



Using FinBERT as a refined approach to measuring impression management in corporate reports during a crisis

Abstract

This paper presents the findings of sentiment analysis as a refined approach to detecting impression management that may be present in the Chairman's Statements of companies during an exogenous event such as the Coronavirus pandemic. FinBERT, a more advanced machine learning model of natural language processing (NLP), was used to investigate the change in net sentiment expressed in the Chairman's Statements of a sample of South African JSE-listed companies before and during the pandemic. A computation of net sentiment for each report was performed. Overall, no generic pattern of communication in the Chairman's Statements emerged between the periods researched. Impression management tactics may vest within reports on an entity-specific basis and may be the exception, not the rule. Considering the increasing amount of unaudited narrative disclosure presented in formal corporate communication, consideration must be given to whether the sentiment expressed in these formal corporate reports is balanced, clear and transparent. Content analysis has historically been labour-intensive. More accurate ways of analysing growing bodies of financial text would be relevant to investors, analysts, key stakeholders, policymakers and academics. Pre-trained NLP models such as FinBERT offer a specialised way of understanding the sentiment of financial text. Research exploring impression management in corporate narrative sections using FinBERT is still gaining momentum across the world and is limited in South Africa. To the researchers' knowledge, this is one of the first South African studies to employ FinBERT as an innovative, accurate and efficient approach to analysing the sentiment in the Chairman's Statement.

Keywords

Chairman's report; Coronavirus pandemic; FinBERT; impression management; machine learning; natural language processing; sentiment analysis; South Africa

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INTRODUCTION

The 2019 Coronavirus disease (hereafter referred to as COVID-19) was declared a world health emergency by the World Health Organisation (WHO) on 30 January 2020 (WHO, 2020). The measures that were implemented during 2020 and 2021 to curb the virus such as travel warnings and bans, and lockdown procedures, have affected the economy on a global scale (Stephany, Stoehr, Darius, Neuhäuser, Teutloff & Braesemann, 2020). The economic stress caused by the pandemic may have resulted in unexpected changes in an organisation's performance and so the question of how the disclosure practices of management of these firms may have changed during COVID-19, becomes relevant (Adams & Abhayawansa, 2022; Larcker, Lynch, Tayan & Taylor, 2020; Zyznarska-Dworczak & Rudzionienė, 2022).

South Africa was the African country most severely affected by COVID-19 (Stiegler & Bouchard, 2020). In their literature review on corporate governance (CG) during COVID-19, Koutoupis, Kyriakogkonas, Pazarskis and Davidopoulos ((2021) noted that there is scope for more research to be performed on CG during the pandemic for both developed and emerging economies. Several studies on COVID-19 relate to the applicability of the going concern assumption within the context of the COVID-19 pandemic (Albitar, Gerged, Kikhia & Hussainey, 2020; Hay, Shires & Van Dyk, 2021; Humphreys & Trotman, 2021), and disclosures related to COVID-19 have also received growing attention (Larcker et al., 2020; Loughran & McDonald, 2020; Stephany et al., 2020; Wang & Xing, 2020; Zyznarska-Dworczak & Rudžionienė, 2022). Little research has been done to explore the effect of the pandemic on the ability to and opportunity for management to employ impression management strategies, such as the creation of bias in corporate reports by presenting information in a manner that emphasises positive sentiment.

Impression management is concerned with the depiction of a socially desired image achieved through the emphasis on certain characteristics of a personality or the concealment or misrepresentation of that personality (Gioia, Schultz & Corley, 2000). Within the context of corporate communication, impression management manifests as a strategic selection, display and presentation of narrative information designed to emphasise entity success and obfuscate failures (Brennan, Guillamon-Saorin & Pierce, 2009; Davies & Brennan, 2007; Godfrey, Mather & Ramsay, 2003; Varachia & Yasseen, 2020; Yang & Liu, 2017).

In some prior studies exploring different genres of impression management in corporate information, its presence has been investigated with reference to the underlying performance of the entity (Abrahamson & Amir, 1996; Abrahamson & Park, 1994; Brahmana, Setiawan & Kontesa, 2022; Brennan et al., 2009; Clatworthy & Jones, 2006; Courtis, 2004; Davies & Brennan, 2007; Im, Kim & Miao, 2021; Yang & Liu, 2017; Yasseen, Moola-Yasseen & Padia, 2017; Yasseen, Mohamed, & Moola-Yasseen, 2019).

In these studies, it is usually hypothesised that there is more incentive for management to employ impression management techniques in corporate communication when the firm's performance is relatively unfavourable than when the firm performance is relatively good (Clatworthy & Jones, 2006; Davies & Brennan, 2007; Yang & Liu, 2017; Yasseen et al., 2017; Yasseen et al., 2019). Within a crisis setting, however, Patelli and Pedrini (2014) and Moreno and Jones (2021) provide evidence that management has less of an incentive to employ impression management. According to Keusch, Bollen and Hassink (2012), it is reasonable to assume that against the backdrop of differently performing companies, management may choose to explain organisational performance in the narrative section of corporate reports (such as Chairman's reports) in different manners. More specifically, in a crisis setting, as opposed to a non-crisis setting, management may correlate bad results with the hardship imposed by environmental factors (Brahmana et al., 2022; Keusch et al., 2012).

The purpose of this paper is to explore the contradictory findings of a crisis versus non-crisis setting within the context of the ongoing COVID-19 pandemic, by presenting the preliminary findings of an ongoing study that uses FinBERT to conduct sentiment analysis, as a refined approach to detecting impression management that may be present in a company's corporate communication reports produced in the course of an exogenous event. More specifically, the presence of thematic manipulation of the Chairman's Statement is investigated with reference to the net sentiment (positive sentiment over negative sentiment or vice versa) of its textual references.

A consideration of management disclosure is important, firstly because the presentation of narrative reporting in corporate communication reports may provide management with the opportunity to present and display biased information (Brennan & Merkl-Davies, 2013; Clatworthy & Jones, 2006; Davies & Brennan, 2007; Keusch et al., 2012). A consideration of these opportunities may be especially important, given the unprecedented nature of the pandemic and that management may have adopted varied response actions to the disease, according to Brahmana et al. (2022). Secondly, a consideration of reporting bias is relevant because of the high frequency at which financial information in the form of online news, reports and company announcements is being created and released (Araci, 2019; Liu, Huang, D., Huang, K., Li & Zhao, 2021; Yang, Uy & Huang 2020). Limited South African studies have been performed on the level of impression management present in formal narrative disclosure sections of corporate reports (Yasseen

et al., 2017; Yasseen et al., 2019). This study is intended to add to the body of literature on impression management practices in South Africa. To the researchers' knowledge, it would also be the first to explore the presence of impression management in corporate communication during the coronavirus pandemic within a South African context. The use of more refined NLP techniques such as FinBERT, may be of interest to external audiences (investors, broader stakeholder groups and policymakers such as the JSE) that use corporate reports for investment or policy decisions, and to academics who wish to further explore accounting communication of management in a crisis setting (Keusch et al., 2012).

Using agency theory, the focus of this paper is on the Chairman's Statement as a representation of the narrative aspect of formal corporate communication of an organisation. According to Merkl-Davies and Brennan (2017), the connection between accounting communication and its external audiences (such as investors and interested stakeholders) is uncharted territory, especially in so far as how the articulation used in such communication conveys technical aspects of accounting. For the purpose of this paper, the level of impression management that may be present in the Chairman's Statements of a sample of South African companies listed on the Johannesburg Stock Exchange (JSE) during a pre-pandemic period (2018-2019) was compared with those prepared during a period within the pandemic (2020-2021). The researchers hypothesised that the tough macro-economic conditions created by COVID-19 have reduced the incentive of management to impress shareholders as an external factor, COVID-19 in this case, may be used to explain poor performance. Computer-assisted content analysis techniques have typically been used to test for impression management (Abrahamson & Amir, 1996; Abrahamson & Park, 1994; Brennan et al., 2009; Davies & Brennan, 2007). In this article, we refined the approach that typically has been used in prior studies and employ FinBERT as a specialised natural language processing (NLP) model to analyse the overall sentiment expressed in the Chairman's Statements of a company with reference to underlying organisational performance. By controlling for organisational performance, the researchers believe that the overall sentiment of the textual references in the Chairman's Statement will be an accurate measure of whether impression management in the form of thematic manipulation has been employed, as instances of emphasised positive sentiment despite negative performance can be identified. FinBERT has been found to be an accurate pre-trained language processing model within the financial reporting arena (Araci, 2019; DeSola, Hanna, Nonis, 2019; Yang, Uy & Huang, 2020).

The subsequent section presents a discussion of the relevant literature that supports this paper's theoretical stance and the development of the hypotheses tested. The literature review section is then followed by a discussion of the methodology adopted for the study. Thereafter a section displaying and analysing the results is presented. Lastly, concluding remarks are presented, including a summary of the main findings and a presentation of limitations, delimitations, and possible future areas of research.

LITERATURE REVIEW

The agency theory

The agency theory has been applied to a variety of organisational phenomena including impression management (Eisenhardt, 1989). Thus, the exploration of impression management through the lens of the agency theory is appropriate, and consistent with many prior studies (Brahmana et al., 2022; Makhlof, 2022; Merkl-Davies & Brennan, 2007; Nel, Arendse-Fourie & Ontong, 2022). Central to the agency theory is the agency relationship, which entails one or more persons (the principal/s) conferring upon another person or persons (the agent/s) authority to act on behalf of the principal (Jensen & Meckling, 1976). Agency theory includes the agency problem that may arise from the agency relationship (Eisenhardt, 1989). The agency problem arises when it is assumed that both parties will aim to achieve their economic goals and the agent is enticed to exhibit self-serving behaviour which may be contrary to the best interest of the principal (Eisenhardt, 1989; Jensen & Meckling, 1976).

The relationship between stockholders and managers would exist within the field of the agency theory (Jensen & Meckling, 1976). Investors may be considered the main users of an entity's Chairman's Statements (Abrahamson & Amir, 1996; Baird & Zelin, 2000) and various studies support the usefulness

of the Chairman's Statement (Abrahamson & Amir, 1996; Hyland, 1998; Kiattikulwattana, 2019; McConnell, Haslem & Gibson, 1986; Ntalianis, 1993; Smith & Taffler, 2000). The Chairman's Statement may be described as a mechanism for the communication of significant aspects of an entity (Allison, 2017, Patelli & Pedrini, 2014), as it contains important narratives which are considered to be important as they supplement the financial data given to stakeholders that may be interested in the performance of the entity (Yuthas, Rogers & Dillard, 2002).

The structure of an agency relationship and its related agency problem may be extended to any setting in which the principal and agent exhibit cooperative behaviour, but may have different perspectives towards the goal achievement and the assessment of risk (Eisenhardt, 1989). Rowbottom and Lymer (2010) investigated the use and users of narrative sections presented in online corporate reports and noted that the provision of online annual reports created extensive availability and accessibility of online content, which could, in turn, attract a wider audience group. Consequently, even though the Chairman's Statements were scrutinised in this study based on their perceived usefulness, the possible impressions created therein have important implications for other types of corporate narratives available to a wider readership.

Impression management

The theory underpinning impression management may stem from various assumptions. One orientation towards impression management may be a defensive tactic undertaken to protect an already recognised social identity. Another orientation may be assertive, undertaken to improve a social identity (Tetlock & Manstead, 1985). The notion of impression management has been extended towards the corporate reporting arena to discern if the information contained in corporate reports is communicated in its true sense or strategically manipulated to create a perception to its audience (Abrahamson & Amir, 1996; Brennan & Merkl-Davies, 2013; Clatworthy & Jones, 2003; Clatworthy & Jones, 2006; D'Aveni & MacMillan, 1990; Davies & Brennan, 2007; Moreno & Jones, 2021; Patelli & Pedrini, 2014; Rutherford, 2005; Yasseen et al., 2017; Yasseen et al., 2019; Yuthas et al., 2002).

In their review and synthesis of the literature on discretionary disclosures in the narrative sections of corporate documents, Davies and Brennan (2007) draw a distinction between two research taxonomies that exist in relation to impression management. The first research taxonomy, the 'impression management school', assumes that management behaves opportunistically and exploits the information asymmetries that exist between them and third parties (Abrahamson & Park, 1994; Godfrey et al., 2003; Smith & Taffler, 2000). The second taxonomy is referred to as the 'incremental information school', which assumes that discretionary disclosure bridges the communication gap between management and third parties by allowing them to overcome information asymmetries that may exist (Hassell & Hillison, 2000). The stance adopted in this paper is that of the impression management school perspective, which conforms with our use of the agency theory perspective.

In their comprehensive summary, Davies and Brennan (2007) also distinguish between two types of behaviours that managers may exhibit when engaging in impression management, namely concealment and attribution, and the strategies employed within these behavioural patterns. Concealment is concerned with obscuring negative organisational outcomes or by highlighting positive organisational outcomes. One of the strategies employed to achieve this is thematic manipulation, which is the emphasis on positive words through the presentation of bias in information by communicating the information with a very positive sentiment (Davies & Brennan, 2007). This paper explores concealment behaviour and its related thematic manipulation strategy within a crisis setting by looking at the sentiment of the sentences contained in the Chairman's Statement.

In terms of thematic manipulation, the results of studies are mixed. Smith and Taffler (2000) found it important to compare positive and negative textual mentions in Chairman's Statements and provided evidence that discretionary narrative disclosures do reflect the underlying firm financial performance. Abrahamson and Amir (1996) calculated a numerical measure of negativity expressed in Chairman's letters to shareholders and found that disclosures in the letters mirrored the financial performance.

Abrahamson and Park (1994) looked at the concealment of negative organisational outcomes and found support that negative organisational outcomes are associated with greater negativity in the president's letters. In contrast, Lang and Lundholm (2000) offer evidence that management change their disclosure strategy prior to stock offering and that the tone of such pre-offering disclosures was optimistic. Rutherford (2005) analysed the UK Operating and Financial Review (OFR) by employing word frequencies and found narratives to be more positively orientated as opposed to an expected neutral. Melloni, Stacchezzini and Gibson (2016) assessed positive disclosure in relation to poor performance and weak corporate governance and presented evidence to support the use of this impression management strategy.

Within a crisis setting, the results of studies that have been performed on impression management suggest that management may not be motivated to strategically manipulate corporate communication when adverse conditions are imposed by an exogenous event (Moreno & Jones, 2021, Patelli & Pedrini, 2014). Patelli and Pedrini (2014) investigated the rhetorical tone of CEO letters of a large sample of Fortune 500 firms during the global financial crisis (GFC) and found evidence suggestive of sincere disclosure during the crisis. Moreno and Jones (2021) analysed impression management also within the context of the GFC. Consistent with the findings of Patelli and Pedrini (2014), a lower level of impression present in the Chairpersons' Statements of companies during the GFC period compared to the non-GFC period was found (Moreno & Jones, 2021). Thus, even though some measures of impression management were present, it is possible that management was under greater pressure to accurately present a narrative that aligned with actual firm performance (Moreno & Jones, 2021). Im et al. (2021), investigated a sample of letters of the CEOs of Fortune 500 companies operating in the hospitality sector during COVID-19 by applying the Aristotelian concept of persuasive rhetoric and found evidence of the rational and credible rhetorical appeals and impression management in the letters (Im et al., 2021). Keusch et al. (2012), also found evidence of impression management within a crisis setting as opposed to a non-crisis setting.

Hypothesis development

Based on the preceding discussion, a balanced, unmanipulated Chairman's Statement is expected to present a sentiment which echoes the outcomes of the organisation. More specifically, if the organisational performance for a financial period is poor, it is expected that the narrative reporting in the Chairman's Statements for that financial period portrays those results accurately and as such would contain negative sentiment. Conversely, if organisational financial performance is relatively positive, the Chairman's Statement is likely to have more positive sentiment to explain the good performance. Consequently, the following null hypothesis was developed:

H0: When organisational performance is relatively poor or decreases, the overall sentiment expressed in the Chairman's Statement will be negative. Conversely, when organisational performance improves or is relatively good, the overall sentiment of the Chairman's Statement will be positive.

The theory underpinning the impression management school of thought does not support the null hypothesis (Davies & Brennan, 2007). Rather, it suggests that poor organisational financial performance may prompt management to obfuscate these negative outcomes in narrative sections of corporate reports through various strategies, which include the presentation of biased information by emphasising the positive.

Consequently, the following hypothesis was developed:

H1: When organisational performance is relatively poor or decreases, the overall sentiment expressed in the Chairman's Statement will be positive. When organisational performance improves or is relatively good, the overall sentiment of the Chairman's Statement will also be positive.

As outlined in the previous section, within a crisis setting, studies have shown that management may have less of an incentive to engage in impression management practices (Moreno & Jones, 2021; Patelli & Pedrini, 2014). The following hypothesis was consequently developed:

H2: Within the context of tough macroeconomic conditions created by an exogenous event, such as the Coronavirus pandemic, negative organisational outcomes do not incentivise management to observe impression management behaviours concerned with concealment, by presenting corporate narrative information in a biased way. As such, report sentiment is expected to be negative or neutral.

Using a Natural Language Processing (NLP) model FinBERT to identify sentiment

Traditionally, impression management analysis of positive or negative sentiment has been restricted to computerised methods using word counts classified as either positive or negative. These classifications between positive and negative words have historically been derived from carefully crafted financial sentiment lexicons such as the Loughran and McDonald (LM) financial dictionary (Loughran & McDonald, 2011), or more generally, using tools such as the Linguistic Inquiry and Word Count (LIWC) software developed by Pennebaker, Booth and Francis (2007). Several impression management studies including those performed by Asay, Libby and Rennekamp (2018), Merkl-Davies et al. (2011), and Zhang and Aerts (2015), have used these word count methods with a distinct and unavoidable limitation that the context within a sentence cannot be accurately established merely through individual word analysis.

Establishing accurate sentiment within the financial realm is difficult and more prone to errors when utilising word counts rather than evaluating a sentence as a whole (Yang et al., 2020). Take for example the following news headline: "For Markets and Ukraine, 'Good' Scenarios Are Gone" (Bloomberg, 2021). This statement clearly has a negative sentiment, but a word count analysis would identify the word "Good" as positive. This illustrates how important determining context is when trying to establish relationships between sentiment and financial performance.

With advancements in Machine Learning (ML) and Artificial Intelligence (AI), breakthroughs have been made in the area of Natural Language Processing (NLP) where NLP models can be trained to (amongst other applications) identify the sentiment of text within its context (Devlin, Chang, Lee & Toutanova, 2018). This offers a possible solution to the limitation of using word counts in impression management studies (Araci, 2019).

A breakthrough in NLP occurred in 2018 when ULMFiT (Universal Language Model Fine-tuning) was developed to be trained using unlabelled data and then subsequently fine-tuned with task-specific layers (Howard & Ruder, 2018). Previously the limitation in NLP progression was the lack of labelled data to effectively train a model (Howard & Ruder, 2018). Labelled data, in this study's context, is a list of available sentences which have been assigned a label of "positive", "negative" or "neutral" sentiment by a subject specialist (Araci, 2019). Using unlabelled data to train the model meant that fine-tuning could subsequently be performed on a much smaller dataset (Yang et al., 2020). Other language training models followed this concept with the most significant being BERT (Bidirectional Encoder Representations from Transformers) (Devlin et al., 2018).

BERT is designed to pre-train bidirectional representations in unlabelled text by jointly conditioning both the left and right context in all layers (Devlin et al., 2018). This is achieved through a Masked Language Model (MLM) which randomly masks tokens from the input with the objective to predict the original word based only on its context, thereby fusing the left and the right (Devlin et al., 2018). This creates the bidirectionality of BERT, which is different to other NLP models using left to right pre-training. For example, in the sentence, "My dog is cute and likes to play", the word "cute" may be masked requiring BERT to predict it using the context of the sentence both before and after the word "cute" (Devlin et al., 2018). This allows it to be fine-tuned by adding only one additional layer. Using this approach, BERT was pre-trained using English Wikipedia (2500 million) and BookCorpus (800 million words) (Devlin et al., 2018). In comparison to other NLP models performed in 2019, BERT is the most accurate (Devlin et al.,

2018).

FinBERT was developed by further pre-training BERT using TRC2-financial, which is a subset of Reuters' TRC2, consisting of 1.8M news articles published by Reuters, and then fine-tuning it using labelled data from the Financial PhraseBank which added sentiment to 4845 sentences from financial news (Araci, 2019). When FinBERT was tested, it was found to be 97% accurate in correctly predicting the sentiment of financial text (Araci, 2019). An example of a failure is "Pre-tax loss totalled €0.3 million, compared to a loss of €2.2 million in the first quarter of 2005", which FinBERT labelled as negative as it was unable to distinguish that the numerical decrease in the loss was positive in the absence of words such "increased from" (Araci, 2019).

METHODOLOGY

This section discusses the research method including the data sources used and the computation of both the independent variable measuring performance change and the dependent variable of net sentiment.

Data Collection

The Chairman's Statement (for the periods 2018 – 2021) and the financial statements (for the periods 2016 – 2021) of all available companies listed on the JSE were obtained from the IRESS (previously McGregor) database accessed through the University of the Witwatersrand library. This resulted in complete datasets for 700 companies and allowed for the study of two periods before the Covid-19 pandemic (2018 – 2019) and for the two periods during the pandemic (2020 – 2021).

The data was filtered to identify anomalies which may unduly influence subsequent analysis. As the performance measure is the change in return on equity (ROE), 11 companies with a negative equity value were removed from the dataset. All companies with a change in ROE larger than one in absolute value were investigated by reading through the financial statements to identify the reason for the large change. Of the 31 companies with an unusually large ROE change ($abs(>1)$), seven companies included a single large isolated event not related to normal operating activities. This included items such as a once-off large dividend payout lowering equity significantly in one year and a write-off of an investment taken through profit and loss, which resulted in an abnormally large loss in one year.

To ensure comparability between years and exclude sources of variability associated with behaviours attributable to corporate culture, the data was filtered further to only include companies with complete data for each of the four years of the study. Despite this reduction in the size of the overall dataset, it still allowed the integrity of data to be maintained, from which reasonable conclusions might be drawn.

The remaining dataset used for analysis consisted of 168 companies, split between four years, as shown in Table 1.

Table 1: Companies by year (Comprising complete sets of companies)

2018	2019	2020	2021
42	42	42	42

[Source: Author's own work]

Computing the performance measurement variable

As discussed in the literature review, impression management may arise when a decrease in performance motivates management to conceal organisational outcomes through thematic manipulation. This can be achieved through an increased emphasis on positive performance (Abrahamson & Park, 1994; Davies & Brennan, 2007; Rutherford, 2005). In line with some prior studies exploring impression management, performance was measured using ROE (Abrahamson & Amir, 1996; Keusch et al., 2012; Kohut & Segars, 1992). ROE was calculated by dividing net profit by the average equity for each year and the change in ROE was then calculated by subtracting the prior period computed ROE from the current period.

Computing the net sentiment for each Chairman's Statement

Each Chairman's Statement was formatted to ensure that each sentence within it was separately identifiable. The sentences from each Chairman's Statement were then run through the FinBERT model, which returned an analysis of the probability of the sentiment per sentence in the report. Table 2 contains an extract of the output from the FinBERT NLP model.

Table 2: Extract from one of the Chairman's Statements from the sample with FinBERT analysis completed.

Headline	Positive	Negative	Neutral
We began 2020 with cautious optimism about the future, notwithstanding economic and fiscal challenges in South Africa.	0.598146	0.100992	0.300861
The Board was pleased with the growth momentum various parts of our business had started generating, and the steady progress we were making towards meeting our growth and strategic goals.	0.924936	0.01358	0.061484
The South African government had begun to take action to reverse the institutional damage caused by the previous year's corruption and mismanagement.	0.742714	0.180113	0.077173
However, as we now all know, 2020 was to be an unprecedented year that would challenge the Group's resilience in the face of a devastating Covid-19 pandemic.	0.052489	0.911291	0.036221
Globally, by 23 March 2021, 123m people had fallen ill, with 2.7m recorded deaths directly linked to the pandemic.	0.011976	0.928372	0.059652

The first sentence in the extract from the Chairman's Statement has been assessed by FinBERT as having a 59.8% probability of being positive in sentiment, a 10.1% probability of being neutral and 30.1% probability of being negative sentiment.

[Source: Author's own work]

To measure the net sentiment (NS) of each Chairman's Statement, the difference between the number of positive sentences (sp) and negative sentences (sn) was calculated as a percentage of total sentences (st) in the report ($NS = (sp - sn) / st$). All sentences with a probability of 60% or greater of being of positive sentiment were counted as positive sentences and likewise for negative sentences. The reason for choosing 60% was to ensure a sufficient gap existed between a sentence being identified as positive versus negative. If a 50% benchmark had been used, a sentence with a probability of 50.1% of being of positive sentiment and a 49.9% probability of being of negative sentiment would have been classified as positive despite it clearly being borderline. The 60% threshold ensured that at a minimum a 20% gap would exist between positive and negative sentiment probabilities, adding to the robustness of the data.

Dataset for statistical evaluation

The final dataset used for statistical evaluation included the company, the year, net profit, and equity as obtained from the IRESS database together with the average equity, ROE, the change in ROE, and the net sentiment as computed.

Summary statistics

Univariate summary statistics for the Rand-denominated variables (in '000's) appear in Table 3. These variables were used in the computation of ROE and the change of ROE for each company.

Table 3: Rand-denominated variables in '000's.

Variables	Min	Mean	Median	Max	SD
Average Equity	102 734	10 786 615	3 150 252	159 903 500	23 636 570
Equity	98 943	10 940 510	3 143 810	167 887 000	24 642 124
Net Profit	-15 960 000	1 011 769	180 200	30 211 000	4 598 045

[Source: Author's own work]

Univariate summary statistics for the derived variables appear in Table 4.

Table 4: Derived variables

Variables	Min	Mean	Median	Max	SD
Neg_Sent	0.000	0.130	0.108	0.400	0.094
Net_Sent	-0.129	0.345	0.359	0.850	0.189
Pos_Sent	0.200	0.475	0.472	0.857	0.123
ROE	-1.108	0.054	0.092	0.747	0.272
ROE_change	-1.245	0.004	-0.011	1.158	0.248

[Source: Author's own work]

Statistical analysis

The statistical analysis was performed in r using the "ggplot"¹ package. All assumptions to run the analysis were met.

A "broken stick" regression was used to establish the relationship between net sentiment and change in ROE. This was to highlight possible changes in behaviour regarding net sentiment when performance (as measured by the change in ROE) decreased from one year to the next. As illustrated in Figure 1, most companies in this study fall close to the centre of the x-axis with only a slight ROE increase or decrease.

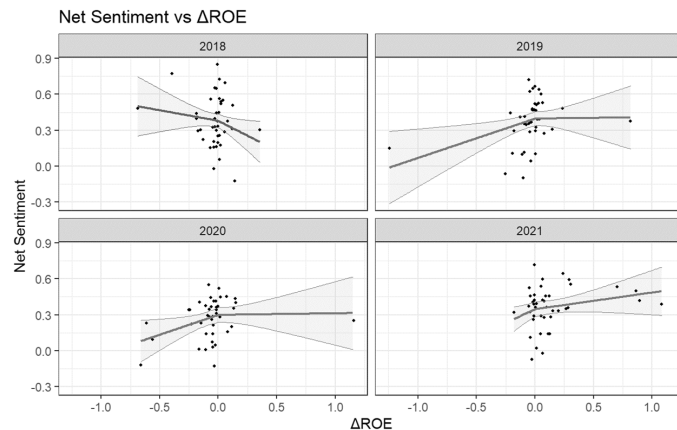


Figure 1: Broken stick regression of net sentiment vs change in ROE per year

[Source: Author's own work]

1 <https://ggplot2.tidyverse.org/>

It is evident from Figure 1 that the average net sentiment is above zero in all years under review, with 2018, 2019 and 2021 having an average net sentiment of approximately 40% compared to 2020, where the average net sentiment is around 30%. This downward shift in sentiment from 2019 to 2020 is more evident when one overlays the images in Figure 1, as shown in Figure 2.

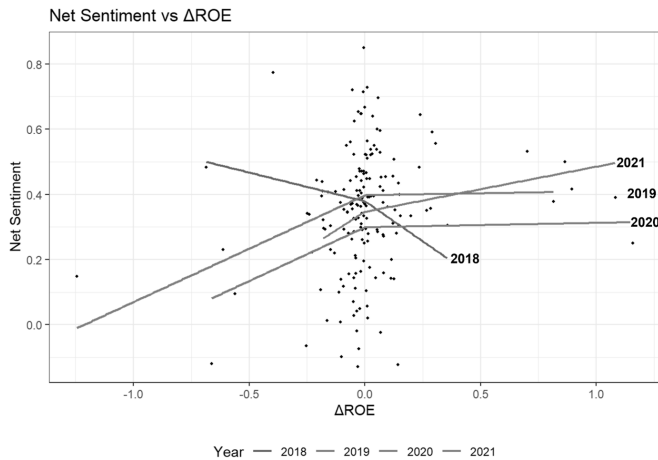


Figure 2: Overlay of Broken Stick regression for net sentiment vs ROE change.

The overall drop in net sentiment in 2020 is clear.

[Source: Author's own work]

The fact that net sentiment for each year under review is on average positive (even during Covid-19) is consistent with the phenomenon described as the "Pollyanna" effect – that corporate narratives, whether based on poor or favourable performance, will remain largely positive (Hildebrandt & Snyder, 1981). This positive outlook adopted by management may be attributed to good corporate stewardship rather than impression management (Abrahamson & Amir, 1996).

Figure 1 also shows that there were more ROE decreases in 2020 with a bounce-back in both ROE and sentiment in 2021. Other studies performed on the effect of Covid-19 on JSE-listed companies suggest that this was largely due to significant impairments being recognised in 2020, due to the uncertainty in the future economic conditions which was corrected in 2021 when more clarity on the overall future impacts of Covid-19 had been established (Cherry, 2021; Hay et al., 2021; Koutoupis et al., 2021). The positive slope of the regression line shows that in 2021 the larger the increase in ROE relative to 2020, the higher the net sentiment. This supports both Hypothesis 2 and the Null Hypothesis – as performance increases, net sentiment will increase, and that impression management will not occur when an external factor is present to explain any poor performance respectively.

Figure 2 shows that the range of net sentiment varies from a low point of just below negative 10% to a high of just under 90%, although both points have similar ROEs. This would suggest that the change in ROE is not explaining much of the variation in net sentiment. The low R² value of 0.0862 (see Table 5) supports this view. A low R² value in social sciences, often associated with the subjectivity in human behaviour, is generally accepted and similar studies performed on impression management have reported significant relationships despite low R² values (Merkl-Davies et al., 2011; Moreno & Jones, 2021; Zhang & Aerts, 2015). Despite the high level of unexplained variation, both the 2019 and 2020 years are significant (see Table 5), suggesting that a change in behaviour may be present. A positive increase in correlation in these years when compared to 2018 suggests that our Hypothesis 2 may be true – when an external factor is available on which to blame poor financial performance, impression management is not used.

Table 5: Fitted regression coefficients for broken-stick regression of net sentiment against change in ROE and year

	Estimate	Std. Error	t-value	Pr(> t)
(Intercept)	0.379	0.029	12.97	0
ROE_change	-0.176	0.189	-0.93	0.3537
as.factor(Year)2019	0.018	0.04	0.44	0.6575
as.factor(Year)2020	-0.08	0.041	-1.96	0.0516
as.factor(Year)2021	-0.033	0.043	-0.76	0.4482
l(pmax(ROE_change, 0))	-0.316	0.175	-1.81	0.0728
ROE_change:as.factor(Year)2019	0.504	0.217	2.32	0.0217
ROE_change:as.factor(Year)2020	0.505	0.221	2.29	0.0235
ROE_change:as.factor(Year)2021	0.631	0.247	2.56	0.0115

The coefficient for the base (2018) change in ROE is not significantly different from zero (p -value = 0.3537), and 2019 (p -value = 0.0217), 2020 (p -value = 0.0235) and 2021 (p -value = 0.0115) have significant interaction terms with the change in ROE. The adjusted R^2 for this broken-stick model is 0.0862. The fitted regression is shown in Figure 1 and Figure 2.

[Source: Author's own work]

In addition, Figure 1 suggests a negative association between ROE change and net sentiment in 2018. This may indicate the presence of impression management in 2018, albeit not statistically significant (see Table 5). The year 2018 is also apparently different to 2019 in this respect. 2019 has a slope parallel to 2020, indicating no difference in the slope of net sentiment versus ROE change between 2020 and 2019, which was also pre-pandemic. These conflicting views make it difficult to draw firm conclusions about the relationship between net sentiment and performance at an overall market level. The only clear conclusion one can draw from the above results is that a drop in net sentiment occurred during 2020. Moreno and Jones (2021), in their study of impression management during the global financial crisis in 2008, drew a similar conclusion.

A likely reason for the poor explanation of the variability in net sentiment by ROE change is that corporate culture and individual characteristics within each company and its chairman could be a key drivers for impression management.

To investigate the possibility of different corporate cultures explaining impression management, all companies were included as factors in the broken stick regression model (i.e. the model allows for the possibility of a company-specific effect on net sentiment level). The adjusted R^2 increased substantially to 0.608 with the majority of individual companies showing significant differences in mean net sentiment across the four years of this study (See Table 6). Figure 3 suggests that certain companies may use impression management techniques, whereas others do not. This highlights a need for further studies to explore the development of a model which can be used to establish whether an individual company is using impression management. A positive indication of impression management could warn stakeholders to exercise caution when using those corporate narratives to make decisions.

Table 6: Fitted regression coefficients for broken-stick regression of net sentiment against change in ROE and year with each individual company as a factor

Broken Stick Regression with each company as a factor			
(Intercept)	0.182**	as.factor(ID)25688	0.339**
ROE_change	-0.117	as.factor(ID)25691	-0.051
as.factor(Year)2019	0.020	as.factor(ID)25719	-0.110
as.factor(Year)2020	-0.074**	as.factor(ID)25721	0.071
as.factor(Year)2021	-0.036	as.factor(ID)25729	0.226**
as.factor(ID)5	0.236**	as.factor(ID)25796	0.332***
as.factor(ID)15	0.162	as.factor(ID)26073	0.140
as.factor(ID)80	0.184*	as.factor(ID)26085	0.233**
as.factor(ID)100	-0.203*	as.factor(ID)26099	0.365***
as.factor(ID)103	0.107	as.factor(ID)26170	0.334***
as.factor(ID)122	0.385***	as.factor(ID)26175	0.336***
as.factor(ID)128	0.299***	as.factor(ID)26184	0.365***
as.factor(ID)178	0.106	as.factor(ID)26215	0.181*
as.factor(ID)195	0.214*	as.factor(ID)26218	0.258**
as.factor(ID)201	0.102	as.factor(ID)26224	0.353***
as.factor(ID)217	0.201*	as.factor(ID)26237	0.191*
as.factor(ID)230	0.299***	as.factor(ID)26250	0.328***
as.factor(ID)247	0.004	ROE_change × as.factor(Year)2019	0.481**
as.factor(ID)294	0.380***	ROE_change × as.factor(Year)2020	0.523**
as.factor(ID)355	0.157	ROE_change × as.factor(Year)2021	0.770***
as.factor(ID)3645	0.212*	l(pmax(ROE_change, 0))	-0.522***
as.factor(ID)3727	0.487***	Num.Obs.	168
as.factor(ID)18271	-0.056	R ²	0.723
as.factor(ID)25274	0.165	R ² Adj.	0.608
as.factor(ID)25543	0.227**	AIC	-197.6
as.factor(ID)25566	0.305***	BIC	-38.2
as.factor(ID)25573	0.342***	Log.Lik.	149.783
as.factor(ID)25590	0.147	F	6.284
as.factor(ID)25650	0.255**	RMSE	0.12
Broken Stick Regression with each company as a factor			
* p < 0.05, ** p < 0.01, *** p < 0.001			

[Source: Author's own work]

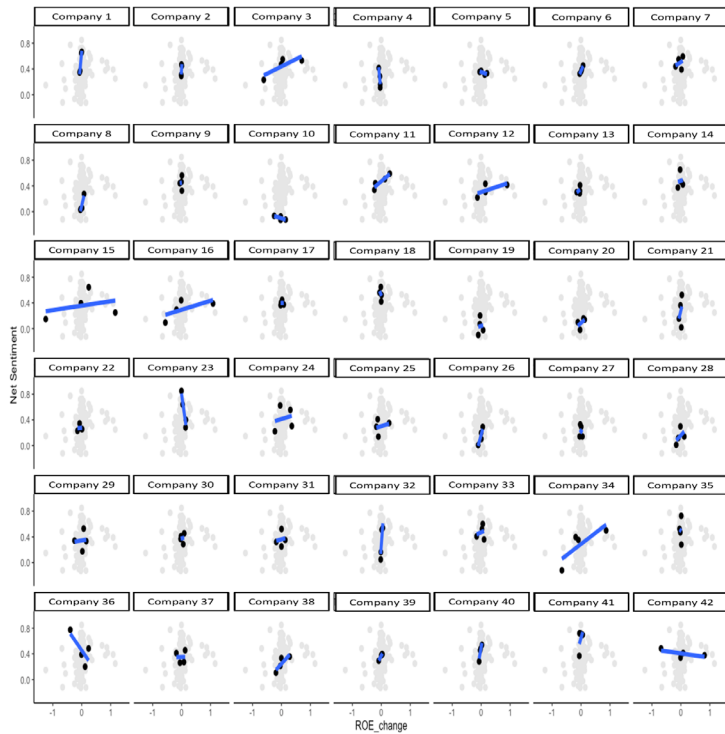


Figure 3: ROE change vs net sentiment per company for years 2018 - 2021
 [Source: Author's own work]

The negative slope of certain companies in Figure 3, such as Company 36, Company 42 and Company 23, suggests that impression management could exist at an individual company level. What is refreshing is the number of companies with a positive correlation between ROE change and net sentiment. This suggests that an unbiased and transparent view is being provided in most cases. This also suggests that the requirements of King IV relating to the chairman being an independent non-executive director has led to overall good governance and improved reporting. A future study looking at the independence of the chairman and the likelihood of corporate impression management could assist in strengthening the relationship between sound governance practices and reporting practices.

CONCLUSION

The focus of this paper was to analyse whether the communication in the Chairman's Statements contains evidence of impression management behaviour during a crisis such as the COVID-19 pandemic. A sample of JSE-listed companies was selected and a period pre-pandemic (2018-2019) and within the pandemic (2020-2021) were analysed. More specifically, the focus was on the presence of thematic manipulation in the form of an emphasis on the positive performance aspects of the organisation or the possible concealment of the negative performance aspects during the COVID-19 pandemic. The net sentiment of the textual references in each Chairman's Statements is believed to achieve this and was measured by conducting sentiment analysis using FinBERT.

Research performed on impression management has typically been performed using an agency theory perspective. Under this framework, it can be assumed that management will exhibit self-interested behaviour within the context of relatively poor performance resulting in the use of impression management tactics (Davies & Brennan, 2007). This notion led to the development of Hypothesis 1 (H1).

Evidence from studies such as Patelli and Pedrini (2014) and Moreno and Jones (2021) suggest that the H1 may not hold true during a crisis and that management may use the effects of the exogenous event

to describe poor performance. This idea led to the development of Hypothesis 2 (H2).

Overall, the results of the analysis did not point to a particular pattern of communication in the Chairman's Statement – at a market level, there was no obvious distinction between communication patterns before the crisis (2018-2019) and during the crisis (2020-2021). This lends support to the notion put forward by Kohut and Segars (1992) that communication patterns are often not generic. At first sight, some aspects of the results for the different years were seemingly in conflict with one another when looked at within their categories of being pre-pandemic or during the pandemic, although there was a definitive drop in net sentiment during 2020 (the first year of the pandemic). Consequently, there is little concrete evidence to support the notion that an organisation's management in general engages in opportunistic behaviour by manipulating the textual references in the Chairman's statement by promoting the good and concealing the bad. Some aspects of the results of the study support H1 while others support H2. For example, the net positive sentiment for all four years within both the defined crisis and non-crisis setting lends credibility to the Pollyanna effect, which supports H1 – the concept of eternal optimism, regardless of the underlying circumstances (Hildebrandt & Snyder, 1981). In addition, within the crisis period, the 2021 analysis showed a higher level of net sentiment given a change in ROE than did 2020 (also within the crisis period), which lends credibility to H0 and H2. Within the pre-pandemic period, 2018's broken stick regression model showed a negative correlation between net sentiment and ROE, which supports H1, but the 2019 regression model had a similar slope to 2020, which works against H1.

Also important were the findings of a large range in net sentiment (10% to just under 90%) for a similar change in ROE, suggesting that changes in net sentiments may have little to do with changes in a firm's underlying performance (measured by changes in ROE). This is also observed by Keusch et al. (2012) and is also consistent with the low value of R^2 found in this study. When the R^2 was adjusted to consider company-specific effects on net sentiment, R^2 increased to a level suggesting that impression management takes place on a company-specific basis that may be linked with its individual make-up.

Based on the preceding discussion, the results of the study do not confirm a consistent manner of communication adopted by management in the Chairman's reports but rather suggest that communication strategies may be company specific. Factors that could possibly give rise to these company-specific communication strategies include corporate culture and CEO traits of leadership, factors linked to corporate governance frameworks. This, however, is an area for future research.

According to Davies and Brennan (2007) the qualitative nature of impression management and the difficulty in coding may deter future research on this subject matter. This study extends prior research that has typically used content analysis and provides two main methodical refinements that carry analytical advantages. First, for the purposes of measuring bias towards positivity, sentiment analysis was used to calculate net sentiment. Second, for the purposes of accurately capturing net sentiment, FinBERT (as opposed to traditional NLP models which use computerised linguistic models utilise sentiment lexicons and word counts), was employed, which was found to be very accurate in predicting financial text sentiment, (Araci, 2019). It is believed that this helped to reduce the degree of subjectivity and simplicity associated with testing for thematic manipulation (Brennan et al., 2009). These methodical refinements may have aided the relief of the burden associated with content analysis, as content analysis has been considered labour-intensive (Abrahamson & Park, 1994; Davies & Brennan, 2007).

The provision of management's explanation of events and conditions that underpin financial performance is an important dynamic process, because it may affect a firm's competitive position (Kohut & Segars, 1992), the quality of financial information contained therein (Davies & Brennan, 2007), and the performance expectations formed by investors and analysts (Keusch et al., 2012). This study looked at the Chairman's Statement as a proxy for narrative corporate communication, but it is believed that the findings have important implications for other types of narrative disclosures made in corporate documents.

This paper has several limitations and delimitations. Firstly, the findings in this paper are preliminary and are based on an analysis of one section of the annual or integrated report – the Chairman's Statement. As such, the sentiment in other sections of the same reports or in other formal corporate communication documents has not been considered. Secondly, the use of sentiment analysis through FinBERT, which

measures overall financial text sentiment, is limited to one type of impression management strategy (thematic manipulation) that management may employ to conceal corporate information. As such, other impression management strategies such as readability or rhetorical manipulation that may be classified under the attribution to concealment behaviours were not explored. Thirdly, the detection of impression management in the Chairman's Statement was investigated through the textual references in the statement and not through references such as graphs or other illustrations. Lastly, the researchers adopted an impression management school of thought which assumes that management will behave opportunistically and exploit the information asymmetries that may exist between them and third parties. Consequently, it does not assume that corporate communication will bridge the communication gap between management and third parties (Davies & Brennan, 2007).

Given the limitations and delimitations inherent in this study and based on the preliminary results presented in this paper, several areas for further research have been identified. These include:

- i. An industry-specific analysis that can be conducted during a crisis setting considering the lack of distinct communication patterns found in this study.
- ii. The selection of different proxies for firm performance such as share price movement, firm size, change in revenue.
- iii. The extension of sentiment analysis using FinBERT to analyse other larger types of corporate documents. This may be particularly important, given the growing body of corporate communication being shared online and considering corporate reporting transformations that relate to integrated and sustainability reporting.
- iv. A consideration of the impact of organisational culture on management's ability and opportunity to manipulate corporate narrative documents, given that managers may be motivated to engage in impression management based on a desired social status (Davies & Brennan, 2007), and that corporate reporting does have a social orientation (Merkl-Davies, Brennan & McLeay, 2011).
- v. A consideration of how board mechanisms may limit impression management strategies. Melloni et al. (2016) found evidence consistent with the notion that board characteristics may impact optimistic disclosure in corporate narratives. In South Africa, the required application by listed companies of King IV may explain the lack of distinct communication patterns found in this study, a notion also supported by Yasseen et al. (2019).

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