

## IS MANDATORY CARBON DISCLOSURE ASSOCIATED WITH REAL CARBON PERFORMANCE: A STUDY OF SOUTH AFRICAN COMPANIES LISTED ON JSE

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### Abstract:

With the increasing importance of carbon disclosure as a tool to reduce carbon emissions, the enduring question remains whether carbon disclosure reduces carbon emissions. This paper analyzes the rapport between "carbon disclosure and carbon performance" of 82 Johannesburg Stock Exchange (JSE) listed mining and manufacturing firms grounded on data released from 2010 to 2021. The environmental disclosure index is used in this study to quantify carbon disclosure, and the carbon intensity of the selected firms is used to gauge carbon performance. Using IBM SPSS Statistics 26, the study discovers that carbon disclosure ( $p < -0.023$ ) is negatively associated with carbon performance. It means that an increase in carbon disclosure minimizes carbon performance.

Additionally, the study finds that carbon disclosure improves financial performance proxied by return on assets. The findings strongly support King Code III and IV's position that companies can improve environmental and financial performance by extensively disclosing environmental impacts. In this case, carbon disclosure can act as an instrument to improve corporate sustainability and counteract climate change. In line with the research results, it is recommended that policymakers in South Africa promote and adopt policies that compel and regulate companies to disclose their environmental impacts.

**Keywords:** Carbon Disclosure, Climate Change, Carbon Performance, Carbon Disclosure Project, South Africa



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## INTRODUCTION

The unprecedented levels of climate change have forced stakeholders to demand environmental information related to businesses' operations. As a result, the corporate sector has recently received growing pressure to reveal its strategic plans to reduce negative environmental impacts (Alsaifi et al., 2020). It has resulted in demands for companies to disclose accurate and trustworthy information so interested stakeholders can extensively analyze associated risks and threats. It is to empower stakeholders to put pressure on companies to lessen their carbon emissions. Hence, mandatory carbon disclosures have been enacted in various countries, including South Africa, by operating King's Code III and IV. Internationally, the Carbon Disclosure Project (CDP) was coined to assist with corporate carbon emissions reduction by offering companies a podium to reveal ecological information, including carbon emissions (Clarkson et al., 2015). The key aim of CDP is to encourage transparency in investment in companies, which can dishearten investment in companies at risk of adverse climate change effects. Therefore, companies are projected to perform

a critical role in alleviating climate change, and controlling greenhouse gas GHG emissions is imperative for sustainability. Given this, there is an increasing plea for carbon-related information.

The issue of ecological disclosure has developed into a strategic tool for companies (Lewandowski, 2017). Despite that, the link between carbon disclosure and carbon performance regarding GHG remains unclear and less understood (Alsaifi et al., 2020). No research has been conducted to identify if improved carbon disclosure is related to improved carbon performance by reducing the emissions intensity. In addition, the results of these few research studies (Knox-Hayes & Levy, 2011) have provided mixed and inconsistent conclusions. It renders these findings inconclusive. This research has provided some limitations. For instance, environmental disclosure and associated performance is a relatively broad and multi-dimensional construct. It is not easy to find a suitable and pertinent proxy for all companies (Linnenluecke et al., 2018). Therefore, whether carbon disclosure is related to carbon performance remains a critical unanswered research question that this study intends to examine empirically.

**Literature Review, Carbon Disclosure, and Carbon Performance.** Dhaliwal et al. (2011) argue that with a growing demand for carbon information, a relationship between carbon disclosure and actual carbon performance ought to exist. If measured, it is undoubtedly manageable; so, what begins as data ends with action. Uyar et al. (2020) further contend that carbon emissions have, of late, become a contentious issue due to the increasing social costs. It has forced most corporate organizations to embed carbon emissions in decision-making conceptually and practically.

In their recent research, Qian and Schaltegger (2017) questioned whether carbon emission relates to carbon performance. Using Global 500 companies and their environmental data between 2008 and 2012, they discovered that variation in carbon revelation levels is directly linked with an ensuing variation in carbon performance. Carbon performance was proxied by direct and indirect carbon emissions forces. Therefore, Qian and Schaltegger (2017) observe that carbon disclosure improves carbon performance. It is in line with Velte et al. (2020) observations.

Using a sample of Global 500 companies based on the Carbon Disclosure Project from 2011 to 2015, Siddique et al. (2021) report an adverse connection between carbon emissions and environmental disclosure. However, the study affirms that carbon disclosure is a reliable source of climate change information to stakeholders. It is essential in some developed countries where carbon reporting has been legislated. Mandatory carbon reporting provides investors reliable information to make better investment decisions (Griffin et al., 2017). Siddique et al. (2021) accept that voluntary carbon disclosure is among the approaches to sustain legitimacy. It stems from the fact that society may penalize companies if they ignore implementing proactive strategies to fight climate change.

In investigating the link between voluntary carbon disclosure and carbon performance, Luo and Tang (2014) scientifically validate that carbon disclosure positively affects carbon performance. The study used 474 UK, USA, and Australian companies on the Australian Stock Exchange (ASX 200). It suggests that disclosing carbon emissions puts companies under the spotlight of various stakeholders to ensure low carbon emissions and adopt environmentally friendly tools to improve carbon performance.

In support of Luo and Tang (2014), Alsaifi et al. (2020) study was undertaken in all companies with an uninterrupted listed on the FTSE 350 index in the United Kingdom from 2007 to 2015 based on data on the Carbon Disclosure Platform. After analyzing the data from the sample companies, it was found that better carbon performance was associated with improved carbon disclosure. Also, the authors report that the carbon disclosure-carbon performance connection is trivial during the financial crisis period. It implies that companies tend to ignore carbon reporting during a financial crisis and employ other survival strategies.

Despite the significance of the nexus between carbon disclosure and carbon performance, only some studies have examined this topic, and the results of those studies have needed to be more convincing (Qian & Schaltegger, 2017; Hummel & Schlick, 2016). To what degree the disclosure of carbon emissions relates to enhancing carbon performance remains blurred. More importantly, prior studies have focused on the developed countries ignoring the emerging markets such as South Africa. As such, this study extends the literature by investigating the nexus between carbon disclosure and carbon performance from an emerging market perspective, precisely in a sample of South Africa's 82 companies.

We anticipate a favorable link between carbon disclosure and carbon performance based on the above contentions. Therefore, our hypothesis is proposed below:

H1: A positive nexus exists between carbon disclosure and carbon performance.

**Theoretical Background: Legitimacy Theory.** Griffin et al. (2017) defined legitimacy theory as "a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions." Legitimacy theory argues that companies are likely to function within the confinements of social value. Otherwise, they will be starved of their right to persistent survival (Qian & Schaltegger, 2017). Consequently, it can be suggested that an unsigned social contract between the company and society exists. As a result, social apprehension contributes to the amplified disclosure of appropriate information to attain the expectations of different social clusters.

Organizational legitimacy can be viewed as an abstract process (Clarkson et al., 2011). The degree of legitimacy implies that a company functions within the limits of what a specific society regards as correct, so its aptitude to perform operations may be unaffected. Additionally, following legitimacy is known as legitimization; if their legitimacy level is endangered, companies adopt proper strategies to accomplish it. It follows that the degree of organizational legitimacy can be endangered when specific confines of social propriety are approached. For example, this can happen when carbon emissions are oddly high. Companies must conduct suitable action to narrow such a lacuna between their values and those of the broad society (Hassan & Romilly, 2018). In the end, organizational legitimacy is bestowed by appropriate "publics" (He et al., 2013), which have the supremacy to establish legitimacy and show their views of a company's actions. Therefore, companies must continually monitor transformations in any societal views that can culminate in a legitimacy crisis (Luo & Tang, 2014).

With the increase in scientific evidence indicating that climate change is among the grave threats to humankind and the physical environment, a shift in government and society has been documented in the need to trim down carbon emissions. A legitimacy gap emerges when "societal expectations for valuable lessening policies or enough steps adopted for adaptation are now viewed as socially negligent companies. Therefore, their legitimacy level will need to be revised. Unless they implement responsive strategies, companies "may be penalized by society or their stakeholders" (Qian & Schaltegger, 2017). Therefore, carbon disclosure can be taken as a reaction to legitimacy and can help the company by acting as an image-management approach (Dahlmann et al., 2019). So, based on legitimacy theory, an adverse link between carbon performance and carbon disclosure is likely. Affected companies can implement different responsive strategies to counterbalance adverse news accessible publicly by "either repairing, maintaining or gaining legitimacy" (Delmas et al., 2015).

## METHODS

**Sample.** The research sample involves all mining and manufacturing firms with a constant listing on the Johannesburg Stock Exchange (JSE) between 2010 and 2021. The selected period

presents an advanced policy debate on emission matters, encompassing the recent introduction of a carbon tax under the Carbon Tax Bill 2017. The sample consists of 114 companies representing 2506 firm-year observations. Our focus on the mining and manufacturing firms is based on their alleged public leading role in addressing climate change.

Due to the absence of data, 82 companies were used in the study as they both matched carbon emissions and carbon performance data for all the years covering the study.

**Variable Measures, Carbon Performance.** Carbon emissions intensity was applied to quantify carbon performance (CAR). The Carbon Disclosure Project emissions data is adopted and scaled based on each firm's sales income. Jaggi et al. (2018) contend that this approach to measuring carbon performance is acceptable because emissions are recognized as a significant element of a company's carbon responsibility. Also, the carbon emission intensity is scaled by R' 000 of annual sales turnover. It supports previous studies (Li et al., 2018; Dhaliwal et al., 2011).

**Carbon Disclosure.** The study applied an environmental disclosure index grounded on scores. The study used the Carbon Disclosure Score (CDS) to indicate a company's carbon disclosure (CARD). As per the Carbon Disclosure Project, the quality of carbon disclosure is linked to the inclusiveness of reporting on environmental and sustainability issues, such as climate change emissions related to product emission reduction strategy.

**Controls.** Firm size has consistently been used as a control variable in contemporary environmental literature (Liesen et al., 2015; Luo, 2015). A contention has been made that more prominent companies are related to robust regulatory and political pressure with subsequent sophisticated compliance costs. Thus, in this study, company size (SIZE) is controlled by applying the company's total assets. Furthermore, companies with positive cashflows are strategically positioned to invest in significant environmental initiatives, make available funds for complying with environmental regulations, and enhance ecological performance (Meng et al., 2014; Peng et al., 2015; Sutantoputra et al., 2012). As a result, we used the leverage ratio (LER) by dividing the sum of "total debt to total assets" (Hassan & Romilly, 2018).

Additionally, previous research identified a profound connection between financial and corporate sustainability (Shen et al., 2019). Financial performance (FIN) is controlled by adopting a return on assets. Its managers' effectiveness and capability determine a company's capacity and potential to fund ecological initiatives.

**Model.** The suggested hypothesis is put to the test using the following model:

$$CAR_{it} = \beta_0 + \beta_1 CARD_{it} + \beta_2 SIZE_{it} + \beta_3 LER_{it} + \beta_4 FIN_{it} \epsilon_{it} \quad (1)$$

"CAR is the measure for carbon performance; CARD is the carbon disclosure score; SIZE is the natural log of total assets; LER is the total debt to total capital ratio; FIN is the return on assets."

## RESULT AND DISCUSSION

As shown in Table 1, the mean overall emission concentration as a proxy for CAR is 5.871, implying that, on average, the sampled companies emit 5.871 tonnes of emissions per thousand rands of sales turnover. The average emission is noticeably more significant than the median, 5.871 > 1.991, meaning the sample comprises a section of the more significant emitters.

**Table 1.** Descriptive Statistics

Variable	N	Mean	Median	SD	Min	Max
CAR	1671	5.871	1.991	23.991	0.112	478.011



<b>CARD</b>	1998	71.776	67.009	32.881	6	121
<b>SIZE</b>	2412	32.661	87.991	2.981	21.991	121.881
<b>LER</b>	1981	16.998	23.001	21.881	0.002	142.992
<b>FIN</b>	2332	1.891	0.128	0.618	0.003	11.817

Table 2 indicates that the correlation between CAR and other variables, such as CARD, SIZE, and LER, coincides with recent studies. Concerning SIZE, Doda et al. (2016) agree that "large firms need to maintain their economic scale in terms of products, sales, and employees, and thus cause greater GHG emissions." Also, a strong bond between CAR and FIN validates that recurrent commercial expansion intensifies combined carbon emissions swiftly (Appannan et al., 2020; Tang & Demeritt, 2018). The significant inverse connection between CAR and CARD, which aligns with the theoretical outlook, provides a primary result that emission disclosure seems to favorably impact the carbon emissions level by lessening its intensity. From the findings in Table 2, the study's hypothesis is validated that enhanced carbon disclosure contributes to a decline in levels of carbon emissions. Put differently, there is a significant inverse or negative association between environmental disclosure and environmental performance. An upsurge in carbon disclosure reduces carbon emissions and vice versa. In this context, carbon disclosure may produce an impetus within a company to amplify social and environmental situations. Consequently, for that reason, recognized burdens on sustainability, as shown by the Carbon Disclosure Project, are concentrating companies' prime attention on greenhouse gas emissions (Lee et al., 2015).

In addition, CAR denotes a positive relationship with financial performance (FIN). It implies that an increase in carbon disclosure amplifies financial performance. Luo and Tang (2014) believe that it is essential for firms to adopt carbon disclosure as a tool to reduce carbon emissions and increase financial performance simultaneously. Additionally, this result may suggest that sustaining a positive return on assets goes hand in hand with increasing carbon disclosure, which reduces carbon emissions. It points to a contention that economically stable companies enhance their carbon performance, as Mungai et al. (2020) echoed.

**Table 2.** Evaluation of Correlation

Variables	CAR	CARD	SIZE	LER	FIN
<b>CAR</b>	1				
<b>CARD</b>	-0.023*	1			
<b>SIZE</b>	0.021**	0.562***	1		
<b>LER</b>	0.254	0.004	0.671***	1	
<b>FIN</b>	0.033	0.761***	0.077***	0.023	1

\*, \*\* and \*\*\* signify significance at 10%, 5% and 1%.

The empirical findings of the rapport between carbon disclosure and carbon performance are depicted in Table 2. Overall, the findings support the concept that it pays to be green. It is essential as contemporary literature provides inconsistencies on the effect of adopting environmental initiatives on sustainability. It reinforces prior findings by Mungai et al. (2020) and Neto et al. (2016) that environmental tools are critical in upsurging sustainability. However, this directly contrasts with findings by Nishitani et al. (2017) that support that adopting environmental initiatives is costly

for corporate performance. However, Ong et al. (2020) argued that environmental initiatives remain a financial burden on the firm for up to two years as the company has to invest hugely in environmental equipment before setting off the costs.

Also, the results support legitimacy theory in that adopting carbon disclosure to get approval from various stakeholders improves financial and carbon performance. It buttresses recent findings by Qian and Schaltegger (2017) that legitimacy theory can be a good source of lessening climate change. Literature reveals that most companies adopt environmental management practices primarily as an approach to achieve legitimacy from various stakeholders (Mikial et al., 2019). It, in turn, is improving both corporate and environmental sustainability. This study, therefore, makes available empirical evidence that legitimacy theory is critical in attaining sustainability. Additionally, the study supports findings by Mokhtar et al. (2016) that mandatory disclosure of environmental impacts is essential in reducing adverse environmental effects.

## CONCLUSION

The study mainly aimed to identify if the mandatory disclosure of carbon emissions is subsequently related to carbon performance. It stems from the compulsory approach applied by the JSE in line with the King Code IV for all listed companies to disclose their environmental, social, and governance issues thoroughly. However, it remained unclear whether the disclosure is reducing negative environmental impacts. The study established that carbon disclosure significantly reduces carbon emissions; therefore, a significant negative relationship was observed. Furthermore, the study reveals that the sampled companies in South Africa are enjoying the benefits of reduced carbon emissions, such as low carbon tax. Therefore, the study has been essential in unmasking the link between carbon disclosure and carbon performance in 82 mining and manufacturing companies listed on the Johannesburg Stock Exchange. Carbon disclosure was measured by carbon emissions intensity, while carbon performance was quantified by applying an environmental disclosure index grounded on scores.

The study concludes that compulsory disclosure of environmental performance is essential for improving environmental performance. It is crucial in emerging markets such as South Africa, where environmental disclosure is voluntary for non-listed companies. The findings provide evidence-based motivation for managers to adopt carbon disclosure to mitigate climate change. It helps to inspire managers to increase carbon disclosure with subsequent better carbon performance voluntarily.

In many cases, this paper has improved contemporary literature; the research applied data from the mining and manufacturing firms in South Africa to study the effect of carbon disclosure on carbon performance, which has yet to be undertaken in sustainability literature. Furthermore, the study increased the credibility of applying the Carbon Disclosure Project for quantifying environmental performance among companies. The policy consequence of our study is that ecological policy ought to swing its concentration from creating additional reports and guiding principles to making available support to interested stakeholders in enhancing their understanding and dimensions to adopt carbon performance measurement. However, future research can apply a qualitative approach to accommodate non-listed companies' views on whether disclosing carbon emissions is vital to minimizing carbon emissions.

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