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A Critical Review of Non-Financial Disclosure Measurement Methods

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Abstract
The abstract should contain the main purpose of the study, the methodology, some results, and conclusions in 200-250 words.
Purpose – The measurement of non-financial disclosure (NFD) remains a key challenge in corporate reporting due to inconsistencies, subjectivity, and methodological limitations. As companies increasingly disclose information on environmental, social, and governance (ESG) issues, corporate social responsibility (CSR), and sustainability, the need for robust, reliable, and comparable measurement frameworks has become critical. This study critically evaluates existing NFD measurement methods, highlighting their strengths, weaknesses, and future directions.
Design/methodology/approach – A systematic literature review was conducted, focusing on five primary disclosure measurement techniques: content analysis, disclosure indices, market-based measures, regulatory compliance-based assessment, and disclosure surveys. The study evaluates these approaches based on their ability to assess the quality, relevance, and comparability of non-financial disclosures. Additionally, emerging methodologies such as AI-driven content analysis, machine learning applications, and sentiment analysis are explored as potential solutions to enhance disclosure assessment.
Findings – Traditional NFD measurement methods suffer from bias, subjectivity, and excessive focus on disclosure quantity over quality. Furthermore, the voluntary nature of many non-financial disclosures complicates standardization and comparability across industries and jurisdictions. The study highlights the need for more adaptive, technology-driven measurement frameworks that integrate automation, contextual analysis, and qualitative evaluation to improve reliability and objectivity.
Originality – This study contributes to the ongoing discourse on corporate transparency and sustainability reporting by advocating for a more holistic and technology-enhanced approach to NFD measurement. It underscores the importance of AI, natural language processing (NLP), and machine learning in improving accuracy, comparability, and scalability in corporate disclosure assessment.

Keywords: content analysis, disclosure measurement, ESG reporting, non-financial disclosure, voluntary disclosure.

1. Introduction

Corporate disclosure is a broad and complex concept that includes various types of information shared by companies, covering both financial and non-financial aspects. These disclosures differ in format, purpose, timing, and scope, and can be mandatory or voluntary, as well as qualitative or quantitative in nature. Due to disclosure being an abstract and theoretical construct, it cannot be directly observed or measured (Gibbins et al., 1990). Over the years, researchers have developed several methods to evaluate financial disclosure. However, as noted by (Hassan & Marston, 2019a), there is still no universally accepted framework that systematically assesses these measurement approaches across the literature. This diversity and complexity present ongoing challenges for measuring disclosure in empirical accounting research. As a result, this study focuses specifically on non-financial disclosure, which is a subset of disclosure that has gained increasing attention due to growing global emphasis on environmental and social responsibility. Non-financial disclosure includes information related to environmental, social, and governance (ESG) performance, sustainability strategies, employee well-being, ethical conduct, technology, and human capital management. These disclosures have become increasingly important due to rising concerns about climate change, inequality, stakeholder engagement, and the long-term impacts of corporate behavior. Investors,

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regulators, and consumers now expect firms to be transparent not only about financial outcomes but also about their broader role in society and their impact on the environment. This article presents a critical review of the main methods used to measure non-financial disclosure in academic research. It evaluates their theoretical foundations, empirical application, strengths, and limitations, with a particular focus on whether these methods produce valid, reliable, and comparable results. The purpose of this review is to highlight where current approaches are effective, identify their limitations, and suggest directions for improving future disclosure measurement frameworks.

To carry out this review, a systematic literature search was conducted using the Scopus database, covering the period from 2020 to 2025. The search was limited to peer-reviewed journal articles within the subject areas of Business, Management and Accounting, and Economics, Econometrics and Finance. The search using the terms "financial reporting" OR "financial disclosure" was applied to the title, abstract, and keyword fields of the selected journals. This initial search yielded 117 articles. Each article was then screened manually by reading its title, abstract, and conclusion, with the aim of identifying empirical studies focusing on corporate non-financial disclosure. Based on these criteria, a final sample of 22 articles was selected for detailed review.

Table 1. Summary of Measurement Methods and Studies

Method	Studies	Measurement Approach
Content Analysis (10 studies)	(Beretta et al., 2023; Bini et al., 2023; Cerrato & Ferrando, 2020; Cuomo et al., 2024; Doni et al., 2019; Malmmose & Linneberg, 2024; Manzi et al., 2024; Rossi & Candio, 2023; Sahakiants et al., 2024; Zahn, 2022)	Textual analysis of sustainability reports
ESG Scores (5 studies)	(Cicchiello et al., 2023; Dobija et al., 2023; Nicolò et al., 2021; Parajuli et al., 2022; Pratici et al., 2024)	Third-party ESG ratings (MSCI, Refinitiv, etc.)
Disclosure Indices (4 studies)	(Di Vaio & Varriale, 2020; Krasodomska et al., 2020; Martínez Falcó et al., 2024; Okorie et al., 2023)	Structured frameworks (GRI, SASB, IIRC)
Stakeholder Surveys (3 studies)	(Cerrato & Ferrando, 2020; Hadro et al., 2021; Vallone, 2022)	Investor & regulator perception studies
Legal Compliance (3 studies)	(Bini et al., 2023; Doni et al., 2019; Mustafa Khan & Mohd Ali, 2023)	Analysis of laws (EU NFRD, CSRD, SEC rules)

Source: researcher's own work

Table 1 summarizes the selected studies, including their thematic focus and the measurement approaches used. These approaches were then grouped into two categories: Disclosure-based methods, which assess actual disclosures through tools like disclosure indices and textual analysis; and Non-disclosure-based methods, which use observable variables to approximate disclosure quality. These include market-based proxies, regulatory compliance-based assessments, and disclosure surveys.

This study contributes to the literature by examining how non-financial disclosure is currently measured in empirical accounting research. Foundational studies such as (Healy & Palepu, 2001) and (Beyer et al., 2010) laid the groundwork by exploring the role of disclosure in reducing information asymmetry. These ideas have since been extended to the non-financial domain. For example, (Hassan & Marston, 2019b) reviewed disclosure measurement in accounting literature and observed that many studies do not rigorously test the

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reliability and validity of their disclosure measures. This concern remains relevant in more recent literature. Studies from the past five years (Ma et al., 2024; Maji & Haloi, 2024; Mehmood et al., 2024) indicate that many papers still rely on basic scoring methods or correlation analysis, without exploring whether disclosure actually leads to improved outcomes such as firm performance or investor confidence. Moreover, commonly used tools like ESG ratings and disclosure indices often suffer from a lack of transparency and consistency, making it difficult to compare findings across studies and contexts. The structure of this paper is as follows: Section 2 presents a framework of the main methodologies used to measure non-financial disclosure, and identifies five common measurement approaches. Section 3 critically reviews how these methods have been applied in the empirical studies identified. Section 4 concludes the paper by summarizing key findings and proposing improvements to strengthen the objectivity, comparability, and relevance of future non-financial disclosure research.

2. Measurement Framework for Non-Financial Disclosure

Disclosure measurement is a critical aspect that researchers must carefully consider when investigating corporate transparency and reporting practices (Ibrahim, 2017). Organizations, whether financial or non-financial (Barakat & Hussainey, 2013), utilize various channels to share information with the public and stakeholders, such as annual reports, interim reports, conference calls, prospectuses, websites, social media, and press releases (Courtis, 2004; Hamade et al., 2024; Ibrahim, 2017). These channels serve as key vehicles for both financial and non-financial disclosures. However, the challenge lies in accurately measuring the quality and quantity of these disclosures. Merely counting data items or focusing on the volume of disclosed information is insufficient, as it fails to capture the depth, relevance, or narrative context that stakeholders rely on to make informed decisions. Therefore, to provide a comprehensive evaluation of disclosure practices, it is essential to combine quantitative assessments with qualitative analysis, ensuring that the information shared is both meaningful and relevant to its audience. This balanced approach allows for a more accurate reflection of an organization's transparency and commitment to accountability (Elham Masoumi, 2022).

Previous studies have classified disclosure measurement methods in several ways, offering different approaches to assess both the quantity and quality of corporate disclosures. Two primary approaches were identified by Hassan & Marston (2010). The first relies on proxies for disclosure, which do not directly involve the examination of original disclosure documents, while the second approach is based on analyzing the actual disclosure sources. Hassan & Marston (2019b) expanded this framework by focusing on two main strategies for measuring corporate financial disclosure. First, a disclosure-based approach, which evaluates actual disclosures using tools like disclosure indices and textual analysis, and secondly, a non-disclosure-based approach, which uses observable variables such as market-based indicators as proxies for disclosure. In addition, Ibrahim & Hussainey (2019) reviewed various techniques in the literature, highlighting both direct and indirect methods for measuring disclosure, including six key techniques outlined in Figure 1. These approaches range from direct analysis of annual reports and content counting to more indirect methods such as surveys and interviews that gather external perceptions of disclosure practices.

Another commonly used method is the assignment of scores by analysts based on the amount of information disclosed, such as those provided by organizations like the Association for Investment Management and Research (AIMR) or Standard & Poor's (S&P) (Beattie et al., 2004). However, these scores are sometimes criticized for being subject to analysts' biases and for the limitations of the sample sizes used (Healy & Palepu, 2001). To address these concerns, many researchers prefer to use self-constructed disclosure indices, which are widely employed for their flexibility and applicability across different companies and types of information. This method is seen as more reliable, as it allows for the measurement of disclosure quality regardless of the specific firm or data being analyzed (Bravo et al., 2010).

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In this review, we focus on how non-financial disclosure is measured in empirical accounting research between 2020 and 2025. After screening 117 articles and selecting 22 relevant empirical studies, we have identified five key methodological approaches that researchers have used to measure non-financial disclosure. These are the following: Content Analysis, Disclosure Indices, Market-Based Disclosure Measures, Regulatory Compliance-Based Assessment and Disclosure Surveys and Interviews. Content Analysis analyzes written corporate documents (e.g., annual reports, sustainability reports) to identify disclosure themes and patterns, either manually or using software. Disclosure Indices are structured scoring systems based on predefined checklists (e.g., GRI indicators), used to assess whether specific types of information are disclosed. Market-Based Disclosure Measures use observable market variables (e.g., stock returns, cost of capital) as proxies for disclosure, assuming that better disclosure improves market outcomes. Regulatory Compliance-Based Assessment evaluates whether a firm complies with non-financial disclosure regulations (e.g., NFRD, CSRD), either fully or partially. Disclosure Surveys and Interviews collect stakeholder perceptions of disclosure quality through structured surveys or qualitative interviews.

These five methods can be grouped into two broader categories, as seen in Table 2. One category is Disclosure-Based approaches, which analyze actual corporate documents (e.g. content analysis, disclosure indices). The other is Non-disclosure-based approaches, which use external or indirect indicators (e.g. market-based proxies, compliance checks, or stakeholder perceptions) to evaluate disclosure.

Table 2. Classification of Non-Financial Disclosure Measurement Methods

Approach Type	Measurement Method	Description	Examples of Use
Disclosure-Based Approaches	**1. Content Analysis**	Analyzes the actual text of disclosure documents to identify themes, frequency, and tone.	Manual or automated review of sustainability reports.
	2. Disclosure Indices	Uses a checklist or scoring system to evaluate whether specific items are disclosed.	GRI-based or self-constructed indices applied to annual reports.
Non-Disclosure-Based Approaches	**3. Market-Based Measures**	Uses market variables (e.g., stock returns, volatility) as proxies for disclosure quality.	Regression of disclosure impact on cost of capital.
	4. Regulatory Compliance Assessment	Measures the extent to which a company complies with mandated disclosure laws or frameworks.	Assessment of compliance with NFRD or CSRD.
	5. Disclosure Surveys & Interviews	Gathers stakeholder perceptions of disclosure through surveys or interviews.	Surveys with investors or interviews with managers.

Source: researcher's own work

2.1 Content Analysis

Content analysis is a widely used research technique for examining the substantive content or information contained in written texts or other communication media (Griffin & Griffin, 2021). It is commonly applied to measure both the quality and quantity of corporate disclosure (Ibrahim & Hussainey, 2019) and is particularly suited for assessing narrative disclosure. This method involves systematically coding written

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documents by identifying phrases, words, or sentences according to a specific schema (Bowman, 1984). Considered highly reliable for evaluating disclosure, Abraham & Cox (2007), Linsley & Shrives (2006) and Krippendorff (2004) also highlight the importance of producing replicable and valid results through content analysis. These techniques are broadly applied across various fields (Quinn & Prendergast, 2023).
Several definitions of content analysis have been provided over time (K. S. M. Hussainey, 2004). Berelson (1952) offered one of the earliest and most widely accepted definitions, describing it as "a research technique for the objective, systematic, and quantitative description of the manifest content of communication." Carney (1972) expanded on this by defining content analysis as "a research technique for making inferences by objectively and systematically identifying specified characteristics of messages." Later, Krippendorff (2004) described content analysis as "a research technique for making replicable and valid inferences from data to their context."
Smith & Taffler (2000) identified two main approaches to content analysis: the "meaning-oriented" analysis, which focuses on identifying the underlying themes in narratives, and the "form-oriented" analysis, which involves counting specific words or references. There are two main types of content analysis, manual and computerized. Manual analysis involves detailed classification of report content but is labor-intensive and may limit sample sizes (Beattie & Thomson, 2007). Computerized content analysis emerged in the 1980s due to technological advances, offering advantages in terms of efficiency and scale (Hassan & Marston, 2019b). However, it has limitations, such as interpreting keywords without full context, which can lead to misleading results (Beattie & Thomson, 2007; Milne & Adler, 1999). Despite its convenience, computerized content analysis may be constrained by software limitations and the need for comprehensive keyword mapping (Hassan & Marston, 2019b).

2.2 Disclosure Indices

A disclosure index is a widely used tool to assess the breadth of information disclosed by entities, based on a predefined set of criteria (Hassan & Marston, 2019b). This index can measure both qualitative and quantitative disclosures and is applied to various types of disclosures, such as mandatory, voluntary, or specific disclosures, for instance management forecasts. Rather than counting all disclosed items, it evaluates whether specific pieces of information are included (Marston & Shrives, 1991). While researchers often create custom disclosure, indices tailored to the needs of their studies, standardized indices developed by professional bodies, such as Standard & Poor's transparency scores, are also common. Self-constructed indices allow for flexibility but can be time-consuming and challenging to generalize due to small sample sizes. Moreover, assigning scores to disclosures, often on an ordinal scale, can introduce issues related to weighting the importance of information items (Hodgdon et al., 2009). Existing indices, on the other hand, offer consistency and ease of comparison across studies.

2.3 Disclosure Survey (questionnaires and interviews)

The questionnaire approach is commonly used to assess how different user groups, such as investors and financial analysts, perceive a company's disclosure practices (Hassan & Marston, 2019b). The effectiveness of this method largely depends on the quality of the questionnaires themselves. However, there is a risk that respondents may fill out questionnaires hastily or without sufficient attention, potentially causing key issues to be missed (Gillham, 2008). Surveys and interviews also represent indirect methods for gauging disclosure levels and characteristics. While these methods can be less time-consuming than constructing detailed disclosure indices, their accuracy hinges on how well the interviews are conducted and how effectively the survey questions are formulated. Furthermore, the objectivity of the respondents' perspectives plays a crucial role in the reliability of the results (Hassan & Marston, 2010). Despite its relative simplicity, this approach is not widely used in the literature.

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2.3 Market-Based Disclosure Measures

Market-based disclosure measures evaluate the relationship between corporate disclosure and financial market behavior. The underlying assumption is that higher disclosure quality reduces information asymmetry, leading to lower stock price volatility, lower cost of capital, and increased investor confidence (Hassan & Marston, 2019b); (Healy & Palepu, 2001). Unlike direct content-based assessments, market-based measures assess disclosure indirectly, relying on financial metrics and investor reactions. These measures assume that markets efficiently price available information, meaning that firms with greater transparency should experience less uncertainty and better financial outcomes (Francis et al., 2008). There are two widely used approaches: Stock Market Reactions and Cost of Capital Models. The first approach examines how disclosure influences stock price movements, trading volume, and bid-ask spreads following corporate announcements (Li, 2010). Market efficiency theories suggest that investors incorporate new information into stock prices, making market reactions a useful proxy for disclosure quality (Hassan & Marston, 2019b). Cost of Capital Models assess whether firms with higher disclosure quality experience lower equity or debt costs. The premise is that transparent disclosure reduces perceived risk, encouraging investors to demand lower risk premiums (Francis et al., 2008).

2.4 Regulatory Compliance-Based Assessment

Regulatory compliance-based assessment measures the extent to which firms comply with mandatory non-financial disclosure regulations. This method focuses on whether a firm meets specific legal reporting standards, sustainability requirements, or governance disclosures, rather than evaluating the quality or voluntary nature of disclosure (Hassan & Marston, 2019b). Researchers assess compliance by analyzing corporate reports against formal disclosure frameworks, such as the International Financial Reporting Standards (IFRS) and the Generally Accepted Accounting Principles (GAAP), which are required for financial disclosures. The Non-Financial Reporting Directive (NFRD) and the Corporate Sustainability Reporting Directive (CSRD) are EU regulations mandating sustainability reporting. The Sustainability Accounting Standards Board (SASB) and the Global Reporting Initiative (GRI) are voluntary but widely used disclosure frameworks. This method is particularly useful in jurisdictions where mandatory non-financial reporting laws exist, allowing researchers to study how well firms comply with disclosure obligations and whether regulations lead to improved transparency.

3. Review of Disclosure Measurement in Prior Empirical Studies

In corporate reporting research, accurately measuring disclosure is crucial for understanding how companies communicate both financial and non-financial information to stakeholders. Different methods are used to evaluate the extent, quality, and impact of disclosure, each with distinct advantages and limitations. The selection of an appropriate method depends on the research objectives, data availability, and measurement focus. Prior empirical studies have commonly used three primary disclosure measurement techniques: content analysis, disclosure indices, and surveys/questionnaires (Ibrahim & Hussainey, 2019). However, recent literature has expanded the scope by incorporating market-based disclosure measures and regulatory compliance-based assessments (Helfaya & Whittington, 2019). These five methods, along with their respective strengths and weaknesses, are summarized in the table below.

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Table 3. Strengths and Weaknesses of Disclosure Measurement Methods

Disclosure Measurement	**Strengths and Weaknesses**
Content Analysis	(Alkaraan et al., 2022; Hassanein & Hussainey, 2015; K. Hussainey et al., 2003, 2022; Karim et al., 2021)
Strengths: - Versatile Application: Content analysis can measure information at various levels, such as words, sentences, or pages, making it adaptable to different types of disclosures and companies. - Efficiency with Automation: Automated content analysis enables the processing of large datasets, reducing the time and effort required for manual analysis and allowing for comprehensive examination across a wide range of documents. - Flexible Approaches: The technique offers two main approaches: conceptual content analysis, which measures the presence or frequency of key terms, and relational content analysis, which explores relationships between concepts.	Weaknesses: - Manual Process Challenges: Manual content analysis is labor-intensive and time-consuming, limiting the scope and sample size in studies due to the effort involved. - Limitations of Automation: Automated analysis can misinterpret terms by failing to capture context or meaning, leading to inaccurate results. It also struggles with non-text formats and can miss important information if the keyword list is not comprehensive. - Software Constraints: Certain automated tools are restricted by language or file format, limiting the ability to analyze diverse or complex documents.
Disclosure Indices	(Helfaya & Whittington, 2019; Mura et al., 2018; Papoutsi & Sodhi, 2020; Taplin, 2011)
Strengths: - Comprehensive Coverage: Disclosure indices can assess both mandatory and voluntary information, offering a broad view of a company's reporting practices across different channels like annual reports and investor relations. - Comparability and Historical Use: Since its introduction by Cerf in 1961, the disclosure index has been a common research tool, enabling comparisons with past studies and facilitating the analysis of trends over time. - Customizability: Researchers can either use pre-existing indices or create tailored ones, allowing them to focus on specific disclosures relevant to their study, industry, or country. - Weighted Information: Researchers can assign weights to information items, prioritizing critical data and enhancing the focus on significant qualitative or quantitative disclosures.	Weaknesses: - Time-Consuming: Creating custom disclosure indices can be labor-intensive, which often limits the sample size of studies, making it hard to analyze large datasets. - Subjectivity: The selection and weighting of items in self-constructed indices rely on the researcher's judgment, potentially introducing bias and limiting the relevance of the results. - Lack of Standardization: The absence of a universally accepted disclosure index leads to differences in the items included, complicating the comparison of findings across studies. - Overlooked Relationships: Disclosure indices typically do not consider the relationships between different items of information, which could lead to missing incremental insights that a more detailed analysis might reveal.
Disclosure Surveys	(Fink & Chen, 1995) (Gillham, 2008; Tauringana & Chithambo, 2016)
Strengths: - Broad Sample Coverage: Surveys and interviews can collect data from a wide range of firms, bypassing the labor-intensive nature of self-constructed disclosure indices and providing a more representative dataset across industries and countries. - Flexible Application: These surveys can capture both financial and non-financial disclosures, making them adaptable to evolving regulations and industry trends. - Efficient Data Collection: Compared to manual content analysis, disclosure surveys are less time-consuming, allowing for large-scale studies involving multiple firms or regions.	Weaknesses: - Subjectivity and Bias: Responses may be influenced by biases, as analysts and investors might have vested interests, making it difficult to ensure objectivity. - Design Flaws: Poorly designed questionnaires can yield inaccurate data, as the quality of survey instruments directly affects the results. - Limited Detail: Surveys typically assess perceived adequacy rather than the actual content of disclosures, potentially missing important details.

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	- Comparison Challenges: Different user groups may prioritize different types of information, making it difficult to aggregate or compare findings across studies.
Market-Based Disclosure Measures	(Brown & Hillegeist, 2007; Francis et al., 2008; Hassan & Marston, 2019b)
Strengths: - Objective and quantifiable: Uses real market data, reducing subjectivity in disclosure measurement - Captures investor perception: Reflects how financial markets react to disclosure practices. - Applicable to large datasets: Market data is widely available, allowing for broad cross-sectional or longitudinal studies.	Weaknesses: - Indirect measure: Does not directly analyze disclosure content but rather its assumed impact. - External factors influence results: Stock prices and cost of capital are affected by macroeconomic events, making it difficult to isolate disclosure effects. -Assumes market efficiency: Assumes that all investors interpret and react to disclosure information in a rational way, which is often not the case.
Regulatory Compliance-Based Assessment	(Bini et al., 2023; Hassan & Marston, 2019a)
Strengths: - Standardized Measurement: Uses legally defined benchmarks, making cross-company comparisons easier. - Enables Regulatory Impact Studies: Helps researchers assess whether disclosure laws improve transparency over time. - Objective and Structured Approach: Relies on publicly available compliance data, reducing researcher bias.	Weaknesses: - Limited to Mandatory Disclosure: Does not assess voluntary disclosures, which often provide deeper transparency insights. - Does Not Assess Disclosure Quality: A firm can comply with regulations but still provide minimal useful information. - Difficult to Apply Globally: Regulatory requirements differ across countries, limiting comparability in international studies.

Source: researcher's own work

3.1 Trends in Prior Empirical Research

Over the past decade, researchers have increasingly adopted a combination of these methods to improve measurement robustness. Early studies primarily relied on Content Analysis and Disclosure Indices, as these methods provided a direct examination of corporate disclosures. However, recent research has integrated Market-Based Indicators and Regulatory Compliance Measures, especially in studies focusing on investor behavior, stock market impacts, and regulatory enforcement (Francis et al., 2008). Hybrid approaches that combine multiple methods are gaining traction. For example, Textual Analysis and Market-Based Proxies are used to assess how disclosure sentiment affects stock returns (Li, 2010). Disclosure Indices and Regulatory Compliance are applied to compare voluntary vs. mandatory sustainability reporting (Bini et al., 2023). Surveys and Content Analysis are used to validate whether stakeholder perceptions align with reported disclosures (Tauringana & Chithambo, 2016). This shift towards mixed-method research highlights the need for triangulation, namely cross-validating results using multiple disclosure assessment techniques.

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3.2 Causal Claims in Prior Disclosure Studies and the Reliability & Validity of Disclosure Measures

3.2.1 Causal Claims in Prior Disclosure Studies

Many studies on corporate disclosure assume that better disclosure leads to positive financial outcomes, such as lower cost of capital, higher stock prices, and improved firm performance. However, proving this cause-and-effect relationship is difficult. One major issue is endogeneity, which happens when both disclosure and firm performance are influenced by the same underlying factors, such as corporate governance or industry regulations (Hassan & Marston, 2019b). Another problem is reverse causality, where it is unclear whether firms disclose more because they perform well or whether good disclosure improves performance (Cuomo et al., 2024).

To solve these problems, researchers use advanced statistical methods to separate correlation from causation. Some studies apply Instrumental Variables (IV) to isolate external factors that affect disclosure but are not influenced by firm performance (Nikolaev & Lent, 2005). Others use Difference-in-Differences (DiD), which compares companies before and after a regulation, such as the EU Non-Financial Reporting Directive (NFRD), to see if disclosure changes lead to better financial outcomes (Dobija et al., 2023) .However, not all studies use these methods, which makes it hard to draw firm conclusions about the true impact of disclosure.

3.2.2 Reliability and Validity of Disclosure Measures

To make sure research results are trustworthy, disclosure measures should be reliable and valid. Reliability means that the same measurement method should produce consistent results over time. Validity means that the method should accurately measure what it is supposed to measure. However, many studies in disclosure research do not fully test these aspects. For example, Content Analysis, which is a common method used to study non-financial disclosure, often lacks reliability because different researchers may interpret corporate reports differently. Some studies improve reliability by using inter-coder agreement tests, where multiple analysts check if they get similar results (Beretta et al., 2023). Another way to improve reliability is by using automated text analysis tools, such as natural language processing (NLP) algorithms, which reduce human bias (Hassan & Marston, 2019b).

Validity is another major concern. Some studies use ESG scores from agencies like *MSCI* and *Sustainalytics* as a measure of corporate transparency, but these scores often have hidden calculation methods that make it hard to check their accuracy (Cicchiello et al., 2023). Other studies use disclosure indices based on frameworks, such as the Global Reporting Initiative (GRI) or Integrated Reporting (IIRC), but these indices may overlook industry-specific factors (Di Vaio & Varriale, 2020).

To improve disclosure research, future studies should combine multiple measurement methods. For example, using both Content Analysis and ESG Scores can provide a clearer picture of corporate transparency. Additionally, researchers should conduct more rigorous reliability tests, such as test-retest analysis and factor analysis, to ensure their results are accurate and reproducible.

4. Discussion and Conclusion

4.1 Critique of Non-Financial Disclosure Measurement Methods

Measuring non-financial disclosure is challenging because the different methods have different strengths and weaknesses. The five main methods used in prior studies are Content Analysis, ESG Scores, Disclosure Indices, Stakeholder Surveys, and Regulatory Compliance Analysis. However, each of these methods has limitations that affect the reliability of research findings. Content Analysis, which examines corporate sustainability reports and other public disclosures, is widely used but often criticized for being subjective. In manual Content Analysis, different researchers may interpret corporate messages differently, leading to

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inconsistent results (Beretta et al., 2023). Some studies try to solve this by using automated text analysis, but AI-based tools sometimes misinterpret words and miss important context (Hassan & Marston, 2019b). ESG Scores, which are assigned by financial rating agencies like *MSCI, Refinitiv*, and *Sustainalytics*, provide a numerical measure of corporate social and environmental performance. However, these scores lack transparency because different agencies use different scoring models, which can lead to inconsistent results (Cicchiello et al., 2023). For example, a company might receive a high ESG score from one agency but a low score from another, making it difficult to compare studies. Disclosure Indices, such as those based on the GRI, SASB, or IIRC frameworks, offer a more structured approach to measuring disclosure. However, they do not account for industry differences, meaning that some sectors such as finance and healthcare, may require more detailed disclosures than others (Di Vaio & Varriale, 2020). Furthermore, these indices often assign equal weights to all disclosure elements, even though some disclosures e.g., climate change reporting, may be more important than others.

Stakeholder surveys, which measure how investors, regulators, and consumers perceive corporate disclosure, are useful for understanding market reactions. However, surveys capture perception rather than actual disclosure quality and are often influenced by bias and social expectations (Hadro et al., 2021). Regulatory compliance analysis focuses on whether companies follow disclosure laws, such as the EU Non-Financial Reporting Directive (NFRD) or the Corporate Sustainability Reporting Directive (CSRD). While compliance-based studies provide objective benchmarks, they ignore voluntary disclosures, which many firms use to enhance transparency beyond legal requirements (Bini et al., 2023).

4.2 Recommendations for Future Research and Conclusion

To improve the measurement of non-financial disclosure, future research should incorporate several methodological enhancements. One important step is to use a mixed-methods approach by combining content analysis, ESG scores, and disclosure indices. This triangulation can improve the robustness and consistency of results. In addition, adopting artificial intelligence and machine learning, particularly advanced Natural Language Processing (NLP) techniques, can reduce bias in content analysis and ensure more accurate interpretation of contextual nuances. Another key recommendation is to develop industry-specific disclosure indices. Standardized frameworks often overlook sector-specific materiality, so tailored indices should assign differentiated weights to disclosure components based on industry characteristics. Enhancing the reliability and validity of these indices is also crucial. This can be achieved through methodological tools such as factor analysis, inter-coder reliability assessments, and test-retest procedures. Finally, future studies should move beyond correlational analysis and aim to strengthen causal inference. Advanced econometric techniques, including Difference-in-Differences (DiD), Instrumental Variables (IV), and Structural Equation Modeling (SEM), can help establish stronger empirical claims about the effects of non-financial disclosure.

This paper reviewed how non-financial disclosure is measured in academic research and highlighted key challenges in causality, reliability, and validity. While disclosure measurement methods such as Content Analysis, ESG Scores, and indices are widely used, they suffer from inconsistencies, biases, and lack of comparability. Future research should focus on improving measurement accuracy by integrating multiple approaches, adopting AI-driven methods, and refining industry-specific frameworks. By addressing these issues, disclosure research can provide more reliable insights for policymakers, investors, and corporate sustainability leaders.

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