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Readyness for Biodiversity Accounting Disclosure in Corporations Towards Future Hilirization

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Abstract: This study examines biodiversity accounting in Indonesia's mining and energy sectors, highlighting the challenges and readiness of companies to support the downstream agenda. Despite the increasing importance of biodiversity for sustainability, issues such as transparency in environmental cost reporting and compliance with regulations persist. Using a qualitative approach through textual analysis of sustainability reports from 60 companies listed on the Indonesia Stock Exchange for 2022-2023, the research identifies key themes related to biodiversity impacts and company actions. The findings reveal that these companies exhibit varying levels of readiness in facing downstream initiatives, with a significant gap between corporate commitments to biodiversity protection and actual implementation. Recommendations for future studies emphasize the importance of integrating advanced technologies, stakeholder engagement, and the role of policy frameworks in enhancing biodiversity management. This research contributes to understanding how companies can align their practices with sustainable development goals, ensuring economic growth while safeguarding biodiversity.

Keyword: Hilirization, Biodiversity Accounting, Sustainability Reporting, Qualitative Approach, Sustainability Future

INTRODUCTION

Biodiversity, or biological diversity, refers to the variety of life forms on Earth (Cipullo, 2016). It encompasses the understanding of living organisms, ecological processes, and evolutionary mechanisms. Biodiversity includes all species on the planet (Syarifuddin & Damayanti, 2020). It plays a crucial role in maintaining ecosystem balance, ensuring the availability of natural resources, and supporting human life. Biodiversity provides essential benefits for the survival of living organisms, such as nutritious food, medicine, disease control, and ecosystem stability (Cordella et al., 2022).

Several factors threaten biodiversity, including habitat destruction, deforestation, global temperature rise, pollution, changes in rainfall patterns, and the overexploitation of natural resources (Schulze et al., 2020). Among these, resource exploitation poses a significant threat to biodiversity sustainability (Senn & Giordano-Spring, 2020). Uncontrolled resource exploitation can result in negative impacts on humans, ecosystems, and long-term economic

prosperity (Skouloudis et al., 2019). Therefore, the protection and management of natural resources are critical to mitigating the negative effects of exploitation. Activities such as palm oil plantation expansion, land clearing for mining, smelter construction, and converting forests into residential or industrial areas are major threats to biodiversity sustainability (Syarifuddin and Damayanti 2020).

Biodiversity is essential for the survival of living beings, and addressing this requires a framework for measuring, monitoring, and reporting the impact of economic activities on biodiversity (King et al., 2021). One approach to achieve this is through Biodiversity Accounting (Corey et al., 2020), which is crucial in efforts to preserve and enhance biodiversity. Biodiversity accounting includes setting biodiversity indicators, inventory and mapping, calculating economic value, evaluating ecosystems, reporting and disclosure, and policy development (Roberts et al., 2021). It can also improve the quality of sustainability reporting in companies, making it a reflection of biodiversity management (Senn & Giordano-Spring, 2020). Biodiversity accounting promotes transparency, accountability, and effective resource management by offering a specific approach to measure, monitor, and report the impact of organizational activities on biodiversity (Tiwari & Khan, 2020).

Currently, biodiversity reporting is considered insufficient due to a lack of understanding and awareness about the importance of biodiversity and maintaining ecosystem balance. The absence of proper regulations and standard guidelines has resulted in biodiversity reporting being treated merely as a formality (Senn and Giordano-Spring 2020).

Indonesia has started implementing natural resource management activities to increase economic value through various government programs. One such initiative is the downstreaming strategy, or value-added processing, aimed at enhancing economic value and providing long-term benefits to the economy (Syarifuddin and Damayanti 2020). The government has emphasized downstreaming, referred to as "hilirisasi," as a key strategy in the national development plan towards a prosperous Indonesia by 2045. Hilirisasi involves further processing and decentralization of natural resources to reduce reliance on raw material exports, increase domestic product value, and stimulate job creation (Sabowo & Siswanto, 2023). In the mining sector, this has led to significant investments in smelter construction and in-country processing of raw materials to enhance export value (Asmy et al., 2024).

While downstreaming holds promising prospects for Indonesia's economic development, it brings about environmental concerns, particularly with intensified natural resource exploitation. Thus, a balance between sustainable economic growth and biodiversity protection is necessary (Cipullo, 2016). Mitigation frameworks must be developed to assess environmental risks, ensure specific accountability reporting, and accurately evaluate ecosystems to minimize the negative impacts of downstreaming (Asmy et al. 2024).

A bibliometric analysis (Maione et al., 2023) reveals that biodiversity reporting remains low, highlighting the need for biodiversity accounting to be incorporated into future biodiversity management and reporting practices. Biodiversity accounting is highly relevant for developing environmentally sustainable organizational practices (Blanco-Zaitegi et al., 2022). The growing intensity of natural resource exploitation indicates a decline in biodiversity, underscoring the importance of environmental accounting frameworks within national economic programs to preserve biodiversity and provide protection (King et al. 2021).

In Indonesia, studies show that local government reports do not yet adequately reflect biodiversity information for stakeholders. As a result, sustainability information is often symbolic, suggesting management has simply fulfilled environmental reporting requirements (Syarifuddin and Damayanti 2020). Biodiversity accounting is essential for evaluating biodiversity on a global scale (Maione, Cuccurullo, and Tommasetti 2023). It enables the

assessment of management processes by considering environmental values to improve future productivity (Schulze et al., 2020).

Furthermore, appropriate regulations are crucial to accommodate biodiversity accounting practices, especially in companies that exploit natural resources. Biodiversity accounting is relevant as a governance and sustainable reporting tool for businesses (Aureli et al., 2020). Given the global sustainability framework (SDG) set by the United Nations for 2030, integrating biodiversity accounting with these goals can contribute to optimal biodiversity sustainability (Tsalis et al., 2020). Ultimately, biodiversity accounting can enhance accountability in sustainability reporting, making it valuable for stakeholders (Boiral & Heras-Saizarbitoria, 2020).

Previous research provides insights into sustainability reporting and biodiversity accounting in a global context (Blanco-Zaitegi et al., 2022; Cordella et al., 2022; Dhar et al., 2022; Geneletti et al., 2003; Roberts et al., 2021; Skouloudis et al., 2019; Syarifuddin & Damayanti, 2020; Weir, 2019). Some studies have outlined specific frameworks for implementing biodiversity accounting in sustainability reports (Aureli et al., 2020; Boiral, 2016; Schulze et al., 2020; Tsalis et al., 2020). However, there is a gap in understanding how sustainability management can effectively integrate biodiversity accounting information and analysis, particularly in countries with high biodiversity like Indonesia. This research aims to address this need by identifying and developing effective methods for integrating biodiversity accounting information and analysis into sustainability reporting practices in Indonesia.

This study is particularly relevant in the context of Indonesia's national strategy towards 2045, which includes the downstreaming of natural resources. It employs a qualitative approach to sustainability reporting in the mining and energy sectors. The biodiversity accounting approach is also employed to assess the readiness of energy and mining companies in implementing downstream programs in the future. This approach helps evaluate how prepared these industries are to balance their economic activities with the need to protect biodiversity, ensuring sustainable practices as they engage in value-added processing and reduce their reliance on raw material exports. Biodiversity accounting provides insights into the environmental impacts of these sectors and guides the development of strategies that align with sustainable resource management, essential for the successful execution of downstreaming programs.

METHOD

The research was conducted using a qualitative method with a Grounded Theory approach (Al-Eisawi, 2022). The study involved a textual analysis review of sustainability reports from energy and mining companies listed on the Indonesia Stock Exchange. A total of 60 sustainability reports from energy and mining companies for the years 2022-2023 were examined. The textual review focused on the extent to which elements of biodiversity accounting had been implemented (Boiral, 2016; Maroun & Atkins, 2021; Traxler et al., 2020; Weir, 2019).

The data used in this study were derived from the textual summaries of biodiversity accounting found in 60 sustainability reports from energy and mining companies. These data were then classified and textually coded using N-Vivo software (Sadri & Hossein Ranjbar, 2024).

This research applied a deductive approach (Azizi et al., 2023), employing a strategy of classifying corporate disclosure on biodiversity accounting reporting. The study assessed the extent and patterns of how companies reported on biodiversity accounting. The data analysis process began with textual code searches, followed by code categorization, examination of biodiversity accounting elements, theme formulation, and concept development within the Grounded Theory procedure (Makri & Neely, 2021).

Further data analysis involved extracting emerging patterns through open coding, directed coding, selective coding, and theory development (Asiaei et al., 2022; Holt et al., 2022; Stough & Lee, 2021). The Nvivo software was utilized to assist in the coding process, providing a structured and systematic visualization for the development of new theoretical findings. Additionally, the study employed triangulation of sources, data, and time to validate the quality of the results.

RESULTS AND DISCUSSION

In order to collect qualitative data on biodiversity accounting for 60 mining and energy businesses listed on the Indonesia Stock Exchange in 2022–2023, this study performed a textual analysis. Based on the sustainability reports of mining and energy businesses, the research created a preliminary framework to explain the dynamics of biodiversity accounting in these industries.

Six major topics were found and categorized into two sections of the study in order to examine the dynamics of biodiversity accounting. The biodiversity component, which covers activities performed, biodiversity impact, and environmental impact, is the main topic of Part 1. The accounting for biodiversity is the subject of Part 2, which also covers expenses incurred, reporting produced, transparency, and compliance.

Biodiversity

a) Environment impact

The image below illustrates the environmental impacts caused by the industrial and mining sectors in Indonesia, based on the 2022-2023 sustainability reports. These impacts are categorized into five main areas: Air Pollution, Water Pollution, Land Degradation, Industrial Waste, and Ecosystem Damage, each with various subcategories of impact. Air Pollution includes gas emissions such as NOx and CO2, which have the highest impact (20), while Ship Emissions have the smallest impact (2). Water Pollution shows the most significant impact, primarily from Hazardous Waste Pollution (80), followed by Heavy Metal Pollution (20) and Hazardous Chemical Waste (30). Land Degradation, including Habitat Destruction (15), also has a significant impact, whereas Topographic Changes and Deforestation show lower impacts. Industrial Waste and Ecosystem Damage present smaller impacts, ranging from 2 to 4. Overall, water pollution is the primary issue, followed by air pollution and land degradation, while industrial waste and ecosystem damage remain relevant to sustainable environmental management.

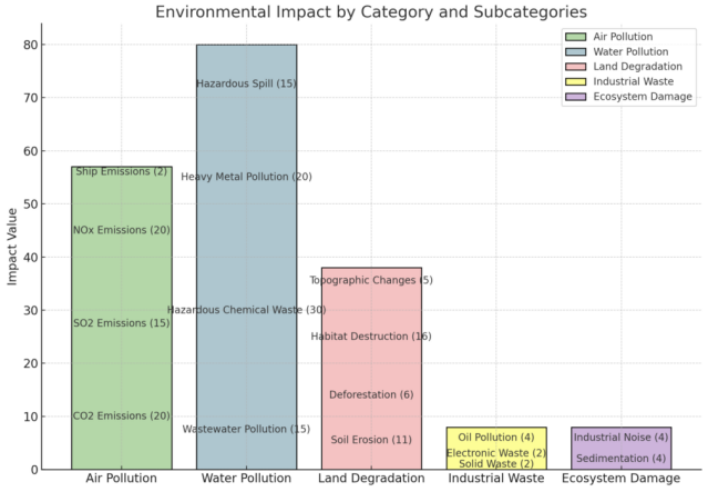

Figure 1. Environment Impact
Source: Data Process, 2024

b) Biodiversity Impact

Below is the visualization of the outputs obtained from the Nvivo coding and analysis using Python (Abram et al., 2020).

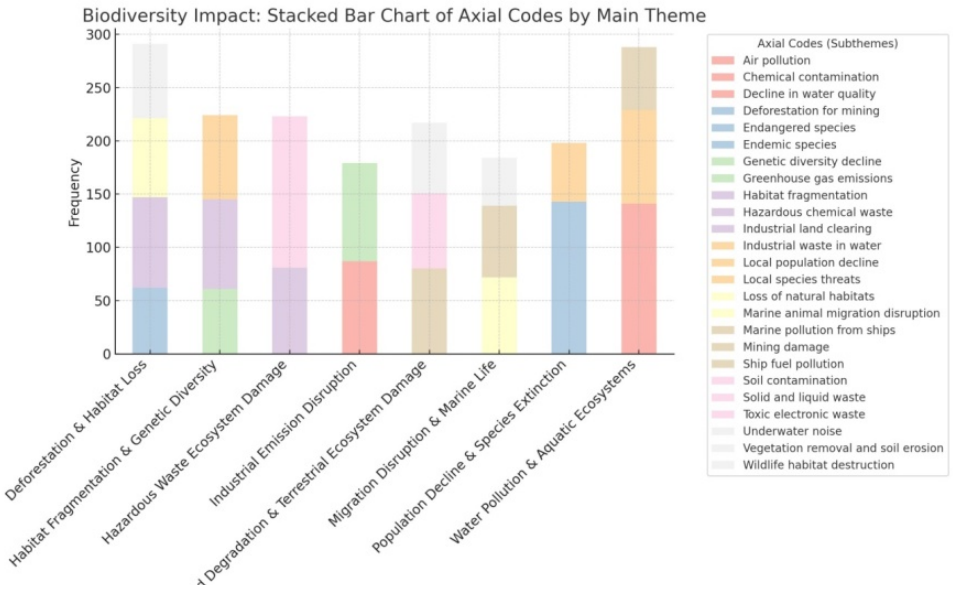

Figure 2. Biodiversity Impact
Source: Data Process, 2024

The image above illustrates the frequency of biodiversity impacts based on the main themes, with various subthemes contributing to each theme. The graph focuses on the effects caused by industrial and mining activities, with subthemes covering different types of pollution, habitat destruction, and ecosystem disruption.

From the information presented, it can be concluded that corporate activities in Indonesia, particularly in the industrial and mining sectors, have significant impacts on biodiversity and the environment. The high levels of air, water, and soil pollution highlight that waste and emission management remain major challenges. Deforestation and habitat destruction due to land clearing and mining activities have also led to a decline in biodiversity. Poor hazardous waste management has caused ecosystem damage, especially on land and in water bodies (Schulze et al., 2020). Disruptions to local species and the degradation of water and soil quality further emphasize the lack of long-term consideration for ecological impacts. Overall, companies in Indonesia need to enhance sustainability practices and manage their environmental impacts more responsibly.

c) Activities Performed

The term "Activities Performed" refers to the company's efforts in anticipating and addressing the impacts on the environment and biodiversity. These activities were carried out during the 2022-2023 period and serve as a form of corporate responsibility in response to environmental and biodiversity impacts. Below is an image showcasing the actions the company has taken. The image (figure 4) below illustrates the relationship between various environmental and biodiversity impacts and the actions taken by companies in Indonesia to address them. Various environmental impacts such as air pollution, water pollution, land degradation, ecosystem damage, and habitat loss are listed, with corresponding company actions represented by different colors. These actions include tree planting and reforestation,

emission and pollution reduction, energy efficiency, waste management, and post-mining land rehabilitation. Each environmental impact is addressed with a different combination of actions, showing that companies are striving to mitigate and recover from the negative effects of their industrial activities. The main focus appears to be on environmental rehabilitation, pollution management, and energy efficiency, with the goal of ensuring long-term sustainability.

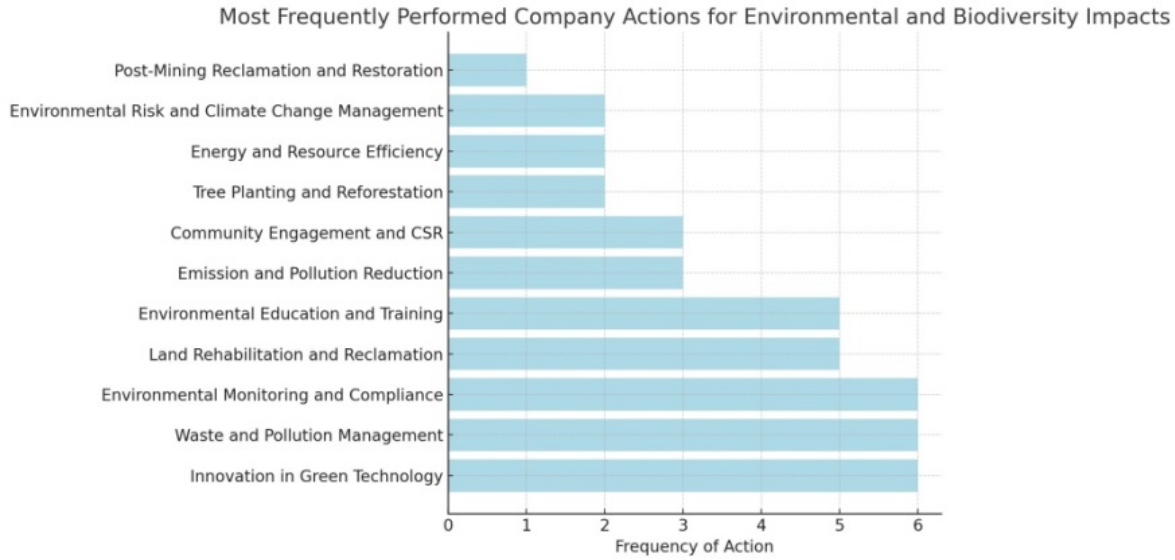

Figure 4. Frequently Activities Performed
Source: Data Process, 2024

The below is solution findings for problem-solving actions obtained from the results of a focus group discussion using the inquiry approach with environmental experts. In the discussion, it was found that there are 5 activities that are insufficiently conducted by companies in the energy and mining sectors. Below is a table summarizing the experts' conclusions using the FGD-Inquiry method.

The focus group discussion with environmental experts identified five key activities that are still insufficiently addressed by companies in the energy and mining sectors. First, post-mining reclamation and restoration require long-term investment and planning from the outset, supported by GIS technology to map land changes. Second, environmental education and training must be integrated into companies with a curriculum aligned with ISO 14001 standards, and sustainability reports should include the impact of these programs. Third, community engagement through CSR programs must involve active and transparent participation, with sustainability reports covering measurable KPIs related to social and economic impacts (Remme et al., 2016). Fourth, tree planting and reforestation should focus on selecting local species that enhance biodiversity, along with long-term monitoring to track vegetation growth. Lastly, environmental risk management and climate change mitigation need to be supported by investments in eco-friendly technologies and scenario-based risk analysis to mitigate the effects of climate change.

Biodiversity Accounting

In this study, the concept of biodiversity accounting is examined through four main aspects: expenses incurred, reporting produced, transparency, and compliance. Each of these aspects helps assess the extent to which companies are committed to minimizing negative environmental impacts, restoring damage, and maintaining ecosystem sustainability through actions that are both environmentally and socially accountable via financial reporting.

a. Expenses incurred

Expenses incurred is a theme highlighted in this research to identify corporate activities related to environmental and biodiversity financing. Below is frequency environment cost reporting.

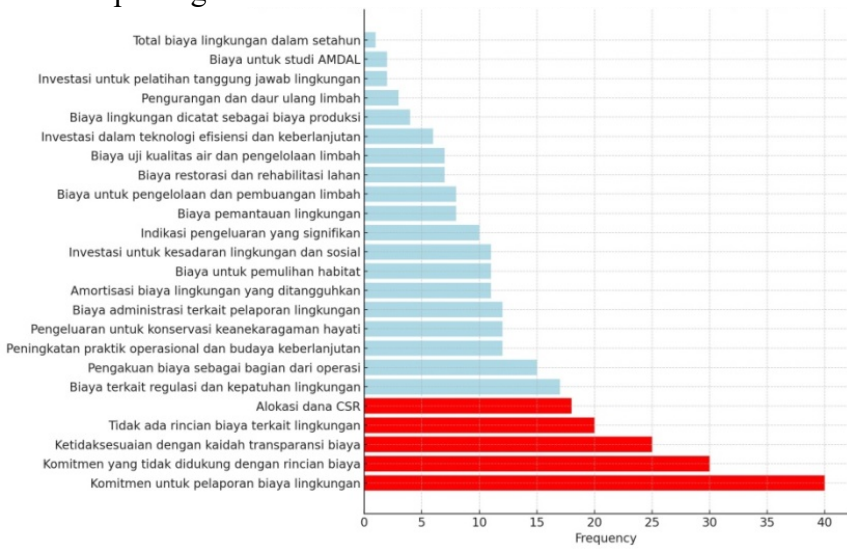

Figure 5. Frequently Environment cost reporting
Source: Data Process, 2024

In the image above, categories with medium to high frequency, such as Waste management costs and Indication of significant expenditure, reflect a greater focus on waste management and investment in environmentally friendly technologies. However, the highest frequency is observed in the categories No details on environmental costs and Commitment to environmental cost reporting, indicating a lack of transparency in reporting and compliance with expected standards. The discrepancy with cost transparency principles is a major issue, although the allocation of CSR funds related to the environment also shows that companies are beginning to focus on social responsibility. Overall, there are significant challenges in terms of environmental cost reporting, with room for improvement in transparency and regulatory compliance.

b. Reporting produced

Below is a graph depicting the reporting procedures of energy and mining companies, obtained from textual coding.

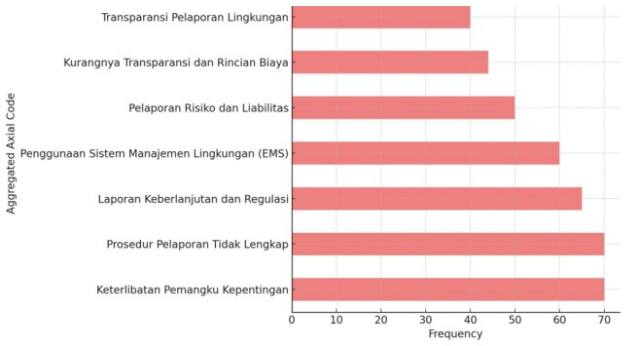

Figure 6. Frequently Reporting produced
Source: Data Process, 2024

From the analysis, the best-performing category is Environmental Reporting Transparency, which indicates that many organizations prioritize openness in reporting

their environmental accounting and provide feedback mechanisms for stakeholders. This emphasizes the importance of transparency and public participation in environmental reporting to create more accurate and accountable reports.

However, several key areas still require attention, particularly Incomplete Reporting Procedures. This category shows a relatively high frequency, suggesting that many environmental reports prepared by organizations are still not comprehensive. This could mean the reports cover only part of their environmental commitments without delving into more detailed impacts, such as biodiversity and other environmental effects. To address this, organizations need to ensure that all critical aspects of their reports are explained in detail and in compliance with stricter reporting standards.

Stakeholder Engagement is another crucial area that needs improvement. Many organizations have yet to fully involve communities, governments, and other stakeholders in their environmental reporting process. Greater engagement could enhance accountability and the quality of the reports. Effectively involving stakeholders will not only enrich the reports but also help organizations better understand and respond to their environmental impacts.

In addition, Lack of Transparency and Cost Details is a concern. Some organizations have not provided clear details regarding the costs incurred in fulfilling their environmental commitments, which may raise doubts about their level of commitment to sustainability. Increasing transparency in financial aspects is essential to providing stakeholders with a more complete and reliable picture (Renaldo et al., 2022).

Risk and Liability Reporting shows that environmental risk reporting and legal obligations are generally well-executed. However, some organizations still need to improve their risk management practices to protect the environment more effectively. While many organizations have implemented Environmental Management Systems (EMS), not all of them follow international standards such as ISO 14001, indicating there is room for improvement in adopting environmental management standards.

Finally, Sustainability Reporting and Regulation demonstrates a relatively high level of compliance with government regulations, such as POJK and SEOJK, particularly in terms of waste management reporting. Even so, organizations must continuously improve their reporting to align with evolving regulatory standards.

c. Transparence and compliancy

This graph illustrates the transparency and compliance scores of organizations, with a focus on negative perceptions highlighted in red. The Commitment to Transparency and Sustainability category recorded the highest score, indicating that many organizations consistently report their sustainability efforts transparently. This signifies a strong commitment to accurate and open reporting. The Recognition and Standards Supporting Transparency category also reflects that organizations following international standards and receiving external recognition tend to have better and more trustworthy reporting practices, which, in turn, enhances their reputation and public trust.

Here is the output derived from Nvivo and the Python program used to track codes related to compliance and transparency. Based on the coding that was determined, the following graph can be generated:

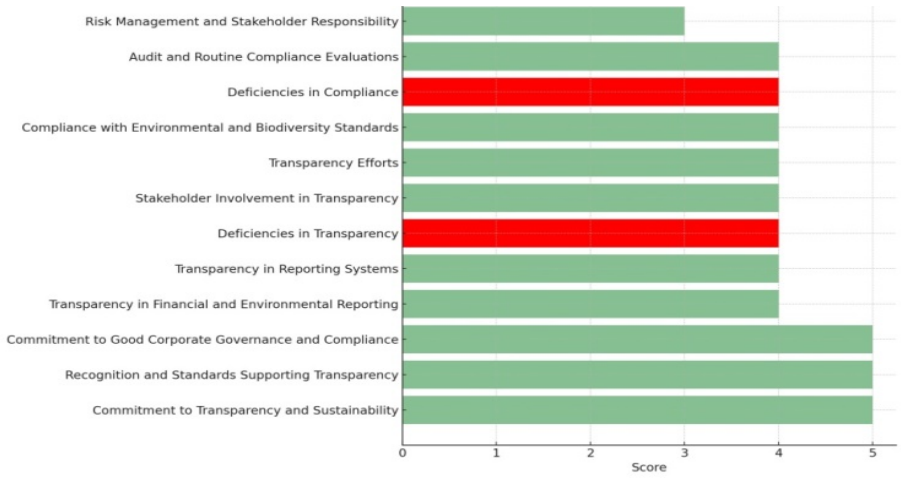

Figure 7. Frequently transparency and compliance
Source: Data Process, 2024

However, the two lowest categories, which received negative attention, are Lack of Compliance and Lack of Transparency. The Lack of Compliance category shows that some organizations do not fully comply with environmental regulations and reporting obligations, potentially damaging their credibility. The Lack of Transparency highlights the inability of some organizations to provide adequate information about their environmental activities, which could harm stakeholder relationships and undermine public trust.

The Focus Group Discussion (FGD) highlighted the actions companies should take to address issues related to transparency and compliance in environmental and biodiversity reporting. Regarding transparency, key problems identified include insufficient disclosure of environmental costs, lack of third-party verification for sustainability reports, and incomplete coverage of relevant transparency aspects. To address this, companies are advised to conduct independent audits, engage third parties in verifying reports, and provide comprehensive and detailed information on environmental costs, including both direct and indirect expenses related to long-term environmental risk mitigation. Experts also recommend adopting international standards such as ISAE 3000 for auditing and utilizing blockchain technology to improve the integrity and transparency of environmental data.

In terms of compliance, the discussion revealed gaps in biodiversity initiatives and the absence of ISO 14001 certification. Companies are encouraged to enhance their biodiversity conservation efforts and pursue ISO 14001 certification to ensure adherence to global environmental standards. Experts suggested implementing Natural Capital Accounting (NCA) to assess biodiversity impacts in economic terms and using technologies like GIS and satellite imagery for real-time monitoring. Additionally, adopting environmental offset strategies and transparently reporting these efforts in sustainability reports were recommended to further improve compliance and public trust.

Biodiversity Accounting in the Energy and Mining Sectors in Indonesia

Biodiversity accounting in Indonesia's energy and mining sectors reveals a significant gap between corporate commitments to environmental reporting and the actual implementation on the ground. A major issue is the lack of transparency in reporting environmental costs. Many companies express their commitment to biodiversity protection, but specific details of expenditures, particularly for environmental restoration and conservation, are often not clearly explained in annual reports. This lack of clarity makes it

difficult for external stakeholders to assess the true extent of the efforts being undertaken by these companies.

In addition, compliance with biodiversity standards and environmental regulations remains a challenge. While some companies have adopted Environmental Management Systems (EMS) as a step towards regulatory compliance, there are still many deficiencies in their implementation. The execution and reporting processes are often incomplete or poorly coordinated, leading to discrepancies between what is reported and what is actually happening in the field.

The poor quality of reporting systems also poses a significant barrier to effective biodiversity accounting. Despite intentions to be transparent, many companies fail to provide reports that cover all critical aspects, such as detailed costs and outcomes of the conservation programs being undertaken. For example, companies frequently omit detailed reporting on efforts to protect local species or restore damaged habitats, even though some restoration initiatives have been carried out .

Some companies have indeed initiated restoration and rehabilitation efforts in areas affected by their operations. However, reporting on the progress of these initiatives is often lacking in detail. Reports typically mention that restoration projects are ongoing, but rarely provide concrete data on the outcomes or the impact of these activities on biodiversity in the affected areas.

Furthermore, corporate commitments to Corporate Social Responsibility (CSR) programs and sustainability are not reported in sufficient detail, particularly regarding the allocation of funds for conservation and biodiversity protection initiatives. Although companies may allocate budgets for sustainability, the specific use of these funds is often unclear. This lack of transparency raises doubts among the public and stakeholders about the extent to which companies are genuinely committed to environmental conservation efforts.

In summary, while there is growing recognition of the importance of biodiversity accounting in Indonesia’s energy and mining sectors, substantial improvements are needed in transparency, compliance, and the quality of reporting. Clearer disclosure of environmental costs, detailed reporting on biodiversity initiatives, and better implementation of environmental management systems are critical for aligning corporate practices with sustainability goals and for building public trust in the sector's environmental stewardship efforts.

Readiness Corporation toward future hilirization

Based on the current biodiversity accounting conditions in the mining and energy sectors in Indonesia, the readiness of companies to support the major downstream agenda in the future faces several challenges and concerns. The downstream agenda, which aims to add value to raw materials through processing and refining domestically, requires companies not only to improve operational efficiency but also to align with increasingly stringent global environmental and sustainability standards.

One of the main challenges is the lack of transparency in reporting environmental costs, particularly related to biodiversity impacts. If mining and energy companies do not improve the way they report their environmental impacts and costs, including expenditures for mitigating environmental damage, restoration, and conservation, this will hinder their ability to gain support from stakeholders, both from the government and the international community. Transparency is crucial, especially since the downstream agenda will increase the scale of operations, potentially causing greater environmental impacts.

Additionally, compliance with environmental regulations and international standards such as ISO 14001 remains uneven across the sector. The downstream agenda will bring additional pressure to ensure that companies operate according to strict environmental

standards, especially in terms of biodiversity conservation. With the growing international attention on environmentally friendly business practices, mining and energy companies in Indonesia must strengthen the implementation of effective and transparent Environmental Management Systems (EMS).

Inadequate reporting related to sustainability and conservation programs also poses a barrier that must be addressed promptly. To support downstream initiatives, companies need to be more transparent in detailing their efforts to preserve the environment, including rehabilitation and recovery efforts for habitats affected by their activities. Without more detailed and transparent reporting, companies will struggle to attract international investment and meet the sustainability standards expected by the global market.

Furthermore, the use of technologies such as blockchain and satellite imagery, as suggested by experts for real-time monitoring of environmental impacts, could be a solution to enhance transparency and accountability. These technologies can assist companies in accurately tracking environmental impacts and ensuring that reports align with on-the-ground realities.

Overall, the readiness of mining and energy companies in Indonesia to face the downstream agenda still requires significant improvements in reporting and environmental compliance. If these challenges can be addressed, companies will be better prepared to implement downstream initiatives while considering sustainability, maintaining their global reputation, and supporting government targets in creating value-added and environmentally friendly industries.

CONCLUSION

Based on the analysis of biodiversity accounting in the mining and energy sectors in Indonesia, the readiness of companies to support the downstream agenda still faces significant challenges. Limitations in transparency regarding environmental cost reporting and biodiversity impacts are primary obstacles, as companies often fail to clearly report expenditures for mitigation, restoration, and conservation. Additionally, compliance with environmental regulations and international standards remains uneven, hindering the effective implementation of Environmental Management Systems.

To support downstream initiatives, companies must enhance their openness in detailing their environmental preservation efforts and ensure that the information provided aligns with on-the-ground realities. The use of technologies such as blockchain and satellite imagery could improve transparency and accountability in environmental impact reporting.

Overall, if these challenges can be addressed, mining and energy companies in Indonesia will be better prepared to implement downstream initiatives while considering sustainability, maintaining their global reputation, and supporting government targets in creating value-added and environmentally friendly industries.

Future research should develop frameworks for biodiversity accounting using technologies like AI and big data for better impact assessments. Comparative studies can identify best practices in biodiversity reporting, while stakeholder engagement analysis will enhance transparency. Examining policy impacts and government incentives on sustainability will inform effective regulations. These studies will help align economic development with environmental protection in Indonesia.

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REFERENCES

Abram, M. D., Mancini, K. T., & Parker, R. D. (2020). Methods to Integrate Natural Language Processing Into Qualitative Research. *International Journal of Qualitative Methods*, *19*, 1–6. https://doi.org/10.1177/1609406920984608

Al-Eisawi, D. (2022). A design framework for novice using grounded theory methodology and coding in qualitative research: Organisational absorptive capacity and knowledge management. *International Journal of Qualitative Methods*, *21*, 16094069221113552.

Asiaei, K., Bontis, N., Alizadeh, R., & Yaghoubi, M. (2022). Green intellectual capital and environmental management accounting: Natural resource orchestration in favor of environmental performance. *Business Strategy and the Environment*, *31*(1), 76–93. https://doi.org/10.1002/bse.2875

Asmy, A. E., Rauf, A., Rahmawaty, Badaruddin, & Khasanah, U. (2024). Reformulation of Persimmon Value-Added Model: Product Downstream Development Strategy for Farmers in East Java, Indonesia. In *Resources* (Vol. 13, Issue 3). https://doi.org/10.3390/resources13030034

Aureli, S., Del Baldo, M., Lombardi, R., & Nappo, F. (2020). Nonfinancial reporting regulation and challenges in sustainability disclosure and corporate governance practices. *Business Strategy and the Environment*, *29*(6), 2392–2403. https://doi.org/10.1002/bse.2509

Azizi, S., Sotoudehnejad, F., & Yazdinejad, E. A. (2023). Environmental Accounting : An Effort to Develop for Identifying and Ranking Green Accounting Indicators. *International Journal of Finance and Managerial Accounting*, *8*(30), 309–324. https://ijfma.srbiau.ac.ir/article_21627.html%0Ahttps://ijfma.srbiau.ac.ir/article_21627_a3631a5facf757a66424b748c2388ff7.pdf

Blanco-Zaitegi, G., Álvarez Etxeberria, I., & Moneva, J. M. (2022). Biodiversity accounting and reporting: A systematic literature review and bibliometric analysis. *Journal of Cleaner Production*, *371*(August). https://doi.org/10.1016/j.jclepro.2022.133677

Boiral, O. (2016). Accounting for the Unaccountable: Biodiversity Reporting and Impression Management. *Journal of Business Ethics*, *135*(4), 751–768. https://doi.org/10.1007/s10551-014-2497-9

Boiral, O., & Heras-Saizarbitoria, I. (2020). Sustainability reporting assurance: Creating stakeholder accountability through hyperreality? *Journal of Cleaner Production*, *243*, 1–17. https://doi.org/10.1016/j.jclepro.2019.118596

Cipullo, N. (2016). Biodiversity Indicators: The Accounting Point of View. *Procedia Economics and Finance*, *39*(November 2015), 539–544. https://doi.org/10.1016/s2212-5671(16)30297-0

Cordella, M., Gonzalez-Redin, J., Lodeiro, R. U., & Garcia, D. A. (2022). Assessing impacts to biodiversity and ecosystems: understanding and exploiting synergies between Life Cycle Assessment and Natural Capital Accounting. *Procedia CIRP*, *105*, 134–139. https://doi.org/https://doi.org/10.1016/j.procir.2022.02.023

Corey, B., Andersen, A. N., Legge, S., Woinarski, J. C. Z., Radford, I. J., & Perry, J. J. (2020). Better biodiversity accounting is needed to prevent bioperversity and maximize co-benefits from savanna burning. *Conservation Letters*, *13*(1), 1–13. https://doi.org/10.1111/conl.12685

Dhar, B. K., Sarkar, S. M., & Ayittey, F. K. (2022). Impact of social responsibility disclosure between implementation of green accounting and sustainable development: A study on heavily polluting companies in Bangladesh. *Corporate Social Responsibility and Environmental Management*, *29*(1), 71–78. https://doi.org/10.1002/csr.2174

Geneletti, D., Beinat, E., Chung, C. J. F., Fabbri, A. G., & Scholten, H. J. (2003). Accounting for uncertainty factors in biodiversity impact assessment: Lessons from a case study.

Environmental Impact Assessment Review, *23*(4), 471–487. https://doi.org/10.1016/S0195-9255(03)00045-3

Holt, N. L., Pankow, K., Ormond, I., Jørgensen, H., Deal, C. J., & Pynn, S. R. (2022). Grounded theory. *International Review of Sport and Exercise Psychology*, *15*(1), 199–225.

King, S., Vardon, M., Grantham, H. S., Eigenraam, M., Ferrier, S., Juhn, D., Larsen, T., Brown, C., & Turner, K. (2021). Linking biodiversity into national economic accounting. *Environmental Science and Policy*, *116*(November 2020), 20–29. https://doi.org/10.1016/j.envsci.2020.10.020

Maione, G., Cuccurullo, C., & Tommasetti, A. (2023). Biodiversity accounting: a bibliometric analysis for comprehensive literature mapping. *Sustainability Accounting, Management and Policy Journal*. https://doi.org/10.1108/sampj-04-2022-0214

Makri, C., & Neely, A. (2021). Grounded theory: A guide for exploratory studies in management research. *International Journal of Qualitative Methods*, *20*, 16094069211013654.

Maroun, W., & Atkins, J. (2021). A Practical Application of Accounting for Biodiversity: The Case of Soil Health. *Social and Environmental Accountability Journal*, *41*(1–2), 37–65. https://doi.org/10.1080/0969160X.2020.1819360

Remme, R. P., Hein, L., & Van Swaay, C. A. M. (2016). Exploring spatial indicators for biodiversity accounting. *Ecological Indicators*, *70*, 232–248. https://doi.org/10.1016/j.ecolind.2016.06.024

Renaldo, N., Sevendy, T., & Simatupang, H. (2022). the Role of Environmental Accounting in Improving Environmental Performance Through Csr Disclosure. *Business Management and Accounting (ICOBIMA)*, *1*(1), 17–23.

Roberts, L., Hassan, A., Elamer, A., & Nandy, M. (2021). Biodiversity and extinction accounting for sustainable development: A systematic literature review and future research directions. *Business Strategy and the Environment*, *30*(1), 705–720. https://doi.org/10.1002/bse.2649

Sabowo, H. K., & Siswanto, B. (2023). *Legal Aspects of the Export Prohibition of Raw Nickel Related to Increasing Hilirization in Indonesia BT - Proceedings of the International Conference On Law, Economics, and Health (ICLEH 2022)*. 733–743. https://doi.org/10.2991/978-2-38476-024-4_74

Sadri, N., & Hossein Ranjbar, M. (2024). Developing a Model for Clean Production in Management Accounting Based on Grounded Theory and Thematic Analysis. *International Journal of Finance and Managerial Accounting*, *9*(35), 173–188.

Schulze, K., Malek, Ž., & Verburg, P. H. (2020). The Impact of Accounting for Future Wood Production in Global Vertebrate Biodiversity Assessments. *Environmental Management*, *66*(3), 460–475. https://doi.org/10.1007/s00267-020-01322-4

Senn, J., & Giordano-Spring, S. (2020). The limits of environmental accounting disclosure: enforcement of regulations, standards and interpretative strategies. *Accounting, Auditing and Accountability Journal*, *33*(6), 1367–1393. https://doi.org/10.1108/AAAJ-04-2018-3461

Skouloudis, A., Malesios, C., & Dimitrakopoulos, P. G. (2019). Corporate biodiversity accounting and reporting in mega-diverse countries: An examination of indicators disclosed in sustainability reports. *Ecological Indicators*, *98*(May 2018), 888–901. https://doi.org/10.1016/j.ecolind.2018.11.060

Stough, L. M., & Lee, S. (2021). Grounded theory approaches used in educational research journals. *International Journal of Qualitative Methods*, *20*, 16094069211052204.

Syarifuddin, S., & Damayanti, R. A. (2020). Biodiversity accounting: uncover environmental

destruction in Indonesia. *Social Responsibility Journal*, *16*(6), 809–825. https://doi.org/10.1108/SRJ-11-2018-0291

Tiwari, K., & Khan, M. S. (2020). Sustainability accounting and reporting in the industry 4.0. *Journal of Cleaner Production*, *258*, 120783. https://doi.org/10.1016/j.jclepro.2020.120783

Traxler, A. A., Schrack, D., & Greiling, D. (2020). Sustainability reporting and management control – A systematic exploratory literature review. *Journal of Cleaner Production*, *276*, 122725. https://doi.org/10.1016/j.jclepro.2020.122725

Tsalis, T. A., Malamateniou, K. E., Koulouriotis, D., & Nikolaou, I. E. (2020). New challenges for corporate sustainability reporting: United Nations' 2030 Agenda for sustainable development and the sustainable development goals. *Corporate Social Responsibility and Environmental Management*, *27*(4), 1617–1629. https://doi.org/10.1002/csr.1910

Weir, K. (2019). The logics of biodiversity accounting in the UK public sector. *Accounting Forum*, *43*(3), 348–379. https://doi.org/10.1080/01559982.2019.1605873