



# The use of graphs as an impression management tool in the annual integrated reports of South African listed entities

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**Orientation:** The annual integrated report is one of the primary means used by companies to communicate with stakeholders regarding both financial and non-financial information. However, the format of the annual integrated report has changed, resulting in different communication mediums being used. Graphic disclosure is being used more widely for both financial and non-financial information. Although beneficial, graphs may also be used by management to manipulate how readers interpret results.

**Research purpose:** The purpose of the study was to analyse the frequency, quality and measurement distortion of graphs in the annual reports of the top 100 South African listed companies.

**Motivation for the study:** Research on graph usage in South Africa is limited. The study explored the extent to which South African listed companies use graphs in annual reports and if graphs are employed as an impression management tool.

**Research approach/design and method:** The study followed a descriptive quantitative research method. Graphs in the annual reports of the sampled companies were analysed based on guidelines developed by earlier researchers to determine the quality and measurement distortion of graphs.

**Main findings:** Graphs are used widely by South African listed companies. South African companies do not enhance the presentational features of graphs to a large degree, but the graphs analysed show significant measurement distortion. Graphs presented tended to overstate the underlying trend as opposed to an understatement.

**Practical/managerial implications:** The study will be beneficial to the users, regulatory bodies, auditors and the management of companies to understand how graphs can be used to alter the presentation of results, which could result in incorrect decisions being taken.

**Contribution/value-add:** This study contributes to the body of research regarding the quality of annual integrated reports in a South African context and may assist users who use these reports to understand how graphs can be used as a manipulation tool.

**Keywords:** annual integrated report; graph; impression management; measurement distortion; presentational enhancement.

## Introduction

### Orientation

Traditional financial reporting, which is retrospective, focuses only on a portion of the company's status and does not provide a holistic view (Bernardi & Stark 2016; Surty, Yasseen & Padia 2018; Türker & Zafer 2014). Integrated reporting presents the opportunity to establish the link between the financial, social and environmental information of organisations (Reuter & Messner 2015; Roberts 2014).

The increase in information has resulted in an increase in the volume and complexity of information presented in company reports, resulting in users finding it difficult to read annual integrated reports (Frownfelter-Lohrke & Fulkerson 2001; Rezaee & Porter 1993). In an attempt to simplify reporting, narratives are being used more frequently as it allows for easier understanding (Rentz 1992; Rogers & Grant 1997). Graphs are a form of narrative information, which may be considered valuable as graphs focus the readers' attention as they summarise information,

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highlight trends and also explain complicated relationships (Beattie & Jones 2008a; Frownfelter-Lohrke & Fulkerson 2001). Whilst there has been an increase in the use of graphs, no guidelines are provided on the presentation of graphs in annual integrated reports, although there have been recommendations (Mather, Mather & Ramsay 2005). As a result, the use of graphs, although advantageous, is not problem-free, as it could be a means by which management manipulates the information disclosed to create a better impression for the reader (Beattie & Jones 1999, 2008a).

## Research purpose and objectives

This study specifically aimed to determine whether graphs used by South African companies have elements of impression management and will, ultimately, result in reporting bias. In order to achieve this, the annual integrated reports of the top 100 companies listed on the Johannesburg Stock Exchange (JSE) were analysed using the following four research questions, which have been replicated based on the study by Frownfelter-Lohrke and Fulkerson (2001):

**RQ1:** What is the frequency of graphs included in the annual integrated reports of the top 100 South African listed companies?

**RQ2:** What is the subject matter of graphs included in the annual integrated reports of the top 100 South African listed companies?

**RQ3:** Do the graphs included in the annual integrated reports of the top 100 South African listed companies comply with standards for good graphs?

**RQ4:** Are the graphs presented in the annual integrated reports of the top 100 South African listed companies distorted (measured using the graph discrepancy index)?

The study relating to graphs would be beneficial to the users of annual integrated reports, regulatory bodies, auditors and the management of companies. The results will provide insight into the use of graphs as impression management tools and how users can respond. For instance, users will be able to understand how graphs can manipulate perceptions, auditors can adapt audit procedures for such manipulations and management can ensure that there is proper oversight over the annual integrated report, allowing the report to represent the results of a company truthfully (De Klerk & Van Wyk 2017). It is important to note that, given the accounting scandals both globally and locally, the results of companies are accurate to facilitate appropriate decision-making (Yasseen, Moola-Yasseen & Padia 2017).

The article is structured as follows: The following section provides a literature review, followed by the research methodology. Thereafter, the results and conclusions of the study, limitations and areas of future research will be discussed.

## Literature review

In order to provide insights into the use of graphs within a South African context, a structured literature review method was adopted. A structured literature review is a method for studying a body of scholarly literature to develop

insights, critical reflections, future research paths and research questions (Massaro, Dumay & Guthrie 2016). A structured literature review has been used in similar studies by Engelbrecht, Yasseen and Omarjee (2018) and Yasseen et al. (2017).

The literature review is structured as follows: 'Importance of the annual integrated report' discusses the importance of the annual integrated report, including the change in reporting over time; 'Use of graphs' discusses the reasons for the use of graphs; 'Impression management and the use of graphs' explains how graphs can be used as a tool of impression management; 'Guidelines which can be considered for good graph design' discusses the guidelines for good graphs; 'Calculation of measurement distortion' discusses how measurement distortion is calculated, and 'Results of graph use from other studies' provides an overview of the results from prior studies regarding the use of graphs.

## Importance of the annual integrated report

The annual integrated report is a formal public document produced by public companies as a response to the mandatory corporate reporting requirements of most economies (Stanton & Stanton 2002). Users of the annual integrated report include employees, customers, suppliers, business partners, local communities, legislators, regulators and policymakers (IIRC 2013).

Although there are various modes of communication, the annual integrated report is considered to be an important means of communication between companies, investors and the broader financial community (Chang & Most 1985; Frownfelter-Lohrke & Fulkerson 2001; Lee & Tweedie 1975a). The annual integrated report is viewed as an influential source of information as it is widely circulated and information is easily accessible in one document (Hooks, Coy & Davey 2002; Marston & Shrivies 1991; Stanga 1976).

The annual integrated report is divided into two sections, namely the narrative section and the financial section (Stanton & Stanton 2002; Uyar 2009). The narrative section is usually subject to little oversight: the information is unaudited and voluntary; the financial section, on the other hand, is strongly regulated, mandatory and audited (Beattie & Jones 2000b; Penrose 2008).

There is no rule that the annual financial statements must be included as part of the integrated report and the companies are offered flexibility (Roberts 2014). In South Africa, there are companies that choose to produce one report, with the integrated report included as the narrative section and the annual financial statements follow – the so-called 'annual integrated report' (Bray & Chapman 2012; Roberts 2014). In other cases, the abridged financial statements are included with the integrated report, with the full annual statements available in a separate document (Roberts 2014). For the purposes of this study, the annual integrated report was used

where such a report was published, and if not, the integrated report was used.

### Change in reporting landscape – South Africa and abroad

South Africa led the way in the formalisation of integrated reporting as it was the first country to take on the implementation of integrated reporting (Elda, Renier & Gina 2017). With effect from March 2010, the JSE required all listed companies to comply with the recommendations of King III (Atkins & Maroun 2015). In November 2016, the King IV Report on Corporate Governance (King IV) was released with an effective date of 1 April 2017 (EY 2018).

Integrated reporting is the communication to stakeholders regarding how a company's strategy, governance and prospects lead to the creation of value over time and relays a company's journey in a clear manner (IIRC 2013; IRCofSA 2014). Integrated reporting not only focuses on financial reporting or sustainability reporting but connects the financial and non-financial information (IRCofSA 2014). King IV considers the change in the reporting landscape in terms of the shift to more holistic reporting and the creation of sustainable value (IoDSA 2016). As such, integrated thinking, which considers that a range of factors may impact an organisation, is an underpinning philosophy in King IV (IoDSA 2016). Furthermore, the drafting of King IV considered the International Framework issued by the International Integrated Reporting Council regarding the preparation of integrated reports (IoDSA 2016).

Research has investigated the change and structure in the annual integrated report and results indicate that the size and proportion of voluntary information have increased and there has been a change in the use of alternate communication methods, such as graphs and pictures (Bartlett & Jones 1997; Beattie, Dhanani & Jones 2008b; Lee 1994). Companies are no longer focusing on the annual integrated report as being a statutory-driven document but rather as a design-orientated document, which functions as a public relations tool (Beattie et al. 2008b; Rahman, Hamdan & Ibrahim 2014). The reasons companies use graphs in the annual integrated reports is discussed in the following section.

### Use of graphs

Users find it difficult to read the reports because of the magnitude, complexity and technical jargon of the annual integrated reports and, at times, the information transmitted is of limited interest to the average shareholder (Frownfelter-Lohrke & Fulkerson 2001; Rezaee & Porter 1993). The use of graphs can overcome some of the problems. According to Beattie and Jones (2008a), companies seek to communicate using graphs for six reasons:

- Firstly, as graphs are not governed by standards and regulations, they allow management to present information in a more flexible manner.

- Secondly, graphs attract and capture attention as they are eye-catching because of their use of colour.
- Thirdly, graphs can summarise, refine and communicate financial information and can, in this way, enhance a reader's understanding of financial information (Beattie & Jones 2008a; Falschlunger et al. 2015).
- Fourthly, graphs enable the reader to view the data more clearly and directly as they allow the reader to process information in graphic form.
- Fifthly, graphs are memorable, as pictorial and graphical representations are remembered much more vividly than numbers (Leivian 1980).
- Lastly, graphs do not have barriers relating to languages, accounting standards and the level of sophistication of users.

Graphs are a fascinating manner of communication, given the flexibility they allow preparers, as the values presented are audited but the actual graph is exempted from being audited (Beattie & Jones 2000a; Steinbart 1989). The International Standard on Auditing (ISA) 720 discusses the auditor's responsibility relating to other information, such as graphs, which is to read this information to ensure that there are no material inconsistencies with the financial statements or with the auditor's prior knowledge. Apart from this, there is no other explicit standard specific to the use of graphs in annual integrated reports (Beattie & Jones 1992; Burgess et al. 2008). It has therefore been argued that, as the employment of graphs is at the discretion of management, there may be deliberate misrepresentation of information (Beattie & Jones 1992, 1997; De Klerk & Van Wyk 2017). The manner in which graphs can be used to manipulate perceptions is presented in the following section.

### Impression management and the use of graphs

Impression management can be viewed as the process by which individuals attempt to control the impressions of others and is the conscious or unconscious attempt to control images in a social setting (Leary & Kowalski 1990; Schlenker 1980).

Impression management in corporate reporting occurs when management are able to control information disclosure in order to influence and manipulate users' attitudes towards and perceptions of the firm's performance, as advantage is taken of information asymmetries (Clatworthy & Jones 2001; Merkl-Davies, Brennan & McLeay 2011; Stanton, Stanton & Pires 2004). Management are able to use their discretion regarding the information to reveal and present information in a manner that distorts the readers' perception of corporate achievements (Neu 1991; Neu, Warsame & Pedwell 1998; Stanton et al. 2004). The result of impression management conflicts with the qualitative characteristics of the International Accounting Standards Board (IASB) (2018a) Conceptual Framework, as the information presented is no longer a faithful representation. This is because impression management results in information being presented that is no longer neutral and unbiased (Beattie & Jones 2000b, 2008a).

Impression management is found to occur in less regulated narrative disclosures, which focus on interpreting financial outcomes (Brennan, Guillamón-Saorín & Pierce 2009). Impression management studies have investigated various aspects of the annual integrated reports that may be used as manipulation, such as the language used (Leung, Parker & Courtis 2015), the use of imagery (Stanton & Stanton 2002) and the chairman's statement (Clatworthy & Jones 2001; Yasseen et al. 2017). Graphs have also been used as a tool of impression management as indicated in Table 2.

Impression management relating to graphs can occur in three ways according to Beattie and Jones (2008a), namely, selectivity, measurement distortion and presentational enhancement. Selectivity is the decision whether or not to use graphs within the annual integrated reports (Beattie & Jones 1992). Selectivity occurs when only favourable and positive information is disclosed (Beattie & Jones 2008a). Measurement distortion occurs where the physical representation of the numbers on the graph is not proportionate to the underlying numbers (Tufté 1983). Presentational enhancement occurs when the design of the graph components are changed to emphasise or understate certain features of the graph (Penrose 2008).

### Guidelines that can be considered for good graph design

The effectiveness of graphs stems from the fact that users should be able to perceive the underlying relationship in the data being represented and, if this communication process fails, the impact of using a graph will be diminished (Cleveland 1985). In the study conducted by Frownfelter-Lohrke and Fulkerson (2001) a list was drawn up of 11 weaknesses in graphs and the corrective action, based on prior research conducted. The list is included in Table 1. Based on these principles, Frownfelter-Lohrke and Fulkerson (2001) developed a checklist, which identifies the guidelines for good graphs.

### Calculation of measurement distortion

The fundamental principle of graph design is that the representation of numbers, as physically measured on the surface of the graph itself, should be directly proportional to the numerical values of the variables being represented (Tufté 1983). Therefore, measurement distortion occurs when the numerical values and the physical representation on the graph do not correspond (Beattie & Jones 2002). Tufté measured this principle using the lie factor. The lie factor was modified by Taylor and Anderson (1986) to produce the graph discrepancy index (GDI), which is calculated as follows:

$$\text{GDI} = 100 \times [(a - b) - 1] \text{ or } [(a - b)/b] \times 100$$

where  $a = (g_2 - g_1)/g_1$  and  $b = (d_2 - d_1)/d_1$   
 $g_1$  and  $g_2$  = the height of the first column and the last column in the graph in centimetre

**TABLE 1:** Weaknesses and corrective actions.

Number	Weakness	Corrective action
1.	Inadequate chart titles and labels	There must be clear labels and important events should be highlighted (Jarett 1993; Tufté 1983).
2.	No numerical labels	The specifier should display the corresponding number above the column and there should be no data inside the bar (Jarett 1993).
3.	Obtrusive backgrounds with no clearly defined borders	The background should not be patterned or brightly coloured and there should be borders (Jarett 1993; Tufté 1983).
4.	Optical illusions	The graphs should be two-dimensional (Tufté 1983).
5.	Inappropriate colour	There should be a maximum of six colours and a legend should be included (Jarett & Babad 1988).
6.	Trendy visual effects	Graphs should be simply designed and unnecessary decoration avoided (Tufté 1983).
7.	Baselines and/or data markers that do not begin at a zero baseline	Scales should begin at zero and should be continuous (CICA 1993).
8.	Multiple scales on the vertical axis	There should be one scale as multiple scales cause ambiguity (CICA 1993).
9.	Time series data portrayed in reverse order	When a time series is in reverse order it is difficult for the user to assess the actual trend (Tufté 1983).
10.	Exaggerated width of data markers or spaces	Bars should be uniform and evenly spaced (Tufté 1983).
11.	Overextended scales	The depiction of the graph should be directly proportional to any changes in the numerical values. (Tufté 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), 337–358. <https://doi.org/10.1177/002194360103800308>

$d_1$  and  $d_2$  = data for the first column and the last column in the graph

$a$  = percentage change depicted in graph

$b$  = percentage change depicted in data

The GDI assists with evaluating whether trends are exaggerated or understated. In the absence of measurement distortion, the index is zero (Penrose 2008). Positive (negative) GDI values represent the magnitude by which the trend portrayed in the graph is exaggerated (understated).

### Results of graph use from other studies

Table 2 summarises the prior research conducted on graphs in annual integrated reports.

## Methodology

The study conducted has been framed within a positivist research paradigm using a descriptive quantitative research method. The data used in the study were obtained from the annual integrated reports of listed companies, which resulted in no interaction with research participants, therefore enhancing objectivity (Dudovskiy 2018; Hallebone & Priest 2009; Wahyuni 2012). The data collected were numerical and analysed using statistical means, resulting in the research approach being quantitative (Leedy & Ormrod 2015; Wahyuni 2012).

The top 100 companies listed on the main board of the JSE were selected as the sample for the financial year ending 2017. During the collection of data, annual integrated reports relating to two companies were excluded from the sample. The first company is a dual-listed structure, which comprises

**TABLE 2:** Overview of prior studies conducted.

Study	Population and year examined	Sample size	Percent of annual reports containing graphs (%)	Percent of improperly constructed graphs (%)	Material distortion cut-off (%)	Average GDI (%)
<b>North America</b>						
Steinbart (1989)	US Fortune 500 for 1986	319	79	26	10	11
Frownfelter-Lohrke and Fulkerson (2001)	Companies listed on the New York and American Stock Exchange for the period 1984–1994	37 – US listed companies	US companies – 89	Not provided	Not provided	US companies – 81
		37 – Non- US listed cocpanies	Non-US companies – 86	-	-	Non-US companies – 173
<b>Europe</b>						
Beattie and Jones (1992)	UK Large Listed companies by capitalisation for 1989	240	79	30.5	5	10.7
Uyar (2009)	Companies listed on the Istanbul Stock Exchange for 2006	96	75	Distortion was not analysed in detail	Distortion was not analysed in detail	Distortion was not analysed in detail
Falschlunger et al. (2015)	Top 50 European Companies on the Fortune 500 index for 2006, 2009 and 2012	50	2006 – 97.7 2009 – 100 2012 – 100	43.2	5	773.2
<b>North America and Europe</b>						
Beattie and Jones (1997)	Largest based on sales of 100 UK and US companies for 1990	85 UK and 91 US Companies	UK – 80 US – 92	UK – 24 US – 24	5	UK – 7 US – 16
<b>Australia</b>						
Beattie and Jones (1999)	Top 100 Companies listed on the Australian Stock Exchange for 1991	89	89	34	5	10.5
<b>Asia</b>						
Rahman et al. (2014)	Non-financial public listed companies on the Kuala Lumpur Stock Exchange for 30 years using a 10-year interval	54	1974 – 15 1984 – 31 1994 – 59 2004 – 65	Not considered	Not considered	Not considered
<b>Africa</b>						
De Klerk and Van Wyk (2017)	Mining companies listed on the JSE for 2010–2013	28	86	1	Not disclosed	Not disclosed

GDI, graph discrepancy index; JSE, Johannesburg Stock Exchange.

a UK and South African incorporated company with both companies listed on the JSE. The same integrated annual integrated report is produced for both companies. The second company did not have an annual integrated report available because of the restatement of its financial statements.

### Analysis plan – Data collection and data analysis

An Excel spreadsheet was used to record information in terms of company name, market capitalisation, sector, type of graphs, variables of graphs, the guidelines for good graphs and the calculation of GDI. The variables relating to graphs were split between key financial variable (KFV) graphs, other financial graphs and non-financial graphs. Key financial variable graphs relate to profits, earnings per share (EPS) and dividends per share (DPS), which is consistent with prior studies conducted (Beattie & Jones 1992, 1999; Mather et al. 2005).

### Frequency of graphs in the annual integrated report and subject matter of graphs included in the annual integrated report

In addressing Research Questions 1 and 2, the number of graphs that appear in the annual integrated report of listed entities was manually counted and recorded in an Excel spreadsheet. Each graph was classified as either a financial graph or a non-financial graph. Graphs were also classified in terms of the type of graph, according to the following categories obtained from Frownfelter-Lohrke and Fulkerson (2001): column (column is vertical), bar (column is horizontal),

line, pie diagram, stacked bar or column, area, combination of line-bar, etc..

### Compliance with standards for good graphs in the annual integrated reports

At the present time there are no mandated standards for the creation and presentation of graphs but, in order to address Research Question 3, there is research that provides guidelines on good graphs. Frownfelter-Lohrke and Fulkerson (2001) developed a checklist that identifies the guidelines for good graphs, based on prior research. Beattie and Jones (1997) used the principles dictated by Kosslyn (1989) to measure the compliance with guidelines. These are similar to the principles noted by Frownfelter-Lohrke and Fulkerson (2001). For this study, the checklist created by Frownfelter-Lohrke and Fulkerson (2001) was used, but additional guidelines were incorporated, based on the checklist developed by Beattie and Jones (1997; Table 5).

Both financial and non-financial graphs were analysed for compliance. Certain questions were not applicable to all types of graphs. For instance, the inclusion of an axis was not considered for pie charts. Each question was answered by a Yes, No or Not applicable response and counted on Excel. Instances of not applicable resulted in cases where there was a No answer to the over-arching question. For example, if a graph did not have a financial axis, the location of the axis would not be an applicable question.

### Level of distortion for graphs included in the annual integrated reports

Measurement distortion occurs when the numerical values and the physical representation on the graph do not correspond (Beattie & Jones 2002). Tufte measured this principle using the lie factor and this was modified by Taylor and Anderson (1986) to produce the GDI.

In terms of determining material measurement distortion, Tufte (1983) suggested that values of GDI above 5% are material exaggeration and values below 5% are material understatement. In the studies conducted by Mather et al. (2005) and Beattie and Jones (1992,1997), a figure of greater or less than and equal to 5% was used based on the conclusions of Pany and Wheeler (1989). For the purposes of this study, the established measures of  $\geq 5\%$  and  $\leq 5\%$  were used to determine if there was material distortion.

To address Research Question 4, measurement distortion was calculated using the GDI formula on Excel for all graphs, which fall within the following types: bar, column, line, combination of line-bar and the stacked bar or column. The heights of GDI were measured to the nearest millimetre and were converted to centimetres to comply with the formula.

### Validity and reliability

In this study, content validity was achieved as the measures used for each research question enabled the researcher to reach a conclusion and allowed all the research questions to be answered (Patrick 2009). The research questions were obtained from a replicated study, which further ensured that the research questions and measures were appropriately aligned. Reliability can be described as whether the instrument used in the research study can consistently measure what it is intended to measure (Patrick 2009). Reliability is achieved as the data collection instrument can be consistently used to answer the research questions. In addition, the criteria used to

determine presentational enhancement is consistently applied for each graph examined (Galpin & Krommenhoek 2013), ensuring the validity of the results.

### Ethical consideration

Ethical clearance was given for this study by the University of the Witwatersrand under clearance number CACCN/1164 on 2018/08/28.

## Analysis and results

### Descriptive statistics

The results indicate that 96 companies (98%) out of 98 used graphic disclosure. The total number of graphs included in the annual integrated reports amounted to 4008 graphs. The average number of graphs amounted to 40.9 graphs per annual integrated report.

### Graphic disclosure per sector

The Basic Resources Sector had most graphs, where 934 graphs (23.3% of the total) were found, followed by Real Estate where 597 (14.9%) graphs were found and followed by the Banking Sector where 471 (11.8%) graphs were found. Table 3 provides a sector analysis in terms of graph usage and number of companies.

### Types of graph

The three most frequently used graphs are the column graph (34%), pie chart (24%) and bar graph (12%). Other graphs included pictorial graphs, scatter plots and bubble graphs. In general, graphs, especially column graphs, are able to convey information simply and effectively, which may be the reason why column graphs are mostly used (Harris 2000). In terms of the types of graph used for financial and non-financial graphs the results are similar. The column graph is the most prevalent graph for both the financial and non-financial category as shown in Table 4.

**TABLE 3:** Sector analysis as per the Johannesburg Stock Exchange.

Sector	Number of graphs per sector	Percentage of graphs per sector (%)	Number of companies	Number of companies – percentage (%)	Average per company per sector
Basic resources	934	23.3	17	17.3	54.9
Real estate	597	14.9	15	15.3	39.8
Banks	471	11.8	6	6.1	78.5
Retail	299	7.5	14	14.3	21.4
Healthcare	288	7.2	5	5.1	57.6
Financial services	283	7.1	8	8.2	35.4
Industrial goods and services	245	6.1	7	7.1	35.0
Insurance	241	6.0	6	6.1	40.2
Chemicals	164	4.1	2	2.0	82.0
Food and beverage	162	4.0	8	8.2	20.3
Telecommunications	152	3.8	3	3.1	50.7
Personal and household goods	76	1.9	2	2.0	38.0
Media	42	1.0	1	1.0	42.0
Construction and materials	32	0.8	1	1.0	32.0
Travel and leisure	20	0.5	1	1.0	20.0
Investment instruments	2	0.0	1	1.0	2.0
Technology	0	0.0	1	1.0	0.0
<b>Total</b>	<b>4008</b>	<b>100</b>	<b>98</b>	<b>100</b>	<b>40.9</b>

## Variables graphed

The use of financial and non-financial graphs is a means of communication by which companies inform users of the different aspects of a company's performance (Uyar 2009). South African listed companies present more financial graphs, with 2458 (61.3%) financial graphs being disclosed, compared with 1550 (38.7%) non-financial graphs presented.

In terms of financial graphs, the category 'Other' had the most graphs at 45%. In terms of the KfV, sales were the most graphed category (9%), followed by profit (3%), EPS (2%) and DPS (1%). Regarding the category 'Other', the type of graphs included relates to variations of earnings: operating cash

flow information such as free cash flow, borrowings of the company and expenses incurred.

In terms of non-financial graphs, various types of non-financial information are disclosed. The disclosure in non-financial graphs could be attributed to the introduction of integrated reporting.

## Compliance with standards for good graphs

This section discusses the level of presentational enhancement exhibited by the graphs disclosed. The analysis is based on the questions included in Table 5. The questions were based on the study completed by

**TABLE 4:** Graph type by category.

Financial			Non-financial		
Type	Number of graphs	%	Type	Number of graphs	%
Column	873	35.5	Column	501	32.3
Pie	509	20.7	Pie	438	28.3
Line	311	12.7	Bar	200	12.9
Bar	263	10.7	Line	143	9.2
Combination line/bar/column	215	8.7	Combination line/bar/column	105	6.8
Stacked column	157	6.4	Other	96	6.2
Other	83	3.4	Stacked column	51	3.3
Area	29	1.2	Area	14	0.9
Stacked bar	18	0.7	Stacked bar	2	0.1
<b>Total</b>	<b>2458</b>	<b>100.0</b>	<b>Total</b>	<b>1550</b>	<b>100.0</b>

**TABLE 5:** South African companies' compliance with good graph guidelines.

Question	Guidelines	Findings – Current study (%)	Applicable to all graphs (If not selected pie diagrams are excluded)	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	✓	✓	-
	Is the graph detailed and labelled? (No)	1	✓	✓	-
1.2	Are important events labelled? (Yes)	99	✓	✓	-
	Are important events labelled? (No)	1	✓	✓	-
	Axis	-	-	-	-
	Numeric scale	-	-	-	-
1.3	Is there a scaled financial variable axis? (Yes)	61	-	-	✓
	Is there a scaled financial variable axis? (No)	39	-	-	✓
1.4	Where is the financial variable axis located?	-	-	-	✓
	Conventionally – Left	95	-	-	-
	Unconventionally – Right	5	-	-	-
	Specifier – The column which represents the numeric values	-	-	-	-
1.5	Is there a number attached to the specifier? (Yes)	73	✓	-	✓
	Is there a number attached to the specifier? (No)	27	✓	-	✓
1.6	Is the numeric label on the specifier horizontal? (Yes)	78	-	-	✓
	Is the numeric label on the specifier horizontal? (No)	22	-	-	✓
	Scale	-	-	-	-
1.7	Is the scale continuous or broken?	-	-	✓	-
	Continuous (Yes)	100	-	-	-
	Broken (No)	0	-	-	-
1.8	Does the scale begin at zero? (Yes)	91	-	✓	-
	Does the scale begin at zero? (No)	9	-	✓	-
	Time axis	-	-	-	-
1.9	Is there a scaled time axis? (Yes)	84	-	-	✓
	Is there a scaled time axis? (No)	16	-	-	✓
1.10	Is the numeric label on the time axis horizontal? (Yes)	78	-	-	✓
	Is the numeric label on the time axis horizontal? (No)	22	-	-	✓
	Gridlines	-	-	-	-

Table 5 continue on the next page →

**TABLE 5 (Continues...):** South African companies' compliance with good graph guidelines.

Question	Guidelines	Findings – Current study (%)	Applicable to all graphs (If not selected pie diagrams are excluded)	Frownfelter-Lohrke and Fulkerson (2001)	Beattie and Jones (1997)
1.11	Are gridlines included? (Yes)	18	-	-	✓
	Are gridlines included? (No)	82	-	-	✓
2	Obtrusive backgrounds				
	What colour is the background of the graph?	-	✓	✓	-
	White	81	-	-	-
	Grey	12	-	-	-
	Yellow	0	-	-	-
	Beige/Ivory	3	-	-	-
	Black	0	-	-	-
	Other colours	2	-	-	-
	Picture	2	-	-	-
3	Borders				
	Are there clearly defined borders? (Yes)	100	-	✓	-
	Are there clearly defined borders? (No)	0	-	✓	-
4	Optical illusion				
	Is the graph three-dimensional? (Yes)	2	✓	✓	-
	Is the graph three-dimensional? (No)	98	✓	✓	-
5	Inappropriate use of colour				
	How many colours are in the graph?	-	-	-	-
	Fewer than 6 (<6)	96	✓	✓	-
	More than 6 (>6)	4	✓	✓	-
6	Legend				
	Is there a legend? (Yes)	91	✓	✓	-
	Is there a legend? (No)	9	✓	✓	-
7	Trendy visual effects				
7.1	Do borders detract from the graph? (Yes)	0	✓	✓	-
	Do borders detract from the graph? (No)	100	✓	✓	-
7.2	Are there any data inside the graph? (Yes)	35	✓	✓	-
	Are there any data inside the graph? (No)	65	✓	✓	-
8	Multiple scale on the vertical axis				
	Is there a single scale or multiple scale?	-	-	-	-
	Single	97	-	✓	-
	Multiple scale on the vertical axis	3	-	✓	-
9	Time series portrayed in reverse order				
	Are the data on the graph in sequential or reverse sequential order?	-	-	✓	-
	Sequential	86	-	✓	-
	Reverse	14	-	✓	-
10	Exaggerated width of data markers or spaced				
	Are the bars of uniform width and evenly spaced? (Yes)	100	-	✓	-
	Are the bars of uniform width and evenly spaced? (No)	0	-	✓	-

Frownfelter-Lohrke and Fulkerson (2001); however, additional questions were obtained from the study completed by Beattie and Jones (1997). The source of each question is indicated.

Presentational enhancement was found to some extent in the graphs presented in the annual integrated reports of South African listed entities. The largest non-compliance related to the omission of gridlines (82%). Graphs did not always disclose a scaled financial variable axis (39%), which makes it difficult for a user to gather accurate information (Frownfelter-Lohrke & Fulkerson 2001). Having a specifier on a graph allows users to analyse trends and relationships, however 27% of graphs did not include a specifier. Fourteen percent (14%) of graphs disclosed the time sequence in reverse order, which can cause confusion as data are not presented according to traditional norms

(Arunachalam, Pei & Steinbart 2002). These were the major breaches found in the graphs presented. South African listed companies do not appear to use obtrusive background colours or three-dimensional graphs, as only 2% of graphs included these effects. Overall, there is some non-compliance with good graph standards, but South African listed companies do not appear to use presentational enhancement as a medium of distortion.

### Measurement of distortion – Graph discrepancy index

Of the 4008 graphs, there were no data available for 807 graphs (as the specifier did not have a number attached to it). Regarding 1092 graphs, the GDI could not be calculated because of the nature of the graph. This resulted in the GDI being calculated for 2109 graphs: this is the sample used for the analysis.



**TABLE 6:** Analysis of the number of graphs distorted.

Variable	Materially distorted	%	Not distorted or not materially distorted	%	Total	%
<b>Financial</b>						
Sales	84	4.0	36	1.7	120	5.7
EPS	37	1.8	27	1.3	64	3.0
DPS	27	1.3	14	0.7	41	1.9
Profit	36	1.7	26	1.2	62	2.9
Other financial	724	34.3	309	14.7	1033	49.0
<b>Total financial</b>	<b>908</b>	<b>43.1</b>	<b>412</b>	<b>19.5</b>	<b>1320</b>	<b>62.6</b>
<b>Non-financial</b>	<b>531</b>	<b>25.2</b>	<b>258</b>	<b>12.2</b>	<b>789</b>	<b>37.4</b>
<b>Total</b>	<b>1439</b>	<b>68.2</b>	<b>670</b>	<b>31.8</b>	<b>2109</b>	<b>100.0</b>

DPS, dividends per share; EPS, earnings per share.

### Graphs distorted

A total of 1439 graphs (68.2%) were materially distorted. The remainder 670 graphs (31.8%) were either not distorted or were not materially distorted. Table 6 provides an analysis of the graphs distorted per variable.

### Material exaggeration or understatement

Graphs tend to exaggerate the trend (57.1%) as opposed to understating it (42.9%). Financial graphs have the highest number of discrepancies for exaggeration (35.6%) and understatement (27.4%). Non-financial graphs contain both exaggerated (21.4%) and understated (15.5%) trends, but on a lesser scale. In all instances, apart from the EPS variable, the number of graphs exaggerated exceeded the number of graphs understated.

### Average graph discrepancy index

There appears to be significant measurement distortion for both financial and non-financial graphs. The overall average GDI for all graphs was 134%, resulting in material measurement distortion. The average GDI for material exaggeration is higher (304.8%) when compared to material understatement (-92.8%).

Financial graphs have an average GDI of 121.6%, indicating that trends are materially overstated. Non-financial graphs also displayed exaggeration in trends as the average GDI was 155.2%, which is higher when compared to financial graphs.

Based on these facts, it can be concluded that impression management for graphs of South African companies materially overstate the information displayed to create a more favourable impression of the company to users.

**Analysis of distortion per variable:** If the average GDI is analysed per variable the results indicate that for KfV, profit is the variable most exaggerated as it has the highest average GDI (563.5%), followed by DPS (403.9%), sales (222.4%) and EPS (112.1%). In terms of the type of distortion, the average GDI for material exaggeration exceeded the average GDI for understatement for all variables analysed. Table 7 provides information on the GDI calculated per variable.

**TABLE 7:** Average graph discrepancy index per variable.

Variable	≥ 5%	≤ 5%	Average
<b>Financial</b>			
Sales	222.4	-47.1	110.1
EPS	112.1	-61.6	18.2
DPS	403.9	-39.5	256.1
Profit	563.5	-73.7	368.8
Other financial	283.3	-106.8	110.9
<b>Total financial</b>	<b>289.7</b>	<b>-96.7</b>	<b>121.6</b>
<b>Non-financial</b>	<b>329.8</b>	<b>-85.9</b>	<b>155.2</b>
<b>Total</b>	<b>304.8</b>	<b>-92.8</b>	<b>134.0</b>

DPS, dividends per share; EPS, earnings per share.

## Conclusion

Prior research has indicated that there has been a change in the format of the traditional annual reports as the volume of voluntary information has increased, and there is a change in the use of alternate means of communication, such as graphs, tables and pictures (Bartlett & Jones 1997; Beattie et al. 2008b; Lee 1994). As a result, elements of management bias that result in impression management may be found within sections of the reports in an attempt to provide a more favourable image of management. For the purpose of this study, the use of graphs as a tool of impression management was investigated.

One of the visual representations identified as becoming a popular means of communication is the use of graphs. Graphs have the ability to summarise information and readers can process information in graphic form, which saves time in analysing data and enhances understanding (Beattie & Jones 2008a; Frownfelter-Lohrke & Fulkerson 2001). Although there are advantages, the use of graphs is not problem-free as it can be a means by which management manipulates the information disclosed to create a better impression, which may be deceptive (Beattie & Jones 1999, 2008a). Impression management relating to graphs can occur in three ways according to Beattie and Jones (2008a), namely selectivity, measurement distortion and presentational enhancement. For the purpose of this study, measurement distortion and presentational enhancement were investigated.

The use of graphs was found to be widespread amongst companies listed on the JSE, as 98% of companies presented graphs, with an average of 40.9 graphs per annual integrated report. A total of 4008 graphs were presented. The column graph was found to be the most common type of graph. Regarding KfV graphs, sales is the variable that was mostly used for creating graphs, followed by profit, EPS and DPS. Non-financial graph disclosure displays a variety of information, such as the water use of companies, carbon emissions, race and gender of employees.

Similar to other countries, the graphs presented by South African listed companies have some level of presentational enhancement. The most widespread non-compliance appears to be that graphs do not include gridlines (82%). Graphs omit the scaled financial variable axis (39%) and exclude the

specifier (35%), which can make it difficult for a user to gather accurate information (Frownfelter-Lohrke & Fulkerson 2001). Fourteen per cent of the graphs disclosed time sequence in a reverse, which may cause confusion to a reader (Arunachalam et al. 2002), and 3% of graphs had a multiple axis. In terms of using visual effects, the graphs of South African listed companies appear to avoid visual effects, as only 2% of graphs were three-dimensional and had obtrusive backgrounds. Most graphs had six or fewer colours. Overall, there is some non-compliance with good graph standards, but South African companies do not appear to use presentational enhancement as a medium of distortion relating to graphs.

Measurement distortion occurs where the physical representation of the numbers on the graph is not proportionate to the underlying numbers (Tufte 1983). For the purpose of this study, significant measurement distortion was considered for GDI that was  $\geq 5\%$  or  $\leq -5\%$ . In total, GDI was calculated for 2109 graphs. Of the 2109 graphs, 1439 graphs (68.2%) were materially distorted. Financial graphs had a greater percentage of materially distorted graphs (63.1%) than non-financial graphs (36.9%).

In terms of exaggeration ( $\geq 5\%$ ) or understatement ( $\leq -5\%$ ) of trends, it was found that graphs tend to exaggerate the trend (57.1%) to a larger extent than understate (42.9%). In terms of exaggeration, more financial graphs (35.6%) display material exaggeration than non-financial graphs (21.4%). The same results were found for material understatement as more financial graphs (27.4%) displayed an understated trend than non-financial graphs (15.5%). The average GDI was calculated as 134% for all graphs, which implies that graphs tend to overstate the trend by 134%. This once again supports the statement that South African listed companies use graphs as a tool of impression management, particularly to portray a favourable image of the company to users of the annual integrated reports.

The study is limited as the annual integrated report comprises various disclosures, and this research study is limited to only examining the use of graphs within the annual integrated reports. The companies investigated are all listed on the main board of JSE and the findings may not be representative of smaller companies. Selectivity as a means of impression management was not considered when analysing graphs.

This study can be extended by analysing for a longer time period, which will allow selectivity to be examined. An analysis could be performed on companies with a smaller market share, such as companies listed on the AltX. The public sector could be examined to identify if there are any significant differences when comparing the two sectors.

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The authors have declared that no competing interest exists.

## Authors' contributions

Z.V. is the primary author; she executed the research and composed the article. Y.Y. provided key insight and made key contributions to the design, analysis and interpretation of data whilst the article was being written.

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## Data availability statement

The data that support the findings of this study are available on request from the corresponding author, Zakiyyah Varachia.

## Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the authors.

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