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Varachia, Zakiyyah

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The frequency and quality of graphs in Annual Reports: A South African analysis of graph disclosure in Listed entities

A research report submitted by:

Zakiyyah Varachia

In partial fulfilment of the degree:

Master of Commerce in Accounting

Student number: 316548

Email: Zakiyyah.Varachia@wits.ac.za

Ethics Clearance Number: CACCN/1164

Contact Number : 083 458 6349

Primary Supervisor: Professor Yaeesh Yasseen

Co-Supervisor: Professor Nirupa Padia

University of the Witwatersrand

School of Accountancy

2019

Declaration

University of the Witwatersrand School of Accountancy
1 Jan Smuts Avenue
Johannesburg
South Africa
2002

The Head of the School of Accountancy : Professor Nirupa Padia

Dear Professor

I declare that this research report is my own unaided work. It is submitted in partial fulfilment of the degree of Master of Commerce by Coursework and Research Report at the University of the Witwatersrand, Johannesburg.

This research has been carried out according to the ethical policies of the University of the Witwatersrand and has not been submitted elsewhere for the purpose of being awarded another degree or for examination purposes at any other university.

Yours faithfully

_____

Zakiyyah Varachia, 316548

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Abstract

The Annual Report is viewed as an important communication medium between a company and its stakeholders. The format of the Annual Report has undergone changes over time due to the introduction of integrated reporting and the demands stakeholders have placed on companies to provide a holistic view of the company. As part of the change in the format of the annual report the use of visual representation such as graphs, tables and photography has become a more prevalent feature of the Annual Report. The purpose of the study was to analyse the incidence, quality and measurement distortion of graphs in the Annual Integrated Reports of the Top 100 South African listed entities for the financial year ending 2017. A graph which does not comply with good graph guidelines and a graph which exhibits measurement distortion provide a company with the opportunity to engage in impression management and to alter the perceptions of users of the information. The result is that the information presented is not fair and contains management bias.

The findings of the study indicate that graphs are used widely as a communication tool in the Annual Reports of South African listed companies to convey both financial and non-financial information. The widespread use of graphs is not without its problems and it was identified that for a large number of graphs displayed in the annual report, impression management was present. It would appear that South African listed companies do not use presentational enhancement to a large degree as an impression management tool but the graphs presented displayed significant measurement distortion, implying that graphs are used as a means to change users' perceptions of a company. Further, where significant measurement distortion was present, it was identified that graphs tend to overstate the underlying trend as opposed to an understatement of trends. It can be concluded that companies use graphs as a means to alter users' perceptions of the underlying trends depicted which, in turn, has the ability to alter the company's image in the public domain.

Keywords: Annual Report, Graph, Impression Management, Measurement Distortion, Presentational Enhancement

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1. Introduction

1.1 Purpose of the study

The purpose of this study was to analyse the incidence, quality and measurement distortion of graphs in the annual integrated reports of South African entities listed on the Main Board of the Johannesburg Stock Exchange (JSE). The study was completed using the Top 100 companies listed.

The demand for information from stakeholders has increased with entities having to adapt their practices by increasing voluntary non-financial information because of the increase in public awareness regarding environmental, social and governance (ESG) issues (Appiagyei, Djajadikerta, & Xiang, 2016; Kolk & van Tulder, 2010; Velte & Stawinoga, 2017). 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 appears to present the opportunity to establish the link between the financial, social and environmental information of organisations (Reuter & Messner, 2015; Roberts, 2014). However, the increase in information has resulted in an increase in the volume and complexity of information presented, resulting in users finding it difficult to read such reports (Frownfelter-Lohrke & Fulkerson, 2001; Rezaee & Porter, 1993). In an attempt to simplify integrated reports, narratives are being used more frequently in integrated reports as it allows for easier understanding (Rentz, 1992; Rogers & Grant, 1997). A form of narrative information used is graphs which may be considered valuable by users of the integrated report as graphs can focus the readers' attention as they summarise information, highlight trends and they also explain complicated relationships (Beattie & Jones, 2008a; Frownfelter-Lohrke & Fulkerson, 2001; Hwang, 1995). However, graphs in integrated reports may be used as a tool of impression management as graphs which contain a level of presentational enhancement (which is linked to the quality of graphs) or graphs found to be distorted in that the physical representation of the graph does not correspond to the numbers depicted, can be used to serve managers' interest, as opposed to the users' interest (Beattie & Jones, 2002, 2008a; De Klerk & Van Wyk, 2017; Penrose, 2008; Stanton, Stanton, & Pires, 2004; Steinbart, 1989; Tufte, 1983). Impression management originates from the area of social psychology and is concerned with the study of how individuals present themselves to others in order to be perceived favourably (Yasseen, Moola-Yasseen, & Padia, 2017). Various studies have been conducted on the use of graphs as an impression management tool, mainly in developed countries where it has been proven that graphs are used by management to alter users' perceptions (Beattie & Jones, 1992; Beattie & Jones, 1997; Beattie & Jones, 2000b; Falschlunger, Eisl, Losbichler, & Greil, 2015; P. Mather, Ramsay, & Serry, 1996; Uyar, 2009). From a South African perspective, a study has been completed by De Klerk and Van Wyk (2017) on the use of non-financial graphs in the integrated reports of mining companies where it was found that companies tend to include favourable as opposed to

unfavourable graphs. It was concluded that companies use graph disclosure as a tool to manage the company's corporate image (De Klerk & Van Wyk, 2017). The section which follows provides context to the study that has been conducted.

1.2. Definition of terms and abbreviations

Annual Report/Annual Integrated Report – A report produced by a company which contains both the integrated report and the audited annual financial statements

CF - Conceptual Framework

ESG - Environmental, social and governance

GDI – Graph Discrepancy Index

IASB - International Accounting Standards Board

IFRS - International Financial Reporting Standards

Integrated Report – A report produced by the company which contains environmental, social and governance disclosure, however, the audited annual financial statements are included in a separate document

ISA - International Standards on Auditing

JSE - Johannesburg Stock Exchange

Stakeholders- Shareholders, employees, customers, suppliers, society and the natural environment

1.3. Context of the study

Corporate governance has become a serious concern and has been given an increase of interest due to the corporate scandals of Enron, WorldCom, African Bank and Steinhoff, some of which have endangered global financial stability and have resulted in some of the largest corporate collapses (Claessens & Yurtoglu, 2013; Yasseen et al., 2017). Due to the greater uncertainty being experienced in capital markets it has become more important that the reporting of a company's performance is an accurate reflection and is objective (Yasseen et al., 2017).

The annual report which comprises quantitative information, narratives, photographs, tables and graphs is the traditional form of communication between a publicly listed entity and its stakeholders (Stanton et al., 2004). Annual reports are used to disclose financial, and increasingly non-financial achievements of companies to stakeholders (Padia & Yasseen, 2011). As mentioned there is mounting pressure on companies to produce consolidated reports which focus on more than the financial aspect of a company and to integrate financial and non-financial disclosures (Dube, 2017; Yasseen et al., 2017). Annual reports generally consist of a front section and a back section. The front section which contains mainly voluntary disclosures has been viewed as the section where corporations participate in public relations exercises and where management can

mould readers' expectations of the entity (McKinstry, 1996; Stanton et al., 2004). The back section comprises the audited financial statements.

Increasingly, the annual reports of public companies use visual representation to communicate financial and non-financial information (Beattie, Dhanani, & Jones, 2008b; Beattie & Jones, 2008a). Research indicates that graphs are now used extensively, particularly in the developed Western world as it is a low-cost manner in which annual reports can be enhanced (Beattie & Jones, 2008a; Frownfelter-Lohrke & Fulkerson, 2001). While there has been an increase in the use of graphs, there are no guidelines provided on the presentation of graphs in annual reports although there have been recommendations (D. Mather, Mather, & Ramsay, 2005). The front section which contains the voluntary disclosure has limited insight into what must appear and how such information is delivered (Beattie & Jones, 2000a; Penrose, 2008). There is no authoritative guidance provided to the auditor to determine if the other information contained in the annual report is materially inconsistent, particularly relating to graphs (Beattie & Jones, 1999; Beattie & Jones, 2000a; Beattie & Jones, 2008a; D. Mather et al., 2005; Penrose, 2008; Steinbart, 1989) . As a result, the use of graphs can be a form of impression management where management can manipulate other corporate communications to enhance the perception of performance (Subramanian, Insley, & Blackwell, 1993). The consequence is that one of the qualitative characteristics of financial statements, per the International Financial Reporting Standards (IFRS) Conceptual Framework, relating to faithful representation is prejudiced as the performance of a company is no longer presented in a neutral and unbiased manner (Beattie & Jones, 2000a). The introduction of bias discredits the information as incorrect decisions may be taken by users regarding the allocation of capital within markets (Subramanian et al., 1993). These issues, therefore, lead to the problem statement relating to graphs.

1.4. Problem statement

Studies have indicated that companies in developed countries are using graphs more extensively in their annual reports (Beattie & Jones, 1997; Beattie & Jones, 1999; Falschlunger et al., 2015; P. Mather et al., 1996; Uyar, 2009). Although there are advantages to this, the use of graphs is not problem-free as it can be a means by which management can manipulate the information disclosed to create a better impression for the reader: this may actually be misleading and deceptive (Beattie & Jones, 1999; Beattie & Jones, 2008a). Prior research has been conducted in developed countries such as the United Kingdom (UK) (Beattie & Jones, 1992; Beattie & Jones, 1997), Australia (Beattie & Jones, 1999; P. Mather et al., 1996), the United States of America (USA) (Beattie & Jones, 1997; Steinbart, 1989) and large European Countries (Falschlunger et al., 2015). In terms of a South African context there has been research on impression management such as investigating impression management relating to Chairmen's statements in annual reports (Yasseen et al., 2017) and impression management relating to graphs (De Klerk & Van Wyk, 2017), but it has been limited. The study by De Klerk and Van Wyk

(2017) considered graphs as a tool of impression management but the study was limited to mining companies and only considered non-financial disclosure. As a result, there is a need for the research to be extended to emerging countries such as South Africa. To the author's knowledge no extensive study has been conducted previously.

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 reports of the Top 100 companies listed on the JSE were analysed using four research questions based on the study completed by Frownfelter-Lohrke and Fulkerson (2001).

1.5. Significance of the study

This study will compensate for the void in current literature by analysing the extent to which South African listed entities use financial and non-financial graphs in their annual reports and if impression management relating to graphs is existent in a South African context. The study will be beneficial to the users of integrated reports, regulatory bodies, auditors and the management of companies. Users will benefit by understanding how the use of graphs can manipulate the views and perceptions of users. Regulatory bodies can consider the findings to understand if the use of graphs is prevalent and whether graphs are used as a means of impression management. If manipulation of graphs is found to be significant applicable guidance and standards should be drafted to govern the use of graphs in annual reports. Auditors will be able to gain an understanding of the techniques that may be used by management to manipulate financial graphs and can therefore adapt their audit procedures to mitigate the risk of management bias through the use of graphs. Lastly management can use the findings to understand their roles and responsibilities regarding the annual report and to ensure that there is proper oversight so that the annual report communicates the performance of a company truthfully rather than being a manipulative source of information to enhance management's image to the public (De Klerk & Van Wyk, 2017).

1.6. Scope and Limitations

The annual report comprises various disclosures which may be used by management for impression management. The research study is, however, limited to examining the use of graphs within the annual report. As the annual report is considered to be an important tool of communication, the study of the annual report is deemed to be sufficient (Stanton et al., 2004; Uyar, 2009). The study is limited as the public companies investigated are all listed on the main board of the JSE and the findings may not be representative of smaller companies. Further, only the Top 100 companies were investigated and the results may not be representative of all companies listed on the JSE.

Impression management occurs in three instances, namely, selectivity, measurement distortion and presentational enhancement (Beattie & Jones, 2008a). For the purposes of this study, only measurement distortion and presentational enhancement were investigated. As the period investigated was limited to 2017, selectivity as a means of impression management was not considered when analysing graphs.

There may be other factors that influence the graph design depicted in the annual report, such as the use of design consultants in the preparation of annual reports and the possibility that the graph size may change when the annual report is submitted for printing. However, this impact has not been considered for the purposes of the study and so is viewed as a limitation.

1.7. Assumptions

The subject matter relating to graphs was considered in terms of financial graphs and non-financial graphs. Financial graphs were split into key financial variable (KFV) graphs namely sales, profits, earnings per share (EPS) and dividends per share (DPS) (Beattie & Jones, 1992; Beattie & Jones, 1999; D. Mather et al., 2005). Financial graphs that are not KFV's were classified as other financial graphs.

Prior studies make reference to annual reports which are viewed as a combination of the front section which is the voluntary section including information relating to financial information, as well as ESG disclosure; that is, the non-financial information. Within the same report the audited financial statements are also included, generally after the front section and it is referred to as the back section. The annual report in these instances is sometimes rebranded as 'integrated annual report' or 'annual integrated report' (Bray & Chapman, 2012; Roberts, 2014). In other cases the front section is disclosed in one document with the annual financial statements presented in a separate document. In these cases the separate front section is sometimes referred to as the integrated report.

There is no rule that the annual financial statements be included as part of the integrated report and companies are offered flexibility in terms of how reports should be presented (Roberts, 2014). In South Africa there are companies which choose to produce one report with the integrated report included as the front section and the annual financial statements follow this – 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 produced and published by a company. The terms ‘annual report’ and ‘integrated report’ will be used interchangeably. In situations in which a company produced a separate integrated report and a separate report relating to the annual financial statements, the integrated report (that is the front section) was used for the purpose of the study.

1.8. Chapter layout

The research study is set out as follows. Chapter Two provides an analysis of the prior literature. The review begins with a discussion of the components of the annual report, the use of narrative information in the annual reports and the importance of the annual report. The corporate reporting landscape is then explored followed by a discussion regarding the use of graphs in annual reports including guidelines for good graphs, advantages of graphs and impression management relating to the use of graphs. Chapter Three describes the research method which was employed in conducting the research, including the criteria used to determine if presentational enhancement exists and the calculation of measurement distortion. Chapter Four provides an analysis of the results and findings identified. Chapter Five provides a conclusion to the study and includes areas for future research.

2. Literature review

The purpose of a literature review is to explain the body of knowledge around a topic as it provides a perspective on what has previously been researched (Silverman, 2013). For the purpose of this research, information regarding annual reports, the use of graphs in the annual report, guidelines relating to good graphs, impression management and how graphs can be distorted was researched. The information gathered from prior research was used as a basis to determine the data to be analysed in order to answer the research questions of the study.

Structured literature review

In order to provide information and insights into the use of graphs within a South African context a structured literature review method (SLR) was adopted. A SLR 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). It develops findings from a specific body of literature and offers possible explanations from the data (Massaro et al., 2016). A SLR has been followed for the purposes of the study as a logical structure and plan were adopted (Massaro et al., 2016). This included specifying the questions which determined the identification of research which needed to be investigated (Kofod-Petersen, 2014; Massaro et al., 2016). A keyword search using words such as ‘graphs, measurement distortion and graph discrepancy index,’ was utilised as it assisted in finding articles relevant to the research questions (Massaro et al., 2016). The body of research

investigated included articles which appeared in journals, conference papers and information obtained from the search engine Google. By using multiple journals more information was obtained which enabled a better understanding of the topic analysed (Guthrie & Murthy, 2009). A SLR has been used in studies such as the following: Engelbrecht, Yasseen, and Omarjee (2018), Holt, Yasseen, and Padia (2015), Yasseen et al. (2017) and Phala, Yasseen, Padia, and Mohamed (2018) which have examined various aspects of the integrated report and so has been followed for the purposes of the study.

The chapter which follows begins with an introduction to the annual report per Section 2.1 and subsequent to this is a brief introduction to narrative information under Section 2.2. This is followed by a discussion regarding the importance of annual reports in Section 2.3. The environment surrounding corporate reporting in South Africa is discussed in Section 2.4. As there has been a change in the reporting landscape Section 2.5 investigates the changes noted. Section 2.6 explores the reasons why companies use graphs in their annual reports, followed by a discussion on how graphs can be used as a tool of impression management under Section 2.7. Section 2.8 discusses the components of a good graph, followed by the calculation used for measurement distortion under Section 2.9. Section 2.10 discusses the results of prior studies surrounding graphs. The Chapter then concludes.

2.1 Components of Annual Reports

The Annual 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). It is viewed as the traditional and statutory formal communication mode between a publicly listed corporation and its stakeholders (Stanton et al., 2004). It is a combined report covering different aspects of a company's financial and non-financial performance (Pivac, Vuko, & Cular, 2017). The annual report provides information on strategy, vision, mission, ownership structure, environmental impact, company structure, sales, earnings and market share which allows users to form and revise expectations about the corporation (Uyar, 2009). The annual report is divided into two, namely, the front section or narrative section and the financial section (Stanton & Stanton, 2002; Uyar, 2009). Some components which constitute the front section include the Chairman's letter, Chief Executive's (CEO) report, Chief Financial Officer's (CFO) report, strategy of the company, photographs of the management team, overview of operations and graphics relating to financial performance and other non-financial factors (Penrose, 2008). The front section can vary from a brief message from management to many pages which can detract attention from the financial section (Penrose, 2008). The front section is usually followed by the financial section which comprises four statements, namely, the statement of comprehensive income, statement of financial position, statement of changes in equity and statement of cash flows (Penrose, 2008). The front section usually has little oversight: the information is generally unaudited and voluntary in nature; the financial section, on the other hand, is strongly regulated, mandatory and audited (Beattie &

Jones, 2000a; Penrose, 2008). The published annual report is viewed as less rigid in format and provides the reader with insight into management's reporting philosophy (Stanga, 1976).

2.2. Narrative information, pictures and graphs in Annual Reports

Annual reports consist of narratives, pictures, charts, tables and graphs (Warren, 2005). The use of different formats in the report differs in terms of their use and have different impacts on users' decision-making process (Bierstaker & Brody, 2001; Tractinsky & Meyer, 1999). Narratives include texts, images and events which tell a story and are used on a daily basis as a medium of thought and dialogue (Jameson, 2000). They are used as an important scene-setting device and can be used to tell a story such as the Chairman's statement or the CEO's review (Beattie et al., 2008b). Narratives are an important source of information for analysts and a critical component in annual reports as users can comprehend more easily, read faster, remember information and engage with the information presented (Rentz, 1992; Rogers & Grant, 1997). Optional narrative information is seen as an important way in which management communicate to their investors required information to assess a company's current performance and future outlook (Leung, Parker, & Courtis, 2015).

Visual elements are considered to be integral components of the annual report as they are seen as making the reports more visually attractive and conveying particular types of messages (Beattie et al., 2008b; Preston, Wright, & Young, 1996). Photographs, for instance, are employed to highlight a certain image of a company usually an image appealing to readers (Benschop & Meihuizen, 2002). They are also used as a tool to validate the data presented in the form of text as photographs persuade users that the information presented is truthful (Buchanan, 2001; Graves, Flesher, & Jordan, 1996).

Tables can also assist in enhancing understanding, provided that a table is simple and unambiguous (Stephen & Hornby, 1995). Graphs are defined as a mathematical diagram which shows the relationship between two or more sets of numbers or measurements (Collins, 2018). Graphs are visual displays which explain quantitative data and relations among discrete values (Frownfelter-Lohrke & Fulkerson, 2001; Kosslyn, 1989). Graphs are viewed as being superior to traditional tables as they can capture attention and explain and highlight trends better than tables or text can (Beattie et al., 2008b). Graphs also lead to shorter decision times (Hwang, 1995). In addition due to the low-cost and availability, the use of graphs is increasing (Davis, 1987). Graphs are a fascinating manner of communication, given the flexibility they allow preparers and their accessibility to users (Beattie & Jones, 2000). What further adds to the interest of financial graphs is the values presented are audited but the actual graph is exempt from being audited which may result in distortion of information (Bastardo, 2015; Steinbart, 1989). For the purposes of this study graphs utilised in annual reports will be focused on. The reasons graphs are used will be discussed, however, before this is investigated the importance of annual reports will be discussed.

2.3. Importance of Annual Reports

Annual reports are only one mode of communication between the company and stakeholders as communication can take various forms such as CEO speeches, corporate press releases, advertisements, and sustainability and environmental reports, reporting of meetings with analysts and employees and corporate websites (Courtis, 1998, 2004; Hooks, Coy, & Davey, 2002). Although there are various modes of communication, the annual report is considered to be an important means of communication and an important source of information between companies, investors and the broader financial community (Chang & Most, 1985; Day, 1986; Frownfelter-Lohrke & Fulkerson, 2001; Lee & Tweedie, 1975a, 1975b). Annual reports are prepared with a diverse group of users in mind and contain financial information, opinions from management about the prior year's operations and the firm's future prospects and are considered to be extremely significant sources of company information (Penrose, 2008; Stanga, 1976; Uyar, 2009). Users of the annual report include employees, customers, suppliers, business partners, local communities, legislators, regulators and policy-makers (IIRC, 2013).

Previously, decision-making by the users of financial statements was based on the prepared financial statements which assessed the performance of previous years (Watson & Monterio, 2011). However, as reporting evolved the needs of users changed and there is now more concern about how companies treat the environment, their community and employees, as well as how they govern themselves, in addition to the financial information traditionally provided (DiPiazza Jr & Eccles, 2002). The annual report is a single document which combines an entity's financial and non-financial performance information and allows for the financial performance of an entity to be evaluated in light of the entity's negative or positive impact on the community in which it operates (Eccles & Saltzman, 2011; IoDSA, 2009). The accurate, complete and timely disclosure of information is essential for the functioning of an efficient capital market (Healy & Palepu, 2001; Pivac et al., 2017).

Listed companies play a significant role in the economy as they absorb and invest large amounts of capital (Al-Razeen & Karbhari, 2004). However, the success of listed companies depends on the public desire to invest which is dependent on the type of information available (Al-Razeen & Karbhari, 2004). Annual reports influence stakeholders' decisions and, by providing quality annual reports, issues relating to information asymmetry and the agency theory can be mitigated (Healy & Palepu, 2001). Readers of annual reports place high credibility in the annual report as it is one of the aspects used in assessing whether to buy, keep, or sell shares in a company (Penrose, 2008; Stanga, 1976). Some reasons why the annual report is viewed as such an influential source of information is because the annual report is widely circulated, provides wide

coverage and is viewed as a powerful channel of communication as information is easily accessible in one document (Hooks et al., 2002; Marston & Shrives, 1991; Stanga, 1976).

The annual report is also viewed as an important means for companies to discharge accountability (Chang & Most, 1985; Winfield, 1978). Accountability is the obligation of one party ('management') to provide explanations and justifications relating to its conduct to another party ('stakeholders') (Merkl-Davies, Brennan, & McLeay, 2011). Accountability refers to managements' obligation to justify their behaviour to stakeholders and it is also the process by which stakeholders will scrutinise and judge management (Merkl-Davies et al., 2011). It is concerned with monitoring of the past, predicting the future, assessing the integrity of management and the economic performance (Whittington, 2008). Management must account and report to stakeholders, who have the right to obtain information and to use it in order to evaluate management (Steccolini, 2004). Accountability requires looking beyond financial disclosures to ensure that sufficient and meaningful qualitative information is included in the annual report which allows users to conclude whether management has met its responsibilities to its owners (Hooks et al., 2002; Stanton & Stanton, 2002). The annual report is the accountability mechanism used by stakeholders to hold management accountable for its choices, decisions and actions (Stanton & Stanton, 2002).

In order to be effective, the contents of the annual reports need to be presented to users in a clear manner (Rahman, Hamdan, & Ibrahim, 2014). If annual reports are not clear and contain vast volumes of information the general user will lose interest and will not read the report (Canniffe, 2003). Unclear reports will defeat the purpose of the annual report as users will not be able to use the information to make well-advised decisions. Annual reports which are difficult to read result in either an increase in the information gap between management and investors or an increase in information processing costs (Efretuei, 2013). This is because users have to incur additional costs in order to obtain information from alternate sources (Efretuei, 2013).

A study conducted by the Yanelovich Consulting Group indicated that 54% of analysts stated that the annual report is the most important document a company prepares and shares with the public. Seventy five percent of analysts indicated that the annual report is used when making investment decisions (AmericanDemographics, 1996). From a South African perspective, Stainbank and Peebles (2006) completed a questionnaire-based study to determine the relative importance preparers and users of annual reports attach to sources of communication from a company in determining whether to buy, sell or keep shares. The results of the study indicate that preparers tend to use stockbroker advice, whereas users consider communication with management. Users ranked company announcements/reports as the second most important source of

information when making investment decisions. There appears to be a change in terms of the users view as a study conducted by Flynn (1987) indicated that users perceived the company reports as the most important source. The importance preparers and users attached to information obtained through company announcements and reports such as the annual report, interim report, preliminary announcement, prospectus and company website were also investigated. Preparers viewed the annual report as the most important source of company reports followed by the preliminary announcement. Users viewed preliminary announcement of the company as the most important source of company reports, followed by the annual report (Flynn, 1987). There has been an increase in non-financial and voluntary disclosure in the annual reports as annual reports are used as a means of "establishing a corporate identity in a consumer-oriented world" (Lee, 1994). The changing landscape of corporate reporting will be discussed in the following two sections. The corporate reporting environment in South Africa will be discussed, followed by the general change experienced in corporate reporting.

2.4. Annual reporting in South Africa

The Companies Act, 71 of 2008 (Companies Act) governs the type of companies a South African corporation can form. The type of company formed influences the accounting standards which are followed. The Companies Act categorises companies as either profit companies or non-profit companies. Profit companies are split into state-owned companies, private companies, personal liability companies and public companies. Public companies operate for profit and are allowed to offer its shares to the public (all listed companies are public companies). For the purposes of this paper, public companies listed on the JSE will be discussed. In terms of s30 of the Companies Act, the annual financial statements of a public company must be audited. The financial reporting standard which a company must apply is governed by regulation 27 of the Companies Act which mandates that all public listed companies must comply with IFRS. As a result the annual financial statements will include: a statement of financial position as at the end of the period; a statement of profit or loss and other comprehensive income for the period; a statement of changes in equity for the period; a statement of cash flows for the period and notes, comprising significant accounting policies and other explanatory information (Holt et al., 2015; IASB, 2010). In addition s30 of the Companies Act states additional components that the annual financial statements should comprise of namely: the auditor's report, director's report, approval of the annual financial statements by the board and disclosure relating to directors remuneration. Listed companies are further required to comply with the listing requirements provided by the JSE. Section 8 of the JSE Listing Requirements ('Requirements') states the rules which are applicable to Financial Information. In addition to complying with IFRS, the Requirements mandate that listed companies should comply with the King IV Code on Corporate Governance in respect to reporting (JSE, 2018).

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; EY, 2012; Rensburg & Botha, 2014). Effective from March 2010, the JSE required all listed companies to comply with the recommendations of King III, resulting in listed companies being required to prepare an integrated report or provide reasons for not doing so (Atkins & Maroun, 2015). The second code of corporate governance in South Africa, King II, was issued in 2002 and provided the framework for non-financial disclosure relating to environmental, social and governance ('ESG') disclosures (Atkins & Maroun, 2015). However, King II was not seen as sufficient to achieve holistic reporting and this resulted in the introduction of King III which took non-financial reporting further (Atkins & Maroun, 2015; IoDSA, 2009). In November 2016, the King IV Report on Corporate Governance was released with an effective date of 1 April 2017 (EY, 2018). The introduction of the new King Code is attributed to the significant corporate governance and regulatory developments, both locally and internationally, which King III did not consider as it was issued in 2009 (IoDSA, 2015). King IV also ensures that the interpreting and adopting of corporate governance principles are accessible to all types of entities across all sectors such as non-profit organisations, private companies and public sector entities (IoDSA, 2015). If the King Code is not applied, this is not against the law but the application of King indicates good governance which can be translated into effective leadership (Padia & Yasseen, 2011). Within a South African context, companies either prepare an annual report as mentioned under Section 2.1 where there is a front section and a back section in one document containing the various voluntary disclosure and the audited financial statements. In other cases, South African companies prepare the integrated report which is essentially the front section, and the audited annual financial statements which is the back section, are included in a separate document.

2.5. Change in reporting landscape

A further development in corporate reporting has been the introduction of the integrated report (Moola, 2016; Yasseen et al., 2017). The current economy is dynamic and is continually undergoing change because of the rapid changes in technology, regulation and competition and, as a result, the traditional forms of communication no longer satisfy the needs and interests of stakeholders (Dumay, Bernardi, Guthrie, & Demartini, 2016; Flower, 2015). Global corporate reporting is undergoing significant changes as stakeholders are increasing their demands on companies: resources are also becoming increasingly limited (Rensburg & Botha, 2014). Communication with stakeholders is changing as the disclosure of voluntary information is increasing to ensure that more useful information is provided to stakeholders and to enhance corporate transparency and accountability (Dumay et al., 2016). As opposed to providing separate reporting, integration of reporting is seen as imperative if organisations are to include stakeholder accountability in their business practices and operations in a meaningful way (Solomon & Maroun, 2012).

Integrated reporting is the communication to stakeholders regarding how a company's strategy, governance and prospects lead to the creation of value over the short-term, medium-term and long-term and relays a company's journey in a clear and straight-forward manner (IIRC, 2013; IRCofSA, 2014). Integrated reporting does not focus only on financial reporting or sustainability reporting but rather connects all the different forms of financial and non-financial information and allows a company to explain how value is currently created and how this value creation will continue in the future (IRCofSA, 2014). Integrated reporting is about moving beyond financial information alone, to explain how an organisation creates value and allows organisations to tell their own stories in a meaningful and clear manner (EY, 2018).

Research has investigated the change and structure in the annual report and results indicate that the size of the annual report has increased, the proportion of voluntary information has increased and there has been a change in the use of alternate communication such as graphs and pictures (Bartlett & Jones, 1997; Beattie et al., 2008b; Lee, 1994). In the study conducted by Lee (1994) it was identified that companies increased the use of image management techniques such as using design consultants and distinguishing logos.

A more recent study conducted by Beattie et al. (2008b) investigated the format changes in annual reports of UK companies for the period 1965 to 2004 with a focus on graph use. The results indicate that annual reports are increasing in size and voluntary disclosure is increasing at a faster rate than is regulatory material. For instance, narrative material increased by 375% and the use of pictorial material increased by 100%. The use of graphs was found to be universal. However, there was a slight decrease in key financial graphs with an increase in non-financial graphs such as corporate social responsibility graphs being disclosed.

The above results may indicate that companies are no longer focusing on the annual report as being a statutory driven document but rather as a design orientated document (Beattie et al., 2008b). Companies are enriching their annual reports by using visuals and in this way are transforming their reports from boring financial documents to a colourful marketing instrument (Beattie & Jones, 2008a; Frownfelter-Lohrke & Fulkerson, 2001). It would appear that although annual reports are a valued means of communication, annual reports also function as public relations tools which convey specific messages and images of a company (Rahman et al., 2014). The reasons companies are incorporating graphs in the annual reports will now be discussed.

2.6. Advantage of using graphs

Companies have a responsibility to meet the interests of all stakeholders (Yuthas, Rogers, & Dillard, 2002). Stakeholders such as shareholders, competitors, employees and investors read the published annual report but the amount of time spent on this is limited (Frownfelter-Lohrke & Fulkerson, 2001). A study conducted by Neilson and Lind (1972) found that the average investor spends less than 15 minutes reading the annual report whereas Squiers (1989) reported that 40% of stakeholders spend 15 minutes or less looking at an annual report. A more recent study by David (2001) indicated that users of annual reports spend only 15 minutes looking at the annual report when making decisions. Many users of annual reports do not have the time, inclination, at times ability to read or even analyse the entire annual report so graphs can highlight in an efficient manner the important points (Leach, 1988). The impact of time is important as time pressure affects decision making and so should be considered when producing annual reports (Hwang, 1995). Users find it difficult to read the reports due to the magnitude, complexity and technical jargon of the annual reports, however, the information transmitted is also often of limited interest to the average shareholder (Frownfelter-Lohrke & Fulkerson, 2001; Rezaee & Porter, 1993). The information provided is more than the average user requires or can even comprehend, which results in an information overload (Rezaee & Porter, 1993)

The use of graphs can overcome some of the problems as graphs focus the readers' interest while holding their attention (Frownfelter-Lohrke & Fulkerson, 2001). Graphs have the ability to summarise large volumes of data and are able to illustrate data patterns so as a result, they are useful, particularly when there are complicated relationships (Hwang, 1995). Companies are also including graphs as they are realising that well-presented financial information can promote a company's image (Johnson, Rice, & Roemmich, 1980). In addition one of the low-cost visual means which can enhance the annual report is the graphic presentation of financial and non-financial information (Frownfelter-Lohrke & Fulkerson, 2001).

According to Beattie and Jones (2008a) companies seek to communicate using financial graphs rather than tables or narratives for six reasons:

- Firstly, as graphs are not governed by standards and regulations, they allow management to present and summarise 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). This is because graphs can portray trends, relationships and anomalies.

- Fourthly, graphs enable the reader to view the data more clearly and directly as they allow the reader to process information in graphic form. The visual sense is a dominant human sense and, by being able to see the world, one is able to understand (Ackerman, 1991). As a result, graphs make the communication process more direct since they allow users to "see" the data and can be used as decision aids which provides confidence in decision-making (Amer & Ravindran, 2010; Beattie & Jones, 2000; Sartawi, 2015).
- 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 also viewed as a universal language and can assist in bridging barriers of language and culture (Horton, 1993). There is also an increased emphasis on financial communication, rather than just financial reporting (FRC, 1995). Communication is a key factor in the future of reporting and can be considered as intellectual capital for a company (Beattie, Roslender, & Smith, 2013; Jack, Davison, & Craig, 2013). Graphs which are presented correctly encourage users to analyse and understand the data and, therefore, prompt the user to ask questions, which enhances the communication process (Beattie & Jones, 2000).

Many investors look only at the narrative section of the annual report (Fisher & Hu, 1989) and only look at financial graphs when making decisions (Zweig, 2000). However, it has been argued that, as the employment of graphs is at the discretion of management, there maybe deliberate misrepresentation of information (Beattie & Jones, 1992; Beattie & Jones, 1997; De Klerk & Van Wyk, 2017)

2.7. Impression management and the use of graphs

Impression management is the field of study, within social psychology, which investigates how individuals present themselves to others in order to be perceived favourably (Hooghiemstra, 2000). Impression management can take a variety of forms and can be both verbal and non-verbal, for instance words, dress or facial expressions (Hooghiemstra, 2000). It 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 is an important corporate governance and regulatory issue, namely, a social bias which involves controlling and manipulating the impressions of others with the aim of being perceived favourably (Merkl-Davies et al., 2011).

Impression management occurs when management are able to control information disclosure in order to influence and manipulate users' attitudes and views of the company's performance as advantage is taken of information asymmetries

(Clatworthy & Jones, 2001; Merkl-Davies et al., 2011; Stanton et al., 2004). Impression management is found to occur in less regulated narrative disclosures which focus on interpreting financial outcomes (Brennan, Guillamon-Saorin, & Pierce, 2009). Impression management, when viewed in terms of corporate reporting, is when management use their discretion regarding the information to reveal and present information in a manner which distorts the readers' perception of corporate achievements (Neu, 1991; Neu, Warsame, & Pedwell, 1998; Stanton et al., 2004). It can be viewed as an attempt to control and manipulate the impression conveyed to users of accounting information (Clatworthy & Jones, 2001). When there are adverse financial performances, corporate scandals, environmental disasters and major re-organisations management tends to embark on a deliberate strategy in which the reporting style selected is aimed at the presentation and disclosure of information beneficial to the company (Bowen, Davis, & Matsumoto, 2005; Merkl-Davies & Brennan, 2007). The result of such a reporting style is that positive performance is emphasised and highlighted, whereas negative performance is concealed (Leung et al., 2015; Merkl-Davies et al., 2011). Merkl-Davies and Brennan (2007) classify corporate impression management behaviour under two main categories: attribution and concealment. Attribution refers to where management will attribute poor performance to factors outside its control and attribute good performance to internal factors (Brennan et al., 2009). Concealment refers to the presentation of good and bad news through the emphasis of positive outcomes and minimising of negative outcomes (Hellmann, Yeow, & De Mello, 2017). Negative performance results in a conflict of interest between managers and stakeholders which may result in management concealing negative performance and, therefore, engaging in impression management (Aerts, 2005).

There are two reasons why management manipulate information, namely that annual reports are seen as an accountability mechanism and also as a means to reduce investor uncertainty (Yasseen et al., 2017). In terms of the accountability mechanism, users view the annual report as a means to measure management performance (Merkl-Davies et al., 2011). Annual reports which form part of corporate narrative documents are a description of the firm's behaviour and reflect management performance (Prakash & Rappaport, 1977). This may lead management to engage in impression management to ensure that there is positive feedback from stakeholders (Merkl-Davies et al., 2011). Secondly, public companies want to reduce investor uncertainty as this leads to a decline in confidence and share price (Yasseen et al., 2017). Public companies aim to be perceived in a favourable light continuously as they are in the public domain and to ensure that there is access to capital markets will provide positive results (Aerts, 2005; Yasseen et al., 2017).

Impression management relating to annual reports can be divided into two categories: namely, impression management relating to the accounting numbers and that relating to presentational management (Beattie & Jones, 2000b). Impression

management relating to accounting numbers is the manipulation of the measurement and disclosure of the accounting numbers (Beattie & Jones, 2000b). Presentational management relates to the manipulation of the accounting narratives such as the chairman's statement or presentational formats such as graphs (Beattie & Jones, 2000b) which is the focus of this study.

Impression management studies have investigated the language used within annual reports (Leung et al., 2015). Research indicates that when a company is experiencing negative performance the explanations tend to use technical accounting terms which are confusing and unclear (Aerts, 1994). Positive performance, on the other hand, is explained in understandable and clear terms resulting in narratives of good performers being easier to read than poor performers (Aerts, 1994; Subramanian et al., 1993). The use of imagery such as photography and graphs has also been investigated as a tool of impression management (Stanton & Stanton, 2002). Photographs can personalise an entity and activate readers' imagination (Anderson & Imperia, 1992; Douglis, 2000). However, when used within an annual report, they may distract readers' attention from other information in the report and may not represent information faithfully (Simpson, 2002).

Similarly, the use of graphs within the annual report could be used to influence readers' perceptions (Stanton & Stanton, 2002). Although the use of graphs is universal, the preparers of graphs do not always have the skills required in graph design (Beattie & Jones, 2000). Graphs can be used as a tool of impression management and the result could be that managerial interests are served, rather than the users' interest (Beattie & Jones, 2008a). This is of particular concern as the voluntary, glossy front section is capable of overriding the information contained in the back section of the annual report which contains the numerical and statutory messages (Stanton et al., 2004).

Impression management relating to graphs can occur in three ways according to Beattie and Jones (2008a), namely selectivity, measurement distortion and presentational enhancement. Selectivity, at a basic level, is the decision whether or not to use graphs within the annual report (Beattie & Jones, 1992). Selectivity occurs when only favourable and positive information is disclosed (Beattie & Jones, 2008a). In terms of financial graphs, a company will only graph a variable if there is an increasing trend, for instance, a rise in net income and when there is a decline in a trend, such variables are not graphed (Beattie & Jones, 2008a). The fundamental principle of graph design is that the representation of numbers, as physically measured on the graph must be directly proportional to the numerical values of the variables being represented (Tufte, 1983). Measurement distortion occurs where the physical representation of the numbers on the graph is not proportionate to the underlying numbers (Tufte, 1983). Presentational enhancement occurs when the design of the graph components are changed to emphasise or understate certain features (Penrose, 2008). This is achieved through the selection of the graph

type, colour, axis, scale, and size (Penrose, 2008). In terms of the axis, when there are non-zero axes or broken axes the effect is that a positive trend is overstated and a negative trend is understated (Beattie & Jones, 2002)

In terms of the International Accounting Standards Board (IASB) Conceptual Framework ('the Framework') paragraph 1.2 the objective of financial statements is "to provide financial information about the reporting entity that is useful to existing and potential investors, lenders and other creditors in making decisions about providing resources to the entity" (IASB, 2018a). The purpose of financial reporting is to assist users with economic decision making as the financial statements contain information on a company's financial position, financial performance and the cash flows which represent economic phenomena in words and numbers (IASB, 2018a; Stainbank & Peebles, 2006). As information cannot be obtained directly from a company, users rely on the financial statements to obtain the financial information required (IASB, 2018a).

As the needs of users grow, the information provided to users must be useful, valuable and relevant (Myburgh, 2001). Per the Framework, paragraph 2.4, it states that for information to be useful "it must be relevant and faithfully represent what it purports to represent" (IASB, 2018a). The two characteristics of relevance and faithful representation are viewed as the fundamental qualitative characteristics (IASB, 2018a). Relevance is providing information which can make a difference in the decisions by users by having predictive value, confirmatory value or both (IASB, 2018a). In order to be useful financial information must faithfully represent the financial situation of an entity by being complete, neutral and free from error (IASB, 2018a). Completeness is achieved when all information, explanations and descriptions necessary for users to understand the financial information are included (IASB, 2018a). Information can be considered neutral when there is no bias in the selection or presentation of financial information so that information is not manipulated to increase the prospects that information will be received favourably by users (IASB, 2018a). Lastly, financial information free from error does not mean that it is accurate in every respect but that there are no errors or exclusions in the financial information that is disclosed (IASB, 2018a). The result of impression management conflicts with the qualitative characteristics of the Framework as the representation of information is no longer neutral and unbiased (Beattie & Jones, 2000a; Beattie & Jones, 2008a)

The International Standard on Auditing (ISA) 720 - The Auditor's Responsibilities Relating to Other Information discusses the auditor's responsibility relating to other information. In terms of ISA 720 paragraph 12(c) other information is "financial or non-financial information (other than financial statements and the auditor's report thereon) included in an entity's annual report". Graphs are usually classified as other information as the presentation of graphs is included in the voluntary front section of the annual report. Per ISA 720 paragraph 3, the auditor is required to read other information as other information which is materially inconsistent with the financial statements or with the auditor's knowledge could be a possible indicator that the

financial statements or other information are materially misstated. Such inconsistencies will undermine the credibility of the financial statements and the auditor's report which ultimately impacts the decisions of the users of financial statements (IAASB, 2015). The auditors' responsibility relating to other information in terms of ISA 720 paragraph 11 is:

a) *To consider whether there is a material inconsistency between the other information and the financial statements;*
b) *To consider whether there is a material inconsistency between the other information and the auditor's knowledge obtained in the audit;*
c) *To respond appropriately when the auditor identifies that such material inconsistencies appear to exist, or when the auditor otherwise becomes aware that other information appears to be materially misstated and*
d) *To report in accordance with ISA 720.*

Apart from the above guidance provided in ISA 720, there is no other explicit assurance standard specific to the use of graphs in annual reports (Beattie & Jones, 1992; Burgess, Dilla, Steinbart, & Shank, 2008). According to Burgess et al. (2008) the lack of guidance for auditors is shocking as research as far back to 1989 conducted by Steinbart (1989) revealed that companies distort graphs. A study conducted by Burgess et al. (2008) interviewed accountants and financial statement readers to identify if distorted graphs influence users' judgements. The findings of the study reflect that accountants and users agree that distorted graphs influence users' decisions and that standards for graphs should be drafted and auditors should ensure compliance with such standards. There is also limited research on the procedures auditors perform relating to other information (Beattie & Jones, 2000a).

Graphs are not included within the accounting regulation framework as the current standards do not cover the issues of graph design and presentation (Burgess et al., 2008; Melis, Jones, Gaia, & Aresu, 2013). Although graphs do not fall within the scope of general purpose financial reporting, in order to be useful and beneficial to users, the depiction of graphs must be faithful and impartial (P. Mather et al., 1996). The use of graphs is not regulated or audited and there is no authoritative guidance provided to the auditor to determine if graphs in the annual report are materially inconsistent: it is, as result, easier for management to manipulate graphs (De Klerk & Van Wyk, 2017; Steinbart, 1989).

Agency theory

A critical challenge for any economy is the optimal allocation of investments to companies (Healy & Palepu, 2001). The allocation is complicated because of two factors: the information problem when investors initially invest as companies will attempt to overstate the value (Healy & Palepu, 2001). Secondly, once there is an investment in a company, companies have a motive to expropriate and misuse the investments (Healy & Palepu, 2001). The agency theory arises as a result of

separation between ownership and control of a company (Jensen & Meckling, 1976). The principal, who is the investor/owner, hires an agent, who is the manager, to act on his/her behalf in managing the company (Ibrahim, 2011). The principal expects the agent to pursue the interests of the principal but the agent seeks to advance his/her own interest which results in the agency problem (Husted, 2007; Ibrahim, 2011).

Impression management literature can be viewed as a reflection of the agency theory as it regards voluntary disclosure as being driven by managerial self-serving reporting bias (Leung et al., 2015). The agency theory views a company as having agency relationships, and attempts to understand the reason for a company's behaviour by examining how the parties to the agency relationship within the firm maximise their own benefit (Rahman et al., 2014). An attribute of public companies is the separation of ownership and control which is viewed as an agency relationship with the shareholders being the principal and the managers of the company representing the agent (Hoffmann & Fieseler, 2012; Rahman et al., 2014). Because of the separation of ownership, an information asymmetry problem is created as managers have more information and are better informed than shareholders are, regarding a company's performance (Sartawi, 2015). Managers are expected to base their decisions on the principals' best interests, however as managers are better informed of the firm's real performance they can take actions to maximise their self-interest (Osma & Guillamón-Saorín, 2011). In the context of reporting, the aim of impression management is to present a self-serving view of company and managerial performance by selecting and presenting information in a specific way which is beneficial to the company issuing the report (Bowen et al., 2005)

Agency theory suggests that the conflict between managers and shareholders can be reduced to some degree by routine financial reporting which can be viewed as an accountability mechanism (Rahman et al., 2014). Performance cannot be observed directly and the providers of finance base their evaluation of management performance and effort on the reports produced by management (Rahman et al., 2014). This provides management with the incentive to manipulate performance reporting directly via the financial statements or indirectly by manipulating corporate communications such as the front section (Subramanian et al., 1993). The reputation of management will be enhanced, based on the reports issued, and this will increase the remuneration of management as agency costs will be perceived as being reduced (Jensen & Meckling, 1976).

Managers of companies tend to disclose voluntarily more information to demonstrate to shareholders that they are acting to maximize shareholders wealth, to keep their management position and justify their compensation (Inchausti, 1997). In terms of graphs, management can decide whether or not to use graphs and the variables to present graphically, all depending on the message conveyed to users which leads to biased reporting (Beattie & Jones, 1999). Further graphical construction techniques can be used to manipulate the message conveyed which can either exaggerate or understate trends (Beattie &

Jones, 1999). Information is manipulated by being biased as favourable information tends to be disclosed and by changing the graphical presentation of a graph (Beattie & Jones, 1997). The section which follows discusses the guidelines relating to a good graph.

2.8. Guidelines which 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). According to Kruskal (1975) graphs portray a powerful impression of data and because of this, the use of graphics must be meticulously planned.

According to Tufte (1983) effective graphs should contain six characteristics. The six principles as discussed in the research conducted by Uyar (2009) and Huang, Chung, and Cheng (2008) are as follows: 1)The magnitude of the change which is represented graphically must be directly proportional to the change depicted by the numerical data; 2) There must be adequate labelling on graphs to avoid any confusion; 3) Any changes to the graph design must reflect the change in the numerical data – the graph should reflect data variation and not design variation; 4) The graph should not contain visual effects which distract the reader; 5) Regarding time-series of data, the use of deflated and standardised units of monetary measurement are superior to nominal units and 6) there should be sufficient information and context to allow for the data to be interpreted accurately.

In the study conducted by Frownfelter-Lohrke and Fulkerson (2001) a list of eleven weaknesses in graphs and the corrective action was composed, based on research conducted by Tufte (1983), Jarett (1993), Jarett and Babad (1988) and the Canadian Institute of Chartered Accountants (CICA, 1993). The list of weaknesses and corrective actions is indicated in Table 1 below.

Table 1: Weaknesses and corrective actions relating to graphs

Number	Weakness	Corrective Action
1.	Inadequate chart titles and labels	There must be clear and detailed labels and important events in the data should be highlighted (Jarett, 1993; Tufte, 1983).
2.	No numerical labels	The specifier, which is the column which represents the numeric values, 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 for each graph disclosed (Jarett, 1993; Tufte, 1983)
4.	Optical illusions	The graphs should be two-dimensional and three-dimensional graphs should be avoided (Tufte, 1983).
5.	Inappropriate colour	There should be a maximum of six colours used and a legend should be included to identify why the colours are used (Jarett & Babad, 1988).
6.	Trendy visual effects	Graphs should be simply designed and unnecessary decoration should be avoided (Tufte, 1983).
7.	Missing, obscure, or multiple zero 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 may cause ambiguity and misinterpretation (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 (Tufte, 1983).
10.	Exaggerated width of data markers or spaces	Bars should be uniform and evenly spaced – the bars should not be disproportionality long and narrow or short and wide (Tufte, 1983).
11.	Overextended scales	The depiction of the graph should be directly proportional to any changes in the numerical values. If this principle is not adhered to, graphs will be distorted (Tufte, 1983).

Based on these principles Frownfelter-Lohrke and Fulkerson (2001) developed a checklist which identifies the guidelines for good graphs.

2.9. 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 (Tufte, 1983). As a result 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. The lie factor was modified by Taylor and Anderson (1986) to produce the GDI which is calculated as follows:

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

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

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). The exaggeration of an upward trend and the understatement of a declining trend both provide a more positive impression of the company's performance (Penrose, 2008).

2.10. Results of graph use from other studies

One of the early studies conducted is that of Steinbart (1989) in the USA where 319 annual reports from the Fortune 500 for 1986 were used to ascertain if the values presented in graphs matched those in the financial statements, the level of distortion in financial graphs and if presentational enhancement was noted. The descriptive results indicated that 79% of companies included graphs in their annual reports and the three most commonly graphed KFVs were sales, income and dividends (earnings per share was not included). All values in graphs matched the data presented in the financial statements. Using GDI as a measure of distortion it was found that the mean GDI was 11% suggesting that the data trend for KFVs was exaggerated by an average of 11%. Approximately 26% of the graphs of KFVs in the sample were materially distorted where material distortion was measured as more than 10% in absolute terms. It was also found that discrepant graphs which are more favourable to a company are more likely to occur in annual reports for companies which experienced a decline in net income.

Beattie and Jones (1992) analysed 240 large UK companies for the year ended 1989. The study looked at selectivity regarding whether a KFV was graphed depending on the performance of the company and in terms of the variable being graphed. Measurement distortion was studied in terms of whether distortion gives a more favourable view of the company and if favourable measurement distortion occurs more often when a company was performing poorly. The findings reveal that 79% of UK companies use graphs, with 65% graphing at least one KFV. It was found that KFV graphs are significantly more likely to be included in the annual reports of companies with good, rather than bad, performance and the effect of distortion is that a company's performance is viewed as favourable. The mean GDI score for listed entities KFV graphs was found to be 10.7% (that is, underlying data was exaggerated by 10.7%) which is similar to Steinbart's (Steinbart, 1989) GDI of 11%.

Material measurement distortions occurred in 30% of KFV graphs where a threshold of 5% was considered to be material. If a 10% threshold is used 20% of the KFV graphs were materially distorted.

Beattie and Jones (1997) extended the study relating to UK companies and completed a comparison between 85 UK and 91 US companies using the 1990 annual reports of companies. The study was designed to identify if there are differences in the use of graphs between the two countries in terms of the extent of graphs, the time series of graphs mapped and the level of distortion. In both countries, companies graphed financial variables more than non-financial variables. Also companies in both countries displayed selectivity in that graphs of KFVs were included in the annual reports of companies with favourable rather than unfavourable financial performance. 80% of UK companies were found to use graphs whereas 92% of US companies used graphs in the annual report. Non-compliance with graph design and construction principles was found for companies in the US and the UK, for example, no gridlines included in graphs, no numeric labels on financial variable axis and three-dimensional graphs in use. 24% of KFV graphs were materially distorted in both the US and UK (material distortion was considered as being more than 5%). The mean level of measurement distortion was greater in the US where the GDI was 16%, compared with the GDI in UK which was 7%. The GDI in this study was different from that of Steinbart (1989) where the GDI of US companies was 11% and Beattie and Jones (1992) where UK companies reflected a GDI of 10.7%.

P. Mather et al. (1996) and Beattie and Jones (1999) conducted research on the use of graphs in Australian companies. P. Mather et al. (1996) looked at selectivity, that is, whether the presence of KFV is impacted by the company's performance; distortion in terms of whether there is an association between distortion and the performance of a company by analysing the top 150[1] Australian Stock Exchange listed as at December 1992, as well as 44 non-profit entities. The use of graphs was found to be more common in listed entities (83%) than non-profit entities (73%). Regarding selectivity, no evidence of selectivity was found for the top 50 companies but evidence of selectivity for the next 100 companies over one year, where smaller companies were more likely to include KFVs when their performance increased. The mean GDI score for listed entities was found to be 16.4%. 21.3% of KFV graphs had a GDI of greater than 10% and were considered materially distorted if the threshold is 10% whereas 29.7% of KFV were materially distorted using the 5% cut-off. Exaggeration (15.5%) was found to occur more frequently than understatement (14.2%). However no significant relationship was found between distortion of KFV graphs and company performance which contrasts with Steinbart (1989) findings. The mean GDI score for non-profit entities was 105.6%.

[1] 7 companies were eliminated as the annual reports could not be obtained hence 143 companies were analysed.

Beattie and Jones's (1999) scope was extended to include presentational enhancement, length of time series graphed, graph type, effect of industry classification, graphic designer and topics graphed. The top 100 companies at 31 December 1991 listed on the Australian Stock Exchange were selected; reports were only received for 89 companies. 89% of companies used graphs in the annual reports. It was found that Australian companies were selective in their use of graphs, graphs were materially distorted and presentational enhancement was used. If 5% is considered as the threshold for materiality, it was found that 34% of the graphs of KFVs were materially distorted. The mean GDI score for listed entities was found to be 10.5% and KFV graphs were likely to enhance the financial results of the company as 31% of distortions created a more favourable view than 19% which create a less favourable view.

Beattie and Jones (2000) studied whether the use of graphs at an aggregate and individual company levels depends on corporate performance. Selectivity as a means of measurement distortion was analysed. 137 Top UK companies which were in existence for the five-year period 1988 to 1992 were examined. Strong evidence was found showing that companies select to disclose graphs based on corporate performance. This is particularly true for changes in the direction and percentage of income and EPS as companies were found to be more likely to include graphs in their annual reports when income and EPS increased. Based on the research conducted it was concluded that financial graphs in annual reports can be used to manage favourably the reader's impression of company performance, resulting in a reporting bias.

A study conducted by Frownfelter-Lohrke and Fulkerson (2001) analysed the use of graphs in 37 US-listed and 37 non US listed companies, from 12 countries on the New York Stock Exchange for the period 1984 to 1994. The frequency of graphs, subject matter, compliance with standards for good graphs and measurement distortion were examined. 79% of the annual reports contained graphs and companies were found to depict financial information more often than non-financial information. If this is analysed in terms of US and non US companies, 89% of US companies and 86% of non US companies used graphs. Graphs were found not to comply with guidelines relating to graphics. Some of the findings include 34% of companies which did not supply a legend, 43% of graphs did not use a scale and 17% of the scales did not start at zero. Both groups were found to include distorted graphs but the non U.S. companies had a greater incidence of distortion. The graphs in US reports were distorted on average by 81% and non US companies the average was 173%.

Beattie et al. (2008b) conducted a study on the change in presentation of UK annual reports with a focus on graph use. It was found that the use of graphs increased from 79% in 1989 to 99% in 2004. The increase was due to an increase in the use of non–KFV graphs. There was a decline found in use of KFV graphs. Profit was the most graphed variable, followed by EPS, DPS and, lastly, sales. It was found that most KFV graphs displayed, used column or bar graphs. Selectivity was found in the

use of graphs but this declined slightly from 1989. Using a 10% cut-off for material distortion, it was found that 49% of graphs were distorted.

Uyar (2009) completed a study of the top 100 companies listed on the Istanbul Stock Exchange for 2006, however, only 96 companies were looked at as the annual reports of 4 companies could not be obtained. The study looked at whether there are differences across industries relating to graph disclosure in the annual report and if there was any significant correlation between graphic disclosure and the variables: firm performance, stock price performance, firm size, profitability, and open-to-public ratio. It was found that 75% of companies use graphs, financial companies including most graphs (financial and non-financial) in their annual reports. Most widely graphed KFVs were sales (49%) and profit (36%), but, EPS and DPS variables were not graphed by any of the companies. No correlation was found between the numbers of graphs and performance of a company. However, it was found that there is a correlation between the firm size and the number of graphs as larger companies included more graphs in the annual report. In addition, as profitability increased, the disclosure of graphs also increased. Guidelines relating to good graphs were not always followed as graphs in the annual reports did not have gridlines or vertical axes; time-series were in reverse and non-zero baselines were used.

Rahman et al. (2014) conducted a study where 54 non-financial public listed entities in Malaysia were analysed over a thirty-year period using a ten-year interval period (1974, 1984, 1994 and 2004). The study considered the nature of graphs used in the annual reports of Malaysian companies with focus being placed on the type of graphs used, topics graphed and the trend in disclosure of graphical information over the period mentioned above. The results indicate that the most popular graph type used for all the four years was the bar graph. The growth of graph disclosure increased from 1974 where only 15% of companies used at least one graph to 65% in 2004. Overall the researchers concluded that voluntary disclosure in terms of graphs for Malaysian companies grew at an average level which indicates that Malaysian companies are moderately aware of the importance of providing additional voluntary information in their annual reports. In terms of the topics graphed, profit, turnover, and EPS were the most commonly graphed financial variables. In Malaysia it was found that DPS only ranked between seventh and ninth place although this was considered to be a KFV in other studies conducted by Beattie and Jones (1992), Beattie and Jones (1999) and D. Mather et al. (2005).

A study of the use of graphs relating to the top 50 European companies listed on the Fortune 500 index for 2006, 2009 and 2012 was conducted by Falschlunger et al. (2015). Selectivity, measurement distortion and presentational enhancement were all assessed. All analysed companies used graphs in their annual reports for 2009 and 2012 with column and bar charts being favoured. In 2006 only one company did not use at least one graph in its annual report, resulting in 97.7% graph use.

Graphs were found to be disclosed for both KFV and non-KFV. It was found that the topics presented in graphs differed for the applicable years, indicating that companies are selective regarding information presented. The results also indicate that companies only show longer time sequences if they can present a positive trend. Both KFVs and non-KFVs graphs were distorted but it was found that positive trends are more often exaggerated than understated. Presentational enhancements were used for favourable information rather than for unfavourable information.

Sartawi (2015) analysed the annual reports of 15 banks listed on Amman Stock Exchange for the period 2008 - 2013. The study looked at the relationship between graph disclosure and the following variables: board size, board independence, effectiveness of the audit committee and firm size. Further presentational enhancement as a means of distortion was considered. The results revealed that 64.4% of the annual reports examined included at least one graph which amounted to 58 out of 90 reports. The researchers considered this to be a moderate level of graph use when compared to other studies such as P. Mather et al. (1996). Reasons for this may be due to Jordanian managers not being willing to expand communication techniques to include graphs (Courtis, 1997) or that current Jordanian regulation allows firms to decide whether or not to use graphs in the annual reports. The results indicate that 32% of the annual reports contain improperly designed graphs and 43% of the graphs were noted to be improperly designed and to distort the underlying information. In terms of presentational enhancement almost 57% of the improperly designed graphs were constructed without zero bases. 37% of the improperly designed graphs reverse the sequence of years which may lead to incorrect interpretations and create a misleading impression that the variable graphed is increasing. It was found that the board size and the effectiveness of the audit committee did not reduce the level of graph disclosure but non-executive directors appear to be limiting the use of graphs in annual reports. This may be attributed to non-executive directors in Jordanian banks being aware of the possibility of using graphs as an impression management tool and so limit their use. Lastly, the study also indicated that Jordanian banks tend to use graphs to enhance their positive achievements as more graphs are included when performance is positive.

From a South African perspective De Klerk and Van Wyk (2017) completed a study on impression management by analysing environmental, social and governance (ESG) graphs in the integrated reports of mining companies for the period 2010 to 2013. The study considered the extent that South African mining companies use ESG graphs. Impression management was considered in terms of selectivity and measurement distortion. Measurement distortion was measured using the GDI. It was found that the majority of companies use graphs with only 14% of companies not using graphs (4 companies out of 28 companies did not use graphs). In terms of selectivity, companies were found to illustrate a decreasing trend in bad news topics and increasing trend in good news topics. Impression management in the form of graph selection was evident and significant for ESG graphs. The results of measurement distortion indicated that many South African mining companies did

not make use of measurement distortion as a form of impression management. Only 1% of the graphs were found to contain measurement distortion. This suggests that South Africa might be more conservative regarding impression management and graphs when compared to the other studies conducted. Although the study considered impression management and the use of graphs from a South African perspective the study was limited. Further only non-financial information graphs were considered and so impression management in terms of financial graphs was not analysed for South African companies.

Table 2 below summarises the prior research conducted on graphs in annual reports in terms of the frequency of graphs and the measurement distortion reported. The format of the table has been obtained from the study completed by Frownfelter-Lohrke and Fulkerson (2001).

Table 2 : Overview of prior studies conducted regarding the use of graphs in annual reports

Study	Company population	Number of companies in sample	Percent of companies using graphs	Year examined	Percent of improperly constructed graphs	Material distortion cut-off	Average GDI
NORTH AMERICA							
Steinbart (1989)	US Fortune 500	319	79%	1986	26%	10%	11%
Frownfelter-Lohrke and Fulkerson (2001)	Companies listed on the New York and American Stock Exchanges	37 – US Listed Companies 37 – Non-US Listed Companies (270 Annual Reports for 12 Countries)	US Companies – 89% Non-US Companies – 86%	1984-1994	Not provided	Not provided	US Companies – 81% Non-US Companies – 173%
EUROPE							
Beattie and Jones (1992)	UK Large Listed companies by capitalisation	240	79%	1989	30%	5%	10.7%
Uyar (2009)	Companies listed on the	96	75%	2006	The study focused on the frequency of using graphs and the correlation between		

Study	Company population	Number of companies in sample	Percent of companies using graphs	Year examined	Percent of improperly constructed graphs	Material distortion cut-off	Average GDI
	Istanbul Stock Exchange				graphs and firm factors. Distortion was looked at but not in detail		
Falschlunger et al. (2015)	Top 50 European Companies on the Fortune 500 index	50	2006 – 97.7% 2009 - 100% 2012 – 100%	2006, 2009 and 2012	43.2%	5%	773.2%
NORTH AMERICA AND EUROPE							
Beattie and Jones (1997)	Largest based on sales of 100 UK and US companies	85 UK and 91 US Companies	UK- 80% US – 92%	1990	UK – 24% US -24%	5%	UK – 7% US – 16%
AUSTRALIA AND OCEANIA							
P. Mather et al. (1996)	Top 150 Companies listed on the Australian Stock Exchange and 44 Non-profit entities	Listed – 143 Non-Profit - 44	Listed – 83% Non-Profit – 73%	1992	Listed – 21.3% Non-profit – 51%	Listed – 10% Non-profit – 5%	Listed – 16.4% Non-profit – 105.6%
Beattie and Jones (1999)	Top 100 Companies listed on the Australian Stock Exchange	89	89%	1991	34%	5%	10.5%
ASIA							
Rahman et al. (2014)	Non-financial public listed companies on the Kuala Lumpur Stock Exchange	54	1974 – 15% 1984 – 31% 1994 – 59% 2004 – 65%	Thirty years using a 10 year interval period (1974,	The study focused on the frequency of using graphs, type of graphs and the topic of graphs. Measurement distortion and presentational enhancement were not considered.		

Study	Company population	Number of companies in sample	Percent of companies using graphs	Year examined	Percent of improperly constructed graphs	Material distortion cut-off	Average GDI
				1984, 1994 and 2004)			
Sartawi (2015)	Banks listed on the Amman Stock Exchange	15	64.4%	2008 – 2013	43%	Not calculated	Not calculated
AFRICA							
De Klerk and Van Wyk (2017)	Mining companies listed on the Johannesburg Stock Exchange	28	86%	2010 – 2013	1%	Not disclosed	Not disclosed

2.11. Conclusion

Although there are different ways in which a company can communicate with its stakeholders the annual report is considered an important element and a traditional form of communication between a company and its stakeholders (Lee & Tweedie, 1975a, 1975b; Stanton et al., 2004; Yuthas et al., 2002).

The form of the annual report has changed as companies are increasingly using visuals in order to enhance the usefulness of the annual report (Beattie & Jones, 2008a; Frownfelter-Lohrke & Fulkerson, 2001). Users of annual reports range from skilled professionals such as equity investors who scrutinize every element of the corporation before making an investment decision to naïve investors who do not necessarily analyse the annual report but may be influenced by visuals such as graphs (Penrose, 2008). The increasing use of graphs to display information is depicted in Table 2 above based on research conducted. Graphs are a form of graphic communication which is viewed as a universal language and can bridge language and cultural barriers (Horton, 1993). In addition, the pictorial nature of graphs assists in enhancing users' understanding when compared to the understanding derived from tables or texts (Schmid & Schmid, 1979).

However, the use of graphs is not problem-free as graphs which are not correctly constructed and are influenced by management bias will not enhance users' understanding as managerial interests will be enhanced (Beattie & Jones, 2008a;

De Klerk & Van Wyk, 2017; Schmid & Schmid, 1979; Steinbart, 1989). There is no set guidance provided to the preparers of graphs on what a good graph should consist of or to auditors in order to identify when graphs are materially distorted (Beattie & Jones, 1992; Burgess et al., 2008; De Klerk & Van Wyk, 2017; Steinbart, 1989). Graphs which are not designed correctly provide the opportunity for management to create a favourable picture of a company's performance (Murphy & Zimmerman, 1993). The question of whether annual reports provide credible information has been disputed as it is alleged that sections of the report are managed to present management in a positive and favourable light (Stanton et al., 2004).

3. Methodology

3.1. Research methodology

The purpose of the study is to analyse the incidence, quality and measurement distortion of graphs in the annual integrated reports of the Top 100 South African companies listed on the main board of the JSE. In order to achieve this, the graphs in the annual reports of the listed entities were analysed for specific elements, determined by the research questions posed: this was based on a replicated study by Frownfelter-Lohrke and Fulkerson (2001).

Research has been described as a systematic investigation or inquiry where data are collected, analysed and interpreted in order to understand, describe or predict an occurrence or occurrences (Burns, 1997; Mertens, 2005). The research process includes defining the problem, searching for information, developing research questions or hypotheses, selecting a research design, collecting data, analysing the data either quantitatively or qualitatively to answer the research questions or to verify, modify or reject the hypotheses and to report on the findings (Bacon-Shone, 2015). Research can be viewed as a systematic manner of solving problems by answering questions or hypotheses by obtaining verifiable data (Bacon-Shone, 2015).

A research paradigm is a set of assumptions and beliefs about how the world is viewed and this provides a framework which guides the behaviour of the researcher and is described as the whole system of thinking (Jonker & Pennink, 2010; Neuman, 2011). The paradigm selected sets the intent, motivation and expectations for the research (Mackenzie & Knipe, 2006). It influences the methodology which is where the assumptions, knowledge, theory and practice on a topic come together (Chilisa & Kawulich, 2012). Positivism is a research paradigm which can be followed when conducting research. Positivism is sometimes referred to as a scientific method as it aims to test a theory or describe an experience through observation and measurement in order to predict a phenomenon (O'leary, 2004). Positivist theory suggests that if different researchers observe the same factual problem they should generate a similar result by applying a similar research process and using statistical analysis (Creswell, 2009). This is because in a positivist research paradigm, the researcher is limited to data collection and interpretation in an objective way and the research findings are usually observable and quantifiable

(Dudovskiy, 2018). A positivist researcher should be able to adopt a distant, neutral and minimal interaction with the research participants (Dudovskiy, 2018; Morris, 2006). In positivism studies the researcher is independent from the study as there is a concentration on facts, a non-interactive approach is adopted and detached interpretations are reached on the data collected (Druckman, 2005; Dudovskiy, 2018; Morris, 2006). The application of a positivist paradigm results in a quantitative research methodology being applied as data are collected and analysed via statistical means (Hallebone & Priest, 2009; Leedy & Ormrod, 2015; Lincoln & Guba, 2005; Saunders, Lewis, & Thornhill, 2009; Wahyuni, 2012).

Quantitative research can be described as a research strategy which deals with the collection and analysis of data (Bryman & Bell, 2011). It involves the gathering of data in a numerical form which can be put into categories, rank order, or measured in units of measurement as this provides a systematic manner for data to be analysed (McLeod, 2017; Perumal, 2014). The main characteristic of quantitative research is that the data is collected using structured research instruments, the research study can usually be replicated or repeated, there are clearly defined research questions needing to be answered and data is in the form of numbers and statistics (Labaree, 2018). Descriptive quantitative research which involves either identifying the characteristics of an observed phenomenon or exploring the possible relationships between two or more phenomena, does not change a situation under investigation nor is it intended to determine a cause and effect relationship (Leedy & Ormrod, 2015). The researcher adopts a distanced stance and studies the phenomenon as an outsider (Mouton & Marais, 1988).

The study conducted has been framed within a positivist research paradigm using a descriptive quantitative research method. The study has analysed the extent to which graphs are used, the type of graphs used, compliance with good graph standards and the measurement distortion of graphs. Compliance with good graphs and the calculation of measurement distortion in graph use, considered measures which have been researched and applied in other studies and is not the researchers' own method which reduces subjectivity when data is collected and analysed as structured research instruments were used. The data used in the study were obtained from the annual reports of listed companies which resulted in no interaction with research participants so the researcher was independent which facilitates objectivity (Dudovskiy, 2018; Hallebone & Priest, 2009; Lincoln & Guba, 2005; Saunders et al., 2009; Wahyuni, 2012). The data collected was numerical and was analysed using statistical means, resulting in the research approach being quantitative (Leedy & Ormrod, 2015; Wahyuni, 2012). The research was also aimed at making generalisations which contribute to existing theories, also a characteristic of quantitative research (Leedy & Ormrod, 2015).

In order to conduct the research the following questions were posed which were based on the study by Frownfelter-Lohrke and Fulkerson (2001).

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

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

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

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

3.2. Population and sampling

3.2.1 Population

The Companies Act, 71 of 2008 (Companies Act) categorises companies as either profit companies or non-profit companies. Profit companies are split into state-owned companies, private companies, personal liability companies and public companies. Public companies operate for profit and are allowed to offer their shares to the public (all listed companies are public companies). For the purpose of this study, the type of companies studied relates to public listed companies. The population of listed companies relates to companies listed on the Main Board of the JSE by market capitalisation. The Main Board relates to companies that are well known and established. The reason for selecting public listed companies is that all prior studies have used companies listed on an exchange, including the replicated study by Frownfelter-Lohrke and Fulkerson (2001). Selecting South African listed companies enabled comparisons regarding the use of graphs with prior studies. Listed companies on the Main Board are required to produce integrated annual reports in line with the JSE Listing Requirements which is the medium of communication selected for this study. This ensures that sufficient information will be available to allow data required for the research questions to be collected. Lastly, information relating to graphs is readily available for listed companies which will further facilitate the collection of data.

3.2.2 Sampling

Purposive sampling which is a form of non-probability sampling was employed in the study as the research questions are designed to enhance the understanding regarding listed companies' use of graphs (Devers & Frankel, 2000; Leedy & Ormrod, 2015). The Top 100 Companies listed on the Main Board of the JSE were selected as the sample. The selection of the Top 100 companies allows comparisons to be completed with prior studies where the use of graphs was researched in terms of the larger listed companies in countries (Refer to Table 2). An additional reason for selecting 100 companies was

that the analysis of graphs would take a significant amount of time and, to ensure that the data is manageable the sample was limited to the Top 100 listed companies.

An e-mail request was sent to the contact address per the JSE website requesting the full list of companies on the JSE, the industry the company belongs to and the market capitalisation. A response was received on 28 March 2018 and the sample was selected based on this information. In total there were 317 companies listed on the JSE at 28 March 2018 and 100 companies were selected for the study. During the collection of data, annual reports relating to two companies were excluded from the sample. The first company excluded from the sample was Mondi Limited as the same integrated annual report is produced for Mondi plc which is part of the Top 100 companies as well. Mondi Limited and Mondi plc are known as the Mondi Group and are managed as a single economic enterprise (Mondi, 2018). The board of directors and management teams of Mondi Limited and Mondi plc are identical (Mondi, 2018). The second company is Steinhoff International Holdings where the integrated annual report could not be obtained as the company announced the restatement of financial statements. The 2017 annual integrated report has not been published and the company has been excluded from the sample. Based on this, the final population consisted of 98 companies.

The period analysed for the research related to the financial year ending 2017. The 2017 results are the most recent results available for the listed companies in the sample which ensured consistency as all companies would have published their 2017 annual reports at the time that the research was conducted. This is in line with the Listing Requirements as listed companies must distribute the annual financial statements to all shareholders within three months of its financial year-end and, if this is not adhered to the company must publish provisional annual financial statements (JSE, 2018). It would be expected that the 2017 annual reports of the Top 100 companies have been issued and could be used in the sample for the purposes of the study.

3.3. Analysis plan – data collection and data analysis

The section which follows addresses the data collection method and the data analysis for each research question. In order to gather the necessary data, the annual reports of the selected listed companies were obtained from the respective corporate websites of the companies. An electronic version of the annual report for each company for the financial year ending 2017 was downloaded.

An Excel spreadsheet was used to record information in terms of : the name of the company, market capitalisation, sector, number of pages in the annual report, type of graphs, subject matter of graphs (that is the variable which is graphed), number

of graphs appearing in the annual report, the guidelines for good graphs (refer below) and the calculation of GDI. The variables relating to graphs were split between KFV's graphs, other financial graphs and non-financial graphs.

RQ1and RQ2: Frequency of graphs in annual reports of the top 100 South African listed companies and RQ2 subject matter of graphs included in the annual reports of the top 100 South African listed companies

The first research question investigated if South African listed entities use graphs to the same extent as do countries in which similar studies have been conducted. The second research question identified the variables graphed (that is financial and non-financial graphs) in the annual reports of South African listed entities. The number of graphs which appear in the annual report of listed entities was manually counted and recorded in the 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/column, area, combination of line-bar and other.

The percentage of graph use as well as the number of graphs in total was calculated, as well as per variable. The variables analysed related to financial graphs which were classified as KFV and other financial graphs and non-financial graphs. The average number of graphs per annual report was also calculated. The results were compared with the results obtained from prior studies to identify whether the frequency of graph use is similar to trends established in other countries. An analysis was conducted to identify the number of graphs appearing per sector. The type of sector was obtained from the information received from the JSE as a column was included indicating the sector to which a company belongs. The results were compared to the study completed by Uyar (2009) as a sector analysis was completed in this study.

An analysis was completed to identify the type of graphs used most commonly in the annual report according to the categories mentioned above. The type of graph was, firstly, analysed at an overall level in terms of the total number of graphs which appeared in the annual report. The overall analysis was then completed at a variable level to identify the type of graphs most common at the variable level. The results obtained were compared with prior studies.

An analysis was conducted over the variables graphed in the annual reports in order to identify which variable is preferred by South African companies. The variable graphed was analysed in terms of KFV, other financial graphs and non-financial graphs. Regarding KFV, additional analysis was completed to identify which is the preferred KFV for South African listed companies. The findings analysed were compared to the prior studies to assess if the use of KFV is similar or if differences are noted.

As part of the data collection, the number of pages per annual report was recorded. A test was completed to identify whether there is a correlation between the number of pages and the number of graphs displayed in the annual report. It would be expected that as the number of pages increase the number of graphs may increase given the increasing and universal use of graphs. A Spearman Rho test which is a nonparametric version of the Pearson Correlation was used to test the strength between the number of pages in the annual report and the number of graphs. Similarly, a Spearman Rho test was used to test the strength between the market capitalisation of a company and the number of graphs displayed. The market capitalisation was used as a proxy for a company's size. In the study conducted by Uyar (2009) it was concluded that the larger the company size the more graphs were disclosed in a company's annual report. The test was completed to identify if a similar result would be found for South African companies. In terms of the Spearman Rho test the correlation co-efficient - rho (r) is considered. The correlation co-efficient can range from -1 to +1. The closer the absolute value of r is to 1, the stronger the relationship between the two variables. Similarly, the closer r is to 0, the weaker the relationship.

RQ3: Compliance with standards for good graphs in the annual reports of top 100 South African listed companies

In order to create good graphs which serve to highlight and clarify relationships, as well as filter and summarise data, graphs have to be properly planned and constructed (Frownfelter-Lohrke & Fulkerson, 2001). Currently there are no mandated standards for the creation and presentation of graphs but there is research which provides guidelines on what a good graph should comprise of. In the study conducted by Frownfelter-Lohrke and Fulkerson (2001) a list of eleven weaknesses in graphs and the corrective action was composed, based on research conducted by Tufte (1983), Jarett (1993), Jarett and Babad (1988) and the Canadian Institute of Chartered Accountants (CICA, 1993). The eleven weaknesses and corrective actions have been included in Table 1. Based on these principles Frownfelter-Lohrke and Fulkerson (2001) developed a checklist which identifies the guidelines for good graphs. Beattie and Jones (1997) used the principles dictated by Kosslyn (1989) to measure the compliance with good graph guidelines. These are similar to the principles noted by Frownfelter-Lohrke and Fulkerson (2001) but there are some variations. For the purpose of this study, the checklist created by Frownfelter-Lohrke and Fulkerson (2001) was used to determine whether South African companies comply with graph guidelines, however, additional guidelines based on the checklist developed by Beattie and Jones (1997) were incorporated. (Please refer to **Appendix A** for the checklist).

The graphs analysed were both financial and non-financial graphs. Certain questions (reflected in Appendix A) were not applicable to all types of graphs. For instance, the inclusion of an axis was not considered for pie charts or other graphs such as bubble charts. Each question was answered by a Yes, No or Not applicable response. 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 a question applicable to the graph. The results for each question were counted using the applicable formula on Excel. The results were analysed to identify if companies comply with the guidelines and compliance and non-compliance. The results were presented in a tabular format to facilitate understanding. Comparisons with previous research were conducted to identify if South African companies have similar results to the studies in other countries.

RQ4: Level of distortion for graphs included in the annual reports of the top 100 South African listed companies

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 which is discussed under Section 2.9. D. Mather et al. (2005) critically analysed the accuracy of the GDI and found limitations to using the GDI and introduced the Relative Graph Discrepancy index (RGDI). For the purposes of this study, the GDI will be used to calculate measurement distortion to allow comparability with previous studies where the GDI was used as the measure.

In terms of determining material measurement distortion, Tufte (1983) suggests that values of GDI above 5% are classified as material exaggeration and values below -5% are classified as material understatement. Beattie and Jones (2002) completed a study on what percentage of distortion would trigger a change in the users' perceptions of company performance. It was found that users would not notice a 5% level of measurement distortion whereas a 20% level of measurement distortion would be noticed. At a 10% level the results were mixed and as a result the study concluded by saying that in order to be prudent and to avoid misrepresentation to users' measurement distortions in excess of 10% should not be allowed. Although the term 'more than' is used by Tufte in the studies conducted by D. Mather et al. (2005), Beattie and Jones (1992) and Beattie and Jones (1997) a figure of greater/less than and equal to 5% was used, based on the conclusions of Pany and Wheeler (1989) review of materiality judgements. For the purposes of this study, the established measure of ≥5% and ≤5% was used to determine if measurement distortion is seen as material.

Measurement distortion was calculated using the GDI formula for all graphs which fall within the following graph types: bar, column, line, combination of line-bar and the stacked bar/column. Graphs which do not fall within these stated types will not be subject to a GDI test. Values above and including +5% and -5% will be classified as material exaggeration and material understatement respectively. Consistent with prior studies, positive (negative) values of the GDI indicate the percentage by which the trend in the data is exaggerated (understated) (Penrose, 2008). Measurements for the height of GDI were measured to the nearest millimeter and were converted to centimeters to comply with the formula. The GDI was calculated on Excel, using the formula indicated under Section 2.9.

In order to analyse the data, the full population of graphs was split into three categories: graphs in which GDI was calculated, graphs which did not have data and graphs for which a GDI did not have to be calculated because of their nature. If a graph did not have the required data, the GDI could not be calculated. The number of graphs per each category was counted on Excel. Once the number of graphs was obtained, the analysis focused on the graphs in which the GDI could be calculated. Using Excel, a formula was used to determine if a graph exceeded the 5% threshold in real terms. Based on this formula the total number of graphs materially distorted was calculated as well as the number of graphs either materially exaggerated or materially understated. An investigation was completed to identify differences in distortion for financial versus non-financial graphs. The average GDI for all graphs, as well as per variable was calculated. An analysis of measurement distortion was also completed for each of the KFV in order to understand measurement distortion of financial variables. This included identifying the number of graphs materially exaggerated or materially understated for each KFV as well as calculating the average GDI for each KFV.

3.4. Validity and reliability

Validity and reliability refer to whether a set of indicators measures a concept and whether that measure is consistent (Bryman & Bell, 2011). Validity is the ability of an instrument to measure what it is designed to measure and it is important in order to justify the outcome at the end of the research process (Perumal, 2014; Smith, 1991). A factor included to assess validity is content validity which refers to there being a logical link between the research questions and the objectives of the research (Perumal, 2014). The measures used in the study must be such that they provide the researcher with information required to answer the research questions (Patrick, 2009). 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. The research questions were obtained from a replicated study which further ensured that the research questions and measures were appropriately aligned. External validity is another measure of validity and refers to the extent to which the results of a study can be generalised from a sample to a population (Patrick, 2009). The sample selected is the Top 100 listed companies which provides representation of large companies and also ensures broader coverage.

Reliability can be described as whether the instrument used in the research study can consistently measure what it is intended to measure (Patrick, 2009). In order to achieve validity and reliability, the data must be observed in a systematic and unbiased manner (Mouton & Marais, 1988). The study is replicated based on the study conducted by Frownfelter-Lohrke and Fulkerson (2001) study. Reliability will be achieved as the data relating to graphs were collected from the annual reports of JSE Listed entities which will ensure stability as the analysis remains unchanged. In addition, the criteria used to determine

presentational enhancement will be consistently applied for each graph examined (Galpin & Krommenhoek, 2013). The data collected and observed for each research question are noted under Section 3.2 and were carefully selected to ensure that sufficient data could be obtained to facilitate adequate answering of the research questions. Further data used were obtained directly from the annual reports which are publicly available, reducing concerns relating to subjectivity.

3.5. Ethical considerations

Ethical considerations in research are critical as they assist the researcher to differentiate between acceptable and unacceptable behaviour. The research should be designed to ensure that objectivity and integrity is maintained. In a quantitative study, objectivity and integrity are achieved by minimising the researcher's subjectivity (Neuman, 2011). In the analysis of results there were no references made to specific company names and anonymity was retained. Data picked and selected to make the results look better is unethical (Jones, 2000). Data collected for the study related to information required for answering the research questions posed and data were not selected to achieve a pre-determined conclusion. The International Statistical Institute ('ISI') has in place a Declaration on Professional Ethics ('Declaration') which guides quantitative researchers and statisticians and assists in ensuring that ethical judgements are made (ISI, 2010; Jones, 2000). Some principles mentioned in the ISI are truthfulness and integrity (ISI, 2010). This entails that the statistical methodologies used are transparent, the results are presented in an impartial manner and data and the analysis of the data are completed honestly and openly (ISI, 2010). The statistical methods used for the purpose of the study have been presented under Section 3.3. The results presented were based on the outcome of the data collected and has been communicated irrespective of whether the findings were positive or negative which eliminates the possibility of false information being presented.

4. Analysis of results

The study was carried out to determine whether South African companies employ impression management techniques such as presentational enhancement and measurement distortion when displaying both financial and non-financial graphs in their annual reports. This may indicate that reporting bias is introduced and the underlying performance of a company may be influenced by the distortion of graphs. The top 100 companies listed on the main board of the JSE were analysed to examine the frequency of graphs, type of graphs and if graphs contain elements of impression management.

Chapter Four is structured as follows: the first section presents descriptive statistics relating to the use of graphs. The descriptive statistics include an overview of the number of graphs presented, the variable of graphs used, that is, financial versus non-financial graphs and the type of graph used.

The next section discusses whether South African companies employ presentational enhancement techniques relating to graphs displayed in the annual report. The final section discusses if measurement distortion was found in the graphs displayed.

4.1. Descriptive statistics

The descriptive statistics which follow will discuss the frequency of graphs in the annual reports of South African listed companies. Included in this section is an analysis of the use of graphs per the sectors within the top 100 companies listed. The type of graph and variable graphed (financial versus non-financial) has also been analysed.

4.1.1. Frequency of graphs

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

The use of graphs in South African listed entities is common and conforms to the results obtained in prior studies. In the study conducted by Falschlunger et al. (2015) 100% of the top 50 European Companies included graphs in their annual reports. South African listed companies use more graph disclosure in their annual reports when compared to Turkey where 75% of companies presented graphs (Uyar, 2009), Australia where 89% of listed companies presented graphs (Beattie & Jones, 1999), Jordan where 64% presented graphs (Sartawi, 2015) and Malaysia where 65% presented graphs in the annual report (Rahman et al., 2014). In the study conducted by Beattie and Jones (1997) 80% of UK listed companies and 92% of US listed companies included graphs in their annual reports. Beattie et al. (2008b) noted that the graph use in UK companies increased from 79% in 1989 to 99% in 2004, indicating that graphs have become a common feature of the annual report.

4.1.2. Graphic disclosure per sector

The sector which had most graphs related to the Basic Resources Sector where 934 (23.3%) graphs were presented, followed by Real Estate where 597 (14.9%) graphs were presented, followed by the Banking Sector where 471 (11.8%) graphs were presented. In terms of the number of companies per sector, the Basic Resources sector had 17 companies (17.3%) in the top 100 companies, followed by Real Estate where 15 companies comprised the sample (15.3%) and Retail comprised 14 companies (14.3%). Although Banking Companies only made up 6 companies (6.1%) of the population, the annual reports of banks included 11.8% of graphs.

Uyar (2009) completed a study to identify whether there are differences across industries, relating to the presentation of graphs, of Turkish companies. The findings indicated that the majority of the graphs were included in the industrial companies (50%) followed by financial companies (33.2%) and, then, service companies (13.4%). Technology companies disclosed the least graphs (3%). In terms of the classification by Uyar (2009) financial companies consisted of banks, insurance, holding and investment and real estate investment trusts. Industrial companies consisted of companies trading in food, beverages, basic metals, mining, chemical, petroleum, plastic and metal products. The service industry consisted of telecommunications, transportation, tourism and wholesale and retail trade. The technology industry consisted of information technology and defence. If a similar approach is followed for South African companies, industrials contained most graphs (41.8%), followed by the financial sector (39.8%) and then the services industry (18.4%). The technology sector in South Africa comprised only one company and no graphs were disclosed.

If the average number of graphs per sector is considered in terms of the JSE classification, the chemical industry in South Africa disclosed most graphs with an average of 82 graphs, followed by banking with an average of 78.5 graphs and in third place healthcare with an average of 57.6 graphs. Using the classification adopted by Uyar (2009) the financial sector disclosed the most average graphs (44.3), followed by industrials (42.9), service companies (33.6) and technology companies (0.00).

If the average number of graphs per industry is considered for Turkey, the financial sector discloses most graphs (10.16), followed by service companies (9.08) and industrial sector (7.98). Technology companies had the same average of 0.00 which is the same as for South African companies. In the study conducted by Beattie and Jones (1999) it was found that, when looking at the average number of graphs per industry in Australia, diversified companies use most graphs (25.7), followed by financial services companies (12.3), extractive companies (8.7), and industrial and service companies (7.2).

South African companies disclose more graphs on average per industry, the industrial and financial sectors using majority of graphs. The financials and industrial companies also dominate the number of companies as industrials comprise 39 companies (41.8%) and financial companies (36) (39.8%) which may be a reason for the higher number of graphic disclosures.

Table 3 below provides the sector, number and percentage of graphs per sector, number and percentage of companies and the average number of graphs per sector, using the classification per the JSE. Table 4 uses the classification as prescribed by Uyar (2009).

Table 3 : Sector analysis per the JSE

Sector	Number of graphs per sector	Percentage of graphs per sector	Number of companies	Number of companies – percentage	Average graphs 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
Health care	288	7.2%	5	5.1%	57.6
Financial services	283	7.1%	8	8.2%	35.4
Industrial goods & 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 & beverage	162	4.0%	8	8.2%	20.3
Telecommunications	152	3.8%	3	3.1%	50.7
Personal & household goods	76	1.9%	2	2.0%	38.0
Media	42	1.0%	1	1.0%	42.0
Construction & materials	32	0.8%	1	1.0%	32.0
Travel & 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
Total	**4008**	**100.0%**	**98**	**100.0%**	**40.9**

Table 4 : Sector analysis using the classification by Uyar (2009)

Sector	Number of graphs	Number of companies	Percentage of graphs	Number of companies - %	Average graphs per sector
Industrials	1675	39	41.8%	39.8%	42.9
Financials	1594	36	39.8%	36.7%	44.3
Services	739	22	18.4%	22.4%	33.6
Technology	0	1	0.0%	1.0%	0.0
Total	**4008**	**98**	**100%**	**100%**	**40.9**

4.1.3. Types of graph

Types of graph – total

Table 5 indicates the use of the different graph types by South African companies. The three most frequently used are the column graph (34.3%), pie (23.6%) and bar graph (11.6%). Other graphs related to 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 most used (Harris, 2000). In terms of the change in column graphs, some of the formats relating to columns have changed as some companies do not use the standard vertical graphs: in some cases, the columns are slanted or arrow-shaped. The findings for South African companies are consistent with other studies such as Uyar (2009)

where Turkish companies used column, bar, pie and line graphs. Similarly, in European companies, the most common graph type is the column graph followed by the pie chart (Falschlunger et al., 2015). This was also found in US and UK companies where the column, bar, line and pie charts were the most popular type used (Beattie & Jones, 1997). In Australia, similar results were identified as the column graph was the most popular (55%), followed by the line graph (21%), the pie chart (12%) and other (2%). In the study relating to mining companies conducted by De Klerk and Van Wyk (2017) the column graph was the most prevalent graph representing 53% of graph use. Similarly, in Malaysia the most popular graph type was the bar/column graph (82%) (Rahman et al., 2014). In the study conducted by Sartawi (2015) Jordanian banks mainly used column graphs (47%), followed by line graphs (31%), pie chart (20%) and bar graph (2%). Beattie and Jones (2000b) found that for KFV, 97% of the graph type used was the column or bar graph.

Table 5 : Graph type – total

Type	Total	%
Column	1374	34.3%
Pie	947	23.6%
Bar	463	11.6%
Line	454	11.3%
Combination line/bar/column	320	8.0%
Stacked column	208	5.2%
Other	179	4.5%
Area	43	1.1%
Stacked bar	20	0.5%
Total	**4008**	**100%**

Types of graph – financial and non-financial category

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. It appears that the top 4 categories are similar although the order is slightly different – the most common graphs for both categories are the column, pie, line and bar graphs as indicated in Table 6. The type of graphs used within the financial category will be discussed in more detail.

Table 6 : 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%

Financial			Non- Financial		
Type	**Number of graphs**	**%**	**Type**	**Number of graphs**	**%**
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%
Total	**2458**	**100%**	**Total**	**1550**	**100%**

Type of graph – financial category

In terms of the type of graph the column graph is the most commonly used across all variables with the exception of sales. In terms of sales the three most common graphs are the pie chart (52%), column graph (28%) and the stacked column (6%). At an overall financial category level, the column graph is most used. The study conducted by Beattie and Jones (1999) also indicated that for financial graphs, most common is the column graph, however, for sales the column graph was also found most common. In the Beattie et al. (2008b) study all sales and profit graphs for UK companies in 2014 were column or bar graphs. 95% graphs which UK companies utilised for EPS and DPS were column graphs. Table 7 provides the graph type per financial variable.

Table 7 : Financial variable - graph type

Type	Sales	EPS	DPS	Profit	Other	Total Financial	%
Column	102	40	26	66	639	873	35.5%
Pie	186	5	1	34	283	509	20.7%
Line	4	17	7	2	281	311	12.7%
Bar	16	14	10	14	209	263	10.7%
Combination line/bar/column	16	13	7	11	168	215	8.7%
Stacked column	23	4	3	5	122	157	6.4%
Other	8	0	2	2	71	83	3.4%
Area	5	0	0	3	21	29	1.2%
Stacked bar	1	0	0	0	17	18	0.7%
Total	**361**	**93**	**56**	**137**	**1811**	**2458**	**100.0%**

4.1.4. Variables graphed

The use of financial and non-financial graphs is a means of communication by means of which companies inform users of the different aspects of a company's performance (Uyar, 2009). South African companies present more financial graphs, with 2 458 (61.3%) financial graphs being disclosed when compared to 1 550 (38.7%) non-financial graphs presented. This is consistent with the studies by Frownfelter-Lohrke and Fulkerson (2001) and Uyar (2009) where companies displayed more financial graphs than non-financial graphs. Table 8 below illustrates the number of graphs per variable and the percentage. In Malaysia, the study conducted by Rahman et al. (2014) indicated that the use of KFV graphs increased over the period

examined from 29% in 1984 to 35% in 2004. This finding contradicts the study by Beattie et al. (2008b) where it was found that for UK companies there was a decline in graph use for KFV's from 1989 to 2004.

In terms of financial graphs, the category 'Other' had the most graphs at 45.2%. In terms of the KFV, sales was the most graphed category (9%), followed by profit (3.4%), EPS (2.3%) and DPS (1.4%). In terms of the category 'other' the type of graphs included relates to variations of earnings such as earnings before interest, tax, depreciation and amortisation; earnings before interest and tax; operating cash flow information such as free cash flow, borrowings of the company, expenses incurred, average salary increases and remuneration paid to directors. In mining companies there were many graphs which presented cost information such as all in sustaining costs, production costs and commodity prices. Real estate companies also disclosed different information such as the value of the various portfolios (retail, office and residential) that are held. Banks disclose information relating to the segments from which loans and deposits are received (for instance, consumer and businesses), information relating to credit allowances and impairments and non-performing loans. In the case of South African companies, additional information is provided relating to expenditure spent on Broad-Based Black Economic Empowerment (B-BBEE). As mentioned above integrated reporting is a way in which a company can explain how value is created (IRCofSA, 2014). Companies are, as a result, disclosing the monetary value of contribution to various stakeholders such as employees, government, the community and investors.

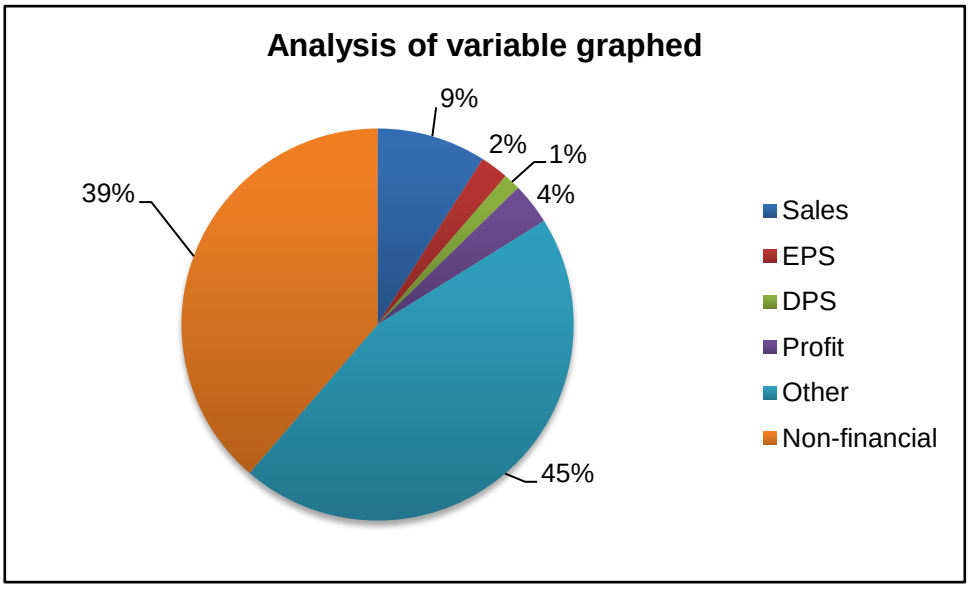
In terms of non-financial graphs which comprise 38.7% of graphs, various types of non-financial information is disclosed. The disclosure relating to non-financial graphs could be attributed to the introduction of integrated reporting. Integrated reporting not only focuses on financial reporting or sustainability reporting but connects all the different forms of financial and non-financial information and allows a company to explain how value is currently created and how this value creation will continue in the future (IRCofSA, 2014). As opposed to providing separate reporting, integration of reporting is seen as imperative if organisations are to include stakeholder accountability in their business practices and operations in a meaningful way (Solomon & Maroun, 2012).The most common form of non-financial information, found in almost all integrated reports, is the composition of the board in terms of race, gender, skills, experience and independence. This can be attributed to the requirements of King IV - Principle 7 which requires a company to disclose various aspects of the composition of a company's board. As integrated reporting also considers the impact that an entity will have on the environment, companies are now disclosing more information relating to the various measures implemented which consider the environment. As part of this, companies disclose information relating to the reduction in emissions over a period, the use of more renewable sources of energy as compared to prior periods, the amount of water used and the recycling of water. Additional information disclosed relates to the number of employees hired by a company, the race and gender of employees, targets in terms of race and

gender and contract versus permanent employees. Within a South African context, the race of employees (at all levels from top management to more junior level staff) is a crucial aspect of how a company is evolving and adding value to society. In terms of mining companies, information disclosed relates to the production at different mines, the injury rate, fatality rate and reconciliation of mineral reserves. In the following section KFV will be discussed in more detail.

Table 8 : Analysis of variable graphed

Variable graphed	Total	%
Other – Financial	1811	45.2%
Sales	361	9.0%
Profit	137	3.4%
EPS	93	2.3%
DPS	56	1.4%
Total Financial	**2458**	**61.3%**
Non-financial	1550	38.7%
Total - Financial + Non-financial	**4008**	**100%**

Figure 1: Analysis of variable graphed



Variable graphed – Key Financial Variables (KFV's)

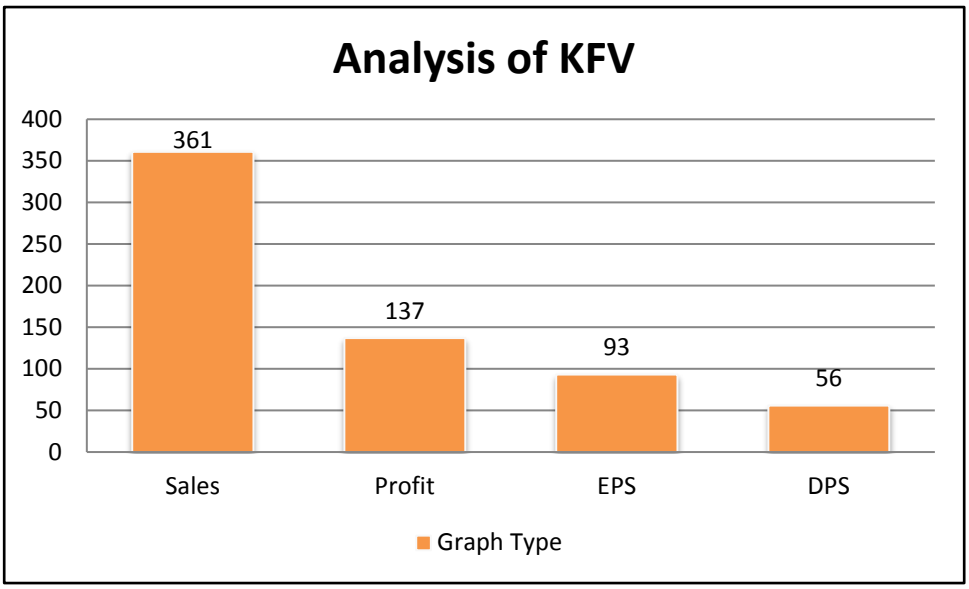
In terms of KFV, sales was the most graphed KFV (55.8%), followed by profit (21.2%), EPS (14.4%) and lastly DPS (8.7%). This is consistent with the findings by Uyar (2009), Beattie and Jones (1997), Frownfelter-Lohrke and Fulkerson (2001), and Rahman et al. (2014) where Turkish , US, and Malaysian companies graphed sales as the most frequent KFV. In the study conducted by Falschlunger et al. (2015) and Beattie and Jones (1999), the most prevalent KFV was profit for European and Australian listed companies. DPS appears to be the least graphed variable in South Africa, Turkey (Uyar, 2009) and Malaysia

(Rahman et al., 2014). In Europe, EPS is not disclosed as often as in other countries (Falschlunger et al., 2015). In the UK the findings appear to contrast with the findings in South Africa: the most graphed variable is profit (Beattie et al., 2008b) which is the same as in European and Australian companies. This is followed by EPS, DPS and sales being the least graphed variable relating to UK companies (Beattie et al., 2008b). In the study conducted by Beattie and Jones (1997) it was suggested that if a country focuses on sales it may reflect that the focus is on long-term growth whereas if there is a focus on earnings, it may indicate of a focus on short-term profitability. Table 9 indicates the number of graphs per KFV and the percentage. Following the table is a graphical representation of the number of graphs per category.

Table 9 : Analysis of KFV graphed

Category	Total	%
Sales	361	55.8%
Profit	137	21.2%
EPS	93	14.4%
DPS	56	8.7%
Total	**647**	**100.0%**

Figure 2 : Analysis of KFV

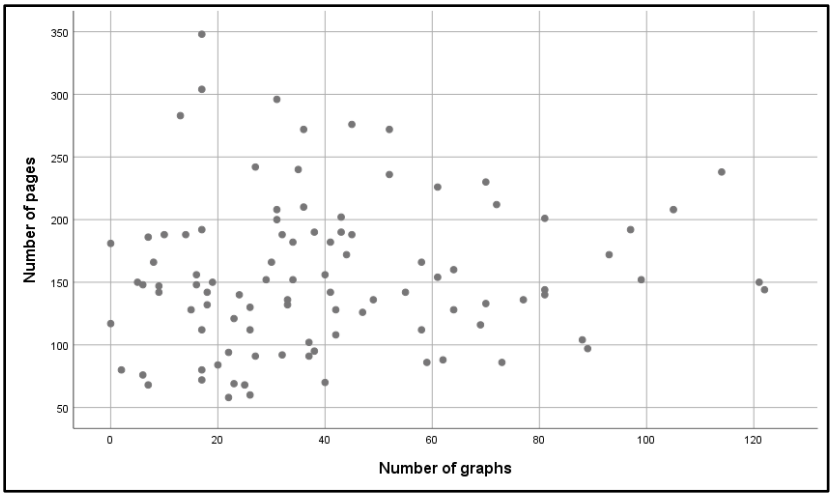


4.1.5. The relationship between the page numbers in the annual report and the number of graphs

As part of the descriptive statistics a Spearman Rho test was used to identify whether there is a correlation between the number of pages in the annual report and the number of graphs. The test was performed as it was expected that the more pages in an annual report, the larger number of graphs displayed as there is more opportunity to use narratives such as graphs. When testing the relationship, it was found that the r value which is the correlation co-efficient equalled to 0.142 and

the p value equalled to 0.163. As the correlation co-efficient is closer to 0 this indicates that there is weak relationship between the page numbers included in the annual report and the number of graphs displayed. This is indicated under Figure 3 below.

Figure 3 : Relationship between number of pages and number of graphs



4.1.6. Relationship between the market capitalisation and the number of graphs

A Spearman Rho test was used to identify if there is a correlation between the size of a company measured, using the market capitalisation and the number of graphs displayed in the annual report. Uyar (2009) completed a similar test and found that there was a positive relationship between the size of a company and the number of graphs displayed. When testing the relationship, it was found that the r value which is the correlation co-efficient equalled to 0.118 and the p value equalled 0.249. As the correlation co-efficient is closer to 0 this indicates that there is weak relationship between the market capitalisation included in the annual report and the number of graphs displayed.

4.2. Compliance with standards for good graphs

This section will discuss if presentational enhancement has been found in the graphs displayed in the annual reports indicated and if this may be evidence of distortion and, as a result, impression management. The analysis is based on the questions included in Appendix A.

The majority of graphs used by South African companies were detailed and labelled, with only 1% of graphs lacking both. The omission of a scale or the inclusion of an incorrect scale can influence a reader's perception of the data relationships (Frownfelter-Lohrke & Fulkerson, 2001). In terms of graphs having a scaled financial variable axis, 26% of the graphs consisted of pie graphs and other types such as bubble charts where a scaled financial variable axis was not needed. In terms of the remaining graphs, that required a scale, 61% of the graphs had a scale with 39% of companies not including a

scale. The lack of scale can become problematic as it does not allow a user to gather accurate information from the graph (Frownfelter-Lohrke & Fulkerson, 2001). In terms of companies where a scale was included 91% of the scales begin at zero with 9% of graphs with no zero-baseline. The absence of a zero-baseline is a factor which results in measurement distortion (Uyar, 2009). All graphs displayed by South African companies included a continuous scale with no broken scales identified. Regarding the display of a time axis, 36% of graphs did not require a time axis (due to the nature, for example, pie chart or the information that was being depicted did not require a time scale). In terms of graphs which required a time axis, 84% of graphs included a scaled time axis; the remainder did not. In terms of a time axis it was found that the time axis was not included but a legend was provided, indicating the year the data related to. 86% of the graphs which displayed a time axis reflected the information in a sequential order, with 14% of graphs displaying graphs in a reverse order. When graphs are displayed in a reverse sequence, mistakes may occur as graphs are usually read from left to right and top to bottom and if data are presented in a reverse order this may cause misunderstanding (Arunachalam, Pei, & Steinbart, 2002). The use of two scales on the vertical axis which results in two or more variables graphed but with multiple scales can confuse readers (Frownfelter-Lohrke & Fulkerson, 2001). 97% of companies use a single scale which avoids confusion.

The majority of South African companies include a number which is attached to the specifier (73%). However 27% of South African companies do not include such a number. During the completion of the research when a number was not attached to the specifier, the GDI could not be calculated as data were not available to calculate what the movement in the numbers is, versus the physical representation. It may, therefore, be difficult for users to ascertain actual trends and relationships if data relating to the graph are omitted. Where a number was attached to a specifier, 78% of the labels were horizontal and complied with good graph guidelines.

In terms of the physical presentation of graphs only 18% of graphs include gridlines with 82% of graphs not including any gridlines. The background used in graphs can either have a neutral impact on the graph, it can generate interest, or it may be distracting and interfere with effective communication of the graphical information from preparer to user (Beattie & Jones, 2008a). 81% of the graphs presented by South African companies use a white background, 12% of companies use a grey background and 3% utilised a beige and ivory background. 2% of graphs displayed used other colours such as blue, green, orange and pink. Only 2% of companies utilised pictures as a background which may be viewed as obtrusive and distorting the communication process. The use of colour can also distort a graph if there are too many colours on a graph as it can distract user's attention from the actual relationship being conveyed. Colours on a graph should be limited to six to avoid distortion (Jarett & Babad, 1988). 96% of the graphs displayed used six colours and fewer for illustrating graphs with only 4% of graphs including more than six colours. Another factor in graphs not being an effective tool of communication is when it is

not possible to match the colours used on a specifier to the applicable data label because of omission of a legend (Falschlunger et al., 2015; Uyar, 2009). 91% of graphs included a legend with only 9% of graphs not doing so. In terms of presentational enhancement three-dimensional graphs should be avoided as they lead to ambiguity and can distort a readers' interpretation of the graph (Beattie & Jones, 1997; Tufte, 1983). Only 2% of the graphs analysed were three-dimensional with the remaining 98% being two-dimensional. In addition, the use of data within specifiers should not be included in order to avoid trendy visual effects (Frownfelter-Lohrke & Fulkerson, 2001). 65% of graphs did not include data within the specifier but 35% of graphs included data within the specifier. Table 10 displays the results for the guidelines.

Table 10 : South African companies' compliance with good graph guidelines

Question	Guidelines	Findings - Current Study
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%

Question	Guidelines	Findings - Current Study
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	
1.11	Are there gridlines included? (Yes)	18%
	Are there 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%

Question	Guidelines	Findings - Current Study
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**	
	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%
	Are the bars of uniform width and evenly spaced? (No)	0%

Comparison with prior studies: Compliance with guidelines

In the study completed by Uyar (2009) deficiencies in graphs were analysed using the 11 deficiencies noted by Frownfelter-Lohrke and Fulkerson (2001), included under Section 2.8. A detailed analysis was not given but it was mentioned that non-zero baselines, missing vertical axes and gridlines using multiple vertical axes with different scales, not showing data values and reversing time-series were some of the deficiencies found in the graphs examined (Uyar, 2009). The graphs displayed by South African companies showed the same deficiencies noted in the graphs.

When compared to the study by Frownfelter-Lohrke and Fulkerson (2001) both South African listed and American listed ('US Listed') (based on companies listed on the New York and American Stock Exchange) do not comply with standards for good graphs. South African companies appear to have slightly lower cases of non-compliance. For instance, all graphs of South African listed companies had a continuous scale whereas 2% of the US listed companies' graphs did not have a continuous

scale. Only 57% of US listed companies' graphs provided a scaled financial variable axis. 23% of the graphs included a multiple scale. 83% of graphs by US listed companies had a zero-baseline compared with 91% of graphs displayed by South African listed companies. Presenting graphs in sequential order resulted in the same with 86% of graphs being presented in sequential order. Regarding the use of three-dimensional graphs, 18% of US listed companies graphs were three-dimensional graphs. The majority of South African listed companies' graphs appear to avoid the use of three-dimensional graphs as only 2% of graphs illustrated were three-dimensional. In terms of the colours used, the majority of the graphs in both countries used fewer than 6 colours (96% for South African listed companies' graphs and 95% for US listed companies' graphs). However, in terms of including a legend, only 66% of US listed companies' graphs included a legend. US listed companies graphs do not seem to include data within the specifier on such a large scale as 9% of graphs included data within the specifier. The use of a white background is also pre dominant for the graphs of US listed companies (59%), followed by grey (17%) and yellow (4%). South African companies' background colours of white and grey were dominant accounting for 93% of the background used. Only 1% of the graphs by US listed companies employed a picture as a background.

European companies, based on the study conducted by Falschlunger et al. (2015), used more often presentational enhancements for favourable information than for unfavourable information. 6% of graphs were found to contain optical illusion elements as they were presented as three dimensional graphs. 8% of graphs included a multiple axis and 7% of graphs portrayed information in a reverse order.

Beattie and Jones (1999) conducted a study relating to Australian companies which also considered presentational enhancement. The questions were slightly different from the guidelines used by Frownfelter-Lohrke and Fulkerson (2001) but there were similar questions. The graphs of Australian companies do not comply with good graph guidelines when it comes to the use of a scaled financial axis and time axis, use of non-zero baselines and gridlines and three-dimensional graphs. This is similar for the studies conducted in the US, Turkey and Europe. 12.7% of graphs analysed did not have a scaled financial variable axis. 4.8% of graphs did not have a zero-baseline. 28.6% of graphs omitted the time axis which is slightly higher than the omission noted for South African companies (16%). It was found that more Australian companies use gridlines as 42.9% of graphs did not include gridlines whereas 82% of the graphs of South African companies did not include gridlines. 21.9% of graphs used had backgrounds considered obtrusive. Further 15.6% of graphs were three-dimensional. Australian companies appear to avoid presentational enhancement in terms of displaying the time series in reverse order as only 1.6% of graphs were found to have an unconventional ordering of time series.

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 appear to omit the scaled financial variable axis (39%) which can make it difficult for a user to gather accurate information (Frownfelter-Lohrke & Fulkerson, 2001). Graphs also appear to exclude the specifier (35%) which can make it difficult to analyse trends and relationships. 14% of the graphs disclosed time sequence in a reverse order which may cause confusion to a reader due to the norm of data being presented from left to right and top to bottom (Arunachalam et al., 2002) and 3% of graphs had a multiple axis which may also confuse a reader. Relating to scaling, the scales of graphs were all continuous and no broken scales were identified. In terms of using visual effects, the graphs of South African companies appear to steer away as only 2% of graphs were three-dimensional and only 2% of graphs had obtrusive backgrounds. Most graphs had six or fewer colours as only 4% included more than six 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.

4.3. Measurement distortion - GDI

Measurement distortion can be used to distort a graph and enable a graph to be used for impression management purposes (Beattie & Jones, 2008a), discussed under Section 2.7 of the Literature Review. Measurement distortion occurs when the representation of numbers, as physically measured on the surface of the graph itself, is not directly proportional to the numerical values of the variables being represented (Tufte, 1983) and is measured using the GDI. The GDI was derived by Taylor and Anderson (1986) based on the lie factor developed by Tufte (1983). Based on prior research a 5% materiality threshold was selected to determine whether a graph is materially distorted or not (Beattie & Jones, 1997; Pany & Wheeler, 1989). The GDI is an important tool to determine if the scale accurately depicts the underlying data as it is a measure which compares the actual numerical differences in the data to the physical measurement differences depicted in the graph of that data (Frownfelter-Lohrke & Fulkerson, 2001).

In terms of the sample of 4 008 graphs, the following was noted: this resulted in the GDI being calculated for 2 109 graphs. Of the 4 008 graphs, there was no data available for 807 graphs (as the specifier did not have a number attached to it). Regarding 1 092 graphs, the GDI could not be calculated because of the nature of the graph, for instance pie charts, bubble charts, histograms and area graphs. This resulted in the GDI being calculated for 2 109 graphs: this is the sample used for the analysis. The split between financial and non-financial graphs is disclosed in Table 11 below.

Table 11 : Analysis of graphs in terms of the calculation of GDI

Reason	Financial	Non-financial	Total
GDI calculated	1320	789	2109
No data available	539	268	807
Not applicable due to nature of graph	599	493	1092
Total	**2458**	**1550**	**4008**

4.3.1. Graphs distorted

1 439 graphs (68.2%) were materially distorted. This implies that the GDI calculated was either greater than or equal to 5% or less than or equal to 5% for 68.2% of graphs. The remainder 670 graphs (31.8%) were either not distorted or were not materially distorted. Based on the results, there are more graphs which are distorted which may imply that the graphs used by South African companies are distorted and the underlying data are not represented by the physical measurement on the surface of the graph. Table 12 displays the variables and the spread of materially distorted compared with not distorted graphs.

The percentage of graphs which contain measurement distortion appears to be higher than results in previous studies conducted. In the study conducted by Beattie and Jones (1992) 30% of graphs in the UK were found to contain measurement distortion; this reduced to 24% according to the study by Beattie and Jones (1997). In the study completed in Beattie et al. (2008b) the percentage of UK distorted graphs increased to 60%. In the US, Beattie and Jones (1997) found that 24% of graphs by US companies were distorted which appears to be consistent with the study conducted by Steinbart (1989) where 26% of graphs were incorrectly constructed. In Europe, Falschlunger et al. (2015) found that 43.2% of graphs contained measurement distortion which is the same as the percentage of incorrectly constructed graphs of Jordanian banks, indicated by Sartawi (2015). In Australia, 34% of the graphs contained material measurement distortion as noted by Beattie and Jones (1999). The analysis of materially distorted graphs based on the variables is discussed in the next section.

Table 12 : Analysis of the number of graphs distorted

Variable	Materially Distorted	%	Not Distorted or Not Materially distorted	%	Total	%
Financial						
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%
Total financial	**908**	**43.1%**	**412**	**19.5%**	**1320**	**62.6%**
Non-financial	531	25.2%	258	12.2%	789	37.4%

Variable	Materially Distorted	%	Not Distorted or Not Materially distorted	%	Total	%
Total	**1439**	**68.2%**	**670**	**31.8%**	**2109**	**100.0%**

Analysis of distortion per variable

In terms of variables graphed, financial variable graphs are materially distorted on a larger scale (63.1%) than are non-financial graphs (36.9%). If the KFV graphs are analysed sales graphs are the most distorted (9%), followed by EPS (4%) and profit (4%) and lastly DPS (3%). A reason for the sales graphs containing the highest number of distorted graphs may be that sales is the most graphed KFV when compared to the other variables. Table 13 contains the analysis of materially distorted graphs per variable.

In the study conducted by Falschlunger et al. (2015), it was found that KFV graphs show a higher proportion being distorted. In the study conducted by Beattie and Jones (1999) which focused on KFV graphs in Australia, it was found that 34.2% of KFV graphs were materially distorted. Beattie and Jones (1992) completed a study on UK companies and it was found that 30% of KFV graphs displayed material discrepancies. In the study conducted by Beattie and Jones (1997), a comparison was completed between the companies in the UK and US with a focus on KFV graphs. It was found that 24% of graphs in the US and the UK were materially distorted. In the UK, EPS was found to be the variable with the most distorted graphs, followed by profit, DPS and sales. In the US, the variable that had the most distortion was profit, followed by sales, EPS and lastly DPS. The study conducted by Beattie et al. (2008b) indicated that 60% of the KFV graphs were distorted. It would appear that, over time, the number of graphs containing measurement distortion has increased. The next sub-section will discuss whether graphs tend to overstate or understate the underlying trend.

Table 13 : Analysis of materially distorted variables

Variable	Materially distorted graphs	% of Total distorted graphs (1439)	% of Specific variable (Financial vs Non-financial)
Financial			
Sales	84	5.8%	9%
EPS	37	2.6%	4%
DPS	27	1.9%	3%
Profit	36	2.5%	4%
Other financial	724	50.3%	80%
Total financial	**908**	**63.1%**	100%
Non-financial	531	36.9%	100%
Total	**1439**	**100.0%**	

Figure 4 : Analysis of materially distorted variables

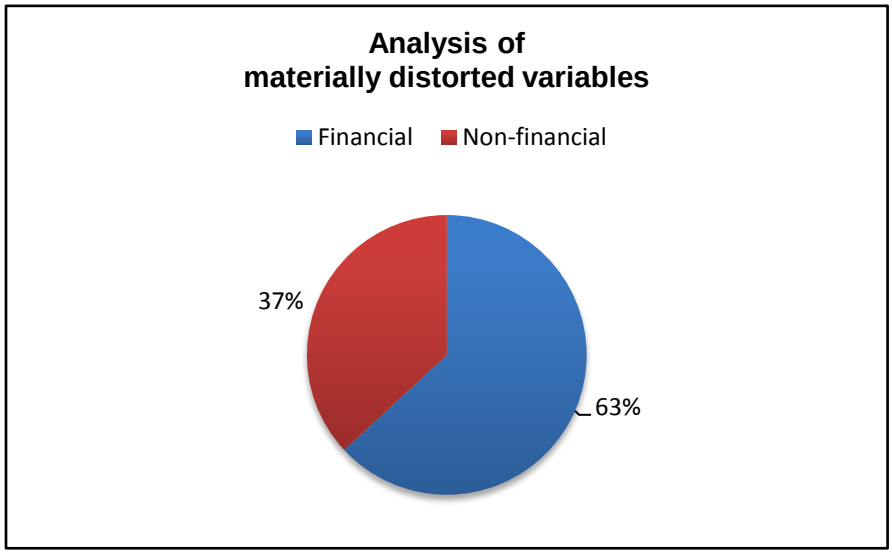
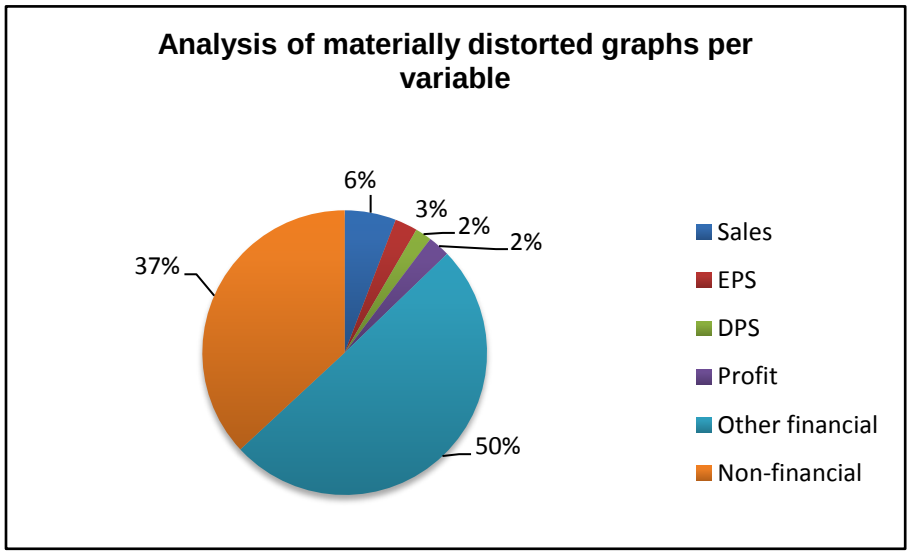


Figure 5 : Analysis of materially distorted graphs per variable



4.3.2. Material exaggeration or understatement per variable

In terms of whether trends are exaggerated or understated it appears that graphs tend to exaggerate the trend (57.1%) as opposed to understating (42.9%). Financial graphs have the highest number for both discrepancies, exaggeration (35.6%) and understatement (27.4%). Non-financial graphs contain both exaggerated (21.4%) and understated (15.5%) trends but this is on a lesser scale. The information disclosed in Table 14 provides the data relating to the type of distortion for financial and non-financial graphs. In all instances, apart from the EPS variable, the number of graphs exaggerated exceeded the number of graphs understated.

The results obtained appear to correspond with the results identified in other studies. For instance, in the study conducted by Beattie and Jones (1992) 73% of materially distorted graphs displayed exaggeration whereas 27% of graphs indicated understatement. In the Beattie and Jones (1997) study both in the UK and the US, the number of graphs which exaggerated exceeded the number of graphs in which understatement was found. In the UK 79% of graphs were exaggerated and 21% understated. In the US 73% of graphs were exaggerated and 28% understated. Beattie and Jones (1999) also found that more graphs contained exaggeration than understatement. The later study conducted by Beattie et al. (2008b) which examined UK graphs in 2004 still found more graphs are exaggerated (55%) than understated (45%). Similarly the results by Falschlunger et al. (2015) showed that graphs are more likely to exaggerate positive trends than to understate them. The material exaggeration or understatement per variable will be examined next.

In terms of the KFV, sales had the most graphs that were both exaggerated (3.4%) and understated (2.4%). Regarding exaggeration sales was followed by profit (1.7%), DPS (1.3%) and EPS (1.2%). Regarding understatement sales was followed by EPS (1.4%), Profit (0.8%) and DPS (0.6%).

In the study conducted by Beattie and Jones (1992) DPS graphs for UK companies contained most exaggeration, followed by profit, sales and EPS. In terms of understatement DPS had most graphs which contained an understated trend followed by EPS, profit and sales. These results appear to contrast with the results obtained for South African companies. According to Beattie and Jones (1997) in the US, sales and profit was the KFV that contained the most graphs that displayed an exaggerated trend however in the UK this was EPS which changed from the Beattie and Jones (1992) study. Beattie et al. (2008b) which is an updated study completed on UK companies identified that EPS remains the graph which contains exaggeration followed by DPS, profit and sales. EPS is the only variable which stayed constant with a change experienced in the remaining variables. In terms of understatement, none of the variables stayed constant as profit displayed the graphs with most understatement followed by EPS, DPS and sales. In Australia profit was the variable most distorted, followed by DPS, sales and EPS. In terms of understatement EPS was understated followed by sales, profit and DPS. It would appear that the different countries discussed follow different trends and there is no developed country South Africa appears to follow in terms of exaggeration and understatement.

Table 14 : Breakdown of type of distortion per number of graphs

Variable	>/5% - Number of graphs	% - >/5%	</5% - Number of graphs	% - </5%	Total Number of graphs	Total %
Financial						
Sales	49	3.4%	35	2.4%	84	5.8%
EPS	17	1.2%	20	1.4%	37	2.6%

Variable	>/5% - Number of graphs	% - >/5%	</5% - Number of graphs	% - </5%	Total Number of graphs	Total %
DPS	18	1.3%	9	0.6%	27	1.9%
Profit	25	1.7%	11	0.8%	36	2.5%
Other financial	404	28.1%	320	22.2%	724	50.3%
Financial – total	**513**	**35.6%**	**395**	**27.4%**	**908**	**63.1%**
Non-financial	**308**	**21.4%**	**223**	**15.5%**	**531**	**36.9%**
Total	**821**	**57.1%**	**618**	**42.9%**	**1439**	**100.0%**

4.3.3. Average GDI

There appears to be significant measurement distortion for both financial and non-financial graphs disclosed in the annual reports of South African listed companies if the average GDI is considered. The overall average GDI for all graphs was 134% which implies that the graphs of South African listed companies exhibit material measurement distortion and graphs are distorted in order to reflect a positive trend. The average GDI for material exaggeration is higher (304.8%) when compared to material understatement (-92.8%). It appears that impression management for graphs of South African listed companies materially overstate the information displayed to create a more favourable impression of the company to users of financial statements. The results obtained for the average GDI at an overall level is displayed in Table 15.

The results of South African listed companies are the same as 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, South African listed entities had similar results to the average GDI Frownfelter-Lohrke and Fulkerson (2001) found for non-US listed companies which was calculated as 173%. In the same study, the average GDI for US listed companies was found to be 81%. The average GDI of European countries was significantly higher as it was calculated as 773.2% (Falschlunger et al., 2015). The average GDI of UK companies was much lower as Beattie and Jones (1992) calculated the average GDI as 10.7% and this decreased to 7% according to Beattie and Jones (1997). The GDI calculated by Beattie and Jones (1997) for US companies was much lower than that of Frownfelter-Lohrke and Fulkerson (2001) as it was calculated as 16%. Although the graphs of Australian companies tend to distort graphs, the average GDI is much lower as this was calculated as 10.5% (Beattie & Jones, 1999).

If the analysis is considered at a variable level, both financial and non-financial variables have average GDI's in excess of 100%. The average GDI's for both financial (121.6%) and non-financial graphs (155.2%) also both have favourable averages which indicates that graphs for both type of variables overstate trends as opposed to understating these.

Table 15 : Average GDI

Type of distortion	Financial	Non-financial	Total
Exaggeration - >/5%	289.7%	329.8%	304.8%
Understatement - </5%	-96.7%	-85.9%	-92.8%
Overall total	**121.6%**	**155.2%**	**134.0%**

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%). The other financial graphs have a relatively high average GDI of 283.3% but this was lower when compared to the average GDI of profit and DPS. In terms of the type of distortion, the average GDI for material exaggeration exceeded the average GDI for understatement for all variables analysed. Table 16 provides more detail on the average GDI per variable in terms of overstatement, understatement at an overall level.

Table 16 : Average GDI per variable

Variable	>/5%	</5%	Average
Financial			
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%
Total financial	**289.7%**	**-96.7%**	**121.6%**
Non-financial	**329.8%**	**-85.9%**	**155.2%**
Total	**304.8%**	**-92.8%**	**134.0%**

4.4. Overall analysis

Beattie et al. (2008b) described the use of graphs in the annual report as universal. In the current study it was found that 98% of companies in the sample displayed a graph when presenting information. The average number of graphs per report amounted to 40.9 graphs. The findings regarding the use of graphs in the annual reports of South African listed companies supports the statement by Beattie et al. (2008b) that graph use is common and universal. The column graph is the preferred type of graph for displaying trends: this is consistent with prior studies. The popularity of the column graph may be attributed to the fact that annual reports are concerned with a company's performance over a period of time and column graphs are able to illustrate such information in an effective manner (Beattie & Jones, 2001; Harris, 2000). Regarding the variable's graphed for South African listed entities, financial variable graphs exceed the number of graphs graphed for non-financial variables. In terms of KFV, sales is the most widely graphed KFV when compared to the other KFV as indicated in Table 8.

In terms of non-financial graphs the impact of the introduction of mandatory integrated reporting for listed companies is visible in the annual reports of South African companies as there is not only a focus on including financial measures but also an inclusion of various ESG measures. The use of narratives such as graphs may be an indication that the annual report is not only a statutory document but also a document which functions as public relations tools which convey specific messages from and images of a company (Frownfelter-Lohrke & Fulkerson, 2001; Rahman et al., 2014).

Although the use of graphs has advantages as they are able to focus readers' attention, summarise large amounts of data, illustrate trends and hold users attention (Frownfelter-Lohrke & Fulkerson, 2001; Hwang, 1995), graphs have also proven to be used as a tool of impression management to further managements' interests (Beattie & Jones, 1999; Beattie & Jones, 2000a; De Klerk & Van Wyk, 2017; Frownfelter-Lohrke & Fulkerson, 2001). In terms of the graphs presented by South African listed entities impression management by using presentational enhancement, was found to some extent but at an overall level the majority of graphs meet good graph guidelines and do not use the graph design to influence users' decisions. The graphs of South African listed entities use measurement distortion as a tool to distort graphs. This was measured using the GDI and it was found that the majority of graphs displayed were materially distorted and will influence users' decisions. The average GDI for graphs was calculated as 134% indicating that the trends tend to be overstated. This may imply that graphs are used to portray a more favourable image of a company's actual performance. The results relating to the frequency of graphs, the variables graphed and the distortion appear to be consistent with prior studies.

5. Conclusion

5.1. Conclusion of the study

Traditional financial reporting which focused only on the company's historical financial performance is no longer the only information stakeholders require in the current economic environment (Appiagyei et al., 2016; Bernardi & Stark, 2016; Kolk & van Tulder, 2010; Surty et al., 2018; Türker & Zafer, 2014; Velte & Stawinoga, 2017). Stakeholders demand for information has changed as information relating to environmental, social and governance (ESG) disclosure is now required (Appiagyei et al., 2016; Kolk & van Tulder, 2010; Velte & Stawinoga, 2017). The introduction of integrated reporting has resulted in a company being able to present a holistic view of a company's performance as it connects financial and non-financial information (EY, 2018; IRCofSA, 2014). Prior research has indicated there has been a change in the format of the traditional annual report as the volume of voluntary information has increased and there is a change in the use of alternate means of communication (Bartlett & Jones, 1997; Beattie et al., 2008b; Lee, 1994). As a result, elements of management bias which result in impression management may be found within sections of the annual report in an attempt to provide a more

favourable image of management. This can happen particularly in the front section of annual reports as providing information is voluntary and is unaudited. For the purpose of this study, the use of graphs as a tool of impression management was investigated.

Research indicates that increasingly, the annual reports of public companies use visual representation to communicate financial and non-financial information (Beattie et al., 2008b; Beattie & Jones, 2008a). One of the visual representations identified as becoming a popular means of communication is the use of graphs. This is because graphs are able to hold users attention and can help focus the readers' interest on the information being conveyed (Frownfelter-Lohrke & Fulkerson, 2001). Graphs are viewed as a universal language and one is able to communicate across languages and cultures (Horton, 1993). In the current period of globalisation they can be viewed as an international medium of communication (Beattie & Jones, 2008a).

Although there are advantages to the presentation of graphs in annual reports, 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 misleading and deceptive (Beattie & Jones, 1999; Beattie & Jones, 2008a). Impression management relating to graphs can occur in three ways according to Beattie and Jones (2008a), namely, selectivity, measurement distortion and presentational enhancement. Selectivity occurs when only favourable and positive information is disclosed. Measurement distortion occurs where the physical representation of the numbers on a graph is not proportionate to the underlying numbers (Tufte, 1983). Presentational enhancement occurs when the design of the graph components are changed to emphasise or to understate certain features (Penrose, 2008).

The purpose of this study was to analyse the incidence, quality and measurement distortion of graphs in the annual integrated reports of the top 100 South African entities listed on the Main Board of the Johannesburg Stock Exchange (JSE) for the financial year ending 2017. In terms of the distortion of graphs, two measures were investigated, namely, measurement distortion and presentational enhancement. Evidence of presentational enhancement and significant measurement distortion indicate that impression management is present in graphs and that graphs are used to influence users' perceptions of a company's performance.

Although there has been a study of graph use in South Africa, the study was limited to mining companies, only focused on ESG disclosure and did not consider the impact of presentational enhancement as a means of impression management. This study will contribute to the body of literature on impression management by analysing the extent to which graphs are

used by South African companies, as well as the use of certain impression management techniques when presenting graphs in the annual reports. Both financial and non-financial graphs have been studied for the purposes of the research which will allow differences to be identified between financial and non-financial graphs. The study will be valuable to the users of integrated reports, regulatory bodies, auditors and the management of companies as it will provide insight into whether impression management techniques are used or not. This will enable users to discount these disclosures because of the reporting bias which may have been introduced (Yasseen et al., 2017) as well as considering introducing standards to govern the use of graphs.

In terms of the descriptive statistics, similar to prior studies conducted, 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 report. In total, 4 008 graphs were presented across the companies which presented graphs. The basic resources sector which had the highest number of companies in the top 100, presented the majority of the graphs, followed by real estate and banks. The column graph was found to be the most common type of graph. Graphs, particularly column graphs, are able to convey information more simply and effectively which may be the reason why column graphs are the most common graph type noted (Harris, 2000). Consistent with other studies, companies display more financial graphs (61.3%) than non-financial graphs (38.7%). Within financial graphs when considering graphs which fall within the key financial variable category (KFV) sales is the variable most graphed, followed by profit, EPS and DPS. Non-financial graph disclosure displays a variety of information, ranging from the water use of companies, carbon emissions, race and gender of employees within an organisation. The most common form of non-financial information in almost all integrated reports is the composition of the board in terms of race, gender, skills, experience and independence. This may be attributed to the requirements in terms of King IV - Principle 7 which requires a company to disclose various aspects of the composition of a company's board. The inclusion of a company's impact on the environment can be attributed to the requirement of JSE listed companies to comply with King which connects all the different forms of financial and non-financial information (IRCofSA, 2014). A Spearman Rho test was used to identify whether there is any relationship between the number of graphs presented and the number of pages in the annual report but no relationship was found. A Spearman Rho test was also used to identify whether there is a relationship between the firm size (measured using market capitalisation) and the number of graphs but no relationship was found. This contrasts with the findings by Uyar (2009) where it was found that the larger the firm size the more graphs disclosed.

Presentational enhancement was found to some extent in the graphs presented in the annual reports of South African listed entities. The largest non-compliance with good graphs standards related to the omission of gridlines when graphs are

presented (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. This omission of a specifier also made it difficult to calculate the GDI as data were omitted. 14% of graphs disclosed the time sequence in reversed order which can cause confusion as data are not presented according to traditional norms (Arunachalam et al., 2002). These were major breaches of good graph standards found in the graphs presented. South African listed companies do not appear to use trendy effects such as obtrusive background colours or the use of three-dimensional graphs to distract users' attention from the underlying trend as only 2% of graphs included an obtrusive background and were three-dimensional. It was found that almost all graphs were detailed and labelled as only 1% of graphs were found to be deficient in this regard. 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 distortion occurs where the physical representation of the numbers on the graph is not proportionate to the underlying numbers (Tufte, 1983). For the purposes of this study, significant measurement distortion was considered for GDI that was ≥5% or ≤5%. In total GDI was calculated for 2109 graphs. GDI was not calculated for the remainder of the graphs as data was not available or the type of graph did not require GDI to be calculated, for instance, a pie chart or bubble diagram. Of the 2 109 graphs 1 439 graphs (68.2%) of the graphs were materially distorted. This implies that 68.2% of graphs misrepresent information to users of the annual reports as the underlying data are not represented by the physical measurement on the surface of the graph. The percentage calculated for South African listed companies appears to be higher when compared to prior studies, for instance, in the UK, this was calculated as 60% (Beattie et al., 2008b), in Europe 43.2% of graphs were materially distorted (Falschlunger et al., 2015) which is the same percentage of graphs distorted by Jordanian banks (Sartawi, 2015). Financial graphs had a greater percentage of materially distorted graphs (63.1%) than non-financial graphs (36.9%). When considering KFV, in addition to disclosing the highest numbers of graphs for sales, sales is also the KFV which had the most graphs that are distorted.

In terms of exaggeration (≥5%) or understatement (≤5%) of trends, it was found that graphs tend to exaggerate the trend (57.1%) on 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%. In terms of material exaggeration, the average GDI was calculated as 304.8% and the average GDI for material understatement was calculated as 92.8%. This once again

supports the statement that South African companies use graphs as a tool of impression management, particularly to portray a favourable image of the company to users of the annual report.

The findings of the study are consistent with prior studies in terms of the widespread use of graphs as a medium of communication in the annual report. However, although graphs may benefit users, they are being used as a tool of impression management. From a South African perspective, companies do not use presentational enhancement as a major means of impression management but measurement distortion was found to be significant.

5.2. Areas of future research

This study can be extended by analysing a longer time period which will allow selectivity to be examined. It could provide insight into the change in graphical disclosure within the South African environment. An analysis could also be performed on companies with a smaller market share such as companies listed on the AltX Board of the JSE to identify how the use of graphs might differ from that of larger companies. Comparative studies could also be carried out with countries which have similar economies to South Africa to identify how graph disclosure differs. The study could also be extended to the public sector to identify if there are any significant differences between the use of graphs when comparing the public and private sector in South Africa. The study could be extended to identify whether company's prepare their own annual reports or if designers are used to do these. This may assist in identifying if distortions are a deliberate strategy employed by management or if they arise because of the use of designers who may not be familiar with the requirements when preparing annual reports. This will add further clarity to the subject.

6. Appendix

Appendix A – Check list used to determine compliance with 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)*	**Frownfelter-Lohrke and Fulkerson (2001)**	**Beattie and Jones (1997)**
1	**Inadequate chart titles and labels**			
1.1	Is the graph detailed and labelled? (Yes/No)	✓	✓	
1.2	Are important events labelled? (Yes/No)	✓	✓	
	Axis			
	Numeric scale			
1.3	Is there a scaled financial variable axis? (Yes/No)			✓
1.4	Where is the financial variable axis located?			✓
	Conventionally - Left (Yes/No)			
	Unconventionally - Right (Yes/No)			
	Specifier -The column which represents the numeric values			
1.5	Is there a number attached to the specifier? (Yes/No)	✓		✓
1.6	Is the numeric label on the specifier horizontal? (Yes/No)			✓
	Scale			
1.7	Is the scale continuous or broken?		✓	
	Continuous (Yes/No)			
	Broken (Yes/No)			
1.8	Does the scale begin at zero? (Yes/No)		✓	
	Time Axis			
1.9	Is there a scaled time axis? (Yes/No)			✓
1.10	Is the numeric label on the time axis horizontal? (Yes/No)			✓
	Gridlines			
1.11	Are there gridlines included? (Yes/No)			✓
2	**Obtrusive backgrounds**			

Question Number	Weaknesses noted in graphs	**Applicable to all graphs.** (*If not selected pie diagrams are excluded)*	Frownfelter-Lohrke and Fulkerson (2001)	Beattie and Jones (1997)
	What colour is the background of the graph?	✓	✓	
	White (Yes/No)			
	Grey (Yes/No)			
	Yellow (Yes/No)			
	Beige/Ivory (Yes/No)			
	Black (Yes/No)			
	Other colours (Yes/No)			
	Picture (Yes/No)			
3	**Borders**			
	Are there clearly defined borders? (Yes/No)		✓	
4	**Optical illusion**			
	Is the graph three-dimensional? (Yes/No)	✓	✓	
5	**Inappropriate use of colour**			
	How many colours are in the graph?	✓	✓	
	Less than 6 (<6) (Yes/No)			
	More than 6 (>6) (Yes/No)			
6	**Legend**			
	Is there a legend? (Yes/No)	✓	✓	
7	**Trendy visual effects**			
7.1	Do borders detract from the graph? (Yes/No)	✓	✓	
7.2	Is there any data inside the graph? (Yes/No)	✓	✓	
8	**Multiple scale on the vertical axis**			
	Is there a single scale or multiple scale?		✓	
	Single (Yes/No)			
	Multiple scale on the vertical axis (Yes/No)			
9	**Time Series portrayed in reverse order**			
	Is the data on the graph in sequential or reversed sequential order?		✓	
	Sequential (Yes/No)			
	Reversed (Yes/No)			
	Bar Graph - Time should run from top to bottom Column Graph - Time should run from left to right			
10	**Exaggerated width of data markers or spaced**			

Question Number	Weaknesses noted in graphs	**Applicable to all graphs.** (*If not selected pie diagrams are excluded)*	Frownfelter-Lohrke and Fulkerson (2001)	Beattie and Jones (1997)
	Are the bars of uniform width and evenly spaced? (Yes/No)		✓	

Appendix B – Companies analysed in sample

Number	Company Name	Number	Company Name
1	Anheuser-Busch InBev SA NV	51	Netcare Limited
2	British American Tob plc	52	Life Healthc Grp Hldgs Ltd
3	Naspers Ltd -N-	53	The Spar Group Ltd
4	Glencore plc	54	AVI Ltd
5	Compagnie Fin Richemont	55	Capital&Counties Prop plc
6	BHP Billiton plc	56	Exxaro Resources Ltd
7	Anglo American plc	57	Santam Limited
8	Firstrand Ltd	58	Mondi Ltd
9	Standard Bank Group Ltd	59	Liberty Holdings Ltd
10	Vodacom Group Ltd	60	Barloworld Ltd
11	Sasol Limited	61	Massmart Holdings Ltd
12	MTN Group Ltd	62	MMI Holdings Limited
13	Old Mutual plc	63	Pick n Pay Stores Ltd
14	Sanlam Limited	64	Dis-Chem Pharmacies Ltd
15	Barclays Africa Grp Ltd	65	Distell Group Ltd
16	South32 Limited	66	Coronation Fund Mngrs Ld
17	Shoprite Holdings Ltd	67	Pioneer Foods Group Ltd
18	Nedbank Group Ltd	68	Investec Ltd
19	Mondi plc	69	Tsogo Sun Holdings Ltd
20	Aspen Pharmacare Hldgs Ltd	70	Hyprop Inv Ltd
21	Remgro Ltd	71	Telkom SA SOC Ltd
22	Discovery Ltd	72	Sibanye Gold Limited
23	RMB Holdings Ltd	73	KAP Industrial Hldgs Ltd
24	Capitec Bank Hldgs Ltd	74	African Rainbow Min Ltd
25	Kumba Iron Ore Ltd	75	Resilient REIT Limited
26	Growthpoint Prop Ltd	76	Italtile Ltd
27	BID Corporation Ltd	77	Fortress REIT Ltd A
28	Anglo American Plat Ltd	78	Brait SE
29	Bidvest Ltd	79	Northam Platinum Ltd
30	Mr Price Group Ltd	80	Impala Platinum Hlgs Ltd
31	Hammerson plc	81	RCL Foods Limited
32	Steinhoff African Rt Ltd	82	Vukile Property Fund Ltd
33	Tiger Brands Ltd	83	JSE Ltd
34	Mediclinic Int plc	84	Echo Polska Prop N.V.
35	Redefine Properties Ltd	85	Globe Trade Centre S.A.
36	NEPI Rockcastle Plc	86	Ayo Tech Solutions Ltd
37	Woolworths Holdings Ltd	87	Attacq Limited
38	Investec plc	88	AECI Limited
39	Rand Merchant Inv Hldgs Ltd	89	Steinhoff Int Hldgs N.V.
40	The Foschini Group Limited	90	MAS Real Estate Inc.
41	PSG Group Ltd	91	Reunert Ltd

Number	Company Name	Number	Company Name
42	Truworths Int Ltd	92	Tongaat Hulett Ltd
43	Imperial Holdings Ltd	93	Astral Foods Ltd
44	Intu Properties plc	94	Hosken Cons Inv Ltd
45	Clicks Group Ltd	95	Super Group Ltd
46	Anglogold Ashanti Ltd	96	Curro Holdings Limited
47	Reinet Investments S.C.A	97	Investec Property Fund Ltd
48	Sappi Ltd	98	PPC Limited
49	Assore Ltd	99	Harmony GM Co Ltd
50	Gold Fields Ltd	100	Adcock Ingram Hldgs Ltd

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