Research Article

Greening the Bottom Line: Exploring the Impact of Sustainability Disclosure on Financial Performance

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Purpose: The main objective of this study is to analyse the connection between sustainability disclosure quality and various financial indicators among mining companies listed on the Johannesburg Stock Exchange (JSE) in South Africa.

Design/Methodology/Approach: The sustainability information disclosure quality assessment was conducted using an evaluation index based on the Global Reporting Initiative (GRI) Sustainability Reporting Guidelines, specifically the Mining and Metals Sector Supplement. Key financial indicators include liquidity, leverage, profitability, and company size. The study evaluates the quality of sustainability disclosures and examines their relationship with these financial indicators.

Findings: The results reveal a significant relationship between sustainability disclosure quality and the financial indicators of leverage and profitability. However, no significant relationship was found between sustainability disclosure quality and the financial indicators of liquidity and company size. These findings highlight the critical role of transparent, high-quality sustainability disclosures in influencing certain financial aspects of mining companies.

Originality: This study contributes to the literature by providing a comprehensive assessment of sustainability disclosure quality using a detailed evaluation index and linking it to key financial indicators. It emphasises the importance of high-quality disclosures for responsible investment and informed decision-making in the mining sector.

Practical Implications: The findings suggest that mining companies should consider early adoption of sustainability reporting regulations to enhance the quality of their disclosures, compliance, and transparency. This can improve their leverage and profitability, which are crucial for attracting responsible investments.

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Social Implications: Enhanced sustainability disclosures can lead to more informed decision-making by stakeholders, fostering a more transparent and accountable mining industry, which is essential for sustainable development in South Africa.

Research Limitations/Implications: Future research could expand the sample size or explore other sectors to validate these findings and further understand the broader implications of sustainability disclosures on financial performance.

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1. Introduction

Companies' sustainability information disclosure has evolved significantly[1], with recent developments like the introduction of IFRS S1 and S2 set for implementation in 2024. The Global Reporting Initiative[2] standards are crucial in enhancing the quality of sustainability information disclosure[3].

Transparent reporting is vital, considering the finite global resources. Companies must manage and communicate their impact on the environment, people, processes, and technologies. This integrated approach aligns with the growing demand for companies to contribute to a sustainable future[4]. Being a good corporate citizen and contributing to communities is increasingly essential for competitiveness[5].

Sustainability reporting, as advocated by Elkington and Rowlands[6], goes beyond financial aspects, encompassing social and environmental facets, fostering a holistic view. A balanced triple-bottom-line approach (people, planet, profit) promotes transparency and sustainable behaviour[7]. The quality of sustainability reporting impacts the market[8], but the absence of mandated regulations hinders consistency. The GRI framework is the widely accepted voluntary standard[9]. Research indicates a positive link between sustainability reporting, using the GRI framework, and financial performance[10] [11]. However, conflicting results on the relationship between financial indicators and sustainability disclosure quality persist[8].

South Africa, an emerging economy with a significant mining sector, faces challenges balancing economic gains with environmental and social impacts. Stakeholder management is crucial for mining companies, and transparency in sustainability reporting can serve as an incentive[12]. The research focuses on understanding the relationship between financial indicators and sustainability disclosure

quality for South African mining companies. It aims to clarify how companies manage stakeholder expectations, align values, and communicate transparently. The study's novelty is evaluating sustainability disclosure quality using the latest GRI guidelines, offering a comprehensive assessment of the interplay. Given the upcoming IFRS sustainability disclosure requirements, early adoption may yield positive connections with stakeholders, benefiting transparent companies. Understanding the role in both financial and sustainability perspectives becomes increasingly important[13].

The following sections elaborate on the theoretical foundation and the available literature, followed by a description of the research method and an explanation of the findings from the analysis. The final section provides a conclusion and recommendations for future research.

2. Theoretical Foundation

Stakeholder theory[14] underscores organisations' responsibilities to diverse stakeholders beyond shareholders, recognising their impact on value creation. This study aligns with stakeholder theory, examining how sustainability disclosure quality responds to stakeholder demands, acknowledging stakeholders like regulators, investors, suppliers, customers, employees, and communities.

Legitimacy theory, closely tied to shareholder theory, focuses on organisations aligning their activities with stakeholder expectations and societal norms to gain legitimacy. Transparency through sustainability disclosure enhances reputation and competitiveness, contributing to the triple bottom line. This theory is relevant to assess whether companies engage in high-quality sustainability disclosure to bolster their reputation and legitimacy.

Impression management theory, aligned with legitimacy theory, involves intentional efforts by companies to present a positive, sincere, and transparent image to stakeholders. Transparency in sustainability disclosure can strategically shape external perceptions, enhance reputation, and mitigate legitimacy threats. This study considers impression management theory to explore how companies use quality sustainability disclosure to positively influence stakeholder perceptions.

These theories collectively provide insight into how sustainability disclosure quality can influence stakeholder relationships, reputation, and financial performance.

3. Sustainability Reporting and Its Relationship to Financial Performance

Sustainability disclosures offer transparency on an organisation's economic, social, and environmental impacts[15]. The absence of universal standards results in lower reporting levels[16]. IFRS S1 and S2, introduced by the ISSB in June 2023, mark a move towards global sustainability disclosure requirements effective from January 1, 2024. Despite this, GRI Standards remain widely adopted for their accessibility and applicability[2].

Research suggests that sustainability reporting, particularly using the GRI framework, positively impacts financial performance[10], addressing information imbalances and increasing a company's value[17][18]. Ameer and Othman[19] found enhanced corporate financial performance through this approach. However, in South Africa, inconsistencies in applying GRI indicators across sectors underscore the need for alignment in sustainability reporting[20]. Additionally, emerging markets like South Africa may provide unique insights into the relationship between financial performance and sustainability disclosure[21]. Table 1 provides a summary of studies that have been conducted in this area.

Citation	Country	Notes
Ameer and Othman[19]	Malaysia	• A significant positive relationship was identified between profitability and corporate social responsibility.
Aras et al.[22]	Turkey	• A positive relationship was identified between firm size and corporate social responsibility. • No relationship was identified between profitability and environmental disclosure.
Ariyani and Hartomo[23]	Indonesia	• A significant positive relationship was identified between leverage and sustainability reporting. • No relationship was identified between the company size, profitability, liquidity and sustainability reporting.
Artiach et al[24]	Australia	• A significant relationship was identified between company size and sustainability reporting. • An indecisive relationship between leverage and sustainability reporting was identified.
Branco et al.[25]	Portugal	• A positive relationship was identified between leverage, profitability, company size and sustainability reporting.
Buallay[26]	United Kingdom	• A positive relationship was identified between financial performance (return on equity) and sustainability reporting.
Buallay[27]	United Kingdom	• A negative relationship was identified between firm performance (return on assets) and sustainability reporting.
Caesaria and Basuki[28]	Indonesia	• A positive relationship was identified between company performance and sustainability reporting.

Citation	Country	Notes
Ching et al.[29]	Brazil	• No relationship was identified between accounting and market-based performance variables and the reporting quality of sustainability reports.
Dilling[16]	Canada	• A positive relationship was identified between profitability and sustainability reporting.
Ebaid[30]	Egypt	• A positive relationship was identified between financial performance and sustainability reporting.
Garg[31]	India	• A negative relationship was identified between financial performance and sustainability reporting over the short term. • A positive relationship was identified between financial performance and sustainability reporting over the long term.
Goel and Misra[32]	India	• The relationship between financial performance and sustainability reporting was inconsistent.
Hardika et al.[33]	Indonesia	• A negative relationship was identified between the company's size, financial performance (leverage) and sustainability reporting.
Ho and Taylor[34]	United States of America and Japan	• A positive relationship was identified between company size and sustainability reporting. • A negative relationship was identified between liquidity, profitability and sustainability reporting.
Husna[35]	Indonesia	• A positive relationship was identified between financial performance (profitability and liquidity) and sustainability reporting. • No relationship was identified between the book value, leverage and sustainability reporting.

Citation	Country	Notes
Indrianingsih and Agustina[36]	Indonesia	• A positive relationship was identified between liquidity and sustainability reporting. • A negative relationship was identified between leverage and sustainability reporting. • No significant relationship was identified between profitability, company size and sustainability reporting.
Jones et al.[37]	Australia	• A negative relationship was identified between financial performance and sustainability reporting.
Kasbun et al.[38]	Malaysia	• A positive relationship was identified between financial performance (return on assets and return on equity) and sustainability reporting.
Kuzey and Uyar[39]	Turkey	• A significant relationship was identified between company size and sustainability reporting. • A negative relationship was identified between liquidity, leverage and sustainability reporting. • No relationship was identified between profitability and sustainability reporting.
Lassala et al.[40]	Spain	• A positive relationship was identified between financial performance (return on equity) and sustainability reporting.
Liu and Anbumozhi[41]	China	• A significant relationship was identified between company size and sustainability reporting.
Lourenço and Branco[42]	Brazil	• A positive relationship was identified between company size and sustainability reporting.
Naeem and Brata[43]	Indonesia	• A significantly positive relationship was identified between liquidity, company size and sustainability reporting.

Citation	Country	Notes
		• No significant relationship was identified between leverage, profitability and sustainability reporting.
Nugroho and Arjowo[44]	Indonesia	• A positive relationship was identified between return on assets/profitability and environmental disclosure. • No relationship was identified between liquidity (current ratio), leverage (debt-to-equity ratio) and environmental disclosure.
Oktarina[11]	Indonesia	• A positive relationship was identified between financial performance and sustainability reporting.
Qiu et al.[45]	United Kingdom	• No relationship was identified between profitability and sustainability reporting.
Reverte[46]	Spain	• A significant relationship was identified between company size and sustainability reporting. • No relationship was identified between leverage, profitability and sustainability reporting.
Sri and Arief[47]	Australia (Indonesia)	• A positive relationship was identified between earnings per share, return on equity, company size, and environmental disclosure. • No relationship was identified between return on assets and environmental disclosure.
Syed and Butt[48]	Pakistan	• A significant positive relationship was identified between company size and sustainability reporting.
Wang et al.[49]	China	• A positive relationship was identified between environmental information disclosure and financial performance (liquidity).
Wardhani et al.[50]	Indonesia	• A positive relationship was identified between company size and sustainability reporting.

Citation	Country	Notes
		• No relationship was identified between leverage, profitability and sustainability reporting.
Weber et al.[10]	Switzerland	• A positive relationship was identified between financial performance and sustainability reporting.
Wu and Li[51]	China	• A positive relationship was identified between profitability and sustainability reporting.

Table 1. Review of similar studies and their findings

Source: Author's summary.

Integrated reporting, incorporating sustainability information, offers insights into the link between environmental, social, governance, and financial performance[52]. The JSE's de facto mandatory integrated reporting improves the connection between environmental, social, and governance reporting and the accuracy of analysts' forecasts, enhancing financial outcomes[52]. Lee and Yeo[53] support this, finding that higher integrated disclosure levels correlate with better financial performance. However, the relationship between sustainability reporting and financial performance remains uncertain[54][55], with mixed outcomes indicating a positive relationship to some extent[56].

The evolution of non-financial reporting raises concerns about the quality and trustworthiness of these reports[57]. The impact of sustainability reporting on market reactions emphasises the importance of its quality[8]. Assessing sustainability information quality involves applying GRI guidelines. Lock and Seele[58] highlight the impact of strong implementation and adherence to GRI Standards on the credibility of corporate social responsibility reports, measured through comprehensibility, Accuracy, genuineness, and honesty.

4. Hypothesis Development

Liquidity measures a company's ability to settle its shorter-term debts. It can be assumed that a higher degree of liquidity garners stakeholder confidence in a company's ability to settle its shorter-term debts. Husna[35] indicates that sustainability reporting and liquidity are positively associated. This is also supported by Indrianingsih and Agustina[36], Wang et al.[49] and Naeem and Brata[43]. In contrast, Ho and Taylor[34] and Kuzey and Uyar[39] found that sustainability reporting and liquidity are not positively associated; further, Ariyani and Hartomo[23] and Nugroho and Arjowo[44] found no relation. Greater liquidity reflects a firm's financial strength[59]. Integrated reporting, including sustainability information, conveys this. Disclosure theory[60] emphasises timely and comprehensive information for effective capital markets. Employing such strategies reduces information asymmetry, lowering trader risks[61]. Increased investor confidence enhances equity market liquidity[61]. Based on the findings of most of the research, the hypothesis related to this relationship can be stated as follows:

- H1: There is a relationship between company liquidity and the quality of sustainability information disclosure.

Leverage gauges a firm's ability to use debt for asset financing[62]. High leverage may deter investors due to increased interest costs[62]. Highly leveraged firms may disclose more to lower agency costs[34]. Wardhani et al.[50] note that high-leverage firms disclose to reassure creditors, aligning with impression management theory[63]. Kuzey and Uyar[39] found no positive link between sustainability reporting and leverage. Other studies report negative impacts[33][36], mixed findings[24], or no clear association[35][43][44][46][50]. Ariyani and Hartomo[23] and Branco et al.[25] found a positive relationship, suggesting that higher leverage leads to more sustainability disclosure. The hypothesis for this relationship can thus be stated as follows:

- H2: There is a relationship between company leverage and the quality of sustainability information disclosure.

Profitability reflects effective asset management and sustainable returns[64], instilling stakeholder confidence in a company's value-creation ability. Reverte[46] links sustainability reporting to economic resources. The link between sustainability reporting and profitability varies. Some authors suggest a positive association[19][25][16][35][38][44][51]. However, Ho and Taylor[34] and Buallay[27] find a negative link.

Others report no relationship[22][45][36][43][46][50][39][23]. Legendre and Coderre[65] note a positive correlation with GRI framework adoption but not with disclosure transparency. The hypothesis for this relationship can be stated as follows:

- H3: There is a relationship between company profitability and the quality of sustainability information disclosure.

Company size matters, as larger firms engage in more business activities, have more stakeholders, and have a bigger environmental impact[66]. They also possess the resources to disclose environmental impact information[41][42]. Following legitimacy theory, Legendre and Coderre[65] argue that larger companies release higher-quality sustainability reports and embrace the GRI Standard to legitimise their operations. This view is supported by Branco et al.[25] and numerous other authors[48][47][22][43][34][50][24][46][39]. However, Hardika et al.[33] found a negative association between sustainability reporting and company size. Ariyani and Hartomo[23] and Indrianingsih and Agustina[36] found no relationship. The hypothesis for this relationship can be stated as follows:

- H4: There is a relationship between company size and the quality of the sustainability information disclosure.

5. Research Method

The study focused on the 41 mining companies listed on the JSE in South Africa as of the end of 2021. Mining was chosen due to its significant social and environmental impact and reporting requirements. The sample covered data from 2012 to 2021, providing 10 years and excluding the 2007/2008 financial crisis. This timeframe aligns with the introduction of integrated reporting requirements and precedes the implementation of the ISSB sustainability report standards. The study's results can serve as a baseline for future research and impact assessments post-ISSB standards. Table 2 summarises the final sample selection.

Sample selection	Companies included	Firm-years
Target population – all mining companies (based on basic materials and energy sectors) listed on the JSE	41	410
Companies not listed on the JSE for the full period under review	5	50
Firm-years removed due to missing values	–	36
Total sample – units for analysis	36	324

Table 2. Sample selection units for analysis

Source: Authors' summary

This study focuses on sustainability disclosure quality, assessed using a GRI-based sustainability disclosure quality index[67][2]. Standardised data collection procedures, ensuring neutrality and transparency, utilised financial research databases (IRESS Research Domain, IRESS Expert) and company websites, with integrated reports being the primary source.

Based on 24 GRI Mining and Metals Sector Supplement guidance questions, the sustainability disclosure quality index employed content analysis, assigning one (met) or zero (not met) to each question. Scores, totalling each company's yearly ratings, determined disclosure quality. A score of 19 or higher indicated favourable sustainability disclosure quality, while a score of nine or lower was unfavourable.

If referenced, the assessment considered integrated reports, supplemented by separate sustainability reports or supplements. The sustainability disclosure quality index evaluated reporting practices over ten years.

The four independent variables, company liquidity, leverage, profitability, and size, were derived from liquidity (current assets/current liabilities), leverage (total debt/total equity), profitability (net income/total assets), and market capitalisation (size). Adjustments, such as natural logarithm calculation for size, ensured comparability between variables.

6. Results

Table 3 provides an overview of the sustainability information disclosure quality landscape per category, over the 10 years, as per the index data sourced.

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Category	Questions or tests (guiding statements)	Ref #	Total score possible	Average score (10-year period)	% of total score achieved
"Balance"	"The report discloses both favourable and unfavourable results and topics."	SR1	3.00	2.58	85.97%
	"The information in the report is presented in a format that allows users to see positive and negative trends in performance on a year-to-year basis."	SR2			
	"The emphasis on the various topics in the report is proportionate to their relative materiality."	SR3			
"Comparability"	"The report and its information can be compared year-to-year."	SR4	5.00	2.86	57.17%
	"The organisation's performance can be compared with appropriate benchmarks."	SR5			
	"Any significant variation between reporting periods in the boundary, scope, length of reporting period or information covered in the report can be identified and explained."	SR6			
	"Where they are available, the report utilises generally accepted protocols for compiling, measuring and presenting information, including the GRI Technical Protocols for Indicators contained in the Guidelines."	SR7			
	"The report uses GRI Sector Supplements, where available."	SR8			
"Accuracy"	"The report indicates the data that has been measured."	SR9	5.00	3.16	63.27%
	"The data measurement techniques and bases for calculations are adequately described and can be	SR10			

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Category	Questions or tests (guiding statements)	Ref #	Total score possible	Average score (10-year period)	% of total score achieved
	replicated with similar results."				
	"The margin of error for quantitative data is insufficient to substantially influence the ability of stakeholders to reach appropriate and informed conclusions on performance."	SR11			
	"The report indicates which data have been estimated and the underlying assumptions and techniques used to produce the estimates, or where that information can be found."	SR12			
	"The qualitative statements in the report are valid based on other reported information and other available evidence."	SR13			
"Timeliness"	"Information in the report has been disclosed recently relative to the reporting period."	SR14	3.00	2.86	95.47%
	"The collection and publication of key performance information are aligned with the sustainability reporting schedule."	SR15			
	"The information in the report (including web-based reports) indicates the period to which it relates, when it will be updated, and when the last updates were made."	SR16			
"Clarity"	"The report contains the level of information required by stakeholders but avoids excessive and unnecessary detail."	SR17	4.00	3.69	92.34%
	"Stakeholders can find the specific information they want without unreasonable effort through tables of contents, maps, links or other aids."	SR18			

Category	Questions or tests (guiding statements)	Ref #	Total score possible	Average score (10-year period)	% of total score achieved
	"The report avoids technical terms, acronyms, jargon or other content likely to be unfamiliar to stakeholders and should include explanations (where necessary) in the relevant section or a glossary."	SR19			
	"The data and information in the report are available to stakeholders, including those with particular accessibility needs (e.g., differing abilities, language or technology)."	SR20			
"Reliability"	"The scope and extent of external assurance are identified."	SR21	4.00	2.88	71.92%
	"The source of the information in the report can be identified by the organisation."	SR22			
	"Reliable evidence to support assumptions or complex calculations can be identified by the organisation."	SR23			
	"Representation is available from the original data or information owners, attesting to its accuracy within acceptable margins of error."	SR24			
	Overall Sustainability Reporting Quality Score		**24.00**	**18.04**	**75.15%**

Table 3. Sustainability Information Disclosure (SID) Index and an overview of the SID landscape

Source: Authors' summary and representation of the Sustainability Reporting Guidelines & Mining and Metals Sector Supplement 2000-2010 GRI Final Version 3.0. MMSS Final Version[67]

Observations on the sustainability information disclosure quality index data revealed that out of the six categories, Timeliness (95.47%), Clarity (92.34%), and Balance (85.97%) achieved the highest average scores over the 10 years, whereas in contrast, Comparability (57.17%) achieved the lowest average score. This was mainly due to the lack of utilisation of generally accepted protocols (GRI Technical Protocols) and the lack of a clear indication of employing GRI Sector Supplements. This supports and emphasises the absence of sole mandated sustainability reporting regulations employed by stakeholders as highlighted by Dilling[16]. Figure 1 presents an overview of the sustainability information disclosure landscape, per the six categories, over 10 years.

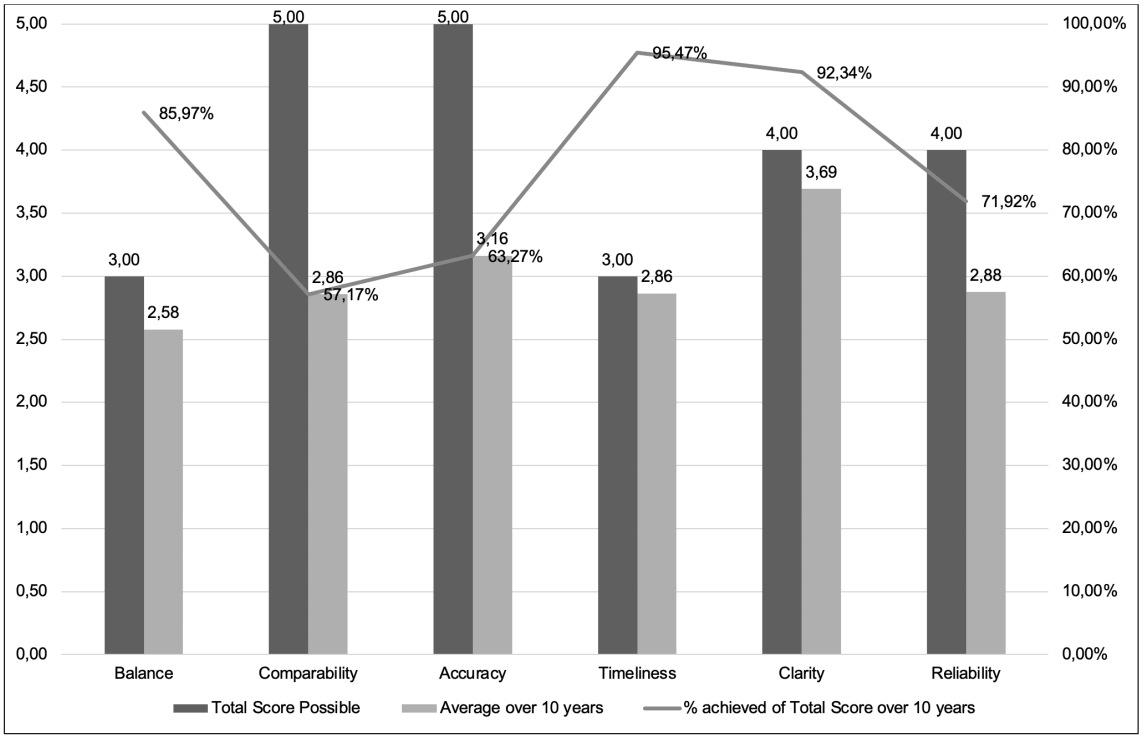

Figure 1. Overview of the sustainability information disclosure landscape per category over the 10 years.

Source: Authors' analysis

Observations on the sustainability information disclosure quality year-on-year data revealed that the total index scores improved from 2012 to 2021, indicating companies acknowledge the importance of clear communication of sustainability information to their stakeholders. Therefore, companies respond to stakeholder requirements more transparently, as Ho and Taylor[34] indicated. The observations align with stakeholder theory, as defined by Freeman[14], where organisational stakeholders are any group that

has a relationship with the organisation and can influence its value creation objectives or have an effect or be affected by its enterprise activities. Figure 2 presents an overview of the normalised sustainability information disclosure landscape data over the period. Scores were normalised to a score of 10 for consistency between the measures.

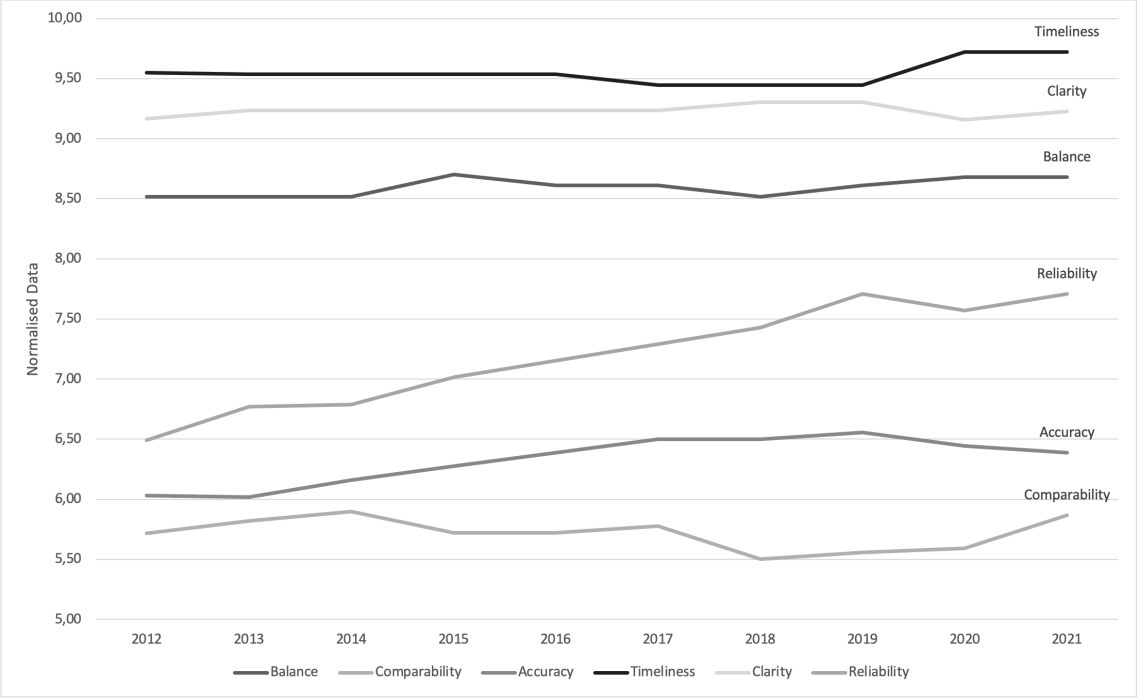

Figure 2. Overview of the normalised sustainability information disclosure data on average per category per year. *Source: Authors' analysis*

Over the review period, Reliability saw the most significant improvement in average total scores, aligning with legitimacy theory, as companies enhanced the quality and transparency of sustainability information disclosure[65]. Timeliness, Clarity, and Balance were consistently followed, while Accuracy and Comparability scored below average. Although Accuracy showed improvement, Comparability displayed minimal movement, emphasising the need for mandated and clear guidance on minimum sustainability information disclosure standards to enhance overall quality.

Descriptive statistics provide valuable insights regarding the variables, as shown in Table 4.

	Range	Minimum	Maximum	Mean	Standard deviation	Skewness	Kurtosis
LQ	209.660	0.120	209.780	6.812	23.821	6.06	39.642
LV	30.430	-3.730	26.700	0.899	2.337	7.908	73.698
PB	1,329.730	-1,257.060	72.670	-6.232	89.077	-10.489	134.289
Size (million)	1,183,670.135	0.000	1,183,670.135	54,867.557	142,359.240	4.332	21.859
SR quality	23.000	0.000	23.000	15.654	7.822	-1.084	-0.387

Table 4. Descriptive statistics

Note: LQ is liquidity, LV is leverage, and PB is profitability

Source: Authors' analysis

Liquidity among mining companies varies widely due to high upfront costs, impacting current assets and debts, leading to lower liquidity[68]. Leverage shows a narrower range, possibly reflecting similar risk appetites with lower debt than equity, influenced by substantial start-up investments[69][70]. Profitability ranges widely, influenced by commodity prices, operating costs, and management practices[71]. The capital-intensive nature of the mining industry may explain lower profitability, exacerbated by operational challenges[72]. Company size varies, reflecting different market capitalisations, with larger multinational companies perceived as outliers due to their market dominance. Sustainability reporting quality varies widely, indicating differing commitments to sustainability practices, with most companies showing relatively high reporting quality[16].

Further statistical analysis supports these observations, including standard deviation, skewness, and kurtosis, revealing non-symmetrical profiles and distribution characteristics. In preparation for correlation and regression analysis, missing data points were addressed through mean imputation and the removal of companies with insufficient data, reducing the sample to 36 companies. Additionally, financial indicator data for four companies were obtained, and outliers were identified and addressed

through Winsorizing. Ninety per cent winsorisation was applied to variables with differences exceeding 20% from the 5th and 95th percentiles.

Reviewing correlation results between sustainability reporting quality and financial indicators (liquidity, leverage, profitability, and size) provides insights into the strength and direction of the relationships[73].

The correlation between the dependent and independent variables is presented in Table 5.

	LQ	LV	PB	Size	SR quality
LQ	1.000				
LV	(0.090)	1.000			
PB	0.007	0.012	1.000		
Size	-0.235*	(0.001)	0.268*	1.000	
SR quality	-0.429*	0.072	0.335*	0.616*	1.000

Table 5. Pearson Correlation between the dependent and independent variables

**Correlation is significant at the 0.01 level (2-tailed).*

Source: Authors' analysis

Regarding sustainability reporting quality, a moderate negative correlation for liquidity and a low positive correlation for leverage were observed. In contrast, a moderate positive correlation for profitability and a strong positive correlation for size were observed concerning sustainability reporting quality. By examining the two-tailed significance values (p-value) associated with the correlation results, liquidity, profitability, and size were considered statistically significant (0.01), indicating that the correlation coefficient was unlikely to have occurred by chance.

A panel regression analysis model was used as the inferential statistical analysis to test the hypothesis-based relationship between selected company financial indicators and the level of suitability information disclosure. A panel regression analysis of the data was performed using the statistical package EViews for Windows, employing the least squares method.

The regression model can be expressed as indicated by Equation 1:

$$SR = \alpha + \beta 1LQ + \beta 2LV + \beta 3PB + \beta 4Size \quad \text{(Equation 1)}$$

Where:

- α = Constant or intercept; and
- β = Coefficient or slope indicates a positive or negative influence.

A fixed effects model in panel regression was appropriate as the panel data included repeated observations on the same company over time. The intention was to analyse how company-specific factors affect the dependent variable. The panel regression was estimated using a fixed effects model (least squares) to control for individual-specific effects. This allowed for analysis of the data collected over time (ten years) from the mining companies. This model is deemed suitable for panel datasets with cross-sectional aspects[74].

The level of sustainability reporting quality could hypothetically be explained by the relationship with the selected company financial indicators as independent variables. The conclusions drawn from the hypothesis testing have been based on significance levels of 0.05. Table 6 summarises the outcomes obtained from the panel least squares regression model.

Variable	Coefficient	Standard error	t-statistic	Probability
Constant (C)	16.642	1.639	10.154	0.000
LV	0.024	0.009	2.726	0.007
LQ	-0.000	0.002	-0.150	0.881
PF	0.000	0.000	4.943	0.000
Size	0.070	0.070	0.989	0.323
Lag (AR(1))	0.623	0.119	5.239	0.000

Table 6. Summary of the panel regression results

R^2 = 0.961; Adjusted R^2 = 0.955; N = 324; p < 0.001; F-statistic = 171.887

Source: Authors' analysis

The overall model is strong, with an R^2 of 0.961, and is thus deemed reliable. The adjusted R^2 of 0.955 is not materially different to the R^2, indicating that the model is satisfactory.

The *p*-value results for the two independent variables, leverage ($p < 0.007$) and profitability ($p < 0.000$), were deemed significant, indicating a meaningful relationship with the dependent variable, sustainability disclosure quality. By considering the model's inaccuracy, fitting the model led to an improvement in variable prediction, which the F-statistic reflects.

In the South African mining context, sustainability disclosure quality is closely tied to financial indicators, particularly leverage and profitability. This aligns with Ariyani and Hartomo's[23] findings of a significant relationship between leverage and sustainability reporting. However, Indrianingsih and Agustina[36] discovered a negative relationship between leverage and sustainability reporting. Ameer and Othman[19] emphasised the significant link between profitability and the impact of sustainability reporting on financial performance. Nugroho and Arjowo[44] observed a positive relationship between profitability and environmental disclosure. Husna[35] found a positive correlation between sustainability reporting and profitability but no notable link with leverage. Naeem and Brata[43] indicated that leverage and profitability do not affect sustainability reporting. Inconsistencies in these findings underscore the need for globally accepted or mandated reporting standards across industries.

H1 was **rejected**, as no significant relationship was found between sustainability reporting quality and companies' liquidity. The results were unexpected, as the researcher anticipated that liquidity would positively affect the quality of sustainability reporting disclosure. The results indicated that liquidity may not be categorically affected by the quality of sustainability disclosure. According to legitimacy theory, companies seek to garner stakeholder validation by disclosing a higher quality of sustainability information[75]. However, the results align with the findings from studies in China[34] and Turkey[39]. Further, the results contrast the view that information disclosure transparency mitigates the possibility of an imbalance in market knowledge, thereby improving the liquidity of company equity shares[61]. Finally, the results are also in contrast with those of Husna[35], Naeem and Brata[43], Wang et al.[49] and Indrianingsih and Agustina[36], who indicate that liquidity and sustainability reporting have a positive relationship.

H2 was **accepted**, as a significant positive relationship between sustainability reporting quality and company leverage was found. Thus, it was observed that leverage had a positive relationship with

sustainability reporting quality, which aligns with the findings by Ariyani and Hartomo[23] and Branco et al.[25]. This can be expected from companies with higher leverage levels, as these companies will produce a higher level of detail and quality sustainability disclosure to stakeholders, to be more positively perceived according to impression management theory[63]. Therefore, companies disclosing higher quality sustainability information may gain access to more favourable debt financing terms, due to their positive market perception, resulting in a higher debt-to-equity ratio. This contrasts with the results from the studies in Indonesia[33][36] and Turkey[39], which indicate that leverage and sustainability reporting are negatively associated. A reason for the significant positive relationship between sustainability reporting quality and leverage may be that a higher level of quality and transparency in reporting sustainability information enhances relationships with stakeholders and, therefore, their perceptions of the company. An enhanced standing with stakeholders could increase stakeholder access to investment and reduce borrowing costs. Another reason for the relationship may be that, due to a higher level of quality reporting, investors find the company more reliable; therefore, the demand for investment in the company could increase its share price and reduce its capital costs, enabling the company to secure more debt and increase the leverage ratio.

H3 was **accepted**, as a significant positive relationship between sustainability reporting quality and companies' profitability was found. This result aligned with the expectation that increasing the quality of sustainability performance disclosure contributes to increased profitability and value for stakeholders. Stakeholder theory considers that companies acknowledge the expectations and perceptions of stakeholders[76]; therefore, if quality sustainability disclosure positively affects these expectations and perceptions, it could contribute to increased profitability due to an increase in investor sentiment or company reputation. This result from this study is supported by Ameer and Othman[19], Branco et al.[25], Dilling[16], Husna[35], Kasbun et al.[38], Nugroho and Arjowo[44] and Wu and Li[51]. However, it contrasts with the studies by Buallay[27] and Ho and Taylor[34].

H4 was **rejected**, as no significant relationship was found between sustainability reporting quality and company size. The results suggest that sustainability disclosure quality is not significantly affected by the size of companies. While stakeholder theory and legitimacy theory indicate that companies with larger market capitalisation and business activities may disclose more sustainability information due to the higher number of stakeholders and environmental impact[66], the results suggest that other factors influence the quality of sustainability disclosure. Since no mandated regulatory requirement exists to report suitability information, companies' motivation to disclose sustainability information would

complement shareholder wealth creation. This study result is supported by Ariyani and Hartomo[23] and Indrianingsih and Agustina[36]. However, it is in contrast to the results from the studies in Australia[24] [47], Brazil[42], Indonesia[43][50], Pakistan[48], Portugal[25], Spain (Reverte[46], Turkey[39], China[41] and jointly from the United States of America and Japan[34]

Data analysis reveals valuable insights into the relationship between sustainability disclosure quality and a company's financial indicators. Notably, leverage and profitability show the most statistically significant and robust connections with sustainability reporting quality. Mining companies that disclose high-quality sustainability information exhibit favourable profitability and leverage indicators. Therefore, improving sustainability reporting quality, detail, and transparency is encouraged for financial benefits[53]. This aligns with the notion that comprehensive and quality sustainability disclosure fosters accountability, trustworthiness, and social responsibility over the long term[77]. Garg[31] supports the idea of a positive relationship between sustainability reporting and long-term financial performance compared to the short-term.

7. Conclusions and Recommendations

Prior research has left gaps in understanding the link between selected financial indicators and sustainability reporting quality among South African mining companies. This study addresses this by exploring the relationship using a quantitative approach, assessing sustainability disclosure quality through content analysis of integrated reports. Based on GRI guidelines, the evaluation index ensures a comprehensive analysis compared to previous studies.

Results reveal varying sustainability reporting quality among the companies, suggesting differing commitments to sustainable practices and stakeholder transparency in the South African mining industry. Most companies, on average, reported high-quality sustainability disclosures, emphasising efforts to comprehensively and transparently report their sustainability information and impacts.

South African mining companies focusing on high-quality sustainability reporting may experience positive effects on leverage and profitability. Improving the Accuracy and comparability of sustainability disclosures is recommended for long-term sustainable financial benefits and alignment with stakeholder expectations. Early adoption of sustainability reporting regulations is encouraged for quality disclosures, compliance, positive stakeholder connection, and transparency.

Stakeholders, including local communities, investors, businesses, regulators, and academics, can benefit from insights into the relationship between sustainability disclosure quality and financial indicators. This promotes transparency, responsible investment, and informed decision-making.

The study acknowledges limitations, such as a small sample size and focus on a single sector (mining). Future research should explore diverse sectors, longer-term financial measures, market valuation indicators, and the impact of sustainability disclosure on financing terms. Additionally, the findings could serve as a baseline for assessing emerging sustainability reporting standards and legislation, exploring variations in different economic contexts, and evaluating broader sustainability reporting standards.

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