting

Corporate sustainability reporting evolved from the voluntary disclosure of CSR to mass ESG reporting practices facilitated through frameworks such as GRI, SASB, CDP, and EU Taxonomy (Landrum and Ohsowski, 2018). Content analysis studies identify increased isomorphism across reporting problems, but remaining heterogeneity at the level of framing stories and measuring indicators (Willison, Lowry, and Baskerville, 2016). Leximancer- and LLM-driven research demonstrates the capability of computer-powered text-mining techniques to garner scaled, structured ESG information (Bronzini et al., 2024, and Zou et al., 2025). Few studies have nonetheless been conducted by employing specific qualitative-analysis tools such as MAXQDA for mutual keyword-frequency visualizations across companies.

In the next section, we will give a brief introduction to companies:

ArcelorMittal

ArcelorMittal is a global steel and mining company headquartered in Luxembourg. ArcelorMittal has operations in more than 60 countries, supplying steel to the automotive, construction, infrastructure, and renewable energy sectors. ArcelorMittal is listed on the NYSE and is a ResponsibleSteel™ certified company that complies with sustainable practices.

Sustainability Focus Areas

In 2024, ArcelorMittal focused mainly on decarbonizing the steel-making process. The company spent over \$1 billion on green steel development, including electric arc furnaces, carbon capture and storage, and circular scrap steel use. They have achieved nearly 50% CO₂ reduction since 2018. Another significant sustainability initiative includes improving workplace safety with the new “One Safety Culture” initiative, community investment programs, and expanding biodiversity initiatives across the facilities. The company claims to use standards such as GRI, SASB and is aligned with the UN Sustainable Development Goals (SDGs).

DS Smith

DS Smith, a UK-headquartered packaging company and a worldwide recognized name, has its operations spread across Europe and North America. The company is best known for creating innovative and sustainable fiber-based packaging products that are fully recyclable and operates on a fully circular business model consisting of paper making, packaging design, and recycling services.

Sustainability Focus Areas

In 2024, DS Smith progressed considerably in its “Now & Next” sustainability strategy. There is a major focus on reducing plastic use by way of fiber packaging solutions, decarbonizing operations, enabling circularity, along with creating a biodiversity protection environment. The achievement should include a replacement of more than 1.2 billion plastic items since 2020, a 19% decrease in greenhouse gas emissions compared to 2019/20 levels, and the up and running of biodiversity programs in 14 paper mills.

Reporting Frameworks and Indices

DS Smith takes a stand against the different global frameworks, ranging from GRI to SASB to UNGC, SDGs, and EU Taxonomy. DS Smith is strongly rated in its ESG ratings, such as CDP Climate Change A, EcoVadis Gold, and MSCI AA. It continues to improve its reporting and third-party assurance as a means of transparency and verification in its sustainability data.

Forbo Flooring Systems

Forbo Flooring Systems is a Dutch-based multinational flooring business. It manufactures sustainable linoleum, vinyl, textile floor coverings, and adhesives for homes and businesses. The company has operations at 15 manufacturing plants and has a strong global distribution network with a presence in 27 countries.

Sustainability Focus Areas

Forbo Flooring Systems registered significant ranges in sustainability, including a 45% reduction in Scope 1 and 2 emissions versus last year's 2023, and achieved 50% renewable energy consumption. Their "Going Round to Move Forward" sustainability strategy targets full circularity and carbon zero by 2050. Also, expansion of the 'Back to the Floor' recycling program to 14 countries, improved product circularity, and third-party assured environmental product declarations (EPDs).

There has been a long-standing and renowned organization in the case of GRI, SDGs, and SA8000. The Greenhouse Gas Protocol recommends the study on a scientific basis. There are EPDs launched based on Life Cycle Assessment based metrics. The executive bonuses have been tied to the targets of sustainability and ESG targets have also been incorporated in the supply chain.

Rabobank

Rabobank is a Netherlands-based cooperative bank with a head office in Utrecht. Rabobank is a truly international bank with operations in 35 countries and focused on food- and agricultural finance, having some 8 million (private) and some 0.8 million business clients. Unlike most traditional banks, Rabobank has members but no shareholders, and its actions are thus directed by the cooperative principles that bind bank and stakeholders together in a chain of social responsibility.

Sustainability Focus Area

In 2024, Rabobank highlighted the three pillars of sustainability, i.e., climate, nature, and people, investing heavily in food and energy transitions, offering green mortgages and sustainability-linked loans, and financing regenerative agriculture through programs like Acorn and Carbon Bank. It prioritized the roll-out of social inclusion initiatives, streamlining access to finance, and growing biodiversity-focused partnerships like the Black Jaguar Foundation in Brazil.

Reporting Frameworks and Indices

Rabobank cites other global frameworks such as GRI, TCFD, EU Taxonomy, and is a signatory to the Net-Zero Banking Alliance. Its sustainability disclosures are also CSRD compliant with double materiality assessment.

Schijvens Corporate Fashion

Schijvens Corporate Fashion is a Dutch family-owned company manufacturing corporate uniforms since 1863. It is focused on sustainable textile manufacturing and uses a circular value chain called the 'Value Circle'. Their clothes are manufactured with direct cooperation with suppliers in Türkiye, Pakistan, India, and other regions by focusing on social responsibility, openness, and long-term cooperation for the direct production of clothes with them.

Sustainability Focus Areas

Schijvens solidified its milestones for sustainability in 2024 by extending further the living wage program, gender equality initiatives, prevention of forced and child labor risk in supply chains, and progress made in supply chain transparency. 1.4 million pieces of clothing were recycled, and circular production behaviors were built. Schijvens started projects to improve women's empowerment in Pakistan and India and began CSRD reporting via double materiality analysis.

Reporting Frameworks and Indices

Schijvens can increase compliance with OECD Due Diligence Guidelines, Fair Wear Foundation requirements, and CSRD requirements. They are also committed to sponsoring the UN Global Compact and ESG reporting history based on both double materiality and stakeholder dialogue.

Table 1. Key ESG Themes

	Significant ESG Themes		
Company	Environmental	Social	Governance
ArcelorMittal	Carbon emissions reduction	Workplace safety training for employees	ResponsibleSteel™ certification
	Renewable energy utilization	Gender diversity	Transparent ESG disclosures
	Electric arc furnaces	Community development programs	Stakeholder engagement
	Biodiversity conservation		
DS Smith	Plastics reduction	Community program initiatives,	UNGC and SDGs alignment
	Fiber optimization	Employee safety among 262 locations with zero accidents	CDP A-list and MSCI AA ratings
	Reduced carbon footprint and water	Inclusive leadership training	
	Biodiversity-linked programs		
Forbo Flooring Systems	Circular designed products,	Safe workplace environments	GRI-aligned reporting
	83% EPDs for products	SA8000 certification	Whistleblower policies
	50% recycled or renewable material	Diversity and inclusion policies	Executive KPIs on ESG issues
	45% Scope 1 & 2 GHG emissions	Employee well-being initiatives	ISO certifications (9001, 14001)
Rabobank	Climate action	Inclusive finance	Member-based governance model
	Sustainable agriculture	Community support of cooperative businesses	Transparency
	Finance of renewable energy	Rural development	Risk frameworks of ESG
	Partnerships for biodiversity	Well-being and equality	Reporting by corporate sustainability reporting directive (CSRD)
Schijvens Corporate Fashion	Circular textile production	Living wage initiative for employees	Open costing
	Efficient water and energy use	Gender equality initiatives	Reporting Frameworks and Indices
	Recyclable materials	Employee development	Clear supplier list
		Secure work environment	Due diligence and CSRD adherence

Methodology

This study presents a methodological approach for identifying and visualizing the most frequently reported sustainability keywords in the annual reports of five European companies: ArcelorMittal, DS Smith, Forbo Flooring Systems, Rabobank, and Schijvens Corporate Fashion. Using systematic content analysis via MAXQDA, we conducted word-frequency analysis, autocode operations, and built interactive visualizations to identify cross-company thematic foci. The findings highlight top priorities in the domains of decarbonization, circularity, and biodiversity on the environmental front; workplace safety, diversity, and community engagement on the social front; and stakeholder engagement, governance frameworks, and ESG disclosures on the governance front. Visualizations make it possible to identify both shared priorities such as *carbon emissions* and *renewable energy* and sector-specific variations. By combining theoretical foundations, methodological innovations, and empirical analysis, this study offers a replicable model for sustainability content analysis that can be extended across industries.

Sample Selection and Report Extraction

Random selections of 2024 sustainability reports for the five companies were collected from official company websites to ensure data validity and reliability (CSRD compliance review; European Commission, 2024). The companies were chosen to represent sectoral diversity—steel, packaging, flooring, banking, and textiles—thereby allowing comparisons across resource-intensive and service-oriented industries.

Screening of Reports

Reports were screened for consistency of format, availability in PDF, and inclusion of environmental, social, and governance content. Reports lacking transparent ESG sections were excluded.

Content Analysis and Visualization in MAXQDA

The reports were imported into MAXQDA and analyzed using MAXDictio's Keyword-in-Context autocode, which generated code systems for over 200 sustainability-related terms (MAXQDA Manual). Code frequencies were then exported to a Word Matrix Browser, interactive word trees were constructed, and MAXMaps was employed to create general word-frequency visualizations comparing the five companies.

Limitations

A key limitation of this design is that only one company per industry was included. As reporting practices may differ significantly within a single sector, the results should not be interpreted as fully representative of industry-wide reporting standards. Instead, this study provides a proof-of-concept demonstration of how MAXQDA-based keyword analysis can be applied across different sectors. Future research could strengthen representativeness by including multiple firms per industry and conducting longitudinal analyses across reporting years.

equality programs. These examples suggest that social reporting is closely tied to the companies' core operations and their impact on employees and communities, underscoring that the meaning of social sustainability is context-dependent.

Within the governance pillar, frequently occurring terms such as “*management*,” “*safety*,” and “*sustainable*” highlight the role of oversight, accountability, and compliance with international standards. Rabobank, for example, applies “management” to risk frameworks and transparency mechanisms in its cooperative banking model, while ArcelorMittal’s “safety” refers to its “One Safety Culture” initiative aimed at reducing workplace accidents. These terms illustrate that governance reporting is framed as a foundation for ensuring the reliability of environmental and social commitments.

Taken together, the results suggest that while environmental concerns dominate overall reporting, each pillar is used strategically by companies to align with sectoral priorities and regulatory expectations. The emerging keywords serve not merely as descriptive labels but as rhetorical devices that allow firms to signal commitment, demonstrate accountability, and differentiate themselves in sustainability discourse.

Implications of these findings are twofold. Theoretically, they show how frequency-based content analysis, when interpreted through Shaw et al.’s (2019) three-pillar model, offers a systematic lens for uncovering both convergences and divergences in sustainability communication. Practically, they highlight which themes companies emphasize most strongly, providing managers and policymakers with benchmarks for comparing sectoral priorities and identifying underreported issues. For example, the dominance of climate and emissions language suggests strong external pressures in these areas, while relatively fewer mentions of social equity or governance transparency indicate potential gaps that stakeholders may wish to scrutinize further.

Finally, it must be noted that only one company per industry was included, which limits the representativeness of the findings. Future research should broaden the sample to multiple firms within each sector and extend the analysis longitudinally to capture changes over time. Despite this limitation, the study demonstrates the value of using MAXQDA-based keyword analysis to produce transparent, replicable insights into the language of sustainability reporting.

ESG Theme Table

A consolidated table of the top 10 environmental, social, and governance keywords by frequency per company is presented below.

Table 2. ESG Keyword Frequencies by Company

Rank	Word	Frequency	Documents
1	sustainability	934	Schijvens
2	emissions	554	Schijvens
3	data	434	Schijvens
4	arcelormittal	381	ArcelorMittal
5	steel	368	DS Smith
6	energy	359	Schijvens
7	management	326	Schijvens
8	safety	326	Schijvens
9	contents	325	Forbo Flooring Systems
10	sustainable	319	Schijvens

Key Findings

Based on the visualization and interpretation above, the following conclusions are obtained:

Environmental Focus: The focus given to "sustainability," "emissions," and "data" mirrors the overall approach to the delineation of sustainability activities, with a focus on emissions monitoring and provision of data.

Social Dimension: Dominance of "Arcelor Mittal," "steel," and "energy" reflects sector-based storytelling in yearly reports and suggests that companies emphasize their day-to-day business industrial operations to stakeholders when social impacts are at stake.

Governance Emphasis: Moderate rates for "management," "safety," "contents," and "sustainable" imply an emphasis on governance structure, risk avoidance processes, and adherence to reporting rules.

Cross-Dimensional Insights: Differential term frequencies across ESG dimensions reveal shared priorities, such as sustainability framing and emissions reduction, and sectoral differences in how companies frame their social and governance practices.

Summary of Results and Discussion

Our analysis demonstrates the efficiency of MAXQDA for systematic, replicable, and transparent sustainability content analysis. Cross-company keyword-frequency visualization allows for immediate comparability and can inform policymakers, investors, and researchers.

Conclusion

This study formulates a robust MAXQDA-based content analysis and visualization approach to corporate sustainability reports. By employing word-frequency metrics and cross-case visualizations, it demonstrates how recurring keywords can be mapped to the environmental, social, and governance pillars, offering a replicable tool for examining both shared and sector-specific sustainability agendas. The analysis highlights the dominance of climate- and emissions-related language in the environmental pillar, the embedding of industrial identity and workforce narratives in the social pillar, and the emphasis on risk management, safety, and transparency within governance reporting.

The implications of these findings are twofold. From a theoretical perspective, the study shows that frequency-based content analysis, when combined with established conceptual models such as Shaw et al.'s (2019) three-pillar framework, provides a structured lens for interpreting sustainability discourse and for comparing reporting practices across sectors. From a practical perspective, the method offers managers, policymakers, and investors an accessible benchmarking tool for identifying priority areas, monitoring industry narratives, and uncovering potential blind spots in sustainability communication. For example, while environmental issues are strongly emphasized, comparatively weaker reporting on social equity and governance transparency suggests areas where stakeholder scrutiny and regulatory attention may increase in the future.

Although the study is limited by its focus on one company per sector, it provides a proof-of-concept for scalable analysis. Future research should extend the sample size, incorporate longitudinal data, and apply sentiment analysis to capture not only keyword frequency but also the tone and framing of corporate disclosures. Taken together, these contributions underline the value of MAXQDA-based approaches in enhancing both academic understanding and practical oversight of sustainability reporting.

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