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BRIDGING THE GAP: AN EVALUATION OF DAX 40 COMPANIES' READINESS FOR
ESRS-COMPLIANT MATERIALITY ANALYSES

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Abstract

This Work Project examines the state of the materiality analyses of DAX 40 companies regarding compliance with the requirements of the upcoming European Sustainability Reporting Standards (ESRS). The results of the content analysis show that, overall, the companies are prepared to varying degrees to report in accordance with the future reporting standards. While for some of the ESRS requirements there is already a commendable understanding and comprehensive implementation, notable gaps remain to be addressed. The findings offer valuable insights for academics, companies and regulators who need to navigate and shape the evolving landscape of sustainability reporting.

Keywords: Materiality Analysis, Sustainability Reporting, DAX 40, ESRS (European Sustainability Reporting Standards), Compliance Assessment.

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1. Introduction

In recent years, social and political developments have led to a growing public awareness of corporate responsibility. Consequently, companies have been and continue to be subject to increasingly high demands in terms of accountability that go beyond the mere reporting of economic performance. Sustainability reporting has established as a standard element of disclosure for many large companies, is gaining worldwide acceptance and is increasingly being integrated into standard financial reporting (Herremans 2020).

The DAX 40 companies are the most experienced organizations in Germany in the area of non-financial reporting. Many of them have already been reporting in accordance with the requirements of the Non-Financial Reporting Directive (NFRD 2014/95/EU¹, see Appendix A1). In addition, the majority of these companies are already starting to prepare for the approaching requirements of the European Corporate Sustainability Reporting Directive (CSRD 2022/2464², see Appendix A2). This new directive will expand the NFRD and significantly broaden its scope of application. Although the CSRD is a directive and the national laws still have to be transposed by the individual countries, the drafts of the European Sustainability Reporting Standards (ESRS), in which the new standardized reporting requirements are specified, provide an overview of the changes that companies will face. It is particularly noticeable that the changes include a new understanding of materiality and give greater importance to the materiality analysis (CSR 2023a). Beginning with the 2024 reporting year, organizations will have to provide information on sustainability topics in the management report in accordance with the ESRS, changing the reporting landscape drastically (European Parliament and Council 2022). According to a recent study of the Accounting Standards

¹ “Directive 2014/95/EU of the European Parliament and of the Council of 22 October 2014 amending Directive 2013/34/EU as regards disclosure of non-financial and diversity information by certain large undertakings and groups with EEA relevance” (European Parliament and Council 2014, 1)

² “Directive (EU) 2022/2464 of the European Parliament and of the Council of 14 December 2022 amending Regulation (EU) 537/2014, Directive 2004/109/EC, Directive 2006/43/EC and Directive 2013/34/EU, as regards corporate sustainability reporting” (European Parliament and Council 2022, 1)

Committee of Germany (*Deutsches Rechnungslegungs Standards Committee*, DRSC) the majority of the DAX 40 companies have already started the ESRS implementation. Thereby, around 75% of the companies have already completed or started working on the initial materiality analysis as the basis for the ESRS implementation project (DRSC 2023).

The aim of this Work Project is to assess the current state of the materiality analyses of DAX 40 companies by examining their reporting for the financial year 2022 and to compare it to the requirements specified in the ESRS in order to identify current gaps in the fulfilment of future reporting requirements and derive the readiness of the companies for reporting in accordance with the new standards.

The Work Project is structured as follows. Following the introduction, Section 2 builds a theoretical basis, to introduce the reader to the topic of materiality. The key terms *materiality* and *double materiality* are defined, the evolution of European as well as German regulation is outlined, and a first overview of the implications of the change from NFRD to CSRD, i.e., the incorporated ESRS is given. Section 3 provides an overview of the literature covering the topic. In the next section, after briefly explaining the methodological approach, the research question and the corresponding variables, the sample and the data collection are indicated. In Section 5, the findings of the research are presented and discussed. Finally, after summarizing the key findings, the Work Project ends with theoretical and managerial implications as well as limitations and suggestions for future research in Section 6.

2. Theoretical and Regulatory Background

The nature of this Work Project requires establishing a theoretical basis to introduce the reader to the topic and to form a foundation upon which the subsequent findings are built. Therefore, an overview of the development of EU regulation and standards for sustainability reporting as well as the inherent implications is given, the status of German regulation and standards

regarding sustainability reporting is outlined, and the concept of materiality is defined and classified in the following.

2.1 Development of the EU Regulation on Sustainability Reporting

As sustainability reporting has become a more prevalent topic, new standards for measurement and reporting have emerged to ensure consistent, reliable and qualitative sustainability information (Jørgensen, Mjøs and Pedersen 2022). The European Union has set itself the goal of becoming a pioneer in sustainability reporting as part of the EU Green Deal. In the course of this, the first regulation – the EU Non-Financial Reporting Directive (NFRD 2014/95/EU) – has been set in 2014. It requires certain large companies to disclose non-financial information in their reporting in order to increase the disclosure of social and environmental information. Being in force since 2017, it was revised in 2018 to strengthen its requirements. It applies to large public-interest entities (PIEs) with more than 500 employees, including listed companies and certain other organizations such as banks and insurance companies (European Parliament and Council 2014).

Although the directive on non-financial reporting represents an important step towards promoting transparency and corporate social responsibility, it has been criticized for some of its limitations. Due to the voluntary nature for small and medium-sized enterprises (SMEs), a significant proportion of companies is not covered. Additionally, the directive does not prescribe specific reporting standards or formats leading to variations in the quality, comparability, and usefulness of disclosed information (Hahnkamper-Vandenbulcke 2021). In response to these shortcomings, the European Commission has seen the need to streamline and standardize sustainability reporting with much stricter mandatory requirements. These emerging statutory reporting requirements are displacing the voluntary reporting standards that have been the focus of attention to date and, being in effect since January 5, 2023, are now being implemented via the Corporate Sustainability Reporting Directive (CSRD 2022/2464).

The objectives of the CSRD are to create transparency and consistency of sustainability information along the entire value chain and to gradually establish equality between financial and sustainable, non-financial topics in order to meet the demands of investors and various other stakeholders (European Commission 2023a). After being signed by the Presidents of the European Parliament and the Council of the European Union, the CSRD was published in the Official Journal of the European Union on December 16, 2022. The CSRD officially entered into force on the twentieth day following this publication. Afterwards, the member states have 18 months, i.e. until July 6, 2024, to transpose the directive into national law (European Commission 2023a). To implement the new reporting requirements, twelve binding reporting standards, the European Sustainability Reporting Standards (ESRS), were proposed, having been prepared by the European Financial Reporting Advisory Group (EFRAG) (see Appendix A3). They provide the framework for the topics to be reported and how companies need to report them in order to meet the CSRD requirements (European Commission 2023b).

Beginning January 1, 2024, the regulations will apply to large public interest corporations with more than 500 employees, with reports due in 2025. These are the same companies which are currently subject to the NFRD. Starting January 1, 2025, the regulations will extend to large companies with more than 250 employees and/or sales above 40 million euro and/or total assets above 20 million euro regardless of whether they are of public interest. This significantly expands the group of companies subject to reporting requirements. From January 1, 2026, listed SMEs must also report accordingly, can, however, be exempted from the obligation until 2028 (European Commission 2023a).

Therefore, the new directive fundamentally reforms and significantly expands the obligation to report on sustainability. With an increase of companies in scope, across Europe, around 49,000 companies will be subject to reporting requirements in the future. In contrast, the NFRD affects only about 11,600 companies (CSR 2023a). They will be obliged to publish

their sustainability information as part of the non-financial declaration within the annual financial report. Another change is the noteworthy expansion of the report content. The CSRD significantly increases the number of disclosures that companies are required to make on "material" sustainability aspects. In particular, companies need to perform a "double materiality assessment" to deduce which sustainability aspects are of capital importance to the company and its stakeholders (PWC 2023). The information to be published should include both forecasting and retrospective details, and the scope of application should be extended to the entire value chain. Furthermore, companies are required to assess the likelihood of occurrence and financial effect of inherent risks and opportunities besides setting targets for the respective topics and reporting on their progress. Apart from that, the regulation imposes an independent assurance requirement ("limited assurance") on reported information, including compliance with the ESRS (KPMG 2022).

2.2 Current Status of German Sustainability Reporting Regulation

Germany is actively involved in promoting sustainability reporting, aligning with international regulation, standards and frameworks. The German Commercial Code (*Handelsgesetzbuch*, HGB) and the German Stock Corporation Act (*Aktiengesetz*, AktG) obligate companies to publish some non-financial information in their management reports. However, as these are not comprehensive, the German CSR Directive Implementation Act (CSR-RUG, see Appendix A4) was implemented. Derived from the EU Directive 2014/95/EU (NFRD), the law applies to certain large companies requiring them to provide public information on environmental, social and employee matters, respect for human rights and the fight against corruption and bribery. The companies concerned must prepare a non-financial report with the necessary information, which must be published annually and reviewed by an independent third party. Violations of the CSR-RUG can be punished with fines (CSR 2023b).

With the replacement of the NFRD by the CSRD, German legislation will also have to adapt to the new European regulations. The CSR-RUG will therefore have to be extended or replaced in line with the new EU requirements when the CSRD comes into force (Envoria 2023). The German Sustainability Code (*Deutsche Nachhaltigkeitskodex*, DNK) has established to be one of the predominant standards. It can be linked to more comprehensive standards such as the United Nations Global Compact³ and the Global Reporting Initiative (GRI) Standards⁴ and receives an increasingly positive response, particularly among small and medium-sized enterprises, as it is geared towards the entrepreneurial realities of these companies. The DNK criteria are currently being compared with the content of the ESRS (CSR 2023b).

2.3 Materiality and Double Materiality

Materiality is a fundamental concept in the field of reporting. Despite its importance and the fact that the term can often be found in academic literature, regulations, standards and frameworks, there is no consensus on a general, clearly delineated definition (see Appendix B). However, the multiple existing definitions agree on the most important characteristics and can be classified into three groups: financial, impact and double materiality (Abhayawansa 2022).

Financial materiality is the traditional concept of materiality in financial reporting and aims to determine aspects that positively or negatively influence or could influence the value of a company and its financial development (PWC 2023). The Integrated Reporting Framework (IIRC 2013, 2) defines information as material “if it is of such relevance and importance that it could substantively influence the assessments of providers of financial capital with regard to the organization’s ability to create value over the short, medium and long term.”

³ Initiative of the United Nations to realize a more inclusive and sustainable economy based on 10 universal principles and the Sustainable Development Goals (Global Compact Netzwerk Deutschland 2023)

⁴ Globally most widely used guidelines for the preparation of sustainability reports by large companies, small and medium-sized enterprises, governments and non-governmental organizations (GRI Standards 2023a)

Impact materiality or social and environmental materiality on the other hand aims to determine the severity and probability of actual and possible negative and positive impacts on people and the environment (PWC 2023). It is defined as “those topics that have a direct or indirect impact on an organization’s ability to create, preserve or erode economic, environmental, and social value for itself, its stakeholders and society at large” (GRI 2023a, 3).

However, as the world has evolved, so have the expectations of stakeholders as well as the regulations. In response to these changes, the concept of *double materiality* has emerged as a broader and more encompassing framework for accounting, encouraging companies to judge materiality from both a financial and an impact perspective. While the outside-in perspective thereby aligns with the concept of financial materiality, the inside-out perspective mimics the impact materiality along the entire value chain (PWC 2023). As part of the NFRD, the European Commission (2019, 4) summarizes double materiality as “[...] information on environmental, social and employee matters, respect for human rights, and bribery and corruption, to the extent that such information is necessary for an understanding of the company’s development, performance, position and impact of its activities.”

While these definitions serve as a basis for alignment, several scholars still call for a more detailed and unified concept in order to combat the confusion and the tendency to undermine the principle (Baumüller and Sopp 2022). In response to this, and with regard to the fact that the CSRD is placing more importance on the inclusion of double materiality, the European Union has agreed on a unified definition as part of the ESRS (EFRAG 2022a), in which impact materiality is characterized as “connected to actual or potential significant impacts by the undertaking on people or the environment over the short-, medium- or long-term [...]” (EFRAG 2022a, 13) and a sustainability matter as financially material “if it triggers or may trigger significant financial effects on undertakings, i.e., it generates or may generate significant risks or opportunities that influence or are likely to influence the future cash flows

and therefore the enterprise value of the undertaking in the short-, medium- or long-term, but it is not captured or not yet fully captured by financial reporting at the reporting date” (EFRAG 2022a, 13). Thus, the new standards address one of the previously mentioned and frequently criticized shortcomings of the preceding regulations and standards.

3. Literature Review

Sustainability reporting has been a subject of increasing attention from stakeholders, policy makers and managers but also academics. In fact, the number of papers published in scientific journals on the topic has increased exponentially since 2010 (Fiandrino, Tonelli and Devalle 2022). The focus of this literature review is deliberately directed towards journal articles published from 2016 onwards, reflecting the relevance of this topic and putting an emphasis on recent developments and perspectives within the field. It encompasses both empirical research (see Appendix C1) as well as comprehensive findings from the latest literature reviews (see Appendix C2). This approach ensures a nuanced exploration of the latest insights to inform the current state of research.

As indicated in section 2.3, academics agree that there is still a need for a universal definition and a common theoretical framework since most standards differ in their definitions and approaches to materiality (Fiandrino, Tonelli and Devalle 2022). Jørgensen, Mjøs and Pedersen (2022) support this hypothesis by analyzing the parallel use of GRI Standards and Sustainability Accounting Standards Board (SASB)⁵ approaches to materiality and found that confusion amongst stakeholders may arise due to different definitions and perceptions of sustainability reporting. However, Baumüller and Sopp (2022) state that while materiality is heterogeneously characterized in various reporting standards, reporting requirements on

⁵ Non-profit organization established in 2011 to develop accounting standards for sustainability with a particular focus on bridging the gap between non-financial information and financial value (SASB 2023)

sustainability matters changed over the past decades with a more homogenous approach supported by the implementation of the CSRD and the corresponding standards.

Various industries have already been analyzed in terms of the levels of disclosure of materiality as well as the most material aspects. There is a consensual sentiment that most industries are lagging behind in terms of their materiality analyses. Guix, Font and Bonilla-Priego (2019) studied materiality assessments in the hospitality industry and identified factors that influence the incorporation and standard of sustainability reports. The authors found that sustainability managers at large hotel groups often lacked the necessary resources and capabilities to conduct systematic materiality assessments. Karagiannis et al. (2022) came to a similar result when analyzing materiality disclosure in sustainability reports of the maritime sector and Papafloratos et al. (2023) investigated essential sustainability issues in the chemical industry with comparable results. Thereby, it became clear that although the chemical industry acknowledges the significance of materiality assessments, with climate change, health and safety, responsible sourcing, and pollution among the most frequently raised issues, the content and detail of sustainability reports could be enhanced.

The analysis of companies listed on stock exchanges showed that though listed companies tend to be more engaged with materiality analysis, there is still a need for significant improvements through stricter regulation and better stakeholder engagement. Madasu (2019) conducted research on the sustainability reports of Indian companies in the Dow Jones Sustainability Index and found that these companies are still in the early stages of materiality analysis. Regulatory initiatives are expected to bring them in line with global standards. Farooq et al. (2021) investigated listed companies based in the member states of the Cooperation Council for the Arab States of the Gulf and found that while the number of companies reporting increased, the rate is still low, and the application of international standards declined. However, improved corporate governance and better financial performance can lead to notable

advancements. Based on the sample of organizations listed in the Top 40 at Johannesburg Stock Exchange (JSE), Cerbone and Maroun (2020) concluded that companies with market, professional and stakeholder logics aligned have the most sophisticated processes to assess materiality. Sepúlveda-Alzate, García-Benau and Gomez-Villegas (2021) investigated the materiality of ESG information in the sustainability reports of Latin American listed companies and demand more stakeholder engagement.

Empirical research about materiality in the German context is rather scarce. Hoffmann, Dietsche and Hobelsberger (2018) analyzed sustainability reports of 522 German companies during the financial year 2015 or 2016 that would be subject to mandatory reporting requirements according to the NFRD starting with financial year 2017. The sample encompassed both large companies, belonging to the 150 largest German companies as well as SMEs which voluntarily submitted their reports (Hoffmann, Dietsche and Hobelsberger 2018, 52). Thereby they found an increasing trend in reporting; however, they also emphasized the need for quality improvements and observed incompleteness in reports by new reporters. Similarly, Beske, Haustein and Lorson (2020) examined materiality analysis in 132 reports from 33 companies of the German 110 HDAX stock market index between 2014 and 2017 (Beske, Haustein and Lorson 2020, 172). Through the lenses of legitimacy and stakeholder theories, they discovered that despite the increasing importance of materiality analysis, companies still disclose only a limited amount of information and often lack transparency in their processes.

All in all, the reviewed literature shows that companies in different industries, with dissimilar sizes and from various countries still have issues in applying materiality due to lack of standardization and that the CSRD and the accompanying ESRS could be an answer to this harmonization deficiency. In addition, this literature review uncovers research gaps regarding the examination of German companies in terms of their materiality analyses and thus proves the need for this study.

4. Methodology and Data

4.1 Research Question and Variables

The aim of this Work Project is to analyze the current state of the materiality analyses of the DAX 40 companies and to compare them with the requirements of the ESRS in order to highlight current gaps in the fulfilment of future reporting requirements as well as to point out best practices. Accordingly, the Work Project follows one overarching research question:

Are the DAX 40 companies prepared for the reporting obligations according to ESRS with regard to the materiality analysis?

A compliance gap analysis (see Appendix D1) was carried out to measure the difference between the current state of disclosure and the target state respectively the requirements of ESRS. For this purpose, the changes in reporting requirements resulting from the introduction of the ESRS were first summarized and categorized. The content of the annual reports and the sustainability reports of the DAX 40 companies were then analyzed regarding the variables. The method used was content analysis (see Appendix D2), as it is widely recognized for a similar type of study (e.g. Beske, Haustein and Lorson 2020; Sepúlveda-Alzate, García-Benau and Gomez-Villegas 2021; Farooq et al. 2021; Karagiannis et al. 2022; Ruiz-Lozano et al. 2022). This research method is used to analyze the content of different forms of qualitative data to organize them and draw conclusions (Bengtsson 2016).

In order to systematically analyze the materiality analyses a set of variables was identified. They are based on the requirements of the ESRS and have been complemented both by variables by Almeida Machado, Pinto Dias, and Fonseca (2021) and Ruiz-Lozano et al. (2022) and by calls for future research (Torelli, Balluchi, and Furlotti 2020; Ruiz-Lozano et al. 2022) (see Appendix E for a more detailed explanation of each variable). They can be clustered in four groups, as follows: (i) General, (ii) Content, (iii) Process, (iv) Stakeholders. The first group (General) comprises the variables *Location* (according to the ESRS non-financial

information needs to be published as part of the non-financial declaration within the management report), *Volume* (the extent of coverage of materiality within the non-financial information), *Timeliness* (if the latest full materiality assessment was performed in the reporting year), *Double Materiality* (if the concept of double materiality is adapted), *Definition* (whether an explicit definition of materiality is disclosed) and *Standards* (compliance with GRI ensures preparation for ESRS due to the high interoperability between the two standards). The second (Content) looks at disclosed content covering the variables *Prioritization* (if material issues are prioritized), *Materiality Matrix* (if a materiality matrix is used to display the prioritization of material issues in the report), *Objectives* (whether specific targets are identified for each of the material issues), and *Risks and Opportunities* (whether risks and opportunities associated to the material issues and their likelihood of occurrence and financial effect are assessed). The third section (Process) is dedicated to the materiality determination process and comprises the variables *Determination Process* (if the materiality determination process is explained) and *Assurance* (whether and by which third entity the report is reviewed). Finally, a dedicated section (Stakeholders) on stakeholders includes the variables *Stakeholder Inclusion* (whether both financial materiality and impact materiality stakeholders are consulted during the determination process), *Stakeholder Engagement* (how stakeholders are engaged in the process) and *Stakeholder Selection* (if the selection process of stakeholders is disclosed).

Finally, in order to communicate the results in a structured and streamlined way, they are quantified in the form of a disclosure index (see Appendix D3) hereinafter referred to as ESRS Readiness Index (ERI). The scoring criterion is binary, either fulfilling the requirements (= 1) or not meeting the requirements (= 0). Since not all the previously defined variables can be measured binominal, two of them (*Volume* and *Stakeholder Engagement*) were excluded. Additionally, the variables *Materiality Matrix* and *Stakeholder Selection* were excluded as they are not explicitly mentioned in the ESRS. This leaves 11 variables characterizing the ESRS

readiness of the companies: *Location* (x_1), *Timeliness* (x_2), *Double Materiality* (x_3), *Definition* (x_4), *Standards* (x_5), *Prioritization* (x_6), *Objectives* (x_7), *Risks and Opportunities* (x_8), *Determination Process* (x_9), *Assurance* (x_{10}) and *Stakeholder Inclusion* (x_{11}). None of the variables are weighted differently since one variable cannot be assessed to be more critical than the other based on the ESRS requirements and consequently different weighting would be too subjective. The ERI is calculated according to the following formula:

$$ERI_n = \left(\frac{\sum_{i=1}^{11} x_i}{11} \right) \times 100 \quad [1]$$

Whereby n is one company of the sample (1, 2, 3, ..., 36), $x_i = 1$ if the requirements of x_i are met and $x_i = 0$ if the requirements of x_i are not met (see Appendix F for a more detailed explanation of the formula and the variables). An ERI of 100% means that the report adheres to all changes in reporting requirements that the ESRS will bring and that the company does not have to adjust its reporting practices in order to comply with ESRS.

4.2 Sample and Data Collection

This study examines the reporting of German listed companies. The method used hereby was purposive sampling or judgmental sampling, a form of non-probability sampling, which involves selecting specific elements for inclusion in the sample based on a particular purpose or criteria (Davis, Cosenza 1988, 216 ff.). The first sampling criterion was that the companies are listed on DAX 40 since these organizations represent all major markets and sectors (see Appendix G1). This diversity ensures that the index is reflective of the broader economic landscape and can serve as a proxy for the overall German market. The second sampling criterion was that a report containing non-financial information is published. Since all 40 companies listed on the DAX 40 at the end of 2023 are required to publish annual reports and are subject to mandatory reporting on non-financial information according to both the NFRD and the upcoming CSRD, rigorous empirical research due to access to and completeness of

required information was facilitated. However, two companies (Porsche Automobil and Siemens Healthineers) do not publish their own report but instead are part of a shared report with their respective parent companies. Another factor that influenced the selection of DAX 40 companies was the emphasis on timeliness, with the aim of reviewing the most recent reports available during the time this research was conducted. The chosen period (2022) is thereby the most recent period of availability of published reports. However, another sampling criterion was that all companies report under the same reporting period, viz. the financial year beginning on January 1 until December 31, excluding Infineon from the sample. Additionally, the sample should include or at least mention a materiality analysis in their respective report, which again excluded one of the companies (Brenntag). All reports of the final sample, encompassing 36 reports, (see Appendix G2) were retrieved from the companies' websites (see Appendix G3) and were published in 2023. Despite the exclusions, the sample still represents a diverse and robust cross-section of the German economy by encompassing companies from 10 different industries. These companies' market capitalization ranges from 142,867 million euro, corresponding to SAP, to Zalando with 5,303 million euro (Finanzen.net 2023). With revenues ranging from 1,996 million euro (Qiagen) to 279,232 million euro (Volkswagen) the companies are among the most profitable in Germany (Statista 2023). The amount of total assets ranges from 2,748 (Sartorius) and 1,339,157 (Deutsche Bank).

5. Results

5.1 Location and Volume

To date, DAX companies have been able to publish their materiality analysis as part of their non-financial statement in the annual report (integrated into the management report or as a separate part), in a sustainability report or as a stand-alone non-financial report. However, the reporting structure will change fundamentally with the introduction of the ESRS, which will require mandatory integration of non-financial information into the management report

(EFRAG 2023a, 6). Half of the companies already locate their materiality analysis in the annual report, the remaining 50% still have to make this formal adjustment to meet the planned requirements of ESRS. Although the directive specifies minimum content requirements, the extent to which these legal requirements are met varies greatly. The amount of space dedicated to the materiality analyses ranges from just a small section (e.g., BMW, RWE, Volkswagen) to up to 13 pages (Merck) (see Appendix H1). The reason for the different scopes is, on the one hand, the different levels of detail in the content, such as the explanation of the process and the description of the individual topics. On the other hand, it is also due to the extent to which use is made of the option to refer to other content in the report.

5.2 Timeliness

According to the ESRS, companies should align the reporting period of their sustainability report with that of their annual financial statements. They are required to define clear time horizons and specify the frequency of materiality assessments in their reporting. The materiality topics ought to be reviewed regularly to ensure a systematic assessment. Consequently, it can be ensured that the results can be consistently compared with previous assessments in order to recognize and transparently communicate changes in materiality (EFRAG 2022a, 18). Of the companies examined, 58% carried out a complete materiality analysis in the reporting year. The least recent materiality analysis belongs to Sartorius and was already completed in 2018 (see Appendix G1). The company therefore runs the risk that the data is no longer up to date and other material topics should be prioritized.

5.3 Double Materiality and Definition

Companies must clearly describe the materiality perspectives applied and explain all judgements and assumptions made in this process. Consequently, they must ensure that these perspectives are reflected in the factors used to identify and prioritize the material topics. In doing so, organizations have to include topics, in accordance with the principle of double

materiality explained in section 2.3, which are deemed material based on their impact perspective, their financial perspective or both (EFRAG 2022, 11 ff.). Following, the materiality analyses were examined to determine whether they correspond to the ESRS understanding of double materiality. Thereby, 78% of the companies fulfill this requirement, showing that there is already an understanding that both the impact of sustainability topics on the financial situation of a company and the impact of the company on its environment must be considered. Additionally, 21 out of the 36 sampled companies include a definition of materiality in their reports (see Appendices H1 and H2).

5.4 Standards

As the GRI has served as an important point of reference during the development of the ESRS, many of the reporting requirements in the ESRS are inspired by the GRI Standards and there is a high degree of conformity between the ESRS and the GRI Standards (European Commission 2023b). In addition, a joint statement by EFRAG and the GRI on September 5, 2023 highlighted the high level of interoperability between the two standards in terms of materiality of impacts and thus the fact that existing GRI reporters will be well prepared to report according to the ESRS and avoid the burden of multiple reporting (GRI 2023b). Many companies already base their sustainability reporting on established frameworks, whereby the most frequently used framework is that of the GRI. The GRI Standards are used by 33 of the 36 companies examined, which is a significant proportion of 92% (see Appendix H1).

5.5 Prioritization and Materiality Matrix

If the company identifies a large number of impacts, risks and opportunities, the ESRS allows it to prioritize them (EFRAG 2022a, 14). With 61% of the companies prioritizing their material issues there is still development needed. The presentation of a materiality matrix in the reporting has become established to provide the addressees of the reporting a quick overview of the material topics and their prioritization. Only 25 % of the sample companies present such a

matrix. The companies thereby use various combinations and different wording to depict the "importance for the company", "the impact on the environment" and "the importance for stakeholders" in the matrix (see Appendix H3). A best practice is the materiality matrix presented by Airbus. It includes three dimensions with variables in the x- and y-axis being "importance to stakeholders" and "potential impact on rightsholders or ecosystems" and bubble size being defined as impact on the company and clustered in to environmental, social and governance. With this three-dimensional matrix, the reader gets a quick and encompassing overview of the most relevant material topics (Airbus 2023, 64, see Appendix H4).

5.6 Objectives

The ESRS set out specific requirements for target setting and emphasizes the importance of "measurable, outcome-oriented targets" (EFRAG 2022a, 21). These objectives must provide a defined target level, quantifying the desired performance, and a clear description of how the outcomes are aligned with the broader strategic objectives. In addition, the scope of the objective is delineated, including both the company's activities and, where appropriate, its value chain. Specifying a base year and timeframe also ensures an understanding when these objectives are to be realized (EFRAG 2022a, 21). Most companies (75%) do not set specific targets relating to their material topics (see Appendix H3). A best practice, however, is Vonovia which quantifies its material topics in so-called "Material Performance Indicators" and sets specific goals based on these. For example, the company's average primary energy demand was 37.7 kWh/sqm per year in 2022 and it set a demand of 31.3 kWh/sqm as a target for 2023 corresponding to its material topic "Sustainable Construction and Refurbishment" (Vonovia 2022, 69 f.).

5.7 Risks and Opportunities

According to the new standards, companies are required to derive risks and opportunities based on the identified material topics. In addition to the identification, this also includes prioritization

relative to other types of risks. Furthermore, they should assess the likelihood and effects associated with them (EFRAG 2022b, 14f.). The results show that the fulfillment of this requirement demands the most improvement. Risks and opportunities are included in a rudimentary form with a minority of six companies (17%, Airbus, Bayer, Hannover Rück, Mercedes-Benz Group, Porsche AG and QIAGEN) reporting them as required by the ESRS (see Appendix H3). As the companies scored particularly negative in this category, it becomes clear that there is a need for action in this area and that the companies have to make significant adjustments to their reporting in order to meet the standards. They should develop a robust methodology to identify and prioritize risks and opportunities in order to report on the type of risks, potential consequences and the company's efforts to mitigate or capitalize them.

5.8 Determination Process

ESRS 1 contains specific requirements for the disclosure of the determination process of materiality analyses. Companies should present the process of their materiality analysis transparently and follow the specified process. Firstly, companies are obliged to comprehensively record the context, i.e. the value chain, the business activities, the regions and the stakeholders involved. The investigation process then involves carefully defining and setting thresholds. Identifying potential impacts, risks and opportunities is a crucial step that contributes to a thorough understanding of the landscape. The results are then analyzed for both impact dimensions. To increase the robustness of the process, it is necessary to consider validating the results through stakeholder engagement (EFRAG 2022a, 20 ff.; EFRAG 2022b, 14 f.). Twenty-five out of the examined 36 companies explain in more detail how the determination process was carried out and all follow a similar process of identification, assessment and prioritization, followed by selection and validation (see Appendix H4). A best practice is BASF, which not only describes its process but also presents it visually to the reader in the form of an illustration (BASF 2023, 46).

5.9 Assurance

Currently, companies are not legally obliged to have all, or parts of their sustainability reporting audited by external service providers. However, with the implementation of the ESRS, the integrity of the material information must be validated by an independent auditor. This involves a thorough assessment of the quality of the information, obtaining confirmation of material data from internal and external sources. Verifiability is a key criterion in this process, so that different independent observers with appropriate expertise come to similar conclusions, thereby confirming that the disclosed information faithfully represents the company's sustainability performance. By engaging external assurance providers, the ESRS aims to strengthen the credibility and robustness of sustainability disclosures and enhance confidence in the reported data (EFRAG 2022a, 10 f.). The analysis of the reports revealed that almost all the companies (92%) had their sustainability reporting audited by external service providers (see Appendix H5). Of these, only one has not been audited by one of the Big Four accounting firms and the majority relied on KPMG (33%) (see Appendix H6). Hereby, it is also noticeable that the determination process is disclosed in all reports audited by KPMG, which is not the case with other auditors. However, deeper analyses regarding a possible correlation are left for future research (see Appendix H7).

5.10 Stakeholders

The materiality of an issue is best determined not only by the company itself but by engaging stakeholders instead as they often attach importance to different issues than the company itself (EFRAG 2022a, 12). With 83% of the companies including their stakeholders in the materiality determination process, stakeholder inclusion is considered an important part. The ESRS (EFRAG 2022a, 12) considers that stakeholders are not a homogenous group and defines two groups of them: "users of sustainability reporting", e.g. investors, analysts, business partners, civil society and NGOs who have an interest in the company, and "affected stakeholders". The

latter are persons or groups who are or may be affected positively or negatively by a company's activities. Particular attention is paid to "vulnerable groups": These can be, for example, local residents who are directly affected by noise or pollution (EFRAG 2022a, 12). In general, the materiality assessment process must ensure that the impact on all relevant stakeholders is taken into account instead of focusing solely on the expectations of users.

The majority of the sample report a comprehensive list of both report users and affected stakeholders (see Appendix H8). These can again be clustered into internal and external stakeholders encompassing employees and shareholders belonging to the first group and investors and other financial bodies, customers, suppliers, business partners, governments and policy makers, academia, Non-Governmental Organizations (NGOs), neighbors and society, as well as industry experts being part of the latter. Some, but not all, stakeholders can belong to both groups like employees which are affected stakeholders but may also be users of reporting being interested in both financial as well as impact materiality topics (see Appendix H9).

The stakeholder selection process, specifically the rationale behind which stakeholders to engage and how this was determined, is disclosed by a minority of eight companies. However, most companies elaborate how they engage their stakeholders. Various formats have been established for this purpose, including surveys, interviews and stakeholder panels. Stakeholder surveys have proven to be a good way to determine the views of stakeholders objectively and comprehensively. The choice of a suitable format also depends on the number of stakeholders to be surveyed. The analyzed companies favored (online) surveys, with 14 companies using them, as online surveys naturally attract more participants than for example face-to-face interviews.

5.11 ESRS Readiness Index

The ESRS Readiness Index is calculated according to formula [1] explained in Section 4.1. and further elaborated in Appendix F. First, the quantification of the variables emphasizes the

results, explained in more detail in the preliminary sections. There are major differences regarding the fulfillment of the variables. While the requirements for *Assurance* and *Standards* (both with 92% highest percentage of companies which meet the formulated requirements) are already met by most companies, there is still considerable need for improvements with regard to *Objectives* and *Risks and Opportunities* (lowest percentage of companies which meet the formulated requirements with 17%) (see Appendices I2 and I3). Overall, 29 of the 36 companies reach an ERI of above 50%, indicating that most of the companies already started with the preparations for the upcoming changes. A mean of 62% indicates that, on average, the companies are scoring above the midpoint of the ERI scale. The median of 64% indicates that at least half of the companies evaluated have an ERI score of 64% or higher (see Appendix I4). Together, the indicators suggest that all of the companies already have a basic level of preparation, however, further investigations show that they are prepared for the ESRS at very different levels. Although there is a large proportion of companies with relatively high ERI scores, there are also companies that have so far only met slightly more than the minimum requirements, which contributes to the aforementioned need for improvement. Thereby, neither a causal correlation between the size of the companies and a higher ERI, nor to the affiliation to a certain industry can be established. The company with highest revenues (279,232 million €) is Volkswagen, which, however, only scores an ERI of 45%. SAP, however, has the largest market capitalization (142,867 million €) and scores an ERI of 73% (see Appendix I5). This indicates that financial resources do not guarantee a higher ERI. Airbus is the only company with a materiality analysis fulfilling all the requirements and therefore reaching an ERI of 100%, belonging to the Mechanical Engineering, Transport, Logistics industry. However, the ERI results in this industry range from 45% to 100%. Zalando, which operates in the Retail and Consumption industry, by contrast, achieved the lowest ERI at 18%. For this industry, too, the range of ERI results is broad at 18-64% (see Appendices I6 and I7).

6. Conclusion

6.1 Summary

The aim of this Work Project was to analyze the current state of reporting of the DAX 40 companies with a particular focus on their preparedness for reporting in compliance with the ESRS. These companies are among the most experienced when it comes to sustainability reporting, however, the ESRS are introducing a paradigm shift by defining more precise guidelines, particularly concerning the disclosure of materiality analyses, and thus bring about several changes. All in all, the analysis shows a nuanced profile of compliance and confirms that the DAX 40 companies are prepared for the reporting obligations to varying degrees in terms of scope and quality. Although every company in the sample already meets the minimum requirements, the analysis highlights disparities. While only one company demonstrates to be fully prepared for the ESRS, over half of the companies exhibit compliance with a large proportion of the requirements. Thereby neither financial resources, nor industry affiliation seem to be relevant for the achievement of higher ERI scores. Opportunities for enhancement persist across several categories. The grasp of the concept of double materiality is evident and the majority comply with the GRI Standards, which indicates a general awareness of upcoming changes. Most companies already involve stakeholders in their process and create clarity and transparency by prioritizing material issues and disclosing the determination process. Additionally, the external audit of sustainability reporting by independent auditors required by the ESRS is already practiced by the majority of the sample, with KPMG proving to be the predominant auditing firm. Although the integration of materiality analyses in the annual report is gaining momentum with almost half of the companies already integrating it, the remaining half need formal adjustments to comply with the ESRS requirements. While more than a half of the companies conduct a full materiality analysis in the reporting year the other half is at risk of using outdated data due to infrequent updates. Challenges seem to arise in articulating a

precise definition of materiality as only about half of them provide one in their reports. Additionally, only a minority discloses how stakeholders are selected, indicating a lack of transparency. Furthermore, issues in assessing risks and opportunities as well as target setting based on the material topics highlight further areas that require increased attention.

6.2 Theoretical and Managerial Implications

This study serves the DAX 40 companies as a state indication and an opportunity to benchmark the current level of materiality reporting. At the same time, it represents a base year for comparison with the next reporting period in which the companies must already apply the ESRS (2024). Hereby, the summary of variables in the ERI as a simple ratio makes it possible to compare the company with itself year after year. As the companies in the sample are among the early adopters of the standards, it can be hypothesized that reporting will be further professionalized with the official implementation of ESRS. Other parties that can benefit from this Work Project are companies that will soon be subject to mandatory reporting. They can use the methodological approach of this Work Project as an individual gap analysis when creating guidelines and action plans for the implementation of ESRS-compliant reporting. Since the variables are based on ESRS requirements as well as questions that have been explored in previous literature, the methodology provides benefits in terms of accuracy and diligence of reporting, as well as applicability to companies of all sizes and industries. Furthermore, this analysis can provide regulators with an overview of where companies have little priority or possibly have no orientation due to overly vague regulations and therefore do not report well. Particularly since the CSRD as a directive still has to be transposed into the law of the respective countries, the institutions can derive helpful lessons and adapt the guidelines accordingly.

6.3 Limitations and Ideas for Future Research

This Work Project has shown how relevant the topic of sustainability reporting is for the near future, especially regarding materiality. While this study provides a comprehensive overview

of the research topic, there are some limitations to it. A limitation of using a content analysis is the dependence on published reports and the availability of these reports. Whereas in this case there was an ample sample, if companies provide incomplete or vague information, there could likely be gaps in the analysis. Although content analysis is a widely used research method, it has potential limitations due to its subjective interpretation. The results can be influenced by the subjective judgment of the researcher, which can lead to distortions in the findings. Finally, the specification of the number of pages has restricted the author to giving a comprehensive overview in a rather short paper. Although many aspects of the topic of materiality in reporting have already been dealt with in the past and a current state has been considered in this study, numerous questions remain unanswered. Consequently, it is also a topic worthy of future research. This analysis was limited to reports from a single year (2022). While this sufficiently fulfills the objective of the study to get an overview of the current state of reporting at a specific point in time, an exploration of how materiality analyses evolve over time to identify dynamic changes in reporting trends, corporate practices and improvements in compliance can be a possible focus of future research. In addition, the factors contributing to the differences in ERI scores between companies can be examined in more detail and the correlation between the scores and various factors can be explored. Another value-adding extension of the study would be to consider companies beyond the DAX 40. Adding companies from different countries and industries to the sample would make it possible to compare materiality analyses and reporting practices of German companies with those of other countries across industries in order to identify international best practices, industry-specific trends and challenges in meeting ESRS requirements. While initial examples of best practice have already been mentioned in this Work Project, in-depth case studies of companies with exemplary materiality analyses and reporting practices will lead to further insights. This would allow the identification of specific strategies, methods and approaches that contribute to effective materiality reporting.

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Appendices

Appendix A Overview of Regulation and Sustainability Reporting Standards.....	35
Appendix A1 Non-Financial Reporting Directive (NFRD).....	35
Appendix A2 Corporate Sustainability Reporting Directive (CSRD).....	35
Appendix A3 Structure of the ESRS	36
Appendix A4 CSR-Richtlinien-Umsetzungsgesetz (CSR-RUG)	36
Appendix B Overview of Materiality Definitions	37
Appendix C Literature Review.....	38
Appendix C1 Literature Review – Empirical Research.....	38
Appendix C2 Literature Review	46
Appendix D Research Methods	49
Appendix D1 Compliance Gap Analysis.....	49
Appendix D2 Content Analysis	49
Appendix D3 Disclosure Index.....	50
Appendix E Variables.....	51
Appendix F ESRS Readiness Index	52
Appendix G Sample	53
Appendix G1 Overview of DAX 40 Companies (Initial Sample).....	53
Appendix G2 Final Sample.....	58
Appendix G3 Final Sample Data Source	58
Appendix H Analysis Results.....	61
Appendix H1 Overview Results - General Variables	61
Appendix H2 Materiality Definitions	62
Appendix H3 Overview Results - Content Variables	63
Appendix H4 Best Practice Materiality Matrix	67
Appendix H5 Overview Results - Process Variables	67
Appendix H6 Detailed Analysis Assurance.....	68
Appendix H7 Detailed Analysis Process Variables.....	68
Appendix H8 Overview Analysis Results Stakeholder Variables.....	69
Appendix H9 Stakeholder Matrix.....	73
Appendix I ESRS Readiness Index Results.....	74
Appendix I1 ESRS Readiness Index - Results	74
Appendix I2 Overview of Companies Meeting the Requirements.....	75
Appendix I3 Ranking of Variables according to ERI Descriptive ERI Results	75
Appendix I4 Descriptive ERI Results.....	75
Appendix I5 Cross-Analysis ERI and Company Characteristics.....	76
Appendix I6 Ranges of ERI Results in Industries	78
Appendix I7 Company Characteristics of Minimum and Maximum ERI.....	78
Appendix J List of Abbreviations.....	79

Appendix A Overview of Regulation and Sustainability Reporting Standards

Appendix A1 Non-Financial Reporting Directive (NFRD)

Directive 2014/95/EU of the European Parliament and of the Council: The directive requires certain large companies (with more than 500 employees) to disclose information about their strategies, risks and results in relation to environmental protection, social responsibility and the treatment of employees with the aim to increase transparency and promote corporate social responsibility. Next to providing a description of their business model, including all environmental and social impacts, as well as the nature and scope of their activities, companies are obliged to provide information on their diversity policy and if applicable, on their due diligence processes (European Parliament and Council 2014).

Appendix A2 Corporate Sustainability Reporting Directive (CSRD)

Directive (EU) 2022/2464 of the European Parliament and of the Council: CSRD is the updated directive that expands the NFRD and thus improves and modernizes the regulation for reporting on social and environmental information by companies. The scope now covers a broader range of large companies, including listed SMEs, that are required to disclose sustainability information (European Parliament and Council 2022). It will be implemented as shown in Table 1:

Table 1: Implementation of Corporate Sustainability Reporting Directive

	EU Companies (Large non-EU Subsidiaries)			„Third-country” Undertakings
Report Due	2025 (Based on FY 2024 data)	2026 (Based on FY 2025 data)	2027 (Based on FY 2026 data)	2029 (Based on FY 2028 data)
Scope	Companies already subject to the NFRD, including 1. large, listed companies and public interest entities; and 2. banks / insurance companies	Companies that meet one or more of these criteria: • 250+ workers • €40m+ net turnover • €20m+ assets	Listed SMEs that have: • 250 workers • €40m net turnover • €20m assets	Non-EU companies with €150m net turnover in EU (in each of last two years), and either 1. a large or listed subsidiary or 2. a significant EU branch
Required Standards	ESRS		Simplified ESRS	

(to be continued)

Table 1 (continued)

	EU Companies (Large non-EU Subsidiaries)	„Third-country” Undertakings
Reporting Level	One consolidated report as part of the non-financial declaration within the annual financial report in electronic reporting format, available in the public European Single Access Point	EU-based subsidiary or branch is responsible for the publication of the report as part of the group

Source: adapted from KPMG 2022

Appendix A3 Structure of the ESRS

Twelve Standards classified in four areas:

- two cross cutting standards (General requirements and disclosures)
- three topical sector-agnostic standards (Environmental, Social and Governance).

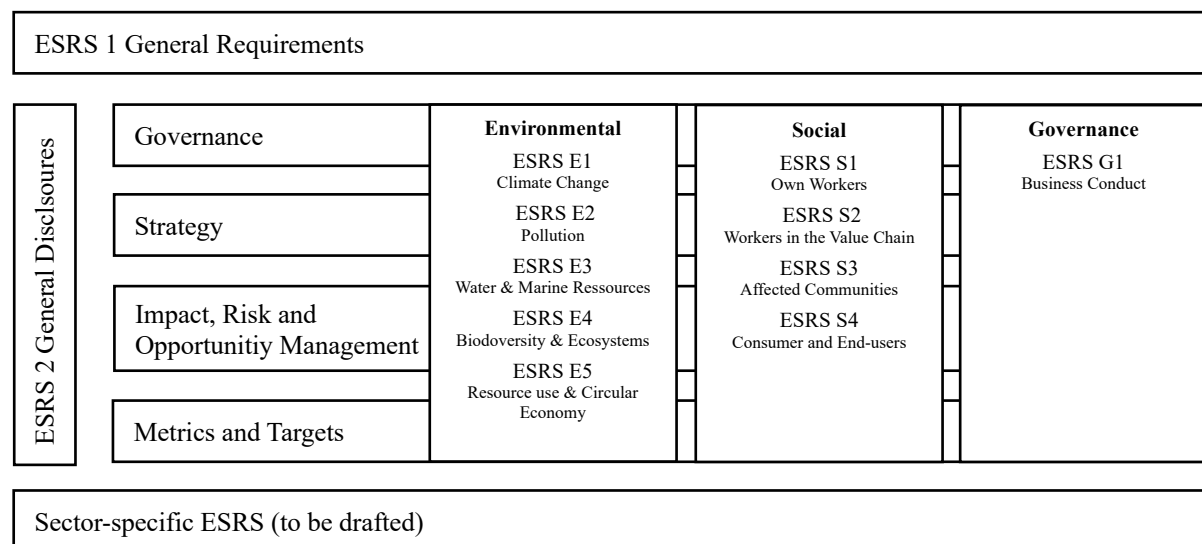


Figure 1: Structure of the ESRS

Source: adapted from KPMG (2023, 9)

Appendix A4 CSR-Richtlinien-Umsetzungsgesetz (CSR-RUG)

The CSR Directive Implementation Act (CSR-Richtlinie-Umsetzungsgesetz - CSR-RUG) is a German law transposed from the EU Directive 2014/95/EU, which obligates large companies in Germany to publish non-financial information. It transposes the EU's Non-Financial Reporting Directive (NFRD) into German law and came into force in 2017 (Bundesministerium der Justiz 2017).

Appendix B Overview of Materiality Definitions

Table 2: Overview of Materiality Definitions

Financial Materiality	
Integrated Reporting Framework (IIRC 2013)	„For the purposes of <IR>, a matter is material if it is of such relevance and importance that it could substantively influence the assessments of providers of financial capital with regard to the organization’s ability to create value over the short, medium and long term.“ (IIRC 2013, 2)
International Financial Reporting Standards (IFRS 2018)	“Information is material if omitting, misstating or obscuring it could reasonably be expected to influence decisions that investors and creditors make on the basis of the management commentary and of the related financial statements” (IFRS 2018, 2)
SASB (2023)	„Information is material if there is “a substantial likelihood that the disclosure of the omitted fact would have been viewed by the reasonable investor as having significantly altered the ‘total mix’ of information made available.” (SASB 2023)
Impact Materiality (or Social and Environmental Materiality)	
AA1000 AccountAbility Principles (2018)	„Materiality relates to identifying and prioritising the most relevant sustainability topics, taking into account the effect each topic has on an organisation and its stakeholders. A material topic is a topic that will substantively influence and impact the assessments, decisions, actions and performance of an organisation and/or its stakeholders in the short, medium and/or long term.“ (AA1000 2018, 20)
GRI Standards (2023)	“Those topics that have a direct or indirect impact on an organization’s ability to create, preserve or erode economic, environmental, and social value for itself, its stakeholders and society at large” (GRI 2023, 3)
Double Materiality	
Non-Financial Reporting Directive (NFRD, 2014)	„[...] information on environmental, social and employee matters, respect for human rights, and bribery and corruption, to the extent that such information is necessary for an understanding of the company’s development, performance, position and impact of its activities.“ (European Parliament and Council 2014, 4)
Sustainable Development Goals Disclosure (SDGD, 2020)	“Material sustainable development information is any information that is reasonably capable of making a difference to the conclusions drawn by: • stakeholders concerning the positive and negative impacts of the organization on global achievement of the SDGs, and; • providers of finance concerning the ability of the organization to create long term value for the organization and society.” (Adams 2020, 9)
European Sustainability Reporting Standards (ESRS 2023)	„Materiality is to be understood as the criterion for the inclusion of specific information in sustainability reports. It reflects (i) the significance of the information in relation to the phenomenon it purports to depict or explain, as well as (ii) its capacity to meet the needs of the stakeholders of the undertaking, allowing for proper decision-making, and more generally (iii) the needs for transparency corresponding to the European public good. The implementation of materiality implies the use of thresholds and/or criteria.” (European Commission 2023, 12)

Appendix C Literature Review

Appendix C1 Literature Review – Empirical Research

Table 3: Literature Review – Empirical Research

Author/s (Year)	Keywords	Research Focus	Sample	Method/ Analysis	Variables	Main Findings	Limitations
Calabrese, Levialdi, and Menichini (2016)	Sustainability reporting Global Reporting Initiative (GRI) Fuzzy Analytic Hierarchy Process (AHP) Small and medium enterprises (SMEs) Materiality assessment Completeness	Proposition of a fuzzy AHP method that facilitates the production of sustainability reports by structuring an analysis of materiality, addressing the critical issues of subjectivity, completeness and resource limitations of SMEs	An Italian SME operating in design, manufacturing and consulting for water projects and hydraulic components (ACMO Group SpA)	Fuzzy analytic hierarchy process method	GRI aspects related to the economic, environmental and social goal, with the next level down being the GRI indicators	- There is a demand for quantitative methods to combat the subjectivity of the materiality assessment arising from the dependence on expert judgment. - Proposition of a fuzzy AHP method that supports companies in the process of defining the content material to their reporting, permitting them to effectively identify those aspects and indicators that better address their key sustainability concerns. - Application of this method to a medium-sized Italian company.	Just a short-term application (future studies could include the implementation of the method in the long-term and from a multi-stakeholder perspective)
Wu, Shao, and Chen (2018)	Materiality; sustainability reporting; global Reporting Initiative; content analysis	Provision of a review on the definition and identification of materiality and proposal of screening methods for materiality assessments	Sustainability reports from the apparel industry in Hong Kong (3 companies) and Italy (3 companies) and energy industry (24 energy companies) with a broader geographical scope	Comparison study for the apparel and energy industries in selected regions using content analysis (two-sample proportional test)	- Management & financial performance - Emissions & GHG - Energy - Water & wastewater - Resources & materials - Chemicals & heavy metals - Employment & labor - Health & safety - Training - Community - Supply chain - Quality control	- Standards and initiatives differ in their definitions and approaches to materiality. - Four screening methods are proposed, including two that are directly applicable: - Sustainability Accounting Standards Board Materiality Map™. - Global Reporting Initiative (GRI) Sustainability Topics for Sectors; and two that involve more desktop research the GRI Sustainability Information Database and screening from a life cycle perspective.	- Only two industries have been studied - Geographical limitations - The chosen methodology – content analysis – can be manipulated at different degrees of detail and complexity (simple word count-based analysis)

(to be continued)

Table 3 (continued)

Author/s (Year)	Keywords	Research Focus	Sample	Method/ Analysis	Variables	Main Findings	Limitations
Hoffmann, Dietsche, and Hobelsberger (2018)	n.a.	Identification of trends and developments in voluntary reporting	Sustainability reports published by German companies from 2014 and 2015; non-financial information presented by 522 German companies during financial year 2015 or 2016	Analysis of sustainability reports Analysis of non-financial information	• Number of sustainability reports • Quality of Sustainability reports • Format of sustainability reports • Completeness of content • Quality of non-financial reporting	• Quantity of stand-alone sustainability reports and integrated reports is growing. • Organizations are aligning on the guidelines provided by the Global Reporting Initiative. • There is still potential for quality improvements. • Many reports from companies that are new to reporting are still fragmentary regarding content.	n.a.
Madasu (2019)	GRI, Materiality, Sustainability Reporting (SR), and DJSI	Emphasizing the purpose and significance of materiality in the context of sustainability reporting	Sustainability reports of 12 Indian companies which are part of Dow Jones Sustainability Index (DJSI)	Review of sustainability reports (exploratory and descriptive study)	• Material topics • Stakeholder groups • Materiality assessment process	• Even though the 12 Indian companies studied have received global recognition for their sustainability reporting, many of the Indian listed companies are still in the early stages in terms of materiality analysis. • The initiatives of the stock exchanges such as the BSE and NSE, as well as SEBI, are expected to bring all listed companies up to the level of the global standards.	• Limited sample (only 12 companies have been reviewed) • Geographical limitations

(to be continued)

Table 3 (continued)

Author/s (Year)	Keywords	Research Focus	Sample	Method/ Analysis	Variables	Main Findings	Limitations
Karagiannis, Vouros, Skouloudis, and Evangelinos (2019)	Accountability, air transport, airport industry, CSR/Sustainability reporting, environmental policy, GRI, materiality, sustainable development	Identification of the airport industry's most material aspects and assessment of the operator's accountability level	55 sustainability reports representing 193 airports	Content Analysis (Development of a grading scheme for systematically reviewing and labeling reports' content)	• Timeliness • Aviation markets • Reporting consistency • Management approach • General disclosure • Specific disclosure •	• The international airport industry is lagging behind other industries regarding CSR/sustainability reporting as it is still not a common practice. • The most crucial material topics are corporate responsibility, economic viability, contribution to local communities, and climate change adaptation. • The accountability level of airport reporters is moderate, particularly considering the disclosure of specific information.	• The initial sample of 55 CSR reports was shrunk significantly by 40% due to reports not matching certain requirements • Complications with data processing due to great variability regarding the names i.e. terminology of the reviewed material issues
Guix, Font, and Bonilla-Priego (2019)	Hospitality industry, Transparency, Accountability, Sustainability reporting, Materiality assessment	Examination of the choices made in the hotel industry about application of materiality assessments	Sustainability managers from eight of the world's 50 largest hotel groups and eight industry sustainability experts	Semi-structured interviews	• Internal contextual variables (including attitudes towards materiality and operational processes) that influence the inclusiveness, quality and completeness of sustainability reports	• Sustainability managers from large hotel groups are rather reluctant to disclose the materiality criteria, their decision-making processes, and how they solicit stakeholder feedback. • These disclosure gaps occur due to limited resources and time as well as a lack of knowledge and skills that could be used for materiality assessment. • According to the experts, hotel groups are inconsistent in their approach to decision-making and monitoring the materiality assessment.	• Small sample size • Novelty of the materiality approach in the hospitality literature

(to be continued)

Table 3 (continued)

Author/s (Year)	Keywords	Research Focus	Sample	Method/ Analysis	Variables	Main Findings	Limitations
Beske, Hausteine, and Lorson (2020)	Stakeholder theory, Integrated reporting, Sustainability reporting, Legitimacy theory, Materiality analysis	Assessment of the disclosure of materiality analyses in sustainability and integrated reporting through the lens of legitimacy and stakeholder theory	132 reports from 33 companies of the German 110 HDAX stock market index between 2014 and 2017	Content analysis	- Extent companies report - Methods used for the analysis of stakeholders and topics/aspects - Disclosure of information	- Materiality analysis is a rising trend. - Companies only disclose a limited amount of relevant information and do not explain the methods used to identify stakeholders and topics/aspects. - The underpinning processes for establishing report content remain ambiguous. - Through the lens of legitimacy theory, the study shows that materiality analysis can be strategically misused to define report content without taking into account the interests of legitimized stakeholder groups, thus not improving the reports for these groups.	- Items of the disclosure index are only binary - Unequal distribution of the assessed companies in the sub-indices of the HDAX - Sample only included listed companies
Torelli, Balluchi, and Furlotti (2020)	Content analysis, GRI, integrated report, materiality, stakeholder engagement, stakeholder theory, sustainability report	Examination of the potential relationship between the adoption of the materiality principle in non-financial reports and the involvement of stakeholders	Non-financial statements of Italian “public interest entities” in 2017	Content Analysis	- Materiality relevance - Industry - Environmentally sensitive industries - IIRC directives and IR - GRI guidelines - Stakeholder engagement - Past experience in voluntary disclosure - Review of the report - Level of indebtedness - Visibility	- Industry and Global Reporting Initiative Standards application are important in the reporting process, in particular in the materiality analysis, to achieve a high level of materiality application and good report quality for stakeholders. - Stakeholder engagement (and the indirect related variables of industry membership and GRI application level) plays a fundamental role in the report production process, particularly in the materiality analysis itself.	- Geographical focus on one country - Analysis of publications from only one year

(to be continued)

Table 3 (continued)

Author/s (Year)	Keywords	Research Focus	Sample	Method/ Analysis	Variables	Main Findings	Limitations
Cerbone and Maroun (2020)	Sustainability reporting, Materiality, Institutional logics, Integrated reporting, Stakeholder engagement	Examination of differences in materiality disclosure in an integrated reporting setting	20 preparers from 14 large organizations listed in the Top 40 at Johannesburg Stock Exchange (JSE)	Semi-structured interviews and institutional logics as a theoretical framework	- Centrality - Compatibility	- Market-dominated companies have an internally focused approach to identifying materiality that emphasizes value relevance to financial capital providers. - Organizations with market, professional and stakeholder logics aligned have the most sophisticated processes to assess materiality. - Instead of lengthy reports and regulatory compliance, the focus is on a comprehensive presentation of the value creation and how companies ensure lasting sustainability.	- Small sample size - Only preliminary views on how stakeholder engagement can be used to enhance reporting - No stakeholder interviews - Lack of examination on how stakeholders are prioritized and information is categorized - No examination of how logics become dominant or align with others
Reimsbach, Schiemann, Hahn, and Schmiedchen (2020)	Materiality, nonfinancial disclosure, sustainability reporting, stakeholder, experiment	Examination on how two stakeholder groups (potential employees and capital market participants) react to nonfinancial information	121 participants 73 were male (2 participants chose not to answer this question) 71 participants provided information on their age with a mean of 41.70 years and mean work experience in their professional role of 10.55 years from 99 responses.	- Full-factorial, between-subjects design - Main manipulated variable was a nonfinancial topic Manipulated variable: (nonfinancial) performance	- Nonfinancial information - Nonfinancial information about energy - Nonfinancial information about biodiversity	- Potential employees perceive non-financial information as more material compared to capital market participants. - After investigating the two non-financial topics, biodiversity and energy, for capital market participants, energy is more material than biodiversity, while for potential employees, both topics are equally material. - Capital market participants appear to be pursuing a more analytical decision-making process in adjusting decisions in combination with quantitative performance differences, as compared to potential employees.	- Oversimplification of the real decision-making process due to experimental structure (limited amount of information) - Results may not be applicable to other stakeholder groups - Sector-specific analysis (focused on chemical industry)

(to be continued)

Table 3 (continued)

Author/s (Year)	Keywords	Research Focus	Sample	Method/ Analysis	Variables	Main Findings	Limitations
Almeida Machado, Pinto Dias, and Fonseca (2021)	Global reporting initiative (GRI), materiality analysis, Stakeholder engagement, sustainability reporting	Identification of stakeholders and respective techniques of engagement in the materiality analysis; quantification of disclosures of materiality-related indicators; exploration of the influence of assurance, standard, and headquarters' location in the transparency	140 GRI-based sustainability reports from 2017 and 2018 reports from large and multinational organizations	Quantitative content analysis	- Stakeholders - Disclosure of six of GRI's indicators	- The organizations do not disclose extensive and in-depth information about their efforts to identify material topics. - Third-party validation, the type of GRI standard and the headquarters' locations are unlikely to have an impact on the level of disclosure.	- Despite the adoption of the same standard, such disclosures can be extremely diverse and difficult to compare. - Longitudinal studies are also needed to verify whether the GRI standards can foster transparency in the long-term.
Sepúlveda-Alzate, García-Benau, and Gomez-Villegas (2021)	Materiality, Stakeholder engagement, Sustainability report, Principal component analysis (PCA), Global reporting initiative (GRI)	Measurement of the materiality of ESG information reported by Latin American listed companies	Sustainability reports of 65 companies for 2017 and 67 companies for 2018 belonging to the energy, mining, chemical, construction, materials and public services in Colombia, Mexico, Chile, Argentina and Brazil.	Content analysis	- Material topics - Information addressing environmental and social issues - Stakeholders	Water management, climate change and occupational health and safety are the most material topics.	n.a.

(to be continued)

Table 3 (continued)

Author/s (Year)	Keywords	Research Focus	Sample	Method/ Analysis	Variables	Main Findings	Limitations
Farooq, Zaman, Sarraj, and Khalid (2021)	Sustainability reporting, Corporate governance, Gulf cooperation council (GCC), Managerial capture, Materiality assessment	Investigation of the scope of materiality assessment disclosures in sustainability reports and their determinants	Listed companies based in the member states of the Cooperation Council for the Arab States of the Gulf	Content analysis of sustainability reports published by listed GCC companies during a five-year period (2013 to 2017) and a fixed effect ordered logic regression	- Corporate leverage - Corporate governance - Company size	- Sustainability reporting rates have improved, however most of companies still do not engage. - The use of internationally recognized standards has declined. - Materiality assessment disclosure scores are positively influenced by higher financial performance, lower leverage and better corporate governance.	- Limited to the examination of reporters' materiality assessments - Only four determinants of materiality assessment disclosure scores are identified and tested
Jørgensen, Mjøs, and Pedersen (2022)	ESG, Materiality, Sustainable business, Sustainability reporting	Examination of how and why the parallel use of the GRI and the SASB approach to materiality may cause confusion and how to resolve this	Survey n = 30 Qualitative interviews n = 6	Survey and qualitative interviews of financial market professionals	17 items in four broad categories: - the information needs of users; - approaches to materiality in sustainability reports; - information availability in sustainability reports; and - information quality in sustainability reports	- Different definitions of sustainability reporting can confuse the users of sustainability performance information. - Stakeholders perceive sustainability information differently, depending on the different approaches to materiality used.	Missing research on factors influencing stakeholders' assessment of materiality and on the processes by which different approaches to materiality emerge and develop.

(to be continued)

Table 3 (continued)

Author/s (Year)	Keywords	Research Focus	Sample	Method/ Analysis	Variables	Main Findings	Limitations
Ruiz-Lozano, De Vicente-Lama, Tirado-Valencia, and Cordobés-Madueño (2022)	Materiality process, Sustainability reporting, State-owned enterprises (SOEs), Institutional theory, Legitimacy theory, Stakeholder theory	Exploration of the disclosure of the materiality process in sustainability reports of state-owned enterprises (SOEs) and the underlying motivation for disclosure	Sustainability reports published by 166 SOEs in Spain	Content analysis	- Materiality disclosure index - Extent of materiality disclosure	- Low rate of information is disclosed about the materiality process. - Even though disclosure of sustainability information is mandatory for SOEs only a few companies follow the mandated principles to disclose materiality. - These results show that institutional uniformity only has a limited influence on the materiality process.	- Sample size - Composition of the sample by sector
Karagiannis, Vouros, Sioutas, and Evangelinos (2022)	CSR/Sustainability reporting, Materiality, Accountability, Maritime Shipping, Port operators	Analysis of the maritime sector's CSR agenda by analyzing the materiality disclosure among sustainability reports	42 sustainability reports and maritime experts	Deep content analysis and MCDA accompanied by a survey of maritime expert interviews	Most material aspects: Corporate features, sustainability impacts and operational aspects	- Maritime industry is lacking behind other industries concerning CSR and sustainability reporting. - Occupational health and safety of employees, air pollution control, efficient energy management and the integration of innovative technologies and security systems are the most important material issues.	- Sample size (initial sample of 90 reports shrank to 42) - No equal representation of the four sub-sectors in the final sample - Response rate of the survey was lower than expected
Papafloratos, Markidis, Kotzaivazoglou, and Fragidis (2023)	Sustainability, CSR reporting, materiality analysis, chemicals industry sustainability, Materiality, sustainability material topics	Exploration of the most material sustainability topics in the chemical industry	25 sustainability reports of some of the biggest companies in the chemical industry	Content analysis	Most material topics	The nine most commonly reported material topics are climate change; health and safety; responsible procurement; environmental pollution; corporate governance; circular economy; waste; water; and diversity and equal opportunity.	n.a.

Appendix C2 Literature Review

Table 4: Literature Reviews

Author/s (Year)	Keywords	Research Focus	Sample	Method/ Analysis	Main Findings	Limitations
Calabrese, Costa, Levialdi Ghiron, and Menichini (2017)	Sustainability reporting, materiality analysis, stakeholder engagement, Global Reporting Initiative (GRI), decision support methods.	Suggestion of an effective method to help companies with their materiality analysis based on the critical review of current sustainability literature	Three different Multi-Criteria-Decision Making (MCDM) methods for materiality analysis proposed by Hsu et al. (2013), Calabrese et al. (2016) and Bellantuono et al. (2016)	Literature review	- Based on a comparison and discussion of advantages and disadvantages of the MCDM methods the authors suggest five recommendations for a more effective method including: - Reduced computational effort, - Taking different stakeholder views into account, - Double perspective including both the significance of economic, environmental and social impacts and the influence on stakeholders' decisions and evaluations, - Dealing appropriately with subjectivity, - Provision of guidance to ensure completeness of content.	n.a.
Madasu (2019)	GRI, Materiality, Sustainability Reporting (SR), and DJSI	Emphasizing the purpose and significance of materiality in the context of sustainability reporting	Sustainability reports of 12 Indian companies which are part of Dow Jones Sustainability Index (DJSI)	Review of sustainability reports (exploratory and descriptive study)	- Even though the 12 Indian companies studied have received global recognition for their sustainability reporting, many of the Indian listed companies are still in the early stages in terms of materiality analysis. - The initiatives of the stock exchanges such as the BSE and NSE, as well as SEBI, are expected to bring all listed companies up to the level of the global standards.	- Limited sample (only 12 companies have been reviewed) - Geographical limitations
Abhayawansa (2022)	Materiality, European Financial Reporting Advisory Group, Global Reporting Initiative, International Financial Reporting Standards Foundation, International Sustainability Standards Board	Examination of the conceptualization of the principle of materiality and new conceptualization of materiality	Current regulatory work on sustainability reporting	Literature review	- Both the financial materiality and dual materiality approaches have limitations. - The author suggests a single materiality approach, based on accountability for financial and nonfinancial capital. - The proposed approach is underpinned by the need to consider the interdependencies between the environment, society, and the organization. - The proposed approach is expected to catalyze real changes in organizational practice.	n.a.

(to be continued)

Table 4 (continued)

Author/s (Year)	Keywords	Research Focus	Sample	Method/ Analysis	Main Findings	Limitations
Baumüller and Sopp (2022)	Non-financial reporting, Sustainability reporting, Materiality	Outline of the development of the materiality principle in the European accounting framework and changes in the requirements	European Union (EU) regulations in the field of non-financial and sustainability reporting	Historic analysis of EU regulations	- Materiality is heterogeneously defined in different sustainability/non-financial reporting standards. - Reporting requirements on sustainability matters have changed over the past two decades. - Trend from single to double materiality. - This shift was driven by the need and desire to appropriately interpret the principle of materiality set in the NFI Directive. - Considerable challenges and costs arise while putting it into practice.	Research on the conceptualization and operationalization of ecological and social materiality as well as on stakeholders' information usage is missing
Fiandrino, Tonelli, and Devalle (2022)	Materiality, Social and environmental accounting and reporting (SEAR), Sustainable development, Accountability, Systematic literature review, Sustainability materiality assessment	Examination of the current state of knowledge of sustainability materiality research	Existing literature on sustainability materiality research	Systematic literature review	- Academic research on sustainability materiality has increased exponentially since 2010. - Sustainability has been examined using content analysis techniques and qualitative approaches. - A common theoretical framework is missing.	- Exclusion of book chapters and conference proceedings - No empirical evidence
Chiu (2022)	Sustainable finance, Sustainable taxonomy, Double materiality, Sustainable benchmark, Sustainable index	Review of the current state of governance for Double Materiality in sustainability reporting in the EU	Existing literature on regulations and governance of sustainability reporting and materiality disclosure in the EU	Literature review	- The regulatory guidance in the latest EU regulations on information disclosure and taxonomy relies heavily on the operation of market-based governance to achieve public interest objectives in sustainable finance. - Additional work to develop sustainability metrics that inform the investment sector about the sustainable performance of companies would be key. - The EU will continue to take a leadership role in the development of metrics. Therefore, governance at the EU level should be appropriately designed, particularly in terms of multi-stakeholder participation in the development of metrics and in relation to key information intermediaries in this area.	n.a.

(to be continued)

Table 4 (continued)

Author/s (Year)	Keywords	Research Focus	Sample	Method/ Analysis	Main Findings	Limitations
Luque-Vílchez, Cordaz, Rimmel, and Tilt (2023)	GRI, Sustainability reporting, Materiality, Comparability, Assurance	Investigation of the current state of knowledge concerning sustainability reporting with a special focus on Global Reporting Initiative (GRI)-related aspects	Papers published in journals concerning sustainability reporting	Literature review	• There are still knowledge gaps and further research needs to be done to ensure high quality sustainability reporting. • There is an ongoing debate about single <i>versus</i> double materiality. • Clearer instructions and better contextualization would lead to better comparability.	n.a.
Perera-Aldama (2023)	Materiality, Sustainability reporting, GRI	Overview of key aspects of the development of the Global Reporting Initiative (GRI) Framework and Guidelines	Publicly available technical documents on GRI	Commentary based on literature review	• Need for the development of more practice-informed research about materiality. • The need is particularly crucial considering the current EU sustainability reporting regulatory and standard-setting process.	n.a.

Appendix D Research Methods

Appendix D1 Compliance Gap Analysis

Gap analysis is an analytical tool that can be used to identify the discrepancy between the actual state or performance of a company at a particular point in time and the desired or prospective state or performance in the future (Mercadal 2023). A compliance gap analysis particularly assesses a company's compliance with external regulations for specific processes. Unlike more strategic forms of gap analysis aimed at expanding market share, a regulatory compliance gap analysis is rather preventative and defensive. Its focus is on regulatory compliance, avoiding penalties, fulfilling reporting obligations and ensuring that external deadlines are successfully met (Hayes 2023).

Appendix D2 Content Analysis

Content analysis is a research approach that can be used to methodically analyze the content of various forms of written, spoken or visual material. It can be applied to a wide range of sources, including written texts, audio samples, videos, images or a compilation of these. Among other things, this research method can be used to determine the objectives, focal points or communication tendencies of a person, group or organization. Thereby content analysis comprises two main types: conceptual analysis and relational analysis. While conceptual analysis focuses on identifying and quantifying the occurrence of concepts in a source, relational analysis, extends this by analyzing the connections between the concepts. Consequently, each type of analysis can lead to different results, conclusions and interpretations. In this thesis, conceptual analysis has been chosen, in which a particular concept is examined, and the analysis consists of quantifying and evaluating its presence. The main objective is to analyze the occurrence of the selected terms in the data. Nevertheless, there are certain limitations. Even with technological help, the process of analyzing facts and drawing conclusions is time-consuming. In addition, there is the possibility of biases occurring

when drawing conclusions based on connections between concepts (Bengtsson 2016; Ungvarsky 2023; Columbia University 2023).

Appendix D3 Disclosure Index

A disclosure index is an indicator of the extent of disclosure of information by a particular company in relation to specific details. It is measured by the ratio of disclosed information to the total items under review and reflects the extent of the company's information transparency (Lemons, Serra, and Barros 2019). It is a tool which has continued to be used since the 1960s as it produces the expected results in many cases. However, a considerable drawback is that constructing an index involves subjective judgement by the researcher. Additionally, while calculating an index score for a particular company can give a measure of the extent of disclosure it does not necessarily analyze the underlying quality of disclosure (Marston and Shrives 1991).

Appendix E Variables

Table 5: Variables

	Variable	Explanation	Categories / Specification	Substantiation	Type of Variable
General	Location	Disclosure of information in the annual report	Yes / No	Annual Report, Sustainability Report	Nominal
	Volume	Scope of the information disclosed	Number of pages	Number of pages	Numerical
	Timeliness	Performance of a full materiality assessment (or just a reassessment)	Yes / No	Full assessment or reassessment, Year of latest full assessment	Nominal
	Double Materiality	Implementation of double materiality	Yes / No	Concept of Double Materiality is adapted	Nominal
	Definition	Definition for materiality is included	Yes / No	Definition	Nominal
	Standards	Orientation/Inclusion of Standards and Frameworks	Yes / No	Standards: Following / Core / Comprehensive	Nominal
Content	Prioritization	Prioritization of identified material topics	Yes / No	Top prioritized issues	Nominal
	Materiality Matrix	Display of a materiality matrix	Yes / No	x/y-axis of materiality matrix	Nominal
	Objectives	Targets related to the identified material issues	Yes / No	Excerpt of targets	Nominal
	Risks and Opportunities	Disclosure of risks and opportunities related to the material topics and consideration of financial effect size and probability of occurrence	Yes / No	Excerpt of risks and opportunities and assessment of their likelihood of occurrence and financial effect	Nominal
Process	Determination Process	The process of the materiality assessment is explained	Yes / No	Determination process is disclosed	Nominal
	Assurance	Independent mandatory assurance on reported information	Yes / No	Third-party auditor	Nominal
Stakeholder	Stakeholder Inclusion	Both financial materiality and impact materiality stakeholders are included	Yes / No	Financial and impact materiality stakeholder	Nominal
	Stakeholder Engagement	The stakeholders are engaged through a (online) survey, interviews, workshops, ...	Form of participation	(Online) surveys, interviews, workshops, other formats	Nominal
	Stakeholder Selection	Selection process of the stakeholders	Yes / No	Explanation of the process	Nominal

Appendix F ESRS Readiness Index

[1] ESRS Readiness Index Formula

$$ERI_n = \left(\frac{\sum_{i=1}^{11} x_i}{11} \right) \times 100$$

Table 6: Explanation of Variables

ERI_n Individual ESRS Readiness Index for company n		
x ₁	Location	x ₁ = 1 if the Materiality Analysis is part of the Annual Report x ₁ = 0 if otherwise
x ₂	Timeliness	x ₂ = 1 if a full Materiality Analysis was conducted in 2022 x ₂ = 0 if otherwise
x ₃	Double Materiality	x ₃ = 1 if Double Materiality is employed x ₃ = 0 if otherwise
x ₄	Definition	x ₄ = 1 if a definition of Materiality is disclosed x ₄ = 0 if otherwise
x ₅	Standards	x ₅ = 1 if the GRI Standards are followed x ₅ = 0 if otherwise
x ₆	Prioritization	x ₆ = 1 if material topics are prioritized x ₆ = 0 if otherwise
x ₇	Objectives	x ₇ = 1 if objectives are set based on the material topics x ₇ = 0 if otherwise
x ₈	Risks and Opportunities	x ₈ = 1 if risks and opportunities regarding the material topics are assessed x ₈ = 0 if otherwise
x ₉	Determination Process	x ₉ = 1 if the process of determining material issues is explained x ₉ = 0 if otherwise
x ₁₀	Assurance	x ₁₀ = 1 if a third-party auditor is involved x ₁₀ = 0 if otherwise
x ₁₁	Stakeholder Inclusion	x ₁₁ = 1 if stakeholders are included x ₁₁ = 0 if otherwise

Appendix G Sample

Appendix G1 Overview of DAX 40 Companies (Initial Sample)

Table 7: Overview DAX 40 Companies

Company	Industry	Sub Industry	Revenue (€ million, 2022)	Market capitalization (€ million, 2023)	Total Assets (€ million, 2022)	Number of Employees (2021)	Headquarter	(Last) DAX Admission Date	Reporting Period
Adidas	Retail And Consumption	Athletic Apparel And Footwear	22,511	27,882	20,296	61,401	Herzogenaurach, Germany	22. Jun 1998	01.01.2022 - 31.12.2022
Airbus	Mechanical Engineering, Transport, Logistics	Aerospace, Defense	58,763	97,479	115,900	126,495	Blagnac, France	20. Sep 2021	01.01.2022 - 31.12.2022
Allianz	Financial Services	Insurance	152,671	88,630	102,000	155,411	Munich, Germany	01. Jul 1988	01.01.2022 - 31.12.2022
BASF	Chemical, Pharmaceutical, Biotechnology And Medical Technology	Chemicals, Materials, Industrial Solutions	87,327	36,901	84,472	111,047	Ludwigshafen Am Rhein, Germany	01. Jul 1988	01.01.2022 - 31.12.2022
Bayer	Chemical, Pharmaceutical, Biotechnology And Medical Technology	Chemicals, Pharmaceuticals	50,739	43,098	124,900	99,637	Leverkusen, Germany	01. Jul 1988	01.01.2022 - 31.12.2022
Beiersdorf	Retail And Consumption	Consumer Goods (Production)	8,799	27,479	158,000	20,567	Hamburg, Germany	20. Jun 2022	01.01.2022 - 31.12.2022
BMW	Mechanical Engineering, Transport, Logistics	Automotive (Production)	142,610	58,346	246,926	118,909	Munich, Germany	01. Jul 1988	01.01.2022 - 31.12.2022

(to be continued)

Table 7 (continued)

Company	Industry	Sub Industry	Revenue (€ million, 2022)	Market capitalization (€ million, 2023)	Total Assets (€ million, 2022)	Number of Employees (2021)	Headquarter	(Last) DAX Admission Date	Reporting Period
Brenntag	Chemical, Pharmaceutical, Biotechnology And Medical Technology	Chemicals (Trade)	19,429	10,827	11,373	17,236	Essen, Germany	20. Sep 2021	01.01.2022 - 31.12.2022
Commerzbank	Financial Services	Banking	9,500	12,650	477,000	46,218	Frankfurt am Main, Germany	27. Feb 2023	01.01.2022 - 31.12.2022
Continental	Mechanical Engineering, Transport, Logistics	Automotive (Supplier)	39,409	13,016	37,927	193,500	Hannover, Germany	24. Sep 2012	01.01.2022 - 31.12.2022
Covestro	Chemical, Pharmaceutical, Biotechnology And Medical Technology	Chemicals	17,968	9,407	14,585	17,909	Leverkusen, Germany	19. Mar 2018	01.01.2022 - 31.12.2022
Daimler Truck	Mechanical Engineering, Transport, Logistics	Utility Vehicles (Production)	50,945	26,276	63,969	99,849	Stuttgart, Germany	21. Mar 2022	01.01.2022 - 31.12.2022
Deutsche Bank	Financial Services	Banking	27,200	20,252	1,339,157	82,969	Frankfurt am Main, Germany	01. Jul 1988	01.01.2022 - 31.12.2022
Deutsche Börse	Financial Services	Diversified Financials	4,338	29,517	269,109	8,855	Frankfurt am Main, Germany	23. Dec 2022	01.01.2022 - 31.12.2022
Deutsche Telekom	Technology	Telecommunication	114,197	98,568	301,686	851,600	Bonn, Germany	18. Nov 1996	01.01.2022 - 31.12.2022
DHL Group	Mechanical Engineering, Transport, Logistics	Logistics	94,436	45,620	68,278	574,047	Bonn, Germany	19. Mar 2001	01.01.2022 - 31.12.2022

(to be continued)

Table 7 (continued)

Company	Industry	Sub Industry	Revenue (€ million, 2022)	Market capitalization (€ million, 2023)	Total Assets (€ million, 2022)	Number of Employees (2021)	Headquarter	(Last) DAX Admission Date	Reporting Period
E.ON	Energy And Raw Materials	Energy (Supply)	115,660	28,166	134,009	69,733	Essen, Germany	19. Jun 2000	01.01.2022 - 31.12.2022
Fresenius	Chemical, Pharmaceutical, Biotechnology And Medical Technology	Medical Technology, Clinics	40,840	15,583	76,415	316,078	Bad Homburg vor der Höhe, Germany	23. Mar 2009	01.01.2022 - 31.12.2022
Hannover Rück	Financial Services	Insurance	33,276	24,909	86,952	3,346	Hannover, Germany	21. Mar 2022	01.01.2022 - 31.12.2022
Heidelberg Materials	Others	Construction Materials	21,714	12,879	33,256	51,209	Heidelberg, Germany	21. Jun 2010	01.01.2022 - 31.12.2022
Henkel Vz.	Chemical, Pharmaceutical, Biotechnology And Medical Technology	Consumer Goods, Chemicals	22,397	26,509	18,080	52,450	Düsseldorf, Germany	01. Jul 1988	01.01.2022 - 31.12.2022
Infineon	Technology	Semiconductor	14,218	41,680	26,912	50,288	Neubiberg, Germany	21. Sep 2009	01.10.2021 - 30.09.2022
Mercedes- Benz Group	Mechanical Engineering, Transport, Logistics	Automotive (Production)	150,017	68,320	273,952	172,425	Stuttgart, Germany	21. Dec 1998	01.01.2022 - 31.12.2022
Merck	Chemical, Pharmaceutical, Biotechnology And Medical Technology	Chemicals, Pharmaceuticals	22,232	67,194	109,000	60,348	Darmstadt, Germany	18. Jun 2007	01.01.2022 - 31.12.2022
MTU Aero Engines	Mechanical Engineering, Transport, Logistics	Aviation	5,330	8,913	9,230	10,508	Munich, Germany	23. Sep 2019	01.01.2022 - 31.12.2022

(to be continued)

Table 7 (continued)

Company	Industry	Sub Industry	Revenue (€ million, 2022)	Market capitalization (€ million, 2023)	Total Assets (€ million, 2022)	Number of Employees (2021)	Headquarter	(Last) DAX Admission Date	Reporting Period
Münchener Rück- versicherungs- Gesellschaft	Financial Services	Insurance	67,100	50,302	106,889	39,281	Munich, Germany	23. Sep 1996	01.01.2022 - 31.12.2022
Porsche AG	Mechanical Engineering, Transport, Logistics	Automotive (production)	37,630	79,803	47,673	36,996	Stuttgart, Germany	19. Dec 2022	01.01.2022 - 31.12.2022
Porsche Automobil vz.	Mechanical Engineering, Transport, Logistics	Holding company, Automotive	4,788	14.,078	n.a.	n.a.	Stuttgart, Germany	20. Sep 2021	01.01.2022 - 31.12.2022
QIAGEN	Chemical, Pharmaceutical, Biotechnology And Medical Technology	Biotechnology	1,996	8,715	56,352	6,000	Venlo, Netherlands	20. Sep 2021	01.01.2022 - 31.12.2022
Rheinmetall	Mechanical Engineering, Transport, Logistics	Defense technology, automotive (supplier)	6,410	10,168	8,089	23,945	Düsseldorf, Germany	20. Mar 2023	01.01.2022 - 31.12.2022
RWE	Energy And Raw Materials	Energy (supply)	38,366	24,576	59,245	18,246	Essen, Germany	01. Jul 1988	01.01.2022 - 31.12.2022
SAP	Technology	Software	30,871	142,867	72,159	107,415	Walldorf, Germany	18. Sep 1995	01.01.2022 - 31.12.2022
Sartorius vz.	Chemical, Pharmaceutical, Biotechnology And Medical Technology	Medical technology	4,175	19,668	2,748	13,832	Göttingen, Germany	20. Sep 2021	01.01.2022 - 31.12.2022
Siemens	Technology	Electrical engineering	71,977	98,157	195,125	303,000	Berlin and Munich, Germany	01. Jul 1988	01.01.2022 - 31.12.2022

(to be continued)

Table 7 (continued)

Company	Industry	Sub Industry	Revenue (€ million, 2022)	Market capitalization (€ million, 2023)	Total Assets (€ million, 2022)	Number of Employees (2021)	Headquarter	(Last) DAX Admission Date	Reporting Period
Siemens Energy	Energy And Raw Materials	Energy technology	28,997	9,170	n.a.	91,000	Munich, Germany	19. Sep 2022	01.01.2022 - 31.12.2022
Siemens Healthineers	Chemical, Pharmaceutical, Biotechnology And Medical Technology	Medical Equipment	21,714	53,439	n.a.	66,000	Erlangen, Germany	20. Sep 2021	01.01.2022 - 31.12.2022
Symrise	Chemical, Pharmaceutical, Biotechnology And Medical Technology	Food, chemistry, cosmetics, consumer goods, fragrances	4,618	12,764	7,783	11,151	Holzminden, Germany	20. Sep 2021	01.01.2022 - 31.12.2022
Volkswagen (VW) vz.	Mechanical Engineering, Transport, Logistics	Automotive (production)	279,232	57,758	564,800	672,800	Wolfsburg, Germany	01. Jul 1988	01.01.2022 - 31.12.2022
Vonovia	Financial Services	Real Estate	5,418	17,881	96,038	15,871	Bochum, Germany	21. Sep 2015	01.01.2022 - 31.12.2022
Zalando	Retail And Consumption	E-commerce	10,345	5,303	7,626	17,043	Berlin, Germany	20. Sep 2021	01.01.2022 - 31.12.2022

Sources: Statista 2023, Finanzen.net 2023, Company Reports (see Appendix G3)

Appendix G2 Final Sample

Table 8: Final Sample

		Number of Companies
Initial Sample		40
Reasons for Inclusion	- Listed on DAX 40 - Subject to mandatory reporting on non-financial information according to both the current NFRD and the upcoming CSRD - Represent all major markets and sectors in Germany	
	Not publishing their own report but instead are part of a shared report with their respective parent companies	2
	Report under the same reporting period, viz. the financial year beginning on the 1 January until the 31 December	1
Criteria for Exclusion	Include or at least mention a materiality analysis in their report	1
Final Sample		36

Appendix G3 Final Sample Data Source

Table 9: Final Sample Sources

Company	Type of Report	Source	Link
Adidas	Annual Report	Adidas (2023) "Annual Report 2022"	https://www.adidas-group.com/media/filer_public/39/e8/39e887ed-0867-4c53-b3d4-36348f43cbb1/annual_report_2022_en_secured.pdf
Airbus	Annual Report	Airbus (2023) "Progressing with purpose"	https://www.airbus.com/sites/g/files/jlcbta136/files/2023-05/Airbus_SE_2022_Annual_Report.pdf
Allianz	Sustainability Report	Allianz (2023) "Building confidence in tomorrow"	https://www.allianz.com/content/dam/onemarketing/azcom/Allianz_com/sustainability/documents/Allianz_Group_Sustainability_Report_2022-web.pdf
BASF	Annual Report	BASF (2023) "BASF Report 2022"	https://report.basf.com/2022/en/_assets/downloads/entire-basf-ar22.pdf
Bayer	Sustainability Report	Bayer (2023) "Sustainability Report 2022"	https://www.bayer.com/sites/default/files/2023-02/Bayer-Sustainability-Report-2022.pdf
Beiersdorf	Annual Report	Beiersdorf (2023) "Formula for sustainable growth"	https://reports.beiersdorf.com/annual-report/2022/?_ga=2.41380257.2008574357.1701288977-1549723859.1701288977
BMW	Annual Report	BMW (2023) "Next level mobility"	https://www.press.bmwgroup.com/global/article/detail/T0410919EN/bmw-group-report-2022?language=en
Commerzbank	Sustainability Report	Commerzbank (2023) "Transformation Net-Zero"	https://www.commerzbank.de/media/en/nachhaltigkeit/viii_dat_en_fakten/20230725_Commerzbank_GRI-Bericht_2022.pdf
Continental	Sustainability Report	Continental (2023) "Turn Change Into Opportunity – Embrace Sustainability"	https://cdn.continental.com/fileadmin/_imported/sites/corporate/_international/english/hubpages/40_20sustainability/60_20reports_20_26_20principles/continental-sustainability-report-2022.pdf
Covestro	Annual Report	Covestro (2023) "Speeding up to circularity"	https://report.covestro.com/annual-report-2022/_assets/downloads/covestro-ar22-entire.pdf

(to be continued)

Table 9 (continued)

Company	Type of Report	Source	Link
Daimler Truck	Annual Report	Daimler Truck (2023) "Annual Report 2022"	https://www.daimlertruck.com/fileadmin/user_upload/document/s/investors/reports/annual-reports/2022/daimler-truck-ir-annual-report-2022-incl-combined-management-report-dth-ag.pdf
Deutsche Bank	Sustainability Report	Deutsche Bank (2023) "Non-financial Report 2022"	https://agm.db.com/files/documents/2023/Non-Financial-Report-2022.pdf
Deutsche Börse	Annual Report	Deutsche Börse (2023) "Annual Report 2022"	https://www.deutsche-boerse.com/resource/blob/3374218/126bfa0fca2b0adbb635212d5a2c0d77/data/DBG-annual-report-2022.pdf
Deutsche Telekom	Sustainability Report	Deutsche Telekom (2023) "Our Journey into a sustainable future"	https://www.cr-bericht.telekom.com/2022/
DHL Group	Annual Report	DHL Group (2023) "We keep delivering"	https://reporting-hub.group.dhl.com/ecomaXI/files/DPDHL-2022-Annual-Report.pdf
E.ON	Annual Report	E.ON (2023) "Taking action now"	https://www.eon.com/content/dam/eon/eon-com/eon-com-assets/documents/investor-relations/en/annual-report/GB2022_gesamt_EN_final.pdf
Fresenius	Annual Report	Fresenius (2023) "#FutureFresenius"	https://www.fresenius.com/sites/default/files/2023-03/Fresenius_Annual_Report_2022_3.pdf
Hannover Rück	Sustainability Report	Hannover Rück (2023) "Annual Report 2022"	https://www.hannover-re.com/1945664/annual-report-2022.pdf
Heidelberg Materials	Annual Report	Heidelberg Materials (2023) "Annual and Sustainability Report 2022"	https://www.heidelbergmaterials.com/en/reports-and-presentations
Henkel Vz.	Sustainability Report	Henkel Vz. (2023) "Sustainability Report 2022"	https://www.henkel.com/resource/blob/1804850/56551a2284bd7d2c9838410b8395a5dd/data/2022-sustainability-report.pdf
Mercedes-Benz Group	Sustainability Report	Mercedes-Benz Group (2023) "Sustainability Report 2022"	https://sustainabilityreport.mercedes-benz.com/2022/
Merck	Sustainability Report	Merck (2023) "Sustainability Report 2022"	https://www.merckgroup.com/en/sustainability-report/2022/_assets/downloads/entire-merck-sr22.pdf
MTU Aero Engines	Sustainability Report	MTU Aero Engines (2023) "Transforming Aviation"	https://sustainability.mtu.de/app/uploads/SustainabilityReport2022-en.pdf
Münchener Rückversicherungs-Gesellschaft	Annual Report	Münchener Rückversicherungs-Gesellschaft (2023) "Group Annual Report 2022"	https://www.munichre.com/content/dam/munichre/mrwebsiteslaunches/2022-annual-report/MunichRe-Group-Annual-Report-2022-en.pdf/_jcr_content/renditions/original/MunichRe-Group-Annual-Report-2022-en.pdf
Porsche AG	Annual Report	Porsche AG (2023) "Annual Report 2022"	https://www.porsche-se.com/fileadmin/user_upload/PSE2022_Annual_Report_en.pdf
QIAGEN	Annual Report	QIAGEN (2023) "IFRS Annual Report 2022"	https://s28.q4cdn.com/125951340/files/doc_downloads/other_reports/2022-IFRS-Annual-Report.pdf
Rheinmetall	Annual Report	Rheinmetall (2023) "Annual Report 2022"	https://ir.rheinmetall.com/de/investor-relations/veroeffentlichungen/finanzberichte/
RWE	Annual Report	RWE (2023) "Energy is our passion Passion is our energy"	https://www.rwe.com/-/media/RWE/documents/05-investor-relations/finanzkalender-und-veroeffentlichungen/2022-GJ/2023-03-21-rwe-annual-report-2022.pdf

(to be continued)

Table 9 (continued)

Company	Type of Report	Source	Link
SAP	Annual Report	SAP (2023) "Integrated Report 2022"	https://www.sap.com/integrated-reports/2022/en.html?pdf-asset=8230868e-647e-0010-bca6-c68f7e60039b&page=1
Sartorius vz.	Sustainability Report	Sartorius vz. (2023) "Sustainability Report 2022"	https://www.sartorius.com/download/1414488/sartorius-sustainability-report-2022-pdf-data.pdf
Siemens	Sustainability Report	Siemens (2023) "Sustainability Report 2022"	https://assets.new.siemens.com/siemens/assets/api/uuid:c1088e4f-4d7f-4fa5-8e8e-33398ecf5361/sustainability-report-fy2022.pdf
Siemens Energy	Sustainability Report	Siemens Energy (2023) "Tackling challenges"	https://p3.aprimocdn.net/siemensenergy/e7e20f33-7478-46b4-b00e-b03b007a4b69/Siemens-Energy-Sustainability-Report-2022-pdf_Original%20file.pdf
Symrise	Sustainability Report	Symrise (2023) "2022 - Sustainability Report"	https://symrise.com/corporatereport/2022/downloads/SYM_gri_2022_EN.pdf
Volkswagen (VW) vz.	Annual Report	Volkswagen (VW) vz. (2023) "Annual Report 2022"	https://annualreport2022.volkswagenag.com/_assets/downloads/entire-vw-ar22.pdf
Vonovia	Annual Report	Vonovia (2023) "Act reliably"	https://report.vonovia.de/2022/q4/app/uploads/Vonovia-SE_Annual-Report-2022.pdf
Zalando	Sustainability Report	Zalando (2023) "Sustainability Progress Report 2022"	https://corporate.zalando.com/en/our-impact/sustainability/sustainability-reports/sustainability-progress-report-2022#planet

Appendix H Analysis Results

Appendix H1 Overview Results - General Variables

Table 10: Overview Results - General Variables

Variable Company	Location Annual Report or Sustainability Report	Volume Number of Pages	Timeliness Year of last full Materiality Analysis	Double Materiality	Definition	Standards
Adidas	Annual Report	< 1 (Section)	2022	Yes	n.a.	GRI Following
Airbus	Annual Report	2	2022	Yes	See Appendix H2	GRI Core
Allianz	Sustainability Report	2	2021	Yes	See Appendix H2	GRI Following
BASF	Annual Report	2	2022	Yes	See Appendix H2	GRI Following
Bayer	Sustainability Report	1	2022	Yes	See Appendix H2	GRI Following
Beiersdorf	Annual Report	1	2021	Yes	n.a.	GRI Following
BMW	Annual Report	0	2022	Yes	See Appendix H2	GRI Following
Commerzbank	Sustainability Report	3	2022	Yes	n.a.	GRI Following
Continental	Sustainability Report	< 1 (Section)	2019	No	n.a.	GRI Following
Covestro	Annual Report	4,50	2020	Yes	See Appendix H2	GRI Following
Daimler Truck	Annual Report	1	2022	Yes	See Appendix H2	GRI Following
Deutsche Bank	Sustainability Report	2	2021	Yes	See Appendix H2	GRI Following
Deutsche Börse	Annual Report	0 (only mentioned)	2021	No	n.a.	GRI Following
Deutsche Telekom	Sustainability Report	2	2022	Yes	See Appendix H2	GRI Following
DHL Group	Annual Report	< 1 (Section)	2021	No	See Appendix H2	GRI Following
E.ON	Annual Report	< 1 (Section)	2022	Yes	See Appendix H2	GRI Following
Fresenius	Annual Report	< 1 (Section)	2020	Yes	See Appendix H2	GRI Following
Hannover Rück	Sustainability Report	1	2020	Yes	See Appendix H2	GRI Following
Heidelberg Materials	Annual Report	1	2022	Yes	See Appendix H2	GRI Following
Henkel Vz.	Sustainability Report	> 3	2022	Yes	n.a.	GRI Following
Mercedes-Benz Group	Sustainability Report	4	2022	Yes	See Appendix H2	GRI Following
Merck	Sustainability Report	13	2022	No	n.a.	GRI Following
MTU Aero Engines	Sustainability Report	3	2022	Yes	See Appendix H2	n.a.
Münchener Rück- versicherungs- Gesellschaft	Annual Report	2	2021	Yes	n.a.	GRI Following
Porsche AG	Annual Report	1	2022	Yes	n.a.	n.a.
QIAGEN	Annual Report	2	2022	Yes	See Appendix H2	GRI Following
Rheinmetall	Annual Report	< 1 (Section)	2022	No	n.a.	n.a.

(to be continued)

Table 10 (continued)

Variable Company	Location Annual Report or Sustainability Report	Volume Number of Pages	Timeliness Year of last full Materiality Analysis	Double Materiality	Definition	Standards
RWE	Annual Report	< 1 (Section)	2021	Yes	See Appendix H2	n.a.
SAP	Annual Report	2	2022	Yes	See Appendix H2	GRI Following
Sartorius vz.	Sustainability Report	< 1 (Section)	2018	Yes	n.a.	n.a.
Siemens	Sustainability Report	3	2021	Yes	See Appendix H2	GRI Following
Siemens Energy	Sustainability Report	1	2022	Yes	n.a.	GRI Core
Symrise	Sustainability Report	3	2022	Yes	n.a.	GRI Following
Volkswagen (VW) vz.	Annual Report	< 1 (Section)	2022	No	n.a.	n.a.
Vonovia	Annual Report	2	2021	Yes	See Appendix H2	n.a.
Zalando	Sustainability Report	< 1 (Section)	2019	No	n.a.	GRI Following

Appendix H2 Materiality Definitions

Table 11: Materiality Definitions

Company	Definition
Airbus	"how important it is for the Company to address a given topic", "potential impact of ist activities on people and environment in connection with the Company's activities", "potential impact of ESG related topics on the Company's financial performance" (Airbus 2023, 63 f.)
Allianz	"identifying material sustainability matters from an impact perspective (our impact on the environment and people) and a financial perspective (risks and opportunities related to sustainability matters)" (Allianz 2023, 158)
BASF	"Impact materiality Actual and potential impacts of our activities along the value chain, Financial materiality Financial impacts of ESG topics on our performance" (BASF 2023, 46)
Bayer	"Impact of Bayer's business operations on economic, social or environmental matters; Impact on decisions by Bayer stakeholders" (Bayer 2023, 33)
BMW	"material were those where the actions of the BMW Group may have a significant Sustainability impact on the environment and society (inside-out) and which may be of high business relevance to the BMW Group (outside-in)" (BMW 2023, 7)
Covestro	"material sustainability topics according to their "business relevance" and "impact of our own activities on respective sustainability aspects" (Covestro 2023, 55)
Daimler Truck	"both the business relevance of sustainability issues and the impact on our environment and the people around us" (Daimler Truck 2023, 65)
Deutsche Bank	"Outside pressure that external stakeholder groups place on Deutsche Bank. Impacts of Deutsche Bank's business activities on the topics, Topic's relevance to Deutsche Bank's current and future business, results of operations and net asset and financial position" (Deutsche Bank 2023, 9)
Deutsche Telekom	"negative and positive impacts of our business activities on the environment, society, and human rights along the entire value chain, as well as financial sustainability opportunities and risks" (Deutsche Telekom 2023, 21)
DHL Group	"topics were derived on which our business has a material influence or, conversely, which can affect our business" (DHL Group 2023, 50)
E.ON	"sustainability topics that are most important to the company and ist stakeholders; considered the financial perspective as well as the impact perspective" (E.ON 2023, 31)
Fresenius	"Impact of Fresenius Group: Impact of the company on the material topic, Potential severity and likelihood of impacts; Impact on Fresenius Group: Relevance of material topic on business operations assessed, including economic, social and governance criteria" (Fresenius 2023, 106)
Hannover Rück	"positive/negative impacts of Hannover Re's operations on the respective topic (inside-out perspective) and positive/negative impacts of the respective topic on Hannover Re's operations (outside-in perspective)." (Hannover Rück 2023, 17)

(to be continued)

Table 11 (continued)

Heidelberg Materials	"Impact on the environment and society: Does the business activity of Heidelberg Materials have an impact on this topic? [...] Business relevance: Does this topic affect the business activity of Heidelberg Materials from a financial point of view?" (Heidelberg Materials 2023, 24)
Mercedes-Benz Group	"Inside out: The positive or negative influences of the Group's business activities on the economy, the environment and society are brought into focus. Outside in: The impact of external requirements and expectations of the Group's sustainability performance on its business activities, business results and general situation is considered." (Mercedes-Benz Group 2023, 20)
MTU Aero Engines	"issues relating to the social and environmental impact of our business activities [...], business relevance of the issues, based among other things on the impact they may have on the company's reputation or on the income statement" (MTU Aero Engines 2023, 21)
QIAGEN	"the impact of our business activity on a particular topic (inside-out perspective) and ii) the impact of the topic on assets, financial and the profitability of QIAGEN (outside-in perspective)." (QIAGEN 2023, 82)
RWE	"the effect the topics have on us as a company as well as the impact we have on the sustainability issues" (RWE 2023, 80)
SAP	"Material topics are topics that represent an organization's most significant impacts on the economy, environment, and people, including impacts on their human rights." (SAP 2023, 277)
Siemens	"Stakeholder perspective: This perspective refers to sustainability topics that are deemed to be material by external stakeholders [...]. Insideout perspective: This perspective refers to sustainability topics that can be positively or negatively influenced by the company's business activities, [...]. Outside-in perspective: This perspective refers to sustainability topics that can be associated with opportunities and risks of the company's business activities or financial situation." (Siemens 2023, 30 f.)
Vonovia	"the relevance of social and environmental changes to the business and value creation (outside-in perspective) and the impact of the business model and company activities on the environment, society and the economy (inside-out-perspective)" (Vonovia 2023, 48)

Appendix H3 Overview Results - Content Variables

Table 12: Overview Results - Content Variables

Variable	Prioritization	Objectives	Risks and Opportunities	Materiality Matrix		
Substantiation Company	Top prioritized Material Issues	Example of Objectives	Excerpt of Risks and Opportunities	Variable in x-axis	Variable in y-axis	Bubble size
Adidas	n.a.	n.a.	n.a.	n.a.		
Airbus	Climate Change, Product safety, Cyber security, Business integrity, Occupational health and safety	Climate Change: "2030: -63% in line with 1.5°C pathway, and neutralising residual emissions" (69)	Climate change; Human rights: impacts related to products and services; Health and safety: Exposure to hazardous substances and materials	Importance to stakeholders	Potential impact on rights holders or ecosystems	Impact on the company or financial materiality
Allianz	1. Climate Change, 2. Ethics and responsible business, 3. Cybersecurity	n.a.	n.a.	n.a.		
BASF	n.a.	n.a.	n.a.	n.a.		
Bayer	Climate Protection, Protection of the Environment, Innovation, Business Ethics, Product Stewardship, Sustainable Food, Security, Access to Healthcare	No (only for selected topics)	No (only for selected topics)	Bayer Relevance (internal perspective)	Stakeholder Relevance (external perspective)	n.a.
Beiersdorf	Climate protection, circular economy, sustainable land use and biodiversity, sustainable use of water	n.a.	n.a.	n.a.		

(to be continued)

Table 12 (continued)

Variable	Prioritization	Objectives	Risks and Opportunities	Materiality Matrix		
Substantiation Company	Top prioritized Material Issues	Example of Objectives	Excerpt of Risks and Opportunities	Variable in x-axis	Variable in y-axis	Bubble size
BMW	Alternative drive systems (Electromobility), Decarbonisation along the value chain (Carbon emissions), Responsible sourcing (Purchasing and Supplier Network), Resource management in line with the principle of the Circular economy, Compliance and Human Rights	n.a.	n.a.	n.a.		
Commerzbank	n.a.	n.a.	n.a.	n.a.		
Continental	Carbon neutrality, Emission-free mobility and industries, Circular economy, Responsible value chain, Good working conditions	n.a.	n.a.	n.a.		
Covestro	Circular economy, Climate neutrality, Sustainable R&D based innovation portfolio, Sustainable product portfolio & stewardship	"Our production processes are intended to use 100% alternative raw materials and thus contribute to our pursuit of a circular economy and to reducing our Scope 3 emissions" (61)	n.a.	Business relevance	Impact of our own activities on sustainability aspects	n.a.
Daimler Truck	Climate change mitigation & adaption to climate change, Human rights, Resource efficiency, Health & safety, Pollution prevention	n.a.	n.a.	n.a.		
Deutsche Bank	Anti-financial crime, Sustainable finance, Employment and employability, Climate risk, Information security	n.a.	n.a.	Topic Impact on Deutsche Bank	Deutsche Bank impact o. topic	n.a.
Deutsche Börse	n.a.	n.a.	n.a.	n.a.		
Deutsche Telekom	n.a.	e.g. "We aim to meet 50 percent of our energy needs through PPAs by 2025." (85)	n.a.	n.a.		
DHL Group	n.a.	"Limit GHG emissions 2 to a maximum of 39 million tonnes of CO ₂ e" (52)	n.a.	n.a.		

(to be continued)

Table 12 (continued)

Variable Substantiation Company	Prioritization	Objectives	Risks and Opportunities	Materiality Matrix		
	Top prioritized Material Issues	Example of Objectives	Excerpt of Risks and Opportunities	Variable in x-axis	Variable in y-axis	Bubble size
E.ON	Climate-change mitigation, Energy affordability, Reliable energy supply	n.a.	n.a.	n.a.		
Fre-senius	Well-being of the patient, Digital transformation, Cybersecurity, Employees, Occupational health and safety, Diversity and equal opportunities, Compliance and integrity, Environment	n.a.	n.a.	n.a.		
Hannover Rück	n.a.	n.a.	Underwriting risks (property & casualty and life & health insurance), market risks, counterparty default risks, operational risks and other risks	n.a.		
Heidelberg Materials	Biodiversity, Circularity & resource management, CO2 emissions, Diversity, equity & inclusion, Emissions (SOx, Nox, dust, noise)	n.a.	n.a.	Different kind of figure		
Henkel Vz.	n.a.	n.a.	n.a.	n.a.		
Mercedes-Benz Group	Climate protection and adaption, Emissions reduction, Resource conservation, Respecting human rights, Sustainable mobility	n.a.	ESG-related risks and opportunities associated with the Mercedes-Benz Group's own business activities, [...], and which are very likely to have a serious negative impact on the non-financial aspects [...] are not currently apparent.	Inside out	Outside in	n.a.
Merck	n.a.	n.a.	n.a.	n.a.		
MTU Aero Engines	Product quality and flight safety, Innovation, Climate impact of products in use, Climate action production sites, Human rights	"Our vision is 'Zero defects.' In this, we stand for future-oriented quality management: [...]" (25)	n.a.	MTUs impact on environment and society	Relevance for MTUs businesses	n.a.
Münchener Rückversicherungs-Gesellschaft	Responsible digital transformation and cyber security, Customer orientation and customer satisfaction, Climate change, Natural disasters, Compliance	n.a.	n.a.	Munich Re's impact on the criteria	Relevance of the individual topics for Munich Re's businesses	Opinions of external stakeholders, i.e. the topics' relevance to the people in question

(to be continued)

Table 12 (continued)

Variable	Prioritization	Objectives	Risks and Opportunities	Materiality Matrix		
Substantiation Company	Top prioritized Material Issues	Example of Objectives	Excerpt of Risks and Opportunities	Variable in x-axis	Variable in y-axis	Bubble size
Porsche AG	Employee-related matters, Anti-corruption, Bribery matters (compliance)	n.a.	"Based on the current estimations, there are no significant risks from the Porsche SE Group's business activities, [...]"	n.a.		
QIA-GEN	n.a.	n.a.	"Improved reputation and increasing revenue opportunities due to higher demand for products without plastic"	n.a.		
Rheinmetall	Financial stability and profitable growth, Integrity and compliance, Respect for human rights, Attractiveness as an employer, Product safety, Corporate safety	n.a.	n.a.	n.a.		
RWE	n.a.	"By 2025, we want to scale back our Scope 1 and 2 greenhouse gas emissions per unit of electricity generated by 27 %." (82)	n.a.	n.a.		
SAP	Security, privacy, and data, Ethics and compliance, Climate change and air quality, Customer responsibility, Employee engagement	n.a.	n.a.	n.a.		
Sartorius vz.	Advance innovation and, as a result, contribute to improved medical care and promote employment [...]"	n.a.	n.a.	n.a.		
Siemens	Sustainable product design and lifecycle management, climate protection, Social and ecological standards in the supply chain, climate protection	n.a.	n.a.	n.a.		
Siemens Energy	Greenhouse gas emissions related to our products, services and solutions, Product safety, Product efficiency, Occupational health, Product quality	n.a.	n.a.	Different kind of figure with two dimensions: 1. Impact and 2. Stakeholder Relevance		
Symrise	Climate protection & climate adaption, Environmental protection & biodiversity, Partners & communities, Raw material use & circular economy, Procurement & human rights	n.a.	n.a.	Different kind of figure with two dimensions: 1. business relevance and 2. impact on environment and society		
Volkswagen (VW) vz.	Decarbonization, circular economy, supply chain and human rights, people & transformation, diversity, and integrity	n.a.	n.a.	n.a.		

(to be continued)

Table 12 (continued)

Variable	Prioritization	Objectives	Risks and Opportunities	Materiality Matrix		
Substantiation Company	Top prioritized Material Issues	Example of Objectives	Excerpt of Risks and Opportunities	Variable in x-axis	Variable in y-axis	Bubble size
Vonovia	Reducing CO2 in the housing portfolio, Appeal on the capital market, Living an fair prices, Homes that meet people's needs and demographic change, Appeal as an employer	"Vonovia has set itself the target of achieving a virtually climate-neutral housing stock by 2045, with catbon intensity of less than 5kg of CO2 equivalents per sqm of rental area" (64)	n.a.	Impact on the Environment, Society and Economy	Business relevance	n.a.
Zalando	n.a.	n.a.	n.a.	n.a.		

Appendix H4 Best Practice Materiality Matrix

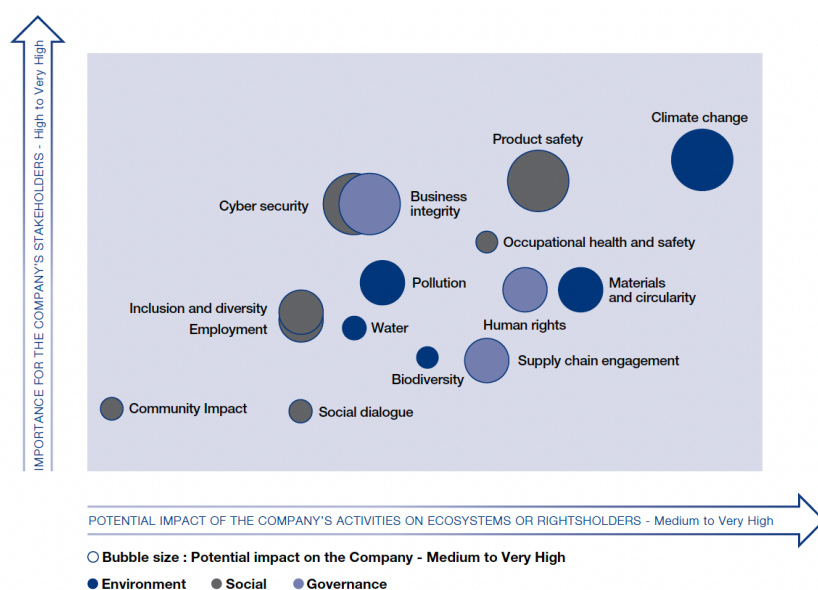


Figure 2: Materiality Matrix Airbus
Source: Airbus 2023, 64

Appendix H5 Overview Results - Process Variables

Table 13: Overview Results - Process Variables

Variables	Determination Process	Assurance
Substantiation	Process disclosed?	Third-party Auditor
Adidas	Yes	KPMG
Airbus	Yes	EY
Allianz	Yes	PWC
BASF	Yes	KPMG
Bayer	Yes	Deloitte
Beiersdorf	No	EY
BMW	No	PWC

(to be continued)

Table 13 (continued)

Variables	Determination Process	Assurance
Substantiation	Process disclosed?	Third-party Auditor
Commerzbank	Yes	DNV Business Assurance Zertifizierung GmbH
Continental	No	PWC
Covestro	Yes	KPMG
Daimler Truck	Yes	KPMG
Deutsche Bank	Yes	EY
Deutsche Börse	No	PWC
Deutsche Telekom	Yes	Deloitte
DHL Group	No	PWC
E.ON	Yes	KPMG
Fresenius	No	PWC
Hannover Rück	Yes	n.a.
Heidelberg Materials	Yes	PWC
Henkel Vz.	Yes	PWC
Mercedes-Benz Group	Yes	KPMG
Merck	Yes	KPMG
MTU Aero Engines	No	n.a.
Münchener Rückversicherungs-Gesellschaft	Yes	EY
Porsche AG	No	PWC
QIAGEN	Yes	KPMG
Rheinmetall	Yes	Deloitte
RWE	Yes	PWC
SAP	Yes	KPMG
Sartorius vz.	Yes	KPMG
Siemens	Yes	EY
Siemens Energy	No	EY
Symrise	Yes	EY
Volkswagen (VW) vz.	No	EY
Vonovia	Yes	KPMG
Zalando	No	n.a.

Appendix H6 Detailed Analysis Assurance

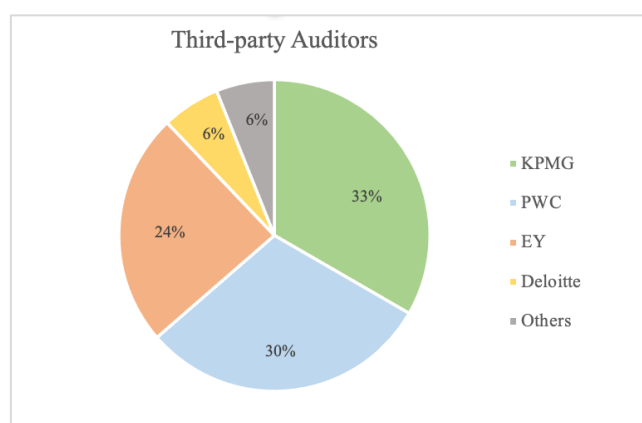


Figure 3: Overview Third-Party Auditors

Appendix H7 Detailed Analysis Process Variables

Table 14: Overview Number of Reviewed Companies against Disclosure of Determination Process

	Reviewed companies	Disclosing determination process
KPMG	11	11
EY	8	5
PWC	10	4
Deloitte	3	3
Others	1	1

Appendix H8 Overview Analysis Results Stakeholder Variables

Table 15: Overview Analysis Results Stakeholder Variables

Variable Substantiation	Stakeholder Inclusion			Stakeholder Engagement	Stakeholder Selection
	Affected Stakeholders	Users of sustainability reporting		Form of Participation	Disclosed?
		Impact Materiality Stakeholder	Financial Materiality Stakeholder		
Adidas	Employees, Consumers	Employees, consumers, suppliers, customers, investors, media, governments, NGOs	Employees, investors	Workshops	No
Airbus	Employees, Suppliers, Community at large	Employees, Suppliers, Partners, Customers, NGOs, Social Partners, Governments, Investors, Industry Associations, Community at large	Investors, Employees, Industry Associations, MRO Providers, Airports	Survey, Dialogue, Council Establishment, Interviews	Yes
Allianz	Employees, Society	Employees, Investors, Customers, Society	Employees, Investors	Interviews, Surveys, Workshops, Networks, Volunteering programs, Dialogue, Discussions and roundtables	No
BASF	Employees, Suppliers, Communities surrounding our sites	Customers, Employees, Investors, Suppliers, the Communities surrounding our sites, Representatives from industry, academia, politics and society	Employees, Investors, Representatives from industry	Dialogue, Council establishment, Advisory panels,	Yes
Bayer	Residents near Bayer sites, Suppliers, Public	Residents near Bayer sites, investors, suppliers, media, politicians and public, NGOs, Associations, representatives/distribution partners, authorities, scientists/universities/schools	Banks, Bayer management, consultants/corporate auditors, investors, rating, competitors agencies	Survey, Dialogue	Yes
Beiersdorf	n.a.	n.a.	n.a.	n.a.	No
BMW	n.a.	n.a.	n.a.	n.a.	No
Commerzbank	Suppliers, Employees, Civil society	Research/Science, Customers, Suppliers, Media, Employees, NGOs, Politics, Civil society	Shareholders, Investors, Employees, Competitors/Financial Industry	Dialogue, Sustainability Advisory Board	No
Continental	Employees, General public	Customers, Employees, General public	Investors, Shareholders, Employees	Survey	No
Covestro	Employees, Suppliers, Neighbors	Customers, Employees, Suppliers, Associations, Scientific community, Investors, Regulators, Public, Neighbors, NGOs, Media	Investors, lenders and analysts, employees	In-person exchanges, Surveys, Dialogue, Workshops	No

(to be continued)

Table 15 (continued)

Variable Substantiation	Stakeholder Inclusion			Stakeholder Engagement	Stakeholder Selection
	Affected Stakeholders	Users of sustainability reporting		Form of Participation	Disclosed?
		Impact Materiality Stakeholder	Financial Materiality Stakeholder		
Daimler Truck	People, Suppliers	People, Customers, Suppliers, Politics, NGOs, Media	Investors, Employees	Expert interviews, Customer/Employee Surveys	No
Deutsche Bank	n.a.	n.a.	n.a.	n.a.	No
Deutsche Börse	Society, Employees	Customers, Employees, Society	Investors, Employees, Rating Agencies	Surveys, Dialogue	No
Deutsche Telekom	Customers, Special interest groups, Suppliers, Employees, Potential employees	Customers, potential customers and their representatives, Science, research and education, NGOs and special interest groups, Media, Suppliers, Politics, Employees, potential employees and their representatives	Analysts, investors and their representatives, Business sector and its representatives, Employees, potential employees and their representatives	Dialogue, Summits, Expert groups	No
DHL Group	n.a.	n.a.	n.a.	n.a.	No
E.ON	Employees, Suppliers, Regions and Communities, Society and the general public	Customers, Employees, Investors, Suppliers and business partners, Regions and Communities, Policymakers, Media, Society and the general public, NGOs and sustainability experts	Employees, Investors	Interviews, Surveys, Workshops	Yes
Fresenius	Patients, Suppliers, Employees	Patients, Suppliers and business partners, Academia, Employees, Providers, Political institutions, Trade Unions, ESG rating agencies	Investors, Analysts, Employees	n.a.	No
Hannover Rück	Society, Employees, Job applicants	Clients, business partners, society, NGOs, ESG analysts, trade press, foundations and associations, Employees, Job applicants, Clients	Capital market players (asset managers, investors, brokers), Employees, Job applicants	Interviews, Surveys, Workshops	No
Heidelberg Materials	Employees, Suppliers, Local communities	Shareholders, Employees, Investors, Customers, Suppliers, Associations, Local communities, Politics and public service, NGOs, Universities and research institutions	Shareholders, Employees, Investors, Analysts	Survey, Workshops	Yes
Henkel Vz.	Professional public	Opinion leaders, Professional public, Academia	International rating agencies, analysts	Dialogue	Yes

(to be continued)

Table 15 (continued)

Variable Substantiation	Affected Stakeholders	Stakeholder Inclusion		Stakeholder Engagement	Stakeholder Selection
		Users of sustainability reporting		Form of Participation	Disclosed?
		Impact Materiality Stakeholder	Financial Materiality Stakeholder		
Mercedes-Benz Group	Employees, Suppliers, People from the surrounding neighbourhood of the company's locations	Customers, Employees, Investors, Suppliers, Associations, Trade unions, Media, Local authorities, People from the surrounding neighbourhood of the company's locations, Science, Politics	Employees, Investors, Analysts	Interviews, Surveys	Yes
Merck	Employees, Neighbors in the vicinity of our sites	Employees, Business partners, Neighbors in the vicinity of our sites, shareholders	Investor groups, Shareholders, Employees	n.a.	No
MTU Aero Engines	Employees, Suppliers, Region	Employees, Business partners, Customers, Suppliers, Science and research, Media, Region, Politics and public agencies, Associations and organizations	Employees, Capital market	Dialogue, Survey	No
Münchener Rückversicherungs-Gesellschaft	Employees, Representatives of wider society	Customers, Employees, Representatives of wider society	Investors, Employees	Workshop	No
Porsche AG	n.a.	n.a.	n.a.	n.a.	No
QIAGEN	Employees, Suppliers, General Society and Local Communities	Employees, Customers, Shareholders, Suppliers, General society and local communities	Shareholders and the financial community, Employees, Banks and financial institutions	Surveys, Workshops, Interviews	No
Rheinmetall	Employees, Suppliers, Society	Customers, Business partners, Private shareholders, Institutional investors, Employees, Suppliers, Media, Science and Research, Society, Politicians and Authorities, Associations and Organizations	Private shareholders, institutional investors, employees	n.a.	No
RWE	Employees	Employees, Business partners, Political officials, Community groups associations	Investors, Employees	Dialogue, Survey	No
SAP	n.a.	n.a.	n.a.	n.a.	No

(to be continued)

Table 15 (continued)

Variable Substantiation	Stakeholder Inclusion			Stakeholder Engagement	Stakeholder Selection
	Affected Stakeholders	Users of sustainability reporting		Form of Participation	Disclosed?
		Impact Materiality Stakeholder	Financial Materiality Stakeholder		
Sartorius vz.	Employees, Suppliers, Neighboring companies, Residents	Customers, Employees, Investors, Suppliers, Business partners, Neighboring companies, Residents	Investors, Employees	Discussions	No
Siemens	Suppliers, Employees, Communities	Investors, Customers, Suppliers, Employees, Communities, Policy Makers, Media, NGOs Business associations, Academic institutions	Investors, Employees	Dialogue	No
Siemens Energy	Employees, Suppliers, Civil society	Shareholders, Employees, Customers, Suppliers, Politics, Associations, Civil society	Shareholders and capital markets, Employees, Banks and financial institutions	Dialogue	No
Symrise	Employees, Neighbors	Customers, Employees, Shareholders, Neighbors, Politicians, NGOs, Business partners	Employees, Shareholders, Lenders	Surveys, Interviews	Yes
Volkswagen (VW) vz.	n.a.	n.a.	n.a.	n.a.	No
Vonovia	n.a.	n.a.	n.a.	n.a.	No
Zalando	Employees	Customers, Employees, Industry Experts	Employees	Survey, Interviews	No

Appendix H9 Stakeholder Matrix

	Affected stakeholders	Users of sustainability reporting	
		Financial materiality	Impact materiality
External	Suppliers	Investors Industry representatives Banks Rating agencies Auditors Consultants Lenders Potential employees / Job applicants Analysts Financial institutions	Investors Industry representatives Consultants Potential employees / Job applicants
			Customers Suppliers Business partners NGOs Governments Policy makers Regions / Communities Academia / Science and research Society / General public Associations Media Special interest groups Residents surrounding the sites Neighbors ESG Rating agencies Industry experts
Internal	Employees	Employees	Employees
		Shareholders	Shareholders

Figure 4: Stakeholder Matrix

Appendix I ESRS Readiness Index Results

Appendix I1 ESRS Readiness Index - Results

Table 16: Overview of ERI Results

Company	Location	Timeliness	Double Materiality	Definition	Standards	Prioritization	Objectives	Risks & Opportunities	Determination Process	Assurance	Stakeholder Inclusion	ERI
Specification	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	
Adidas	1	1	1	0	1	0	0	0	1	1	1	64%
Airbus	1	1	1	1	1	1	1	1	1	1	1	100%
Allianz	0	0	1	1	1	1	0	0	1	1	1	64%
BASF	1	1	1	1	1	0	0	0	1	1	1	73%
Bayer	0	1	1	1	1	1	0	0	1	1	1	73%
Beiersdorf	1	0	1	0	1	0	0	0	0	1	0	36%
BMW	1	1	1	1	1	0	0	0	0	1	0	55%
Commerzbank	0	1	1	0	1	0	0	0	1	1	1	55%
Continental	0	0	0	0	1	0	0	0	0	1	1	27%
Covestro	1	0	1	1	1	1	1	0	1	1	1	82%
Daimler Truck	1	1	1	1	1	1	0	0	1	1	1	82%
Deutsche Bank	0	0	1	1	1	1	0	0	1	1	1	64%
Deutsche Börse	1	0	0	0	1	0	0	0	0	1	1	36%
Deutsche Telekom	0	1	1	1	1	0	1	1	1	1	1	82%
DHL Group	0	0	0	1	1	0	1	0	0	1	0	36%
E.ON	1	1	1	1	1	1	0	0	1	1	1	82%
Fresenius	0	0	1	0	1	0	0	0	0	1	0	27%
Hannover Rück	0	0	1	1	1	1	1	1	1	0	1	73%
Heidelberg Materials	1	1	1	1	1	1	0	0	1	1	1	82%
Henkel Vz.	0	1	1	1	1	0	1	0	1	1	1	73%
Mercedes-Benz Group	0	1	1	1	1	1	0	1	1	1	1	82%
Merck	0	1	0	0	1	1	0	0	1	1	1	55%
MTU Aero Engines	0	1	1	1	1	1	1	0	0	0	1	64%
Münchener Re	1	0	1	0	1	1	0	0	1	1	1	64%
Porsche AG	1	1	1	0	0	1	0	1	0	1	1	64%
QIAGEN	1	1	1	1	1	0	0	1	1	1	1	82%
Rheinmetall	1	1	0	0	0	1	0	0	1	1	1	55%
RWE	1	0	1	1	1	0	1	0	1	1	1	73%
SAP	1	1	1	1	1	1	0	0	1	1	0	73%
Sartorius vz.	0	0	1	0	1	1	0	0	1	1	1	55%
Siemens	0	0	1	1	1	1	0	0	1	1	1	64%
Siemens Energy	0	1	1	0	1	1	0	0	0	1	1	55%
Symrise	0	1	1	0	1	1	0	0	1	1	1	64%
Volkswagen (VW) vz.	1	1	0	0	0	1	0	0	0	1	1	45%
Vonovia	1	0	1	1	1	1	1	0	1	1	0	73%
Zalando	0	0	0	0	1	0	0	0	0	0	1	18%
Number of companies which meet the formulated requirements	18	21	29	21	33	22	9	6	25	30	33	

Appendix I2 Overview of Companies Meeting the Requirements

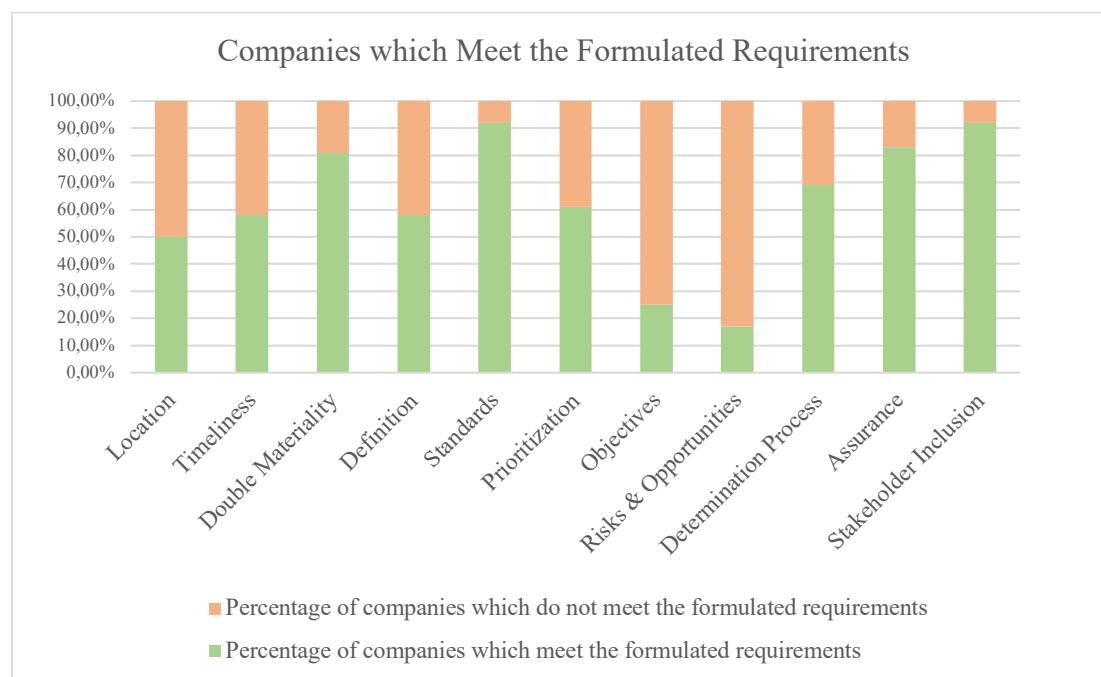


Figure 5: Overview of Companies Meeting the Requirements

Appendix I3 Ranking of Variables according to ERI Descriptive ERI Results

Table 17: Ranking of Variables according to ERI

ERI-Ranking	Variable
1	Assurance; Standards
2	Stakeholder Inclusion
3	Double Materiality
4	Determination Process
5	Prioritization
6	Timeliness; Definition
7	Location
8	Objectives
9	Risks & Opportunities

Appendix I4 Descriptive ERI Results

Table 18: Overview of descriptive ERI results

Minimum ERI	18%
Maximum ERI	100%
Mean	62%
ERI > 50%	29
Median	64%
Minimum / Variable	17%

Appendix I5 Cross-Analysis ERI and Company Characteristics

Table 19: Cross-Table ERI and Company Characteristics

Variable	ERI	Industry	Sub industry	Revenue (€ million, 2022)	Market capitalization (€ million, 2023)	Total assets (€ million, 2022)
Adidas	64%	Retail And Consumption	Athletic Apparel And Footwear	22,511	27.882,20	20,296
Airbus	100%	Mechanical Engineering, Transport, Logistics	Aerospace, Defense	58,763	97.479,10	115,900
Allianz	64%	Financial Services	Insurance	152,671	88.630,70	102
BASF	73%	Chemical, Pharmaceutical, Biotechnology And Medical Technology	Chemicals, Materials, Industrial Solutions	87,327	36.901,30	84,472
Bayer	73%	Chemical, Pharmaceutical, Biotechnology And Medical Technology	Chemicals, Pharmaceuticals	50,739	43.098,90	124,900
Beiersdorf	36%	Retail And Consumption	Consumer Goods (Production)	8,799	27.479,10	158,000
BMW	55%	Mechanical Engineering, Transport, Logistics	Automotive (Production)	142,61	58.346,55	246,926
Commerzbank	55%	Financial Services	Banking	9,5	12.650,20	477,000
Continental	27%	Mechanical Engineering, Transport, Logistics	Automotive (Supplier)	39,409	13.016,40	37,927
Covestro	82%	Chemical, Pharmaceutical, Biotechnology And Medical Technology	Chemicals	17,968	9.407,61	14,585
Daimler Truck	82%	Mechanical Engineering, Transport, Logistics	Utility Vehicles (Production)	50,945	26.276,90	63,969
Deutsche Bank	64%	Financial Services	Banking	27,2	20.252,60	1,339,157
Deutsche Börse	36%	Financial Services	Diversified Financials	4,338	29.517,70	269,109
Deutsche Telekom	82%	Technology	Telecommunication	114,197	98.568,90	301,686
DHL Group	36%	Mechanical Engineering, Transport, Logistics	Logistics	94,436	45.620,50	68,278
E.ON	82%	Energy And Raw Materials	Energy (Supply)	115,66	28.166,00	134,009
Fresenius	27%	Chemical, Pharmaceutical, Biotechnology And Medical Technology	Medical Technology, Clinics	40,84	15.583,50	76,415

(to be continued)

Table 19 (continued)

Variable	ERI	Industry	Sub industry	Revenue (€ million, 2022)	Market capitalization (€ million, 2023)	Total assets (€ million, 2022)
Hannover Rück	73%	Financial Services	Insurance	33,276	24.909,80	86,952
Heidelberg Materials	82%	Others	Construction Materials	21,714	12.879,50	33,256
Henkel Vz.	73%	Chemical, Pharmaceutical, Biotechnology And Medical Technology	Consumer Goods, Chemicals	22,397	26.509,20	18,080
Mercedes-Benz Group	82%	Mechanical Engineering, Transport, Logistics	Automotive (Production)	150,017	68.320,00	273,952
Merck	55%	Chemical, Pharmaceutical, Biotechnology And Medical Technology	Chemicals, Pharmaceuticals	22,232	67.194,90	109,000
MTU Aero Engines	64%	Mechanical Engineering, Transport, Logistics	Aviation	5,33	8.913,46	9,230
Münchener Re	64%	Financial Services	Insurance	67,1	50.302,80	106,889
Porsche AG	64%	Mechanical Engineering, Transport, Logistics	Automotive (production)	37,63	79.803,60	47,673
QIAGEN	82%	Chemical, Pharmaceutical, Biotechnology And Medical Technology	Biotechnology	1,996	8.715,25	56,352
Rheinmetall	55%	Mechanical Engineering, Transport, Logistics	Defense technology, automotive (supplier)	6,41	10.168,60	8,089
RWE	73%	Energy And Raw Materials	Energy (supply)	38,366	24.576,50	59,245
SAP	73%	Technology	Software	30,871	142.867	72,159
Sartorius vz.	55%	Chemical, Pharmaceutical, Biotechnology And Medical Technology	Medical technology	4,175	19.668,53	2,748
Siemens	64%	Technology	Electrical engineering	71,977	98.157,50	195,125
Siemens Energy	55%	Energy And Raw Materials	Energy technology	28,997	9.170,98	n.a.
Symrise	64%	Chemical, Pharmaceutical, Biotechnology And Medical Technology	Food, chemistry, cosmetics, consumer goods, fragrances	4,618	12.764,00	7,783
Volkswagen (VW) vz.	45%	Mechanical Engineering, Transport, Logistics	Automotive (production)	279,232	57.758,55	564,800
Vonovia	73%	Financial Services	Real Estate	5,418	17.881,50	96,038
Zalando	18%	Retail And Consumption	E-commerce	10,345	5.303,23	7,626

Appendix I6 Ranges of ERI Results in Industries

Table 20: Ranges of ERI Results in Industries

Industry	Ranges of ERI Results
Retail And Consumption	18% - 64%
Mechanical Engineering, Transport, Logistics	45% - 100%
Financial Services	36% - 73%
Chemical, Pharmaceutical, Biotechnology And Medical Technology	27% - 82%
Technology	64% - 82%
Energy And Raw Materials	55% - 82%
Others	82%

Appendix I7 Company Characteristics of Minimum and Maximum ERI

Table 21: Company Characteristics of Minimum and Maximum ERI

	ERI	Company	Industry	Sub industry	Revenue (€ million, 2022)	Market capitalization (€ million, 2023)	Total assets (€ million, 2022)
Minimum	18%	Zalando	Retail And Consumption	E-commerce	10,345	5.303,23	7,626
Maximum	100%	Airbus	Mechanical Engineering, Transport, Logistics	Aerospace, Defense	58,763	97.479,10	115,900

Appendix J List of Abbreviations

AktG	<i>Aktiengesetz</i> (German Stock Corporation Act)
CSR-RUG	German CSR Directive Implementation Act
CSRD	Corporate Sustainability Reporting Directive
DAX	<i>Deutscher Aktienindex</i>
DNK	<i>Deutscher Nachhaltigkeitskodex</i> (German Sustainability Code)
DRSC	<i>Deutsches Rechnungslegungs Standards Committee</i> (Accounting Standards Committee of Germany)
EFRAG	European Financial Reporting Advisory Group
ERI	ESRS Reporting Index
ESRS	European Sustainability Reporting Standards
EU	European Union
FY	Financial Year
GRI	Global Reporting Initiative
HDAX	<i>“Hundert DAX”</i> (summarizes the values of all 110 companies from the DAX, MDAX and TecDAX indices)
HGB	<i>Handelsgesetzbuch</i> (German Commercial Code)
IIRC	Integrated Reporting Framework
NFRD	Non-Financial Reporting Directive
PIE	Public-Interest Entity
SASB	Sustainability Accounting Standards Board
SME	Small and Medium-Sized Enterprise