

THE EFFECT OF MANDATORY CARBON DISCLOSURE ON FINANCIAL PERFORMANCE: EVIDENCE FROM SOUTH AFRICAN LISTED CARBON-INTENSIVE COMPANIES

Thomas NYAHUNA¹, Mishelle DOORASAMY²

^{1,2}University of KwaZulu Natal, South Africa

Corresponding author: Thomas Nyahuna

E-mail: thomasnyahuna@yahoo.com

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Abstract:

By concentrating on determining the effect of mandatory carbon disclosure on financial performance, the study assists corporate managers in effectively understanding the significance of carbon information disclosure and searching for enhanced ways of amplifying carbon disclosure. The paper examines the impact of mandatory carbon disclosure on the corporate financial performance of 45 Johannesburg Stock Exchange-listed cement and mining companies considered carbon-intensive entities from 2014 to 2021. This examination is based on the legitimacy theory. To attain the critical aim of the study, panel regression analysis is conducted with the assistance of SPSS 28. Financial performance was measured by return on assets, return on equity and net profit margin. Carbon disclosure was measured by carbon disclosure scores developed by Carbon Disclosure Project (CDP). The study reports that all financial performance proxies are positively and significantly related to carbon disclosure. To upsurge financial performance, the sampled companies must keep extensively disclosing carbon information in their annual reports per the mandatory expectations. Therefore, this paper provides evidence that mandatory carbon disclosure is a source of better financial performance and critical for the corporate sector to accomplish sustainability.

Keywords: carbon disclosure, Johannesburg Stock Exchange, panel regression, financial performance, sustainability

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INTRODUCTION

Climate change is broadly considered among the vexing public challenges of this century. Universally, it has been admitted as a critical source of "physical, economic and social risk." The primary source of this problem is the essential externality that arises when economic matters avoid internalizing the total cost of their carbon dioxide (CO₂) emissions. The ongoing incongruity between the private and social costs of CO₂ has debatably culminated in a persistent global market failure (Alsaifi et al., 2020; Clarkson et al., 2015). As a result, policymakers have proposed measures to thwart this mismatch or incongruity by putting a price on carbon emissions or by straight laws of emissions. Hahn et al. (2015) argue that this has helped companies to accomplish the dual benefits of profitability and sustainability. As such, environmental disclosure has become a strategic element for organizations (Lewandowski, 2017; Delmas et al., 2015).

Kumar and Firoz (2018) posit that the study of carbon disclosure has recently increased to assist organizations in communicating their climate change undertakings to their stakeholders through ecological disclosures. Essentially, these disclosures can also assist stakeholders such as investors and suppliers in making better investment decisions. Carbon disclosure may also help other stakeholders, such as regulatory agencies and the public, to effectively monitor and regulate

organizations' emissions, which is expected to contribute to its enhanced carbon performance. Rokhmawati et al. (2015) argue that better carbon performance may sequentially impact the company's financial performance. As a result, companies have recently begun to view climate change as an opportunity instead of a problem.

In South Africa, comparatively, little is known regarding the efficiency of a sheer carbon disclosure mandate on financial performance as King IV entails companies to disclose their carbon footprint. The restricted debate within extant literature on the financial impact of carbon disclosure shows the need for more consensus on the direction of this link (Lewandowski, (2017). This means that the subject matter of disclosure of carbon emissions needs to be researched more in extant literature. This provides empirical evidence that the link between carbon disclosure and financial performance is, up to now, still being fully agreed upon. Additionally, comparatively little is known concerning this relationship within the African background in general and South Africa in particular. South Africa characterizes an exciting context for this kind of research. South Africa is among the twenty countries with the world's most significant greenhouse gas (GHG) emissions (Ganda, 2018). As a result, South Africa is presently at the forefront in Africa to develop proactive tools to alleviate the risks of climate change.

This study evolves around the King Code III and IV as developed in South Africa. In South Africa, carbon disclosure has been mandated to be part of annual reporting by the introduction of King III in 2009 and, recently, King IV. Globally, carbon disclosure is required by ISO 14064-1 (Lewandowski, 2017). Furthermore, the Johannesburg Stock Exchange (JSE) also demands that all listed companies extensively report on their environmental, economic and social activities in their annual reports. Thus, this makes carbon emission disclosure mandatory for all JSE-listed through the operation of King III and IV. Internationally, institutions such as Carbon Disclosure Project has been instrumental in commending companies for disclosing their climate change activities, such as carbon emissions. This is also vital because investors perceive climate risk reporting as critical as conventional reporting (Matsumura et al., 2014; Lee et al., 2015). This is important because reporting carbon emissions is "a newer area of environmental reporting" in emerging markets such as South Africa (Iriyadi & Antonio, 2021; Ganda, 2018). This partly explains the few studies on the nexus between carbon disclosure and finance in emerging markets.

The study uses a legitimacy theory to describe carbon emissions disclosure about financial performance. Therefore, by performing carbon emissions disclosure, corporations try to persuade stakeholders by underlining that they comply with their expectations to sustain their legitimacy (Albarrak et al., 2019). This study is motivated by the call to understand King IV and CDP mandatory carbon emissions disclosure's impact on financial performance in an emerging market perspective. So, this research aims to examine the association between mandatory carbon disclosure and financial performance. Attaining this objective might validate how the effect of climate change on corporates' operations may be concurrently related to both the environment and business.

Literature refers to carbon disclosure as "disclosure by an organization of information such as GHG emissions intensity and energy use, participation in emissions trading schemes, corporate governance and strategy about climate change, performance against GHG emissions reduction targets, and risks and opportunities related to the impacts of climate change" (Gallego-Alvarez et al., 2015). Put differently; carbon disclosure can be known as a collection of quantitative and qualitative information linked to a corporate's past and projected carbon emission levels. This information can be disclosed through the corporate's annual environmental and sustainability reports. Carbon disclosure can be revealed via companies' websites or other "dissemination channels such as the Carbon Disclosure Project" (CDP, 2016). However, carbon emissions

collectively encompass emissions released from the combustion of carbon, such as GHG, which consists of "carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbon, sulfur hexafluoride, ozone-depleting substances, nitrogen oxide and sulfur oxide" (Hummel & Schlick, 2016). The carbon disclosure proxy is measured by applying the benchmarks proposed by the Global Reporting Initiative Standards (Luo & Tang, 2014). The Global Reporting Initiative Standards equate the disclosures of objects issued by the company with the norms based on GRI.

Numerous other contemporary pieces of research have investigated the impact of mandatory reporting on corporate carbon emissions. Closest to this study are researches by Grewal (2021) and Christensen et al. (2017) to compute the effect of carbon disclosure on ensuing emission levels, Christensen et al. (2017) depend on voluntarily released information listed on the CDP database and on emission projections supplied by the private establishments that track company carbon emissions. Further than the mandate's effect on actual emissions, this study investigates the relationship between carbon disclosure and financial performance.

Results of the existing contemporary studies are broadly conflicting, with negative, positive and neutral findings. This means that various schools of thought, such as the neoclassical schools, have corroborated the link between carbon disclosure and corporate financial performance. Arranging the results of prior studies discussed above, it can be observed that even though the literature on financial performance and environmental information disclosure is enormous, researchers still need to arrive at a stable research conclusion. Instead, this is attributed to researchers selecting numerous methods for environmental information disclosure proxies. On the other hand, with the various research items chosen, the empirical findings as well vary.

As indicated above, prior studies examining the association between carbon disclosure and financial performance have arrived at conflicting findings. Because of that, "the effects of carbon disclosure represent a major gap that should be filled by future research" (Alsaifi et al., 2020). In addition, in terms of carbon disclosure, the literature is principally documented from developed countries' studies. Therefore, the growth in carbon disclosure has yet to be coordinated with empirical evidence and understanding of which way carbon disclosure influences corporate financial performance from an emerging market standpoint. This suggests that the debate on how the degree of carbon disclosure impacts financial performance is comparatively lacking in South Africa.

Relying on the legitimacy theory, the revealed information's cost and integrity are essential because they are "the private information that the company chooses to publish." Management appears to disclose valuable information to upswing the corporate value and hide adverse information that lessens the corporate value, such as the inability to attain emission reduction targets (Luo & Tang, 2014). Also, management is forced to disclose information that surges the company's legitimacy with its stakeholders. Thus, good information encourages the company's growth and will lead to financial gains due to legitimately accepting the company. Conversely, bad news will impede the company's growth and is expected to minimize the financial sustainability of the company due to limited legitimacy from the stakeholders. So, grounded on legitimacy theory, this research contends that corporates with a high class of carbon disclosure have enhanced financial performance. This culminates in hypotheses 1 and 2:

H1: Carbon disclosure can significantly improve the return on assets of JSE-listed cement and mining companies

H2: Carbon disclosure can significantly improve the return on assets of JSE-listed cement and mining companies

H3: Carbon disclosure can significantly improve the net profit margin of JSE-listed cement and mining companies

METHODS

Based on the nature of this study, ex post facto research design and time series data were used in gathering data from financial accounts, annual integrated reports, and environmental and sustainability reports. An ex-post facto research design was adopted because we are evaluating already prevailing information (Ikpor et al., 2019). Based on time and resource restrictions, the form of the research leans towards being chiefly exploratory and descriptive. The population of the study involved 45 cement and mining companies listed on the Johannesburg Stock Exchange. The study includes an analysis of eight years of annual reports and financial statements of the sampled firms from 2014 to 2021.

Carbon disclosure measurement. This study adopts carbon disclosure scores developed by Carbon Disclosure Project (CDP) as measures for carbon disclosure. This means that carbon information disclosure applies an index by CDP. Disclosure scores show the degree of detail and extensiveness in disclosures. Carbon disclosure can be defined as the "natural logarithm of the carbon disclosure score" (CDP, 2016). Numerous studies (such as Rokhmawati et al., 2015; Grewal, 2021; Busch & Lewandowski, 2018) have also applied CDP data to quantify carbon disclosure. The quantification of disclosure of carbon emissions in this study is based on annual integrated reports and environmental and sustainability reports of the sampled companies to ascertain the level to which the company is revealing carbon emissions. If the firm reveals the matters in line with what is determined, it will be allocated a score of 1, while if the identified matter is not revealed, it will be allocated a score of 0 based on content analysis. At that moment, the score of 1 is summed and divided by the maximum number of matters that can be revealed.

Data Analysis. The evaluation method adopted in this study is panel data regression. Panel data is a "collection of several cross-section data from a certain time series" (Onyinyichi et al., 2017). Data collected in this study will be analyzed using multiple regression with the assistance of SPSS version 28 to decide the degree of significance.

Model

$$CFP_{it} = \beta_0 + \beta_1 CCD_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 DEBR_{it}$$

Where CFP_{it} is the financial performance measure applying return on assets, return on equity and net profit margin as the proxies for a company I at time n. CID_{it} is the score of carbon information disclosure.

Variables

Table 1: Definition of variables

Variable name	Variable definition and measurement	Source
Dependent variables- Financial performance		
Return on Asset (ROA)	Net Income/Total Asset	Financial statements
Return on Equity (ROE)	Net Income/ Shareholders Equity	Financial statements
Net Profit Margin (NPM)	Net Profit/Sales x 100	Financial statements
Dependent variables- Carbon Disclosure		
Carbon disclosure (CID)	"Natural logarithm of the carbon disclosure score." To apply a CDP index.	Annual integrated reports, environmental and sustainability reports

Control variables

Number of permanent employees (SIZE)	Natural Logarithm of the number of permanent employees as of 31 December 2021	Annual integrated reports, Website
Debt ratio (DEBR)	The long-term debt/ Total assets	Financial statements
Leverage (LEV)	Total debts/ Total assets	Financial statements
Number of years listed on JSE (LIST)	Natural Logarithm of the number of years trading at the JSE up to 31 December 2021	Annual integrated reports, Website

RESULT AND DISCUSSION

Table 2: Descriptive statistics

Variable	Min	Max	Mean	S.D
Carbon disclosure score	5.000	120.0	54.44	24.87
Return on assets	0.786	3.887	1.187	1.097
Return on equity	0.083	47.97	1.542	1.176
Net profit margin	1.4483	127.9	23.41	11.32
Debt ratio	13.32	23.77	23.41	4.665
Leverage	9.776	32.78	5.771	7.876
Size	13.89	51.68	9.112	6.886
List	5.341	23.67	8.343	15.98

Table 2 depicts the descriptive statistics for each variable. The Logarithm of the number of permanent employees as of 31 December 2021 was used as a proxy for SIZE. In similar studies, Dhar (2021) and Jamil et al. (2020) have used the number of employees as a control variable. Other control variables exhibited in Table 2 include leverage and debt ratio. The return on assets of 1.19% indicates that these cement and mining companies in South Africa produce low value for their shareholders within the sampling period. Therefore, the return on assets ratio needs to be revised to attract investors. The Net profit margin (NPM) is measured as a percentage of net profit divided by sales. Over eight years (2014-2021), the sampled cement and mining companies under review reported an average annual net profit margin of 23.41%. This implies that, on average, the chosen JSE-listed companies' NPM ratio is high. Accordingly, the companies are operating at a profit. Return on equity is a measure of a company's profitability in association with the equity by dividing the net profit by the shareholder's equity. The 45 cement and mining companies in South Africa report a mean return on equity of 1.542. Data on the eight variables in Table 2 shows that their mean values are more significant than the standard deviations. This means that the data have insignificant minor value fluctuation.

Table 3: Correlation analysis

Variables	CID	ROA	ROE	NPM	SIZE	DEBR A	LEV	LIST
CID	1							
ROA	-0.030*	1						
ROE	0.021**	0.432***	1					
NPM	0.003	0.011	0.231***	1				
SIZE	0.051	-0.073*	-0.443***	-0.543***	1			
DEBRA	0.871	-0.021	-0.776***	-0.113***	0.551***	1		
LEV	0.521	-0.033*	0.043	-0.004	-0.034	0.432***	1	
LIST	0.047	0.654***	0.098***	0.009	0.002	-0.043	0.010	1

*, ** and *** indicate significance at 10%, 5% and 1%.

Table 3 indicates the correlation between carbon disclosure and financial performance proxies, namely ROA, ROE and NPM. The three financial performance proxies display a positive link with carbon disclosure. This suggests that for companies to increase financial performance, they must extensively disclose carbon information in their annual reports. SIZE as a control variable also shows a favorable relationship with carbon disclosure. Concerning SIZE, Grewal (2021) posits that "large firms need to maintain their economic scale in terms of products, sales and employees, and thus cause greater GHG emissions." However, a negative relationship exists between carbon disclosure, debt ratio, and leverage. This suggests that increasing debt ratio and leverage minimizes carbon information disclosure by the sampled companies. Additionally, as the number of years listed on JSE increases, so is the increase in carbon information disclosure. The finding supports the recommendation by the King Code III and IV for listed companies to disclose their environmental, social, and governance matters extensively.

The findings suggest that companies that constantly engage in mandatory carbon disclosure of their carbon activities might achieve high financial performance and attain a long-term competitive advantage. Companies want to achieve legitimacy from their stakeholders by thoroughly disclosing carbon information. This finding endorses all hypotheses validating that "it pays to be green" (Hart & Ahuja, 1996). In this study, all three financial performance measures (ROE, ROA and NPM) show a positive relationship with carbon disclosure. Therefore, all hypotheses (H1, H2 and H3) are accepted and supported. This is consistent with Ganda's (2018) and Matsumura et al. (2014) findings. Undeniably, investing in a proactive carbon approach and mandatorily revealing information that conveys effective carbon management culminates in developing firm-specific proficiencies affiliated with improved transparency and accountability.

The study's findings imply that the revelation of carbon emissions will make available information to investors. As a result, this will provide a clue into the company's state of affairs that impacts profitability. Disclosure of positive carbon emissions information is favorable news for investors to invest. Therefore, companies with a quality disclosure of carbon emissions information are assumed by investors to be good candidates for attaining a sufficient degree of production owing to the overpowering cost of applying company assets. With the importance of costs, the attainment of firm profits will be greater and then display a favorable influence on the corporate financial performance as quantified by ROA, ROE and NPM.

This study corroborates the findings by Alsaifi. et al. (2020) reflect a favorable influence between carbon information disclosure and financial performance. Based on the results of this study, one can infer that disclosure of carbon emissions information is consistent with stakeholder investment commitments, which points to a commitment to further resources in anticipation of

attaining an ROE, ROA or NPM in the future. This is because the resources that the companies apply to disclose carbon emissions in sustainability reports produce a positive image in the eyes of the stakeholders. Generally, this image most likely produces cash flow in the form of investments that can lead to amplified productivity and company sales, likely to increase corporate profitability.

The study's findings are essential in providing empirical evidence regarding the effect of King's Code III and IV in improving environmental disclosure in listed companies in South Africa. This is shown by a positive association between the number listed on JSE and carbon disclosure. To maintain this position, more motivations should be developed to increasingly empower companies to disclose carbon information during annual reporting.

CONCLUSION

Inspired by the increasing public worry regarding climate change and green finance, this research empirically evaluates the financial consequences of carbon disclosure. This is important to understand companies' behavior towards carbon disclosure in South Africa, which has one of the most significant levels of carbon emissions in Africa.

This study's results demonstrate that financial performance proxied by return on assets, net profit margin and return on equity are positively and significantly correlated with carbon disclosure. This implies that failure by companies to disclose carbon information effectively reduces their financial performance. This study also makes available evidence that companies listed on the JSE tend to disclose more. Therefore, a good rapport exists between the years listed on JSE and carbon disclosure. This suggests that it is inherently evident that managers are increasingly bowing down to pressure from JSE and King Code to disclose their environmental and social issues extensively and effectively. The results further provide a basis to argue that increased motivation should be provided for companies to maintain their level of carbon disclosure both for the dual benefit of corporate performance and climate change mitigation.

A limitation of this paper is that the study focused on the mining companies primarily listed on JSE. Thus, attention should be paid to generalizing the current study's results to other businesses. Future studies can deliberate on identifying the impact of slack resources, such as financial resources, on carbon information disclosure in South Africa. Future studies should critically evaluate whether carbon disclosure is a cost burden on the business.

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