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A Bibliometric Analysis and Literature Review of Sustainable Business Practices: Sustainability Disclosure in Indonesia's Cement Industry

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ABSTRACT

Objective: The purpose of this study is to analyze data mapping from cement companies and disclosures in sustainability reports. Diagrams will be incorporated to facilitate a comprehensive understanding. **Method:** This research uses sustainability reports from 17 cement companies in Indonesia, with disclosure years 2017-2020, using the GRI standards approach. This study reviews sustainability reports using Textual Analysis with a word-count approach developed by Loughran and McDonald. This approach counts how many words describe the context of the sustainability report and its disclosures, followed by the presentation of the Bibliometric Analysis developed by Hesford. Furthermore, the researcher will conduct a complete descriptive and thematic analysis. **Results:** This study shows that Semen Jawa had the best overall sustainability disclosures across the observed years. The most general aspect was disclosed by Semen Jawa in 2017, Semen Tonasa in 2018, and Semen Baturaja in 2019 and 2020. The most economical aspect was Semen Jawa throughout 2017-2019, and Semen Baturaja in 2020. Disclosing the most environmental aspect was PT. Indocement Tungal Perkasa for the entirety of the observed years. The most social aspect was Semen Jawa from 2017-2020. With this mapping, you will be able to see the cement industry's concern for sustainability. **Novelty:** Through sustainability reports, it is hoped to demonstrate the sustainability of Indonesia's cement industry, which is expected to help protect it from the negative impacts of its production operations. Therefore, it is hoped that the cement industry's role in the country's economy will eventually be strengthened.

INTRODUCTION

Accounting is a tool that companies use to identify, record, and communicate economic events as information about the organization that is of great interest to both internal and external users (Olayinka, 2022; Weygandt et al., 2019). Stakeholders very much need accounting information; this is related to businesses operating in this world, which are facing unprecedented risks covering various interrelated problems. Accounting information, in its development, has become a concern and a need for stakeholders; it is not enough to have only financial information; non-financial information is also needed (Monteiro et al., 2022; Ombai et al., 2024; Sierra, 2018). Arlene (2020) emphasized in her research the importance of non-financial information as an opportunity to integrate sustainable development into the company's business practices, strategies, and environment.

A shift in the need for non-financial information will parallel the development of sustainability reporting. Sustainability reporting is generally still voluntary, but as it develops, it can become standard practice. In Indonesia, the Financial Services Authority

(OJK) has prepared this Sustainability Report mandatory for companies listed on the Indonesia Stock Exchange, starting in April 2022. Several standards that can be used to create Sustainability Reports include the GRI (Global Reporting Initiative) Standards, the SASB (Sustainability Accounting Standards Board) Materiality Maps, the TCFD (Task Force on Climate-Related Financial Disclosure), and the ICMM (International Council on Mining and Metals) Principles. Of the several standards for creating Sustainability Reports, the GRI is the most frequently used worldwide.

Disclosure of company desires can design long-term targets and improvements, create more structured stakeholder participation, be more alert to activities with risk of desire, increase credibility, accountability, and transparency of the company, maintain the company's reputation and image, mark information on other companies' desires that share the same publish a desire report (Anser et al., 2024; PwC, 2012; Srivastava et al., 2022). The cement industry is among the most attractive infrastructure services (Deputy KBUMN, 2020). From an environmental perspective, the cement industry is classified as a high-risk sector, with direct contact with natural resources and heightened sensitivity to pollution risks (Eid et al., 2024; Khan et al., 2026). This is supported by research showing that carbon dioxide accounts for 5-6% of all carbon dioxide produced by human activities worldwide. Apart from that, the cement industry also produces significant pollutants, including dioxins and heavy metals (Elehinafe et al., 2022; Li et al., 2023; Rodrigues & Joeques, 2011). Even though the cement manufacturing process has negative impacts, the cement industry is also closely linked to the concrete industry's supply chain.

The use of cement is also closely related to the problems of modern society, which really needs infrastructure development. Therefore, increasing cement production can support modern society's need for high infrastructure (Griffiths et al., 2023; Mohamad et al., 2022; Rodrigues et al., 2011). This increase in cement production in Indonesia signals positive infrastructure development in modern society; however, it will also increase pollution and negatively affect the cement industry. Namely, 5-6% of the carbon produced from human activities in the world comes from the cement industry (Rodrigues & Joeques, 2011); apart from that, the cement industry also produces pollutants and heavy metals that are harmful to humans (Ismail et al., 2023; Rodrigues et al., 2011). Data from the Indonesian Cement Association in 2021 shows the installed capacity of industrial cement is 116 million tons (ASI, 2021). Considering the negative impacts and the cement industry's important role in development, the problem of poverty in the industry is significant and warrants special attention. One of the important travel issues is the start of performance to ensure the company's direction and goals are as planned. Therefore, a development model to evaluate undesirable damage in Indonesia's cement industry is needed.

The trend of increasing cement production from year to year is expected to continue, in line with the need for infrastructure development, housing, and residential projects in Indonesia. This increase in cement production will create an environmental problem. Sustainability reporting practices have so far been carried out by the cement industry in

Indonesia (Jati et al., 2023; Tantri et al., 2023). However, environmental concerns must remain a priority for the cement industry in Indonesia to move towards a sustainable business model (Melenia et al., 2023; Sodik et al., 2025). Sustainability reports published by cement companies use the Global Reporting Initiative (GRI), a widely used sustainability reporting standard (Rezaee, 2021). This research assesses sustainability performance disclosures against the GRI Standards. This research aims to analyze the mapping of the disclosure of sustainability reports of companies in the cement industry in Indonesia based on the GRI Standards approach, in the observation years 2017 to 2020.

RESEARCH METHOD

Research Approach

This research aims to analyze the mapping of sustainability report disclosures among cement companies in Indonesia using the GRI Standards approach. Bibliometric analysis or methods (bibliometrics), sometimes also referred to as scientometrics, are part of the research evaluation methodology, and from the various literature that has been produced, it is possible to carry out bibliometric analysis using its own method (Ellegaard & Wallin, 2015; Lintangesukmanjaya et al., 2025; Pessin et al., 2022). Bibliometric mapping will benefit both the scientific community and the public in general because it can help transform data into maps or visualizations, which are more manageable to process in order to obtain useful insights, for example visualizing keywords to identify research themes or clusters in certain scientific disciplines, mapping author affiliations of specific journals to identify the geographic scope of the journal, map institutional collaborations and international collaborations as part of a framework for identifying emerging technologies (Tanudjaja & Kow, 2018). By charting the field and analyzing the community (Hesford et al., 2007), researchers will use databases and methods to map data on cement companies in Indonesia and their sustainability report disclosures. Each analysis will be presented in diagram form to facilitate comprehensive understanding, so you can see how sustainability report disclosures can be presented to understand the development of the Sustainability Report topic to date.

Research Sample

This research uses a sample that also serves as a population, namely sustainability reports from cement companies in Indonesia. Researchers can identify 17 cement companies, and their sustainability reports are available from 2017 to 2020. This period was chosen with the understanding that the companies had used the GRI Standards as guidelines for preparing sustainability reports.

Research Process

The approach used in the research is the year of publication of disclosures by cement companies in Indonesia during 2017-2020, identifying which companies disclosed. Sustainability Reports during that period, categorize state-owned and private cement

companies, identify through which Sustainability Reports are disclosed, identify the number of disclosures from year to year from all cement companies in Indonesia, present cement companies that continuously disclose sustainability reports and those that do not continuously, then carry out textual analysis using word count. This approach is based on the number of words needed to explain the context. The method used is to highlight keywords in each aspect as a basis for calculating and identifying the number of disclosures from each topic based on the GRI Standards (Pombinho et al., 2023), namely general disclosure topics-GRI100, management approach disclosure topics-GRI 200, specific economic disclosure topics- GRI 300, and specific environmental disclosure topics-GRI 400 (NCSR, 2017).

RESULTS AND DISCUSSION

The seventeen cement companies in Indonesia that are the objects of this research vary in size, ownership status, and business management. Specifically, the researcher will describe in detail the disclosure map for sustainability reports by cement companies in Indonesia, using the latest standard, namely the GRI Standards.

Cement Companies in the BUMN and Private Categories

If cement companies in Indonesia are separated into BUMN and private categories, 41% are State-Owned Enterprises (BUMN), namely 7 companies. Meanwhile, the other 10 are private companies, both domestic and foreign. The following is a comparison in Figure 1 showing the separation between SOEs and non-SOEs.

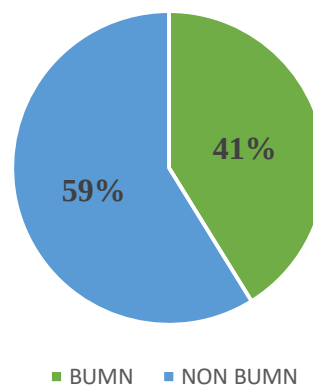


Figure 1. Separation of BUMN/NON BUMN

Cement Companies by Regional Demographics

The demographics of Indonesia, an archipelagic country from Sabang to Merauke, as well as the development being pursued, can spread throughout Indonesia. This will influence cement companies' policies when choosing locations for cement factories. Based on data processed by researchers, 70% of factory locations are still on Java Island, while 12% and 6% of factories are on Sumatra Island and Sulawesi Island, respectively, and are in Nusa Tenggara. The following is Figure 2, showing the regional demographics of cement.

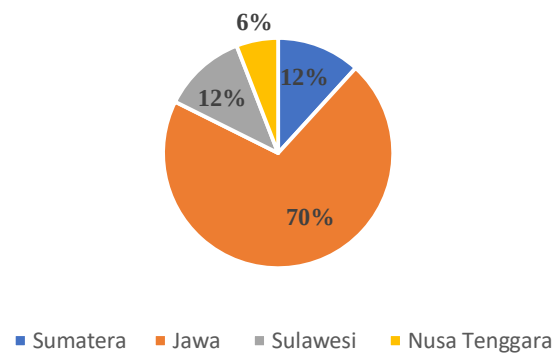


Figure 2. Regional demography

Form of Presentatino of Sustainability Report Disclosure

Of the Sustainability Report disclosures presented by cement companies in Indonesia, 23% are presented in a stand-alone sustainability report, 18% are presented in a CSR report that is part of the annual report, and 6% are presented in a CSR report on the company's website. In comparison, 53% have not; you cannot trace the presentation. The following is Figure 3, showing the form of presentation.

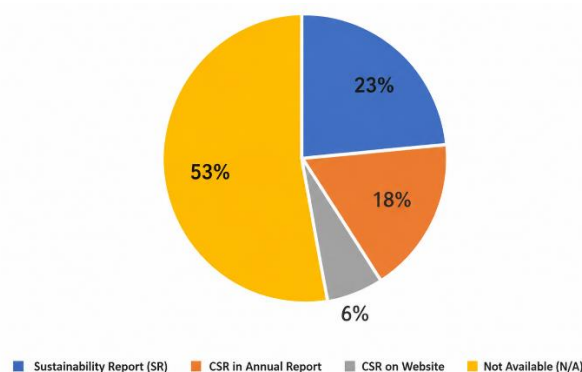


Figure 3. Form of presentation

Continuity of Sustainability Report Disclosure

41% of cement companies in Indonesia have consistently disclosed their sustainability reports, while 59% have not. Continuity in the disclosure of these sustainability reports can be seen in Figure 4 below.

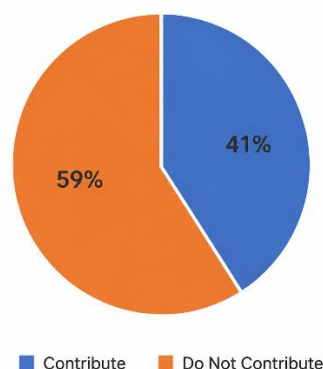


Figure 4. Continuous and discontinuous

General Disclosure Topics (Topic 102)

General Disclosure is a standard disclosure in the GRI, with topic code 102. Of the 17 cement companies as objects of observation, the 3 cement companies that disclosed the breadth of their disclosures were Semen Baturaja in 2020 with 9,665 words and in 2019 with 9,575 words, and Semen Tonasa in 2018 with 9,478 words. The General Disclosure can be mapped as shown in Figure 5 below.

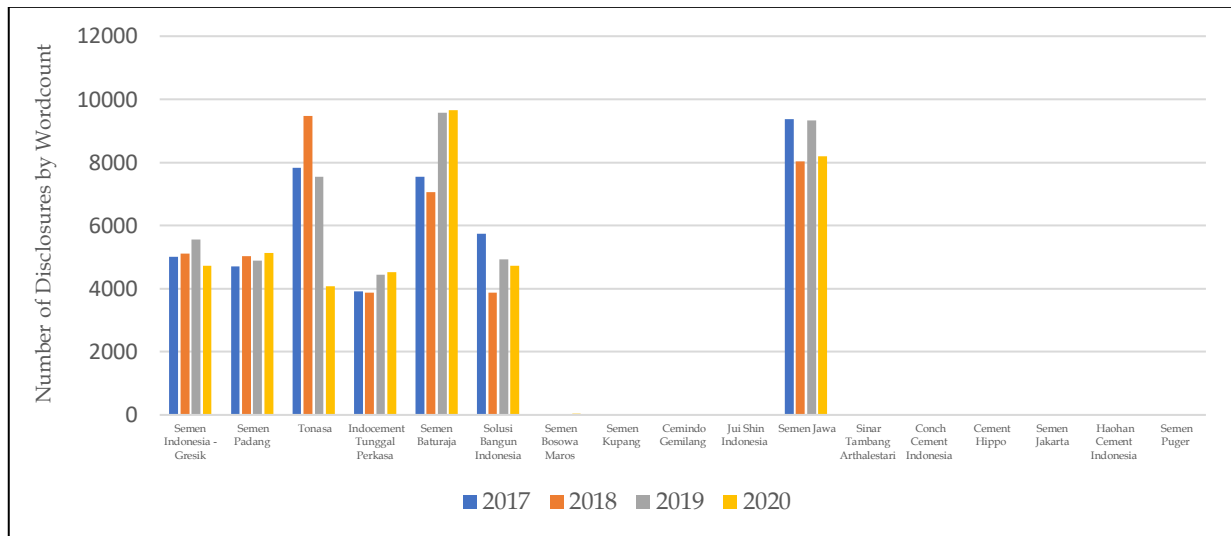


Figure 5. General disclosures

General Disclosure Topics (Topic 103)

The topic of general disclosure regarding the Management Approach in GRI Standards was coded 103 out of 17 cement companies as objects of observation, so the 3 cement companies that disclosed the breadth of their disclosures, respectively, were the Indocement Tunggul Perkasa company in 2019, which disclosed 9,092 words; in 2018, disclosed as many as 6,803 words, and in 2020 revealed 4,989 words. General disclosure topics can be mapped as shown in Figure 6 below.

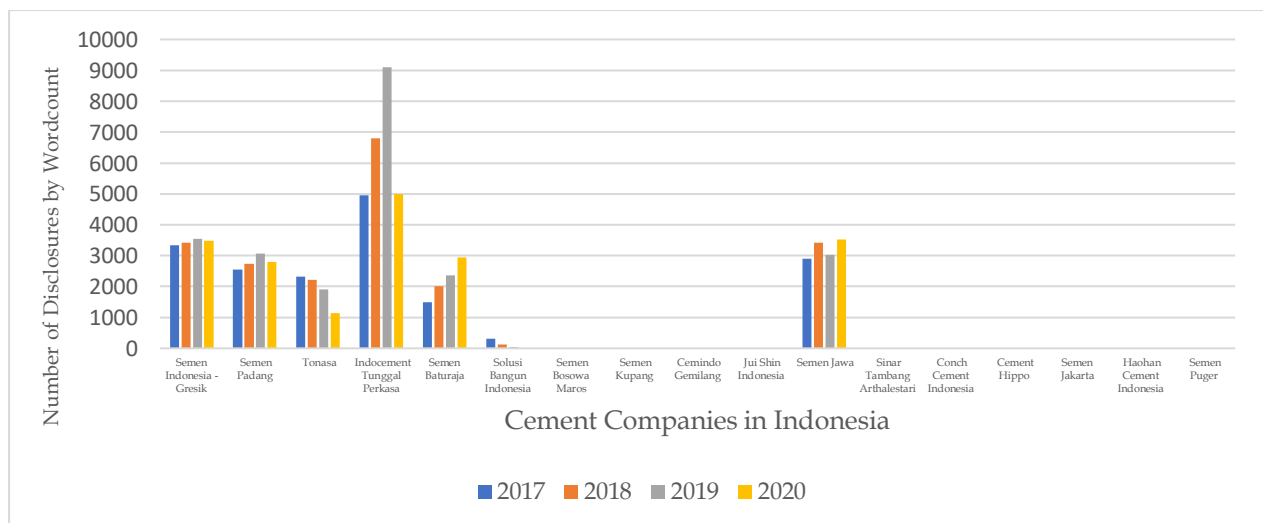


Figure 6. Management Approach

Economic Disclosure Topics (Topics 201-207)

On the topic of economic disclosure, 7 approaches are presented, namely: Topic 201, which provides disclosure of general economic performance. The economic disclosure topics can be mapped as shown in Figure 7 below.

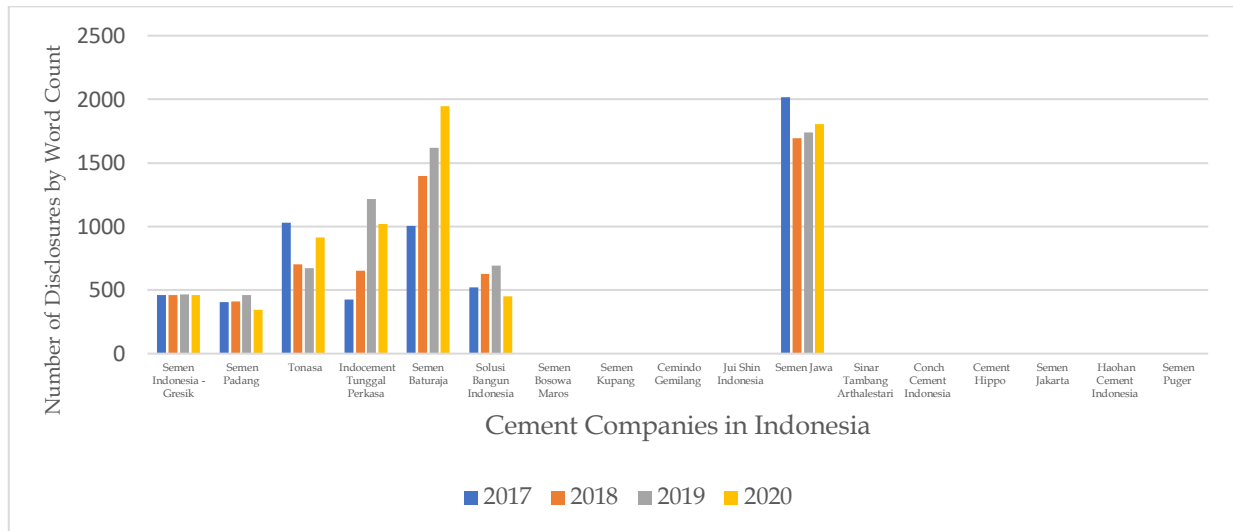


Figure 7. Economic aspect

Topic 202 is about market existence, topic 203 is about indirect economic impacts, topic 204 is about procurement practices, topic 205 is about anti-corruption, topic 206 is about anti-competitive behavior, topic 207 is about taxes.

Environmental Disclosure Topics (Topics 301-307)

Topic 301 provides disclosures about materials; Topic 302 is about energy; Topic 303 is about water and effluent; Topic 304 is about biodiversity; Topic 305 is about emissions; Topic 306 is about waste; Topic 307 is about environmental compliance. The environmental disclosure topics can be mapped as shown in Figure 8 below.

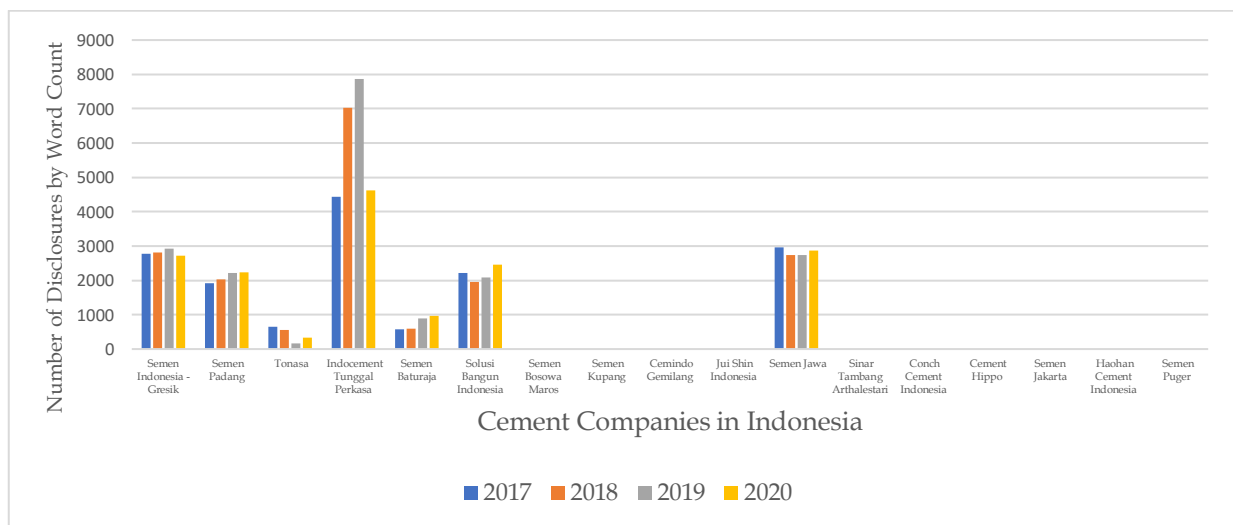


Figure 8. Environmental aspect

Social Disclosure (Topics 401-419)

Topic 401 is a topic that provides disclosures about employment, topic 402 is about labor relations, topic 403 is about safety, topic 404 is about training and education, topic 405 is about diversity and equal opportunities, topic 406 is about non-discrimination, topic 407 is about freedom of association and collective bargaining, topic 408 on child labor, topic 409 on forced and compulsory labor, topic 410 on security practices, topic 411 on the rights of indigenous peoples, topic 412 on human rights assessment, topic 413 on local communities, topic 414 on social assessment of suppliers, topic 415 on public policy, topic 416 on customer health and safety, topic 417 on marketing and labeling, topic 418 on privacy and consumers, topic 419 on socioeconomic compliance. The environmental disclosure topics can be mapped as shown in Figure 9 below.



Figure 9. Social aspect

This research also examines the prevalence of keywords related to cement in the construction sector for the period of 2021–2025. In this visualization, node size represents the frequency of a keyword's occurrence, while connecting lines indicate co-occurrence relationships between keywords within the same publication. The larger the node and the denser the connections, the more significant the keyword's role in shaping the knowledge structure of this research field. Figure 10 below displays the network visualization resulting from the keyword co-occurrence analysis conducted using VOSviewer.



Figure 10. Network Visualization

Visualization results reveal that "sustainable development" is the most dominant keyword and the central node of the research network, showing strong connections to keywords such as "concrete mixtures," "durability," "cement," "microstructure," "carbon dioxide," and "supplementary cementitious materials." These findings indicate that current research focuses on developing concrete materials that not only exhibit high mechanical performance and durability but also reduce carbon emissions through the use of alternative materials such as supplementary cementitious materials, geopolymers, and recycled aggregates. Furthermore, the emergence of keywords like "machine learning," "forecasting," and "strength prediction" points to a trend of integrating artificial intelligence technologies to predict concrete properties and optimize mix designs. Overall, the network demonstrates that research into sustainable development has evolved toward a multidisciplinary approach, combining environmental sustainability, material innovation, and digital technology to support a more eco-friendly construction industry.

CONCLUSION

Fundamental Findings: The results of this research, which analyzes the mapping of sustainability disclosures and organizational understanding in Indonesia's cement industry, show that, overall, Semen Jawa disclosed the most sustainability information throughout the observation period; PT Indocement Tunggal Perkasa ranked next. Indocement Tunggal Perkasa for sustainability disclosures in 2017-2019, while in 2020 Semen Baturaja made more sustainability disclosures. **Implication:** Sustainability disclosure for foundation and general aspects, which contains reporting principles for report content (stakeholder inclusiveness, sustainability context, materiality,

completeness) and reporting principles for report quality (accuracy, comparability, balance, reliability, clarity, timelines). In 2017, Semen Jawa disclosed the most general aspects; in 2018, Semen Tonasa; and in 2019 and 2020, Semen Baturaja disclosed this aspect the most. Disclosure of sustainability for economic aspects includes management approaches to economic performance, market presence, indirect economic impact, procurement practices, anti-corruption, anti-competitive behavior, and taxes. Semen Jawa disclosed the sustainability of this economic aspect the most consecutively throughout 2017-2019, but in 2020 Semen Baturaja disclosed the most economic aspects in its Sustainability Report. In its Sustainability Report, PT. Indocement Tunggal Perkasa demonstrated the highest sustainability in environmental aspects throughout the observation period, namely 2017-2020. These environmental aspects include materials, energy, water and effluents, biodiversity, emissions, waste, environmental compliance, and supplier environmental assessment. The most social aspects were disclosed in Semen Jawa's Sustainability Reports in 2017-2020. This social aspect reveals employment, labor, occupational health & safety, training and education, diversity & equal opportunity, non-discrimination, freedom of association, child labor, forced labor, security practices, rights of indigenous peoples, human rights assessment, local communities, supplier social assessment, public policy, customer health and safety, marketing & labeling, customer privacy, socioeconomic compliance. **Limitation:** This study was limited to companies in the Indonesian cement industry and analyzed sustainability disclosures based solely on information presented in published sustainability reports, which may not fully reflect the actual implementation of sustainability practices. **Future Research:** Future studies are recommended to expand the scope by including companies from different industries or conducting cross-country comparisons to provide a broader understanding of sustainability disclosure practices.

AUTHOR CONTRIBUTIONS

Wijaya Triwacananingrum was coordinator research and manuscript writing. **Rahmawati** processed and analysed bibliometric data. **Djuminah** performed data validation and discussion. **Agung Nur Probohudono** supported the literature search, reference compilation, and final editing. All authors approved the final manuscript.

CONFLICT OF INTEREST STATEMENT

The authors declare that there are no conflicts of interest, either financial or personal, that could influence the content or results of this study.

ETHICAL COMPLIANCE STATEMENT

This article has met the standards of research and publication ethics. The author affirms that this research is original, conducted with academic integrity, and free from unethical practices, including plagiarism.

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