



A Longitudinal Analysis of Environmental Reporting Practices of Listed Manufacturing Firms in South Africa

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ABSTRACT

Purpose: Environmental reporting has become a buzzword in the corporate reporting ecosystem, prompting questions about how firms practise it. This study aims to assess the environmental reporting practices of manufacturing firms listed on the JSE in South Africa.

Design/methodology/approach: The data collection involved using a content analysis method to extract environmental information from the annual reports of 50 manufacturing firms from 2016 to 2020. Descriptive analysis and Wilcoxon signed ranked test were used to present the trend results and significance level in the changes of environmental reporting over the years.

Findings: The results demonstrated an increasing trend in environmental reporting amongst the firms. Notably, the firms disclosed more information about their social and environmental activities, with little reporting emphasis on environmental degradation. The evidence further showed a significant increase in environmental reporting practices over the years. These findings complement the arguments of the legitimacy disclosure theory, suggesting that a quality environmental disclosure portrays firms as environmentally accountable and responsible, resulting in a competitive advantage and winning the trust of the public.

Implications/ Originality/value: The study solidifies the existing definitions of legitimacy and stakeholder theory. It also provides consolidated evidence on the movements and trends amongst the social and environmental practices from JSE-listed manufacturing firms' perspectives.



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Introduction

Public environmental awareness has increased since the first Earth Day held in United States on 22 April 1970. The Earth Day birthed the environmental movement, which aims to encourage public awareness of environmental protection. Thus, this environmental movement was then recognised at a global level. As a result of rapid increased awareness, most countries have started practising environmental conservation and prevention so that the ecological resources can last for a lifetime for future generations (Torelli et al., 2020). Accordingly, the industrial revolution has taken place in recent decades, resulting in technological innovations being implemented to intensify productivity levels to ensure faster economic progress and development. This has also motivated the emergence of high-volume manufacturing industries, resulting in environmental problems such as environmental pollution, water pollution, air pollution, resource depletion and climate change. In some cases, the unconsumed materials or inputs that could not be properly processed during production would destroy the environment when it is negligently discarded with no care. Such environmental problems have provoked the interested parties of civil society and other stakeholders to demand a formal report detailing and clarifying how businesses operate and maintain an eco-friendly relationship with the environment (Domínguez et al., 2021).

Firms finally attended to the call for formal reporting; thus, the term environmental reporting was introduced. Environmental reporting is an accounting practice that provides information demonstrating firms' contribution to economic prosperity and considers all the estimated expenditures incurred as a remedial tool to diminish the negative impacts caused to the environment and society by a firm's business activities (Maama, 2020).

Environmental reporting has become increasingly important for decision-making by institutional stakeholders. Researchers have shown that the primary goal of implementing mandatory environmental reporting is to enhance the level of accountability towards society and the environment, and it strives to reduce environmental pollution (Shi et al., 2021; Wang et al., 2021). Moreover, previous papers have focused on all the listed firms in South Africa. The findings of these studies might have been influenced by the nature of all listed companies. Meanwhile, certain firms, such as financial services and technology firms, may have minimal or no direct carbon footprint or negative environmental impact, which may have implications for the findings of previous studies. The present study recognises the effect of manufacturing firms on the environment. In essence, a gap in extant knowledge is identified in this study. Hence the current paper aims to assess the environmental reporting practices of manufacturing firms listed on the Johannesburg Stock Exchange in South Africa. The study combines legitimacy and stakeholder theory to flesh out a comprehensive classification on the trend of environmental reporting of the firms over five years. Through the utilisation of content analysis, environmental reporting and its components were evaluated to determine the changes in environmental reporting practices over the years. The study employed Wilcoxon signed rank test to present the results of the significance level of the changes in environmental reporting across the years.

The paper is presented according to four sections. The next section presents the literature review. The third section describes the research methodology. The fourth section presents and discusses the results, and the final section presents the conclusions of the study.

Literature Review

The Concept of Environmental Reporting

In the past four decades, the conception of corporate environmental reporting was initiated, and it has swiftly captured great attention from different stakeholders such as government, international bodies and other related associations. The practice was introduced to ensure a proper and steady

implementation amongst the firms (Ye et al., 2021). In this instance, it is essential to prevent and protect against the environmental deterioration due to massive population growth and industrialisation (Ma et al., 2022). The prevailing corporate accounting disclosures could not present environmentally related information to satisfy the users' nonfinancial information needs; hence, environmental reporting emerged in an attempt to meet the demands of the republic by reporting on environmental reporting information (Eccles et al., 2015). Subsequently, companies and other corporate organisations began reporting their commitment to maintaining their environmental performance to meet stakeholder demands.

Several authors have played around with the definition of environmental reporting. In terms of Vollero et al. (2017), environmental reporting is the process of disclosing or presenting all the information about the activities, projects and programmes that a firm undertakes in compliance with social and environmental aspects of firms that promotes a friendly environment (Maama & Marimuthu, 2021). Hence, it is presumed that listed firms are in the spotlight of investors, considering all the factors and circumstances mentioned above. That being so, Stolowy and Paugam (2018) and Jackson et al. (2020) also defined environmental reporting as an endorsed presentation of information that discloses a firm's environmental performance. Hence, environmental reporting refers to the public disclosure of environmental performance-related information in a single document as the presentation or disclosure of annual financial statements.

Theoretical Framework

Legitimacy Theory

Legitimacy theory is engineered on the relationship between firms and their social contract with society. Therefore, a mutual understanding between firms and society should exist for reciprocated well-being and compatibility (Deegan et al., 2002). Legitimacy inspires firms to achieve their strategic objectives and stakeholder demands. In essence, the quest for legitimacy trigger firms into voluntary reporting to meet the information needs of stakeholders (Aramburu & Pescador, 2019).

Legitimacy theory is relevant for ensuring compliance with all acceptable societal norms, cultural elements and social demands (Rezaee & Tuo, 2019). Legitimacy theory has been used in some studies and it continues to be used to explain why it is essential for firms and corporate organisations to report on their social and environmental performance (Deegan *et al.*, 2002; Vourvachis & Woodward, 2015; Qian et al., 2020; Silva, 2021). Legitimacy theory entails that firms make a great effort to be characterised as responsible citizens. As a result, firms initiate projects that inform society about their aims and objectives, especially firms with highly sensitive business activities to the environment (Martínez-Ferrero et al., 2016). Firms use environmental reporting to shift the perception of societies about their business activities to portray a good reputation to the entire society. As expected, such projects aim to change society's expectations towards the firm (Silva, 2021).

Environmental reporting has been recognised by many firms and corporate bodies around the globe as it is regarded as one of the environmental practices that firms use as legitimacy activity for the firms in the eyes of society (Vollero et al., 2019). Thus, the significance of environmental reporting is generally recognised as a positive aspect of increasing firms' environmental and social credibility to society (Mio et al., 2020). The different findings and viewpoints presented above suggest that the legitimacy theory may be sufficient in investigating environmental reporting and its impact on firm value.

Stakeholder Theory

Stakeholders are individuals, institutions or society interested in a firm or people affected by the firm in a legitimate capacity (Okafor et al., 2021). This theory highlights relevant stakeholders to

be considered and further determines how including such stakeholders will contribute to stakeholder value creation (Hörisch et al., 2020). This theory recognises that various stakeholders have different perspectives and expectations about the firms' operations. Thus, it is recommended that firms analyse the views of all the stakeholder groups, enabling them to understand stakeholder needs. This would also assist in deciding how to respond to those needs.

Stakeholder theory highlights the need for firms to provide relevant and accurate information to interested parties to make informed decisions (Amorelli & García-Sánchez, 2021). This makes environmental reporting a legitimate activity that responds to stakeholders' demands to enhance the adequacy and relevance of financial reporting. Therefore, This study postulates that stakeholder theory can be employed to anchor this study on environmental reporting practices given that firms have various parties interested in how companies report on their environmental impact.

Empirical Literature Review

Studies suggest that there has been an increasing trend in the number of companies reporting on the environment. However, disclosure quality remains low in many cases, with reporting being largely ad-hoc and geared towards building a positive corporate image. One interesting contrast in the literature is between the UK and the US, with Holland and Foo (2003) finding that, despite the US having more extensive environmental legislation, more companies in the UK produced standalone reports or included a separate environmental section. This suggests that regulatory frameworks are not the only factor driving reporting practices and that cultural or other contextual factors may also be necessary.

Mahadeo et al. (2011) similarly find that the increase in ethical and social disclosures in Mauritian companies can be seen as a response to criticisms of corruption and lack of social contribution rather than purely regulatory or market-driven motivations. Trevor and Geoffrey (2000) examined the link between the importance assigned by CFOs to specific factors in the decision to disclose environmental information and actual reporting practices in Australian companies, finding some significant correlations but limited support for legitimacy theory as an explanatory link. This highlights the complexity of the decision-making process around environmental reporting, which is influenced by a range of internal and external factors. Mahmood and Uddin's (2021) study of sustainability reporting in Pakistan adopts an institutional logic perspective. The findings indicated that various logics co-exist in sustainability practices, including market, corporate, state, professional, and community logics. This drives the diversity of motivations for and variations in reporting practices. This suggests that sustainability reporting is not driven solely by market or regulatory pressures but is shaped by a range of institutional factors.

Baalouch et al. (2019) examined the determinants of environmental disclosure quality in French-listed companies, finding that a company's strategy and vision (as evidenced by the presence of an environmental audit), diversity in boards (gender diversity), and environmental performance all play significant roles in explaining variations in the quality of disclosure. This highlights the importance of internal factors such as company culture and governance structures in driving environmental reporting practices. A similar study by Wahyuningrum et al. (2020) studied the effect of environmental performance, company financial performance, and company characteristics on environmental disclosure in Indonesian companies. They found that while the number of companies engaging in environmental-related activities is increasing, the level of disclosure remains low, possibly due to a lack of regulatory requirements. This suggests that regulatory frameworks play an important role in driving reporting practices in some contexts. In addition, the study suggests that the lack of obligation to incorporate environmental disclosures

on annual reports and unclear motivations for such disclosures may contribute to the low level of disclosure.

Abhayawansa and Adams (2022) aimed to evaluate nonfinancial reporting (NFR) frameworks concerning risk reporting in the context of the COVID-19 pandemic and climate change. The study analysed the adequacy of climate- and pandemic-related risk reporting in three industries significantly impacted by the COVID-19 pandemic and vulnerable to climate change. The study found that risk reporting on two significant issues, pandemics and climate change, is woefully inadequate, and disclosures are dispersed across different corporate reporting media and fail to appreciate the long-term consequences or offer solutions. Lagasio and Cucari (2019) conducted a meta-analysis of 24 empirical studies to determine the influence of corporate governance on environmental, social, and governance (ESG) disclosure in a setting where disclosure of information is voluntary but not discretionary. The study found that board independence, board size, and women's directorship visibly enhance ESG voluntary disclosure. Although, board ownership and CEO duality do not improve the level of ESG disclosure, and some hesitations remain in respect of the number of board meetings and institutional and family ownership.

Several factors influence a firm's engagement with environmental practices, such as stakeholder pressures and environmental legitimacy (Raut et al., 2019). Firms often experience a lack of ambiguity between engaging in environmental practices and remaining accountable for the environment (Lu et al., 2021). Thus Cantor and Jin (2019) revealed that the level of understanding of a firm's support for the environmental impact significantly impacts a firm's ability to adopt suitable environmental practices. The literature further suggested that these environmental practices are genuine and there are valid reasons for their implementation. Overall, there is some variation across the studies regarding the specific factors driving reporting practices. They all highlight the importance of contextual factors such as regulatory frameworks, internal company culture and governance, and broader societal pressures in shaping environmental reporting practices. The studies also point to the need for improved quality of reporting, with many companies currently engaging in ad-hoc and insufficient disclosure. Earlier in this study, it has been further clarified that in most countries such as South Africa these practices have been mandated and are monitored by government authorities.

Methodology

The study population comprised fifty (50) manufacturing firms listed on the Johannesburg Stock Exchange in South Africa. Furthermore, data was gathered from the integrated annual reports from 2016 to 2020, resulting in a 250-firm-year observation. The manufacturing firms were selected based on the availability of their integrated annual reports. Data were collected using a content analysis method. This study adopted a descriptive research design which allowed for the use of content analysis for data collection. A content analysis made it possible for the researcher to scrutinise every report in detail for all the selected manufacturing firms to gather information about environmental reporting and its components, such as social reporting responsibly and environmental degradation reporting.

Measurements Procedure

The study employed a content analysis method using an interpretative checklist to measure the environmental reporting practices from the integrated annual reports of the manufacturing firms. This procedure departs from related studies conducted by Posadas and Tarquinio (2021) and Carandang and Ferrer (2020), which used a dichotomous procedure to measure environmental accounting and nonfinancial disclosure during data collection. The use of dichotomous only works with 'yes or no', meaning that it only demonstrates whether the disclosure is present, thus not permitting a comparison of different disclosures presented by firms.

Conversely, the use of content analysis for this specific study supported the development of an interpretative checklist where the following Likert scale was thoroughly followed to capture the environmental, social and degradation reporting information from the annual integrated reports of the firms:

Score 1: Very inadequate information, or the information was not provided at all in the report.

Score 2: Inadequate or limited information was provided.

Score 3: Average information was provided to some extent.

Score 4: Strong information was provided to a large extent.

Score 5: Extremely adequate and detailed information was provided.

Based on a checklist, the above Likert scale was used to collect and measure data on environmental reporting; the environmental reporting checklist comprised environmental responsibility, environmental degradation and social responsibility reporting information. The difference between the rating scores was based on the quality of the information disclosed by each manufacturing firm. The 250 integrated annual reports were retrieved from 50 manufacturing firms, and the reports were from 2016 to 2020, representing five years of integrated annual reports. As a result, after thoroughly reading and re-reading the reports, the differences and trends were spotted amongst listed manufacturing firms.

To ensure the validity and reliability of the data, the annual integrated reporting evaluation matrix was developed for the collection and analysis of data. This matrix was thoroughly and critically formulated to align with prior studies, the Integrated Reporting Framework [IRF] content elements, and the Global Reporting Initiative IV. The first author coded all the 250 reports following the developed evaluation matrix as guidelines, and the author was consistent with the coding guidelines to ensure validity and reliability. The second author validated the data collection through a recording of sample reports. The results from both coders were consistent, which suggests that the data captured by the first coder were valid and reliable.

Data Analysis Method

This study adopted the descriptive analysis approach in the form of moving averages, and the Wilcoxon signed rank test to analyse the annual integrated reports of listed manufacturing firms. The collected data were analysed using an average or mean rating scale to identify the trends of environmental reporting practices of listed manufacturing firms. Wilcoxon's signed-rank test was used to investigate any significant and insignificant differences in environmental practices over the five years (from 2016 to 2020). Consequently, the trend in environmental practices was analysed through the change of mean score for every year to demonstrate whether there was any change in the practices of environmental reporting. The significance and insignificance of the change over the years were determined using p-values.

Results and Discussion.

This section presents the results of the level and trend of the environmental reporting practices of the firms. The results are presented according to two sub-sections; the first sub-section represents the level and trend of environmental reporting, and the second is the Wilcoxon signed rank test, which presents the results of the significance level in the changes of environmental reporting across the years. The fluctuating mean scores and the Wilcoxon signed rank test results are presented in Tables 1 and 2. The variables used are as follows: Environmental Responsibility Reporting (ERR), Environmental Degradation Responsibility (EDR), Social Responsibility Reporting (SRR) and Environmental Reporting Index (ERI), which is the average of the three variables.

Table 1: The Level and trend of environmental reporting practices

	2016	2017	2018	2019	2020
ERR	3.93	3.88	3.97	4.38	4.53
EDR	3.18	3.25	3.67	3.79	3.96

SRR	4.11	4.26	4.34	4.38	4.42
ERI	3.74	3.80	3.99	4.18	4.30

Table2: Wilcoxon signed ranked test Results.

	2016-2017	2017-2018	2018-2019	2019-2020
(ERR)	-0.847 ^b (0.397)	2.203 ^c (0.028)	2.704 ^b (0.007)	2.335 ^b (0.020)
EDR	1.617 ^b (0.106)	2.485 ^b (0.013)	1.591 ^c (0.112)	2.129 ^b (0.033)
SRR	2.039 ^c (0.041)	0.932 ^c (0.352)	1.691 ^c (0.091)	1.848 ^c (0.065)
ERI	0.529 ^b (0.597)	0.824 ^c (0.410)	2.013 ^c (0.044)	1.053 ^b (0.292)

b = The sum of negative ranks equals the sum of positive ranks; and c = Based on positive ranks

Source: Author's Computation

Table 1 reveals the extent of environmental reporting practices by South African listed manufacturing firms. In 2016 and 2017, the environmental responsibility reporting information presented by manufacturing firms attained a mean of 3.93 and 3.88, respectively, and according to the checklist used to score the information, score 3 means that average information was provided to some extent. However, a mean of 3.93 and 3.88 is close to a score of 4 (strong information was provided to a large extent), so it is safe to say that the listed manufacturing firms provided strong disclosures for environmental responsibility reporting. These results suggest that the firms adequately presented environmental reporting. Despite this, Table 1 indicates a reduction in ERR from 2016 to 2017. Although this reduction is regarded as insignificant, as shown in Table 2, where the p-value of the Wilcoxon signed ranked test is 0.397, less than the 0.05 benchmark, indicating that the level of reduction is not significant. This suggests a slight decrease in the firms' aggregate and quality of disclosures of environmental reporting information.

Furthermore, in 2017 and 2018, the environmental reporting information presented by the firms obtained mean scores of 3.88 and 3.97, respectively. As indicated in Table 2, the p-value obtained is 0.028; therefore, the increase between 2017 and 2018 is significant. This result implies that the manufacturing firms significantly improved their disclosures of environmental reporting information in 2018. Again, in 2018 and 2019, mean scores of 3.97 and 4.38 were recorded, respectively. The difference between the two years shows an increase. As anticipated, the increase is significant, as depicted in Table 2, where the p-value of the Wilcoxon signed ranked test is 0.007. In 2019, it is evident that the listed manufacturing firms had some improvements in their environmental reporting practices, whereby additional significant environmental information was provided.

Table 1 further shows that during 2019 and 2020, the mean score of Environmental Reporting Responsibility is 4.38 and 4.53, respectively. This indicates a significant increase because the probability = 0.020. This signifies that the environmental reporting practices adopted by firms improved significantly from 2019 to 2020. The results demonstrate that most manufacturing firms disclosed more detailed environmental reporting information in 2020, perhaps due to an increase in manufacturing firms' age and size over the years. In addition, it is highly expected that such firms will increase their environmental reporting practices because they may have accumulated some experience in reporting practices (Liu & Liu, 2021). Besides, since all firms listed on the Johannesburg Stock of Exchange are compelled to disclose environmental reporting, it is highly expected to find improvements in the reports concerning environmental reporting information. An increase in the mean values concerning environmental reporting information is a good indication that firms are serious about the disclosures of environmental reporting practices (La Soa Nguyen et al., 2017).

Unsurprisingly, the South African manufacturing firms listed on the JSE have consistently provided relevant disclosures regarding environmental activities, considering that it has been more than five years since King Code III compelled them to include environmental and social information in their integrated annual reports. Thus, it is reasonably expected of firms to have gradually improved the attributes and the aggregate of environmental reporting practices disclosures. Hence, this study suggests that the older the firms get, the more they present a greater disclosure of environmental reporting practices, suggesting a positive link between environmental reporting practices and firms' age.

As expected, the operations of the manufacturing industry affect the environment in many different ways. Taking charge and becoming fully responsible for disclosing how firms' activities affect the environment marks great corporate behaviour. Table 2 further presents the environmental degradation information disclosure of the South African manufacturing firms listed in the JSE. As shown in Table 1, the environmental degradation reporting attained a mean score of 3.18 in 2016 and 3.25 in 2017, showing an increase between the two years. Consistently, the mean of 3.25 and 3.67 was obtained in 2017 and 2018, respectively. The change between 2017 and 2018 was significant, as indicated in Table 2, with a p-value of 0.013.

Furthermore, Table 1 reveals a mean of 3.67 in 2018 and 3.79 in 2019, indicating increased environmental practices. Table 2 reveals that the p-value increased between the two years, which is 0.007, suggesting that it is statistically significant. Table 1 further shows a mean of 3.96 in 2020, and the change between 2019 and 2020 indicates a significant increase as the p-value found in Table 2 is 0.033.

Unsurprisingly, a related study by Karaman et al. (2018) revealed that firms tend to produce more information that favours their image. This means that firms accelerate to disclose environmental degradation information for their welfare. However, it has been noted that environmentally sensitive firms are perceived to be very harmful to the environment and human health due to hazardous emissions and large workforces subjected to environmental degradation reports (Quintana-García et al., 2022).

Table 1 further shows that social responsibility reporting in 2016 and 2017 obtained means of 4.11 and 4.26, respectively, suggesting an increase in the disclosure level between 2016 and 2017. In addition, the p-value of 0.041 was found in Table 2 from the Wilcoxon signed ranked test results, suggesting a significant increase. The results demonstrate that the South African listed manufacturing firms experienced increased disclosures of social responsibility reporting in 2017. For instance, firms like Adcock Ingram Holdings Limited were more involved in social projects uplifting the community such as skills, socio-economic, enterprise, and supplier developments. In 2018 the social responsibility reporting recorded a mean of 4.24. The increase between 2017 and 2018 is insignificant because the p-value is 0.352. Consistently, the mean score for SRR in 2019 was 4.38, and the p-value between 2018 and 2019 was 0.091, indicating that the increase was insignificant.

Table 1 further shows that the mean score for SRR in 2020 is 4.42, showing an increase over 2019. However, the increment level from 2019 to 2020 was statistically insignificant, as the p-value is 0.065. The current study observed that most of the annual integrated reports kept repeating almost the same information yearly, thus the reason for the steadiness in the mean obtained from 2016 and 2020. What is evident from the results is that more and more South African-listed manufacturing firms have attempted to provide comprehensive and detailed social responsibility information. For this reason, all the means obtained from 2016 to 2020 are approximately 4.00, meaning that South African listed manufacturing firms have disclosed strong social responsibility reporting information to a large extent to fulfil stakeholders' requirements.

The results demonstrate that the South African listed manufacturing firms provided their environmental information to a large extent. The above results seem reasonable considering that all the South African listed firms must prepare integrated reports that, among other things, disclose environmental information. The increase in the presentation of environmental reporting is due to the rise in reporting guidelines and the national and international guidelines set by government authorities, financial markets and stock exchange (Bartels et al., 2016). Additionally, investors are actively analysing and investigating environmental information to evaluate firms' performance when making an investment decision. As a result, it is not surprising that firms have started reporting more on their environmental activities.

Conclusion

The current study assessed the environmental reporting practices of manufacturing firms listed on the JSE. The study covered 50 JSE manufacturing firms and used content analysis to identify all the information that depicts the patterns or themes of environmental practices. The study further utilised a descriptive statistic model, and Wilcoxon signed rank test to determine the movement of environmental reporting practices of the firms. The evidence demonstrated that the environmental reporting practices by manufacturing firms have been increasing over the years. These findings imply these firms provided adequate information about their environmental practices. This finding proves the firms' accountability towards the environment, suggesting that their environmental reporting practices are not only done to comply with the JSE listing requirement. These results align with legitimacy theory, which postulates that firms keep control of their reputation or image by disclosing more quality environmental and social information. This study recommends that manufacturing firms should increase their dedication to environmentally friendly activities as it can strengthen their relationship with stakeholders. The study is limited to JSE-listed manufacturing firms in South Africa. Future research can look at the determinants of the environmental reporting practice by the firms and its impact on the financial performance.

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