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The incidence and quality of graphs in annual reports: A South African analysis of graph disclosure in state-owned entities

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Background: South African state-owned entities (SOEs) have become synonymous with issues such as poor service delivery and wasteful expenditure. State-owned entities are accountable to various stakeholders with the annual report viewed as an accountability mechanism. Given the different components of the annual report, this provides management with the opportunity to use different elements to present a better image of the SOE. Some elements that can be used to manipulate information are graphs.

Aim: The purpose of this study was to analyse the use of graphs in the annual reports of SOEs and to conclude whether SOEs use graphs to manipulate information presented.

Setting: The annual reports of the 277 SOEs included in the Public Finance Management Act (PFMA) schedules as of 31 March 2018 were analysed.

Methods: This study followed a quantitative research method. Content analysis is used to identify impression management techniques used in the graphs of SOEs.

Results: The findings indicate that 64% of SOEs present graphs in their annual reports, with non-financial graphs being disclosed more than financial graphs. Using the graph discrepancy index (GDI), it was found that SOEs tend to overstate data trends more than understating trends resulting in a better image of the SOE being presented. The presentational features of graphs were not used excessively to influence users.

Conclusion: Graphs appear to be used as a form of impression management to manage users' perceptions of SOEs. Given the impact of the annual report on users' decision, the distortion of graph may impact the decisions taken.

Keywords: annual report; graph; impression management; measurement distortion; presentational enhancement; state-owned entities.

Introduction

The public sector is regarded by many countries as a powerful engine of economic growth and sustainable development (Madumi 2018). State-owned entities (SOEs) have become important instruments in both social and economic policies in industrialised economies as well as in developing countries (Khongmalai, Tang & Siengthai 2010). Developing countries such as South Africa view SOEs as instrumental to stimulate and accelerate the gross domestic product (GDP), employment and infrastructure development (Madumi 2018).

Although SOEs are considered instrumental, fraud and corruption in the public sector are prevalent, for example, tender fraud, bribery, maladministration and many other situations that misuse taxpayers' money (World Bank 2017). Much attention has been drawn to certain SOEs such as Eskom, Transnet and South African Airways because of financial difficulty constraints, irregular expenditure and the lack of clean audit reports. Accountability is imperative as it allows the public to be aware of the performance of the entities in the public sector (Luke 2010).

However, given the introduction of integrated reporting, annual reports have become congested with information, and this poses a challenge to understanding the data in annual reports (Saad et al. 2011). To allow for easier understanding, narratives are being used increasingly (David 2001). Although beneficial if used correctly, accounting narratives can be used to alter the perceptions of users' views regarding a company's performance (Beattie, Dhanani & Jones 2008). Graphs are a communication medium used in the annual reports of

companies. Studies regarding graph usage have focused on the private sector, but limited research being conducted in the public sector. This study aims to fill the gap in the current literature by analysing the use of graphs in the annual reports of South African SOEs as included in the *Public Finance Management Act* (PFMA).

The literature review follows with a discussion of three main topics: annual reporting, public sector and impression management. This is followed by the explanation of the research method used. The next section provides a discussion of the results and findings. The article concludes and discusses areas for future research.

Literature review

The public sector

State-owned entities are defined by Gildenhuys, Fox and Wissink (1991) as government-owned entities that provide services where profits are generated for the provision of services provided. State-owned entities are controlled by the South African government and play a vital role in the implementation of South African governmental policies (Kikeri 2018; Matsiliza 2017).

State-owned entities are key players in governments activities and in the delivery of basic services to the people such as water and sanitation, transport and energy (Kikeri 2018; Madumi 2018).

However, over the past few years, South African SOEs have been plagued with various corporate governance scandals (Mashamaite & Raseala 2018; Phillip 2020). This includes poor leadership, corruption, debt burdens, poor accountability, state capture and financial problems (Mashamaite & Raseala 2018; Phillip 2020). Within a South African context, stakeholders are becoming increasingly disgruntled regarding the manner in which SOEs are spending their funds (Luke 2010). This is because instead of promoting the interest of the public, South African SOEs are failing and are costing South Africans billions of Rands (Jager 2016). The debt of SOEs in South Africa stands around R629 billion, with many SOEs at risk of defaulting on their debt (Omarjee 2021). Stakeholders are therefore requiring more accountability by SOEs (Hoque & Moll 2001).

Given the lack of accountability and poor governance, SOEs are no longer able to fulfil the roles that they have been created for, and as a consequence, the South African government cannot achieve growth and development goals (Mashamaite & Raseala 2018). When there is good governance applied by SOEs, those who are responsible for the SOE are held accountable for how they have used the public funds to enhance growth. It also helps to ensure that public funds are not squandered, and growth is achieved (Meyer 2015). The lack of accountability by SOEs is seen as a major reason for the bad performance of SOEs (OECD & KIPF 2016). The annual report serves as an accountability mechanism as it is a manner in which stakeholders are able to hold managers accountable for their actions (Stanton & Stanton 2002). State-owned entities are accountable to various stakeholders such as parliament, government, credit-rating agencies, investors and the public (Challen & Jeffery 2005). Individuals who are governing SOEs are responsible for the resources that they have been entrusted with during the period of their leadership (Motubatse, Ngwakwe & Sebola 2017). The various stakeholders who have an interest in SOEs are concerned with how public funds are being used to advance the public interest (Samkin & Schneider 2010).

One way in which stability and sustainable development in South Africa may be achieved is through the PFMA (Madue 2007). The PFMA is an important piece of legislation that assists with the regulation of corporate governance practices by SOEs (Fourie 2009). The purpose of the PFMA is to improve accountability in the public sector by making managers of an entity responsible for their actions and performance (Erasmus 2008; National Treasury 1999). The PFMA regulates the financial and monetary matters of SOEs at the national and provincial levels (Chilenga 2016). Through the PFMA, management is able to use resources effectively whilst still being held accountable for the consumed resources (Madue 2007; National Treasury 1999).

Change in the annual report

Annual reports are a comprehensive means of communication between a company and its stakeholders as information is included in one document (Hooks, Coy & Davey 2002; Mather, Mather & Ramsay 2005). The information presented in annual reports influences investors' and other stakeholders' decisions (Healy & Palepu 2001). Decision-making by stakeholders was previously influenced by prepared financial statements which evaluated previous years' performances (Watson & Monterio 2012). With the progression of time, however, users' needs have changed (DiPiazza & Eccles 2002).

Concerns have been raised that the traditional annual report does not contain sufficient information to meet the needs of a variety of stakeholders (Cohen et al. 2012). According to the International Integrated Reporting Council (IIRC) framework, the integrated report serves as a means to explain how an entity can create sustainable value over time (IIRC 2013). The annual report includes information relating to the performance of SOEs in terms of both financial performance and the achievements of service delivery targets, governance structures and information relating to personnel (National Treasury 2012).

The change in the format of annual reports has increased in both complexity and the number of disclosures by companies (Rezaee & Porter 1993). The financial section of annual reports has also become technical for users (David 2001). Given the problems experienced by users, companies are changing the format of their annual reports to enhance user's understanding with more creative annual reports being

published, which comprise photographs, colours and visuals (Brasseur 2003; Ruiz-Garrido, Palmer-Silveira & Fortanet-Gómez 2005; Tufte 1983).

The use of graphs in annual reports

The inclusion of different formats in the annual report affects users' decisions (Bierstaker & Brody 2001; Tractinsky & Meyer 1999). Graphs can be described as visual displays of quantitative data (Guddal 2016). The use of graphs enables statistical data and relationships to be visually communicated using words and numbers (Mohd Isa 2006). Given the limited time spent on annual reports, graphs are also relied on when making decisions (Guddal 2016). When used correctly, graphs have the following advantages: users' attention can be engaged particularly when there is the use of colour, understanding is enhanced as patterns and trends are displayed and language barriers are overcome (Courtis 1997; Frees & Miller 1998). Given the increased use of graphs and the reliance placed on graphs for decision making, accurate graph representation has become important (Guddal 2016).

Impression management and the use of graphs

The theory of impression management states that the actions of an individual in a specific way create a desired perception (Pennington & Tuttle 2009). Impression management by a company occurs when the information that is selected to be communicated to users is able to change the view that is held of company's corporate achievements (Godfrey, Mather & Ramsay 2003). Impression management occurs because of managements' motivation to set the reporting agenda and present a self-serving view of performance (Beattie & Jones 2002; Mather, Ramsay & Steen 2000; Rahman, Hamdan & Ibrahim 2014).

Certain disclosure by management such as graph disclosure is not mandatory and is often unaudited, which allows management to distort this information when presenting information to users to create a positive image (Aerts 2005; Brennan, Guillamon-Saorin & Pierce 2009).

In terms of standards surrounding additional information disclosed in the annual report, International Standards of Auditing (ISA 720) provides the auditor with guidance regarding this additional information, referred to as other information per ISA 720. The auditor has no obligation to report on other information outside of the financial statements and is only required to consider whether there are any material inconsistencies with the audited financial statements (IAASB 2016).

Graphs can be distorted in three ways, namely measurement distortion, selectivity and presentational enhancement. Tufte (1983) defines measurement distortion as the occurrence of disproportion between the graph numbers and the underlying number. Selectivity relates only to disclosing positive and favourable information. Finally, according to Penrose (2008), when the layout of the graph's elements is modified to understate or highlight specific information for users, this is termed presentational enhancement. This is achieved through selecting different graph types, colours, axis, scales and sizes (Penrose 2008). For the purpose of this study, only presentational enhancement and measurement distortion have been considered.

A list of 11 deficiencies in graphs in terms of presentation and the correction for each deficiency was created by Frownfelter-Lohrke and Fulkerson (2001), using prior research. The list of weaknesses and corrective actions is shown in Table 1.

Calculation of measurement distortion

The key feature of a graph is that the quantitative information, as measured on the surface of the graph, should be directly proportional to the numerical values (Tufte 1983).

TABLE 1: Weaknesses and corrective actions relating to graphs.

Number	Weakness	Corrective action
1.	Inadequate chart titles and labels	Labels should be explicit and comprehensive and significant incidences in the data should be emphasised (Jarett 1993; Tufte 1983).
2.	No numerical labels	The column representing numerical values (the specifier) should have the number indicated above the column, with no data inside the bar (Jarett 1993).
3.	Obtrusive backgrounds with no clearly defined borders	There should be no brightly coloured or patterned backgrounds and each graph published should be enclosed in a border (Jarett 1993; Tufte 1983).
4.	Optical illusions	The use of three dimensional graphs should be avoided whilst two dimensional graphs are recommended (Tufte 1983).
5.	Inappropriate colour	A graph should contain a maximum of six colours with the use of a legend to indicate what each colour represents (Jarett & Babad 1988).
6.	Trendy visual effects	The design of the graph should be simple with redundant decorations excluded (Tufte 1983).
7.	Missing, vague or multiple zero baselines and/or data markers that do not begin at a zero baseline	The scales should begin at zero and should also be continuous (CICA 1993).
8.	Multiple scales on the vertical axis	A single scale should be used because multiple scales may result in misinterpretation and confusion for the reader (CICA 1993).
9.	Time series data shown in reverse order	The time series should be in sequential order as a time series in reverse order challenges the user's ability to determine the actual trend (Tufte 1983).
10.	Exaggerated width of data markers or spaces	There should be uniformity and even spacing between bars – bars should not be disproportionate in height or width (Tufte 1983).
11.	Overextended scales	There should be a direct proportion between the representation of the graph and any changes in numerical values. Failure to adhere to this principle will cause distortions to the graphs (Tufte 1983).

Source: Frownfelter-Lohrke, C. & Fulkerson, C.L., 2001, 'The incidence and quality of graphics in annual reports: An international comparison', *The Journal of Business Communication* 38(3), 337–357. https://doi.org/10.1177/002194360103800308

Measurement distortion occurs when the numbers displayed in the graph are not in proportion with the numerical quantities, which are portrayed by the graph (Tufte 1983). The graph discrepancy index (GDI) that quantifies measurement distortion of graphs originates from the lie factor introduced by Tufte (1983), which was modified by Taylor and Anderson (1986). The GDI formula is displayed in Table 2.

The GDI assists with assessing whether trends are exaggerated or understated (Penrose 2008; Varachia 2019). The size by which the trend represented in the graph is exaggerated or understated is seen by positive or negative values (Mather et al. 2005).

Some results from prior research

Beattie and Jones (2001) conducted research in Australia, the United Kingdom, the United States, Germany, France, and the Netherlands with 50 leading companies from each country included in the study. Across the six countries, 263 (88%) of the companies studied included graphs in their annual reports. The three countries with the highest percentage of companies using graphs were Australia, The Netherlands and the United States.

Frownfelter-Lohrke and Fulkerson (2001) conducted a study on 37 US-listed and 37 non-US-listed companies. It was found that 79% of reports contained graphs. In terms of US and non-US companies, 89% of US-listed companies used graphs whilst 86% of non-US-listed companies used graphs. The graphs displayed tended to show more financial information than non-financial information. The graphs in US reports had an average distortion of 81% whilst non-US companies had an average distortion of 173%.

Guddal (2016) studied graphic disclosure practices in the annual reports of 52 Norwegian listed companies. The result showed that 82.7% of entities disclosed graphs in their annual reports. It was also found that 19.4% of graphs were materially distorted.

In Brazil, Nunez (2016) studied the use of graphs in the annual reports of Brazilian-listed companies. It was found that 91.9% of companies disclosed graphs in their annual reports. In terms of measurement distortion, 58.9% of graphs were materially distorted. Finally, 31% of the total graphs were materially exaggerated, whilst 27.8% were materially understated.

TABLE 2: Calculation of graph discrepancy index.

GDI = 100 × ([a–b] – 1) or ([a–b]/b) × 100
Where a = (g2 – g1)/g1 and b = (d2 – d1)/d1
g1 and g2 = the height of the first column and the last column in the graph in cm
d1 and d2 = data for the first column and the last column in the graph
a = percentage change depicted in graph
b = percentage change depicted in data

GDI, Graph Discrepancy Index.

Research conducted in South Africa is limited. The first known study was conducted by De Klerk and Wyk (2017) and looked at the period 2010–2013 to understand whether impression management is used by mining companies when disclosing environmental, social and governance (ESG) graphs. Most companies (86%) were found to present graphs in their annual reports. The companies were found to show a decreasing trend in bad news topics and increasing trend in good news topics. A study by Varachia (2019) was conducted on the top 100 Johannesburg Stock Exchange (JSE) listed companies for the financial year ending 2017. Ninety eight per cent (98%) of companies were found to use graphs. The mean GDI was 68.2%. Presentational enhancement was also noted, for instance, deficiencies, included missing gridlines, missing variable axis, as well as no data attached to the specifier.

Methodology

Research methodology

This study is replicated based on the studies by Frownfelter-Lohrke and Fulkerson (2001) and Varachia (2019). To achieve the purpose of the study, the graphs in the annual reports of SOEs were examined for characteristics to enable the research questions to be answered.

The researcher examined the degree of graph usage, the nature and type of graphs used, compliance with good graph standards and the measurement distortion of graphs. The calculation of measurement distortion and compliance with good graphs utilised measures that have been used in other previous studies and are not owned by the researcher. This minimises subjectivity during data collection and analysis since formal structured research instruments were applied.

The following research questions based on the study by Frownfelter-Lohrke and Fulkerson (2001) were examined:

RQ1: What is the incidence of graphs included in the annual reports of South African SOEs?

RQ2: What subject matter of graphs is included in the annual reports of the South African SOEs?

RQ3: Are graphs in the annual reports of South African SOEs in compliance with the standards for good graphs?

RQ4: Is there a significant distortion of graphs included in the annual reports of South African SOEs?

Population and sampling

The selection of the population is based on what is going to provide the most useful information (Saunders, Lewis & Thornhill 2009). The population of SOEs relates to companies listed on the PFMA schedule. Total population sampling is a technique by which the entire population that meets the criteria (e.g. specific skill set, experience, etc.) are included in the research being conducted (Etikan, Musa & Alkassim

2016). In order to ensure the best possible representation of the population, all SOEs listed in the PFMA were selected resulting in 277 entities comprising the sample. The PFMA classified companies into various schedules as of 31 March 2018 as indicated in Table 3.

The research examined the period of the financial year terminating in 2018, ensuring current results for companies are obtained.

Analysis plan: data collection and data analysis

RQ1 and RQ2: The incidence and the subject matter of graphs included in the annual reports of South African state-owned entities

The first research question examined the usage of graphs in the annual reports by South African SOEs. The second research question investigated the subject matter of graphs (i.e. financial and non-financial graphs) presented in the annual report of South African SOEs. The graph type was also considered based on the categories used by Frownfelter-Lohrke and Fulkerson (2001) and included the following: area, bar, column, pie diagram, line, stacked bar/column, combination of line-bar/column and other.

RQ3: Compliance with the standards for good graphs in the annual reports of South African SOEs

There are currently no standards in place for graph design but there has been research to identify the characteristics of good graph design. To measure the compliance with good graph guidelines, the checklist created by Frownfelter-Lohrke and Fulkerson (2001) was used. Additional guidelines based on the checklist developed by Beattie and Jones (1997) were also incorporated. Appendix 1 includes the checklist used to assess compliance with good graph standards.

RQ4: Level of distortion in graphs in the annual reports of state-owned entities

Measurement distortion was measured using the GDI formula. Values above 5% or below -5% were classified as materially exaggerated and materially understated as suggested by Tufte (1983). This premise was used in prior studies such as Beattie and Jones (1992), Beattie and Jones (1997) and Mather et al. (2005).

Reliability and validity

Reliability is defined by Joppe (2000) as the extent to which data and results reflect an accurate representation of the entire population and whether the study can be replicated. The reliability of the study is achieved as the data relating to graphs were obtained from annual reports. Joppe (2000) defines validity as the determination of whether the research truly measures what it was intended to measure and whether the results are truthful. The data collected were from annual reports that are publicly available. This reduces any concerns relating to subjectivity. Given the sample size, this ensured enough data were collected to answer each research question.

TABLE 3: Public Finance Management Act classification of state-owned entities.

Schedule	Number of entities
Schedule 1 – Constitutional institutions	9
Schedule 2 – Major public entities	21
Schedule 3A – National public entities	153
Schedule 3B – National government entities	22
Schedule 3C – Provincial public entities	56
Schedule 3D – Provincial government business enterprises	16

Results and discussion

Descriptive statistics

Frequency of graphs

The analysis of results indicates that 162 of the 254 (64%) entities made use of graphic disclosure in their annual reports. There was a total of 3186 graphs disclosed across 162 entities. The average number of graphs amounted to 12.54 graphs per annual report.

The use of graphs in South African SOEs is not common and does not conform to the results found in prior studies conducted in the private sector. In the study conducted by Varachia (2019) 98% of the companies used graphic disclosure in their annual reports. The study by De Klerk and Wyk (2017) showed that 86% of South African mining companies used graphs. South African SOEs have less graph disclosure in annual reports compared to Brazil (91.9%) (Nunez 2016) and Norway (82.7%) (Guddal 2016).

Graphic disclosure per schedule

Schedule 3A entities had the most graphs as 1629 (51.13%) graphs were disclosed. This can be reasonable as schedule 3A had the greatest number of entities (58.27%). If the average number of graphs per schedule is considered, schedule 3B entities have the most graphs with 32.16 graphs per annual report. Schedule 3D entities have the lowest average with 3.64 graphs. Table 4 illustrates the graph disclosure per schedule.

Disclosure by graph type

The most frequently used graph type was the bar graph (39.86%). This was followed by pie charts (19.49%) and column graphs (16.85%). Bar graphs were found to be the best graph type where a quick summary of information is required (Coll 1992). This is in contrast to Varachia (2019) where column graphs (34.3%) were the most frequently used, followed by pie charts (23.6%) and bar graphs (11.6%). The results were similar to US and UK companies where the bar,

TABLE 4: Schedule analysis of graph disclosure.

Schedules	Graphs per schedule	% of graphs per schedule	# companies per schedule	% companies per schedule	Average per schedule
Schedule 1	105	3.30	9	3.54	11.67
Schedule 2	595	18.68	21	8.27	28.33
Schedule 3A	1629	51.13	148	58.27	11
Schedule 3B	611	19.18	19	7.48	32.16
Schedule 3C	195	6.12	43	16.93	4.53
Schedule 3D	51	1.60	14	5.51	3.64
Grand Total	**3186**	**100**	**254**	**100**	**12.54**

column and pie charts were the most popular types used (Beattie & Jones 1997).

Variables graphed

South African SOEs disclose more non-financial graphs, with 2268 (71.2%) non-financial graphs being disclosed when compared to 918 (28.8%) financial graphs presented. This is in contrast to Varachia (2019) where 61.3% of graphs disclosed were financial and 38.7% non-financial graphs were presented for South African listed companies.

The number of non-financial graphs may be because of the mandates of certain schedules as some schedules such as schedules 1 and 3A are not profit driven but have a specific social responsibility. Another common form of non-financial information found was the disclosure of information relating to service delivery and achievements by entities. Service delivery is a crucial measure for the success of an SOE.

Compliance with standards for good graphs

The analysis relating to presentational enhancement is based on the questions included in Appendix 1. The results per question are indicated in Appendix 1.

The graphs in the annual reports of South African SOEs have deficiencies relating to compliance with the standards for good graphs. The graphs that omit gridlines appear to be the most common deficiency noted (37%). The graphs also appear to exclude the specifier (36%) that presents a challenge to relationships and trends. They also lack a financial variable axis as 20% of graphs had no axis that may pose a challenge to the user to collect reliable information (Frownfelter-Lohrke & Fulkerson 2001). Thirteen per cent (13%) of graphs had a non-zero starting axis, which is considered a bad practice and can make it difficult to see the differences in data points (Cleveland 1994; Tufte 1983). In terms of using visual effects, 9% of graphs were found to be three dimensional whilst 10% of graphs had obstructive backgrounds that created a trendy visual effect and may distract readers from the actual information on the graph. The majority of graphs had six or fewer colours (94%) limiting distraction to users. The majority (99%) of graphs had clearly defined borders whilst 100% of graphs had evenly spaced bars within the graph. The graphs disclosed by South African SOEs contained presentational enhancement to a slight degree but overall, the presentation of graphs was in compliance with good graph standards.

Measurement distortion

Of the 3186 graphs found in the annual reports, GDI was only calculated for 1911 graphs. The 1911 graphs were the sample used for the purpose of the GDI analysis. No data were available for 654 graphs and so the GDI could not be calculated. The GDI could not be calculated for 621 graphs because of the nature of the graphs being for instance pie graphs, histograms or area charts.

Graphs distorted

Of the 1911 graphs where a GDI was calculated, 1272 (67%) were materially distorted. The remaining 639 graphs (33%) were either not distorted or not materially distorted. As there are more graphs that are materially distorted, this may indicate that the graphs used by South Africa SOEs are biased when presenting data. Table 5 displays the percentage of materially distorted graphs compared with the graphs that are not distorted or not materially distorted.

The results appear to be similar to the findings of Varachia (2019) where 68.2% of graphs were distorted. South African SOEs contain more distorted graphs when compared to prior studies conducted outside of South Africa. In Brazil, Nunez (2016) found that 31% of graphs were materially distorted, but 10% was used as the materiality threshold.

Analysis of distortion per variable

In terms of variables graphed, non-financial variable graphs are materially distorted on a larger scale (67%) than are financial graphs (33%). This can be seen as reasonable because of the number of non-financial graphs compared to financial graphs. When analysing financial variable graphs, other financial graphs were the most distorted (27%) followed by sales (5%). The analysis of materially distorted graphs per variable is displayed in Table 6.

Average graph discrepancy index

The average GDI calculation indicates that there is significant measurement distortion for both financial

TABLE 5: Analysis of the number of graphs distorted.

Variable	Materially distorted	%	Not distorted or not materially distorted	%	Total	%
Financial						
Sales	59	3	24	1	83	4
Profit	18	1	9	0	27	1
Other financial	338	18	159	8	497	26
Total financial	415	22	192	10	607	32
Non-financial	857	45	447	23	1304	68
Total	**1272**	**67**	**639**	**33**	**1911**	**100**

TABLE 6: Analysis of distortion per variable.

Variable	Materially distorted graphs	% of total distorted graphs (1272)	% of specific variable (financial vs. non-financial)
Financial			
Sales	59	5	14
Profit	18	1	4
Other financial	338	27	81
Total financial	415	33	100
Non-financial	857	67	100
Total	**1272**	**100**	-

TABLE 7: Average graph discrepancy index per schedule.

Type of distortion	Schedule (%)						
	1	2	3A	3B	3C	3D	Total
Exaggeration – >/5%	54	649	218	187	117	80	361
Understatement – </5%	-44	-155	-68	-179	-42	-40	-93
Overall total	**-2**	**333**	**66**	**43**	**35**	**6**	**141**

and non-financial graphs disclosed in the annual reports of South African SOEs.

Overall, the average GDI for all graphs was 141%, which shows that the graphs of South African SOEs exhibit material measurement distortion. This further indicates that companies tend to overstate the underlying trend to portray a positive trend. The average GDI for material exaggeration was higher (361%) when compared to material understatement (-93%). This further supports the above that the graphs in South African SOEs overstate trends to present a positive image of performance.

When looking at the average GDI per schedule, schedule 2 has the highest overall average GDI with 333%. It is interesting to note that entities such as Transnet, South African Airways and Eskom are schedule 2 entities. Schedule 2 entities are meant to operate as profit entities. The average GDI for material exaggeration was higher in every schedule when compared to material understatement. The results obtained for the average GDI are displayed in Table 7.

The results of South African SOEs are similar to those from previous studies conducted in that the average GDI was found to reflect a favourable trend as trends were exaggerated. In terms of the average GDI, Varachia (2019) had an overall GDI of 134%. The average GDI for material exaggeration was higher (304.8%) when compared to material understatement (-92.8%) showing very similar results.

Conclusion

Conclusion of the study

The study considered graph disclosure in South African SOEs with a focus on the quality of graphs disclosed and the distortion of graphs in the annual reports for the financial year ended 2018. Presentational enhancement and measurement distortion were used to measure graph distortion. The results of the study showed that 64% of entities presented graphs in their annual reports. There was an average of 12.54 graphs per annual report. There was a total of 3186 graphs presented across the companies that presented graphs.

The graphs presented in the annual reports of South Africa SOEs contain some elements where compliance with good graphs standards was not adhered to. However, there seems to be compliance with the standards overall. The most prevalent non-compliance to graph standards was that graphs omit gridlines. The results further indicate that the graphs disclosed by South African SOEs are materiality distorted. Measurement distortion was measured using the GDI. Of the 1911 graphs where a GDI was calculated, 1272 graphs (67%) were materially distorted. Overall, the average GDI for all graphs was 117%, which shows that the graphs of South African SOEs exhibit material measurement distortion and graphs are misrepresented to depict a favourable trend. The average GDI for material exaggeration is higher (361%) when compared to material understatement (-93%). As there is a high number of graphs that are materially distorted, this could indicate that the graphs presented by South Africa SOEs are distorted and therefore biased when presenting data.

Areas of future research

The study can be extended to a longitudinal study where selectivity as a means of impression management may be examined. Additional research can be done to understand whether the strong presence of impression management in the country is temporary because of the current political and economic situation or whether it is a persistent problem and needs more focus for improvement.

The graph design depicted in the annual reports may be influenced by other factors such as the use of design consultants and typesetters in the compilation of the annual report. As such, there is a possibility that the size of the graph may be modified when the annual report is sent through for printing. The study could be continued to establish whether companies develop their own annual reports or if companies make use of designers to do so. This may aid in establishing whether management utilises distortions as a purposeful strategy or whether distortions are present because of the employment of designers who may not be accustomed to the criteria that should be met when compiling annual reports.

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Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

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Ethical considerations

This article followed all ethical standards for research without direct contact with human or animal subjects.

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Data availability

The data that support the findings of this study are available from the corresponding author, Z. Varachia, upon reasonable request.

Disclaimer

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References

Aerts, W., 2005, 'Picking up the pieces: Impression management in the retrospective attributional framing of accounting outcomes', *Accounting, Organizations and Society* 30(6), 493–517. https://doi.org/10.1016/j.aos.2004.07.001

Beattie, V., Dhanani, A. & Jones, M.J., 2008, 'Investigating presentational change in UK annual reports: A longitudinal perspective', *The Journal of Business Communication* 45(2), 181–222. https://doi.org/10.1177/0021943607313993

Beattie, V. & Jones, M.J., 1992, 'The use and abuse of graphs in annual reports: Theoretical framework and empirical study', *Accounting and Business Research* 22(88), 291–303. https://doi.org/10.1080/00014788.1992.9729446

Beattie, V. & Jones, M.J., 1997, 'A comparitive study of the use of financial graphs in the corporate annual reports of major US And UK Companies', *Journal of International Financial Management & Accounting* 8(1), 33–68. https://doi.org/10.1111/1467-646X.00016

Beattie, V. & Jones, M.J., 2001, 'A six-country comparison of the use of graphs in annual reports', *The International Journal of Accounting* 36(2), 195–222. https://doi.org/10.1016/S0020-7063(01)00094-2

Beattie, V. & Jones, M.J., 2002, 'Measurement distortion of graphs in corporate reports: An experimental study', *Accounting, Auditing & Accountability Journal* 15(4), 546–564. https://doi.org/10.1108/09513570210440595

Bierstaker, J.L. & Brody, R.G., 2001, 'Presentation format, relevant experience and task performance', *Managerial Auditing Journal* 16(3), 124–129. https://doi.org/10.1108/02686900110385560

Brasseur, L.E., 2003, *Visualizing technical information: A cultural critique (Baywood's technical communications series),* Bay Press, Incorporated, London.

Brennan, N.M., Guillamon-Saorin, E. & Pierce, A., 2009, 'Methodological Insights: Impression management: Developing and illustrating a scheme of analysis for narrative disclosures – A methodological note', *Accounting, Auditing & Accountability Journal* 22(5), 789–832. https://doi.org/10.1108/09513570910966379

Canadian Institute of Chartered Accountants (CICA), 1993, *Using ratios and graphics in financial reporting,* Canadian Institute of Chartered Accountants, Toronto.

Challen, D. & Jeffery, C., 2005, 'Definition of the reporting entity', *Australian Accounting Review* 15(35), 71–78. https://doi.org/10.1111/j.1835-2561.2005.tb00254.x

Chilenga, A., 2016, 'State owned enterprises: A policy analysis of South African Airways (SAA)', Master's thesis, University of KwaZulu-Natal, Durban.

Cleveland, W.S., 1994, *The elements of graphing data,* rev. edn., AT & T Bell Laboratories, Murray Hill, NJ.

Cohen, J.R., Holder-Webb, L.L., Nath, L. & Wood, D., 2012, 'Corporate reporting of nonfinancial leading indicators of economic performance and sustainability', *Accounting Horizons* 26(1), 65–90. https://doi.org/10.2308/acch-50073

Coll, J.H., 1992, 'An experimental study of the efficacy of tables versus bar graphs with respect to type of task', *Information & Management* 23(1), 45–51. https://doi.org/10.1016/0378-7206(92)90053-I

Courtis, J.K., 1997, 'Corporate annual report graphical communication in Hong Kong: Effective or misleading?', *The Journal of Business Communication* 34(3), 269–284. https://doi.org/10.1177/002194369703400304

David, C., 2001, 'Mythmaking in Annual Reports', *Journal of Business and Technical Communication* 15(2), 195–222. https://doi.org/10.1177/105065190101500203

De Klerk, M. & Wyk, L.V., 2017, 'Impression management and the use of graphs in integrated reports of the South African mining sector', in *2017 Southern African Accounting Association – Biennial International conference proceedings*, Southern African Accounting Association, 28–30 June 2017, Champagne Sports Resort – Drakensberg, pp. 433–452.

DiPiazza, Jr. S.A. & Eccles, R.G., 2002, *Building public trust: The future of corporate reporting,* John Wiley & Sons, Hoboken, NJ.

Erasmus, L.J., 2008, 'Financial performance in terms of the PFMA-what does it mean?', *Southern African Journal of Accountability and Auditing Research* 8(1), 57–66.

Etikan, I., Musa, S.A. & Alkassim, R.S., 2016, 'Comparison of convenience sampling and purposive sampling', *American Journal of Theoretical and Applied Statistics* 5(1), 1–4. https://doi.org/10.11648/j.ajtas.20160501.11

Fourie, D., 2009, 'Institutional mechanisms and good governance: A perspective on the South African public sector', *Journal of Public Administration* 44(4), 1114–1123.

Frees, E.W. & Miller, R.B., 1998, 'Designing effective graphs', *North American Actuarial Journal* 2(2), 53–70. https://doi.org/10.1080/10920277.1998.10595699

Frownfelter-Lohrke, C. & Fulkerson, C.L., 2001, 'The incidence and quality of graphics in annual reports: An international comparison', *The Journal of Business Communication* 38(3), 337–357. https://doi.org/10.1177/002194360103800308

Gildenhuys, H., Fox, W. & Wissink, H., 1991, *Public macro-organisation,* Juta & Co, Cape Town.

Godfrey, J., Mather, P. & Ramsay, A., 2003, 'Earnings and impression management in financial reports: The case of CEO changes', *Abacus* 39(1), 95–123. https://doi.org/10.1111/1467-6281.00122

Guddal, T., 2016, 'Graph usage in annual reports, evidence from Norwegian listed companies', Master's thesis, Nova School of Business and Economics.

Healy, P.M. & Palepu, K.G., 2001, 'Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature', *Journal of Accounting and Economics* 31(1–3), 405–440. https://doi.org/10.1016/S0165-4101(01)00018-0

Hooks, J., Coy, D. & Davey, H., 2002, 'The information gap in annual reports', *Accounting, Auditing & Accountability Journal* 15(4), 501–522. https://doi.org/10.1108/09513570210440577

Hoque, Z. & Moll, J., 2001, 'Public sector reform – Implications for accounting, accountability and performance of state-owned entities – An Australian perspective', *International Journal of Public Sector Management* 14(4), 304–326. https://doi.org/10.1108/09513550110395256

International Auditing and Assurance Standards Board (IAASB), 2016, *ISA 720 - The auditor's responsibilities relating to other information*, International Auditing and Assurance Standards Board, New York, NY.

Jager, N.D., 2016, *SA parastatals are losing billions while being used for personal ends*, viewed 12 July 2021, from https://businesstech.co.za/news/trending/136311/sa-parastatals-are-losing-billions-while-being-used-for-personal-ends/.

Jarett, I., 1993, *Computer graphics and reporting financial data,* John Wiley & Sons, New York, NY.

Jarett, I. & Babad, Y., 1988, *Financial graphics: Communications for the 1990's: The need for financial graphic standards,* Illinois CPA Society, Chicago, IL.

Joppe, G., 2000, 'Testing reliability and validity of research instruments', *Journal of American Academy of Business Cambridge* 4(1–2), 49–54.

Khongmalai, O., Tang, J.C.S. & Siengthai, S., 2010, 'Empirical evidence of corporate governance in Thai state-owned enterprises', *Corporate Governance: The international Journal of Business in Society* 10(5), 617–634. https://doi.org/10.1108/14720701011085580

Kikeri, S., 2018, *Corporate governance in South African state-owned enterprises*, World Bank, Washington, DC.

Luke, B., 2010, 'Examining accountability dimensions in state-owned enterprises', *Financial Accountability & Management* 26(2), 134–162. https://doi.org/10.1111/j.1468-0408.2010.00496.x

Madue, S.M., 2007, 'Public Finance Management Act, 1 of 1999 – A compliance strategy', *Politeia* 26(3), 306–318.

Madumi, P., 2018, 'Are State-Owned Enterprises (SOEs) catalysts for or inhibitors of South African economic growth? The image of an African politician and a public servant in the 21st century', *International Conference on Public Administration and Development*, July 04–06, 2018, Saldanhabay, South Africa, pp. 60–71.

Mashamaite, K. & Raseala, P., 2018, 'Transgression of corporate governance in South Africa's state-owned enterprises', *Bangladesh e-Journal of Sociology* 16, 124–134.

Mather, D., Mather, P. & Ramsay, A., 2005, 'An investigation into the measurement of graph distortion in financial reports', *Accounting and Business Research* 35(2), 147–160. https://doi.org/10.1080/00014788.2005.9729670

Mather, P., Ramsay, A. & Steen, A., 2000, 'The use and representational faithfulness of graphs in Australian IPO prospectuses', *Accounting, Auditing & Accountability Journal* 13(1), 65–83. https://doi.org/10.1108/09513570010316144

Matsiliza, N.S., 2017, 'Corporate governance of the state-owned enterprises in an emerging country: Risk management and related issues', *Risk Governance and Control: Financial Markets and Institutions* 7(3), 35–43. https://doi.org/10.22495/rgcv7i3p4

Meyer, I., 2015, 'Western Cape Government achieves 100% in audit outcomes', Western Cape Government, Western Cape.

Mohd Isa, R., 2006, 'Graphical information in corporate annual report: A survey of users and preparers perceptions', *Journal of Financial Reporting and Accounting* 4(1), 39–59. https://doi.org/10.1108/19852510680001583

Motubatse, K.N., Ngwakwe, C.C. & Sebola, M.P., 2017, 'The effect of governance on clean audits in South African municipalities', *African Journal of Public Affairs* 9(5), 90–102.

National Treasury, 1999, *Public Finance Management Act No. 1 of 1999*, South Africa.

National Treasury, 2012, *Annual Report Guide for National and Provincial Department*, National Treasury, South Africa.

Nunez, B.L., 2016, 'The use and misuse of graphs in stand-alone annual reports evidence from Brazilian listed companies', Master's thesis, School of Business and Economics & Fundaçao Getulio Vargas.

OECD & KIPF, 2016, 'State-owned enterprises in Asia: National practices for performance evaluation and management', OECD and Korea Institute of Public Finance, s.l.

Omarjee, L., 2021, *Covid-19 worsens the fate of state-owned enterprises and several risk a debt default- Treasury*, viewed 24 February 2021, from https://www.news24.com/fin24/budget/covid-19-worsens-fate-of-state-owned-enterprises-several-risk-a-debt-default-treasury-20210224.

Pennington, R. & Tuttle, B., 2009, 'Managing impressions using distorted graphs of income and earnings per share: The role of memory', *International Journal of Accounting Information Systems* 10(1), 25–45. https://doi.org/10.1016/j.accinf.2008.10.001

Penrose, J.M., 2008, 'Annual report graphic use: A review of the literature', *The Journal of Business Communication* 45(2), 158–180. https://doi.org/10.1177/0021943607313990

Phillip, X., 2020, 'Lack of SOE governance is a drain on South Africa's economy, warns OECD', The Africa Report, Johannesburg.

Rahman, A.A., Hamdan, M.D. & Ibrahim, M.A., 2014, 'The use of graphs in Malaysian companies' corporate reports: A longitudinal study', *Procedia-Social and Behavioral Sciences* 164, 653–666. https://doi.org/10.1016/j.sbspro.2014.11.160

Rezaee, Z. & Porter, G.L., 1993, 'Can the annual report be improved?', *Review of Business* 15(1), 15–38.

Ruiz-Garrido, M.F., Palmer-Silveira, J.C. & Fortanet-Gómez, I., 2005, 'Discursive strategies in annual reports: The role of visuals', *The Association for Business Communication 7th European Convention*, The Association for Business Communication, p. 7, s.l.

Saad, R.A.J., Yahya, M.A., Hussain, M.D. & Hairi, M.D., 2011, 'The relationship between performance and graphic presentation in Unit Trusts' Annual Reports: Malaysian evidence', *Journal of Business Management and Accounting (JBMA)* 1, 1–15.

Samkin, G. & Schneider, A., 2010, 'Accountability, narrative reporting and legitimation: The case of a New Zealand public benefit entity', *Accounting, Auditing & AccountabilityJournal*23(2),256–289.https://doi.org/10.1108/09513571011023219

Saunders, M., Lewis, P. & Thornhill, A., 2012, *Research methods for business students*, 6th edn., Pearson, Harlow.

Stanton, P. & Stanton, J., 2002, 'Corporate annual reports: Research perspectives used', *Accounting, Auditing & Accountability Journal* 15(4), 478–500. https://doi.org/10.1108/09513570210440568

Taylor, B. & Anderson, L., 1986, 'Misleading graphs: Guidelines for the accountant', *Journal of Accountancy* 162(1), 126–135.

The International Integrated Reporting Council (IIRC), 2013, <*IR*> *Framework*, The International Integrated Reporting Council, s.l.

Tractinsky, N. & Meyer, J., 1999, 'Chartjunk or goldgraph? Effects of presentation objectives and content desirability on information presentation', *MIS Quarterly* 23(3), 397–420. https://doi.org/10.2307/249469

Tufte, E., 1983, *The visual display of quantitative information,* Graphics Press: Cheshire, CT.

Varachia, Z., 2019, 'The frequency and quality of graphs in Annual Reports: A South African analysis of graph disclosure in Listed', Master's thesis, University of the Witwatersrand.

Watson, L.A. & Monterio, B.J., 2012, 'The next stage in the evolution of business reporting - the journey towards an interlinked, integrated report', *24th XBRL International Conference*, 2011, Abu Dhabi, UAE, XBRL International Conference, n.p.

World Bank, 2017, *Combating corruption,* viewed 29 January 2019, from https://www.worldbank.org/en/topic/governance/brief/anti-corruption.

Appendix 1 starts on the next page→

Appendix 1

TABLE 1-A1: Checklist used to determine compliance with good graph guidelines.
The questions were based on the study completed by Frownfelter-Lohrke and Fulkerson (2001); however additional questions were obtained from the study completed by Beattie and Jones (1997). The source of the question is noted below:

Question Number	Weaknesses noted in graphs	Applicable to all graphs. (If not, selected pie diagrams are excluded.)	Results	Frownfelter-Lohrke and Fulkerson (2001)	Beattie and Jones (1997)
1	**Inadequate chart titles and labels**				
1.1	Is the graph detailed and labelled?	✓	Yes – 99% No – 1%	✓	
1.2	Are important events labelled?	✓	Yes – 100% No – 0%	✓	
	Axis				
	Numeric scale				
1.3	Is there a scaled financial variable axis?		Yes – 80% No – 20%		✓
1.4	Where is the financial variable axis located? (Left or right)		Left – 97% Right – 3%		✓
	Specifier – The column which represents the numeric values				
1.5	Is there a number attached to the specifier?	✓	Yes – 64% No – 36%		✓
1.6	Is the numeric label on the specifier horizontal?		Yes – 87% No – 13%		✓
	Scale				
1.7	Is the scale continuous or broken?		Continuous – 99% Broken – 1%	✓	
1.8	Does the scale begin at zero?		Yes – 87% No – 13%	✓	
	Time axis				
1.9	Is there a scaled time axis?		Yes – 97% No – 3%		✓
1.10	Is the numeric label on the time axis horizontal?		Yes – 93% No – 7%		✓
	Gridlines				
1.11	Are there gridlines included?		Yes – 63% No – 37%		✓
2	**Obtrusive backgrounds**				
	What colour is the background of the graph?	✓		✓	
	White		76%		
	Grey		17%		
	Yellow		0%		
	Beige/Ivory		1%		
	Black		1%		
	Other colours		4%		
	Picture		1%		
3	**Borders**				
	Are there clearly defined borders?		Yes – 99% No – 1%	✓	
4	**Optical illusion**				
	Is the graph three-dimensional?	✓	Yes – 9% No – 91%	✓	
5	**Inappropriate use of colour**				
	How many colours are in the graph? Less than six or more than six	✓	<6% – 94% >6% – 6%	✓	
6	**Legend**				
	Is there a legend?	✓	Yes – 80% No – 20%	✓	
7	**Trendy visual effects**				
7.1	Do borders detract from the graph?	✓	Yes – 10% No – 90%	✓	
7.2	Is there any data inside the graph?	✓	Yes – 21% No – 79%	✓	

Table 1-A1 continues on the next page →

TABLE 1-A1 (Continues...): Checklist used to determine compliance with good graph guidelines.
The questions were based on the study completed by Frownfelter-Lohrke and Fulkerson (2001); however additional questions were obtained from the study completed by Beattie and Jones (1997). The source of the question is noted below:

Question Number	Weaknesses noted in graphs	Applicable to all graphs. (If not, selected pie diagrams are excluded.)	Results	Frownfelter-Lohrke and Fulkerson (2001)	Beattie and Jones (1997)
8	**Multiple scale on the vertical axis**				
	Is there a single scale or multiple scale? Single Multiple		Single – 94% Multiple – 6%	✓	
9	**Time series portrayed in reverse order**				
	Is the data on the graph in sequential or reversed sequential order?		Sequential – 86% Reversed – 14%	✓	
10	**Exaggerated width of data markers or spaced**				
	Are the bars of uniform width and evenly spaced?		Yes – 100%	✓	

Source: Beattie, V. & Jones, M.J., 1997, 'A comparitive study of the use of financial graphs in the corporate annual reports of major US And UK Companies', *Journal of International Financial Management & Accounting* 8(1), 33–68. https://doi.org/10.1111/1467-646X.00016; Frownfelter-Lohrke, C. & Fulkerson, C.L., 2001, 'The incidence and quality of graphics in annual reports: An international comparison', *The Journal of Business Communication* 38(3), 337–357. https://doi.org/10.1177/002194360103800308