
Impression management using graphical resources in Brazilian company reports

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Abstract: The aim of this study is to investigate the evidence of impression management in terms of selectivity or improved presentation in the graphs and charts used by companies. The reports of 180 Brazilian companies between 1997 and 2014 were analysed. The variables tested were: company size, profitability, age, variation in results, report size and publication period. The results indicated that there is a significantly positive relationship between financial performance and the total amount of graphs and charts, in particular those with key financial information (net income, net revenue and dividends) and those with improved or enhanced presentation. This is a sign of impression management in the reports analysed. It was verified a relationship between the company's age and the low amount of graphs and charts used by the company during the initial years of the analysis period to disclose financial information in their reports.

Keywords: management report; impression management; graphical resources; selectivity; improved presentation; enhancement; Brazil; key financial information; financial performance; manipulation.

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1 Introduction

Companies tend to disclose in order to enable fundraising. However, the credibility of the disclosure when carried out voluntarily and used to serve specific interests is questionable: the information published often aims to improve or preserve the organisation's image and its legitimacy in order to guarantee control of the entity's status and its existence. According to Korn and Schiller (2003), the basic voluntary disclosure model shows that in a situation of equilibrium, companies should disclose all of their private information. This is because the market price of companies depends on investors' expectations with regards to future results. Voluntary disclosure sends signals to the market that can influence changes in stock values. But coupled with voluntary disclosure, there may be an attempt to influence the user. This is done via impression management (Wills, 2008). This term refers to the manipulation of stocks or information in order to affect the perception of those who receive them (Mohamed et al., 1999). Only recently has impression management become a more frequent object of study in the literature.

Impression management can occur in different ways, such as through the manipulation of content and the syntax of accounting narratives (Beattie and Jones, 2000a). Narrative structures are used as a vehicle for impression management and highlight the presence of this phenomenon, for example in letters from chief executive officers (CEOs) (Boudt and Thewissen, 2016). The voluntary disclosure environment is directed by managers and preparers of information who may present a favourable view to information users (Jones and Slack, 2010). Users' increasing access to company information enables narratives to be a source of information that would not be available otherwise (Rowbottom and Lymer, 2010).

Thus, as managers know that the information can have a positive impact on their companies' image and influence investment decisions, they use visual resources such as graphs, charts, illustrations and tables in their annual reports. These resources emphasise the information that is being reported, save time in data analysis and overcome language barriers, since they are universally understood (Mather et al., 1996, for example).

Besides, the format and presentation of graphical resources are also subject to manipulation. Communication using those resources will only be efficient if prepared properly without any bias. But users of these reports are prone to using distorted information from inadequately prepared graphics. Various studies have also shown that the use of graphs and charts is possibly related to the company's characteristics, such as financial performance (Beattie and Jones, 2002) or its size (Uyar, 2011).

The aim of this study is to analyse evidence of the relationship between financial performance and impression management in the graphs and charts presented in company reporting. This study is warranted by the relevance of accounting information with regards to decision-making in the capital market. The lack of research focusing on companies in developing countries and with the presence of visual resources should also be noted. Some authors have already explored this theme (Steinbart, 1989; Beattie and Jones, 1992, for example). Beattie and Jones (1992) point to studies, almost three decades ago, that prove that accounting information is not usually read in full and that, in these circumstances, visual resources have a greater chance of being noted and remembered. Due to the increasing amount of information made available by companies, this aspect may have gotten worse in recent years.

Beattie and Jones (2008) point out that neither graphs and charts are audited nor are those the object of regulation in most countries. In the USA and the UK, for example, the pronouncements merely require the auditor to review the additional sections of annual reports. This flexibility encourages manager creativity and innovation, increasing the opportunities for impression management and graphical unfaithfulness. The use of impression management also suggests that managers aim to use graphs and charts opportunistically to present a favourable view of their company.

The research makes advances by raising hypotheses based on previous studies, addressing the lack of research in developing countries, as indicated by Beattie and Jones (2008). In addition, the sample considers a time series of 18 years, leading to a more consistent analysis in relation to the empirical studies previously carried out.

2 Visual resources

Despite the use of various visual resources to provide greater clarity when laying out the information presented to the user, Beattie and Jones (2008) summarise six main reasons for explaining companies' preference for using these resources instead of tables or narrative contents:

- 1 they enable managers to present information in a flexible way
- 2 they are visually attractive
- 3 they are summarising tools
- 4 they are quickly understood
- 5 they are memorable
- 6 they are democratic, since they communicate with more or less sophisticated information users and are also independent of the language used.

In companies' financial statements, their use stands out in management reports, aiming to summarise information and drawing attention to certain items (Huang et al., 2008). Beattie and Jones (2008) and Beattie et al. (2008) claim that there are four main benefits derived from the use of graphical resources in annual reports:

- 1 capturing attention
- 2 conveying information more easily
- 3 enabling the information to be located and compiled more quickly
- 4 the information is shown and expressed more effectively.

Uyar (2011) also described some reasons backing the use of graphs and charts in annual reports. Among these lies the fact that they are more easily absorbed and enable quicker decision-making. They are also easier to remember than tables, enabling comparisons, simplifying more complex quantitative data and demonstrating the relationship between the reported variables.

However, graphs and charts are not always used with the aim of reporting information. Huff (1954) claimed that, when numbers displayed in tables or explanations are not enough to sell an idea, shock, convince or lead the reader to do something, then the most simple statistical visual resource is used: graphs and charts (also see Johnson et al., 1980). Thus, the graphs and charts contained in management reports are used to present and communicate financial data, and the types used depend precisely on the identification of this goal. The expansion of computer resources such as electronic spreadsheets has not only enabled greater usage but also made it easier to assemble those graphs (Bolten, 2012).

Steinbart (1989), Beattie and Jones (1992) and Mather et al. (2000) identified a set of three key financial variables (KFVs from here onwards) that are reported most often using graphical resources: net income, net revenue and dividends. These KFVs were considered in the investigation of studies from the area focusing on selectivity analysis.

3 Impression management with graphical resources

The term impression management comes from psychology and, according to Leary and Kowalski (1990), it refers to the process by which individuals try to control other people's impressions of them. This is because the impressions people have about others implies on how they will deal and talk about them.

This term is confused with another concept of psychology called 'self-presentation', in which individuals, in addition to trying to manipulate the image they pass to others, also try to control the way they see themselves. In this sense, impression management is a broader term, since it also covers the possibility of a third party trying to control the image of other individuals, and it can be applied to companies and institutions (Leary and Kowalski, 1990).

Several studies have been carried out on this issue, the first being in the area of clinical psychology. Braginsky and Braginsky (1967), for example, examined whether patients with chronic schizophrenia might attempt to manipulate impression management strategies in interviews. The authors found that patients presented themselves as 'healthy'

or 'sick' according to their needs and goals, and were able to employ management strategies.

Impression management has been identified in situations in which the managers of organisations produce and distribute information in a way that affects the decisions, opinions and behaviour of users (Stanton et al., 2004). Various studies have been conducted in relation to this theme, including in areas such as health (Braginsky and Braginsky, 1967) and management (Frink and Ferris, 1998).

Leary and Kowalski (1990) presented a two-component model in which the literature on impression management is based. The authors have pointed out two processes that comprise this issue, where the first involves the motivations of the impression management. This process is composed of three factors: the relevance of the impression that is created, the value of what one wants to achieve by creating that impression, and the discrepancy between the desired and current image. The second process involves the impression construction. Five factors that determine what kind of impression individuals try to construct were identified: self-concept, desired and undesired identity image, role constraints, target's values and current social image.

Frink and Ferris (1998) investigated the effects of accountability in goal-setting in a performance evaluation context. The authors have performed two tests to verify the task set-up and targeting with two different groups: university students and telemarketing staff. The results indicated that participants organise tasks and set goals differently according to the conditions for accountability. In addition, the differences found between objectives and performance reflect the use of impression management for higher levels of accountability.

In the financial area, it is possible to cite the study by Wills (2008), which investigated two particular forms of impression management commonly found in annual corporate reports: the distortion of narratives and manipulation of graphs and charts. An experiment was carried out in which the participants received information on two fictitious companies in which one of them presented a management plan and they were required to make investment decisions. The author verified that there was no significant difference between the participants' decisions, concluding that impression management does not affect the perception of the company's performance.

Brennan et al. (2009) state that when managers report bad news, they use syntactic terms and more complex language in their reports to make reading more difficult. And in the narratives, they tend to associate poorer performances with external factors, while good results must be associated with internal factors. For Beattie and Jones (2000a), among the different forms of impression management in the corporate world, besides the manipulation of content and accounting narratives, manipulation is also observed in the way in which visual resources are used. Bhana (2009) claims that visual resources are used to guide the reader's interpretation and that photographs, for example, are employed to distract them from other information in the reports, as well as to give greater credibility to the information reported.

Merkl-Davies and Brennan (2007) indicated six impression management strategies in which selective information and different forms of disclosure are used:

- 1 legibility manipulation
- 2 rhetoric manipulation

- 3 thematic manipulation
- 4 visual and structural manipulation
- 5 performance comparison
- 6 choice of performance indicators and vii) attribution of performance.

Beattie and Jones (1992) highlight three types of unfaithfulness related to graphs and charts: selectivity, improvement or enhancement of presentation and distortion of measures, with the latter being the most widely studied, according to Wills (2008). This author classifies unfaithfulness into four groups: selectivity, improved presentation, distortions by orientation and distortions by measures, with these last two being complementary.

Selectivity involves the choice of using graphs and charts or not, which variables to employ and what periods to cover. Goundar (2009) states that graphical selectivity involves an administration systematically choosing to include or exclude graphs and charts based on the manager's relationship with the company's financial performance. Beattie and Jones (1992) indicated the deliberate choice to include graphs and charts that report KFVs in annual reports. Another selectivity scenario is the inclusion of graphs and charts in company reports that present an increase in results, a hypothesis supported by the study from Mather et al. (2000), who verified a greater incidence of graphs and charts in the reports of companies with rising profits. Another situation is an entity that deliberately decides to use graphs and charts for a positive and rising period of financial performance, covering up possible falls in results.

Improved presentation involves choosing graph and chart design strategies in order to manipulate the data, such as format and background, so that unfavourable news is camouflaged. Bastardo (2015) explains that improved presentation takes place whenever one or more elements of a graph or chart prevent the correct understanding of the data displayed. Distortion is derived from resources such as three-dimensional elements, the absence of titles and colours whose intensity is associated with numerical values and unnecessary lines, among other things that violate some of the basic principles of graphical construction indicated by Kosslyn (1989), such as the obligation to include all variables, titles and information in order to avoid ambiguities and the care to avoid colours to highlight intentionally selected information.

As for *distortion by orientation*, this involves altering the angulation parameter, carried out through changes in the height and width of trend lines in graphs. Cleveland and McGill (1986) verified that when inclination parameters differ from 45°, the data is rendered ineffective and lead to imprecise and biased judgments.

And finally, *distortions by measures*, which are the most widely found in graphs and charts, occur when there is a physical representation of numbers in the graphs and charts that is not directly proportional to the numbers highlighted (Beattie and Jones, 2002). This unfaithfulness violates principles of graphical construction indicated by Tufte and Schmiegel (1985), who state that physical units must be directly proportional to the numbers represented and the dimensions adopted must not exceed the dimensions of the data.

4 Graphs and charts, impression management and financial performance

The main empirical studies in the area have investigated the relationship between the use of graphs/charts and companies' financial performance. This investigation has led the authors to results that are indicative of impression management in the form of graphical selectivity, improved or enhanced presentation and also graphical distortions, which are mostly positively related to the companies' 'good results'.

The first academic paper concerning the use of graphical resources in management reports was published by Steinbart (1989). The author tried to determine whether the graphs and charts present in the annual reports of 319 US companies from 1986 were used in order to create a more favourable impression of the company's performance. For this, statistical tests verified that companies that presented growth in their net revenues use more graphs and charts involving KFVs and that 26% of the graphs and charts related to these variables presented a physical distortion equal to or greater than 10% and that the frequency of the distorted data is greater in reports from companies that presented a worsening of their results.

Beattie and Jones (1992), the most fruitful authors in this area, analysed the annual reports of the 240 biggest companies in the UK from 1989, documenting the nature and extent of the use of graphs and charts. They identified indications of selectivity in the reports analysed, where 65% of the companies used at least one graph or chart involving KFVs. They also verified that companies with greater financial performance employed more graphs and charts and that 30% of them had graphical distortions.

In 1994, Beattie and Jones investigated for the first time the format choices involving graphs and charts in the annual reports of charities, their commitment to the principles of graphical construction and whether there was evidence that the graphs and charts were used to convey information in a more favourable way for the entity. 76 documents originating from the 50 biggest charities in the UK were analysed, using distortion rates developed by the authors, as well as analysing selectivity by identifying graphs and charts involving KFVs. The results indicated that more than 70% of the graphs analysed reported information related to the entities' revenues and that 54% of the KfV graphs and charts were in the pie chart format.

Mather et al. (1996) analysed annual reports between 1991 and 1992 from the 143 biggest Australian companies and from the 44 biggest not-for-profit entities in the country, by collecting data related to the amount of graphs and charts, the use of KFVs and distortions of graphical measures using the distortion index; no significant relationship was found. However the authors perceived that smaller companies are more likely to employ KfV graphs and charts in their reports when there is an improvement in performance.

Beattie and Jones (1997) compared the graphical disclosure of US and British companies. The annual reports of 176 companies from the USA and the UK in 1990 were analysed, in which it was verified that in the two countries, at least one graph or chart related to one of the KFVs associated with growth in results is employed.

Mather et al. (2000) were the first authors to analyse the use of graphs and charts in another source that was not included in annual reports. They investigated the use, selection of variables and construction of graphs and charts in 484 initial public offerings (IPO) prospects from Australian companies between 1991 and 1993. Approximately 57% of the graphs and charts analysed presented average distortions. The authors noted signs

of selectivity with the use of more graphs and charts in reports from companies with rising profits, however no evidence was found of a significant association between graphs and charts with distortions by measures and financial performance.

Beattie and Jones (2000a) examined whether graphs and charts with KFVs are more likely to be included when performance has improved and whether this distortion leads to a more favourable perception of their image. The authors analysed reports from 300 Australian, French, German, British, and US companies. Evidence was found of selectivity, especially for graphs and charts involving results, and also distortions by measures. However, it was not possible to explain the differences in disclosure between the countries, despite the results showing that countries with stronger capital markets presented a greater degree of impression management.

Beattie and Jones (2000b) conducted the first study with a time series, verifying whether the use of graphs and charts depends on financial performance. The analysis was carried out in the annual reports of the 137 biggest companies in the United Kingdom during a five-year period, between 1988 and 1992. Evidence was found of an association between the use of graphs and charts reporting financial contents and the positive financial performance of the companies.

More recently, Uyar (2011) sought to investigate the association between the characteristics of the company and the level of voluntary disclosure of graphs and charts in the annual reports of Turkish companies in 2006. The results indicated that the company's size and the auditing company are significantly and positively associated with the voluntary disclosure of graphs and charts, while financial performance and corporate structure do not have any significant association.

Sartawi (2015) sought to describe the graphical disclosure practices in the annual reports of Jordanian banks by investigating graphical distortions and factors that influence the level of graph and chart usage. Data were collected from the annual reports of 15 banks, from 2008 to 2013. The presence of graphical distortions was found, signalling the need for greater regulation with regards to this type of disclosure and a positive association between the amount of graphs and charts and the company's financial performance.

Cho et al. (2012) investigated whether companies manipulate the graphs and charts in their sustainability reports in order to present a more favourable view of their social and environmental performance. Impression management was measured in 77 US company reports from 2006 via the presence of a favourable bias in the choice of the items reported graphically and via distortion levels. Considerable evidence of selectivity was also found in the choice of the graphical contents and moderate evidence of graphical distortion. The graphs and charts of companies that presented poorer social performance used a greater degree of impression management, while no significant relationship was found in relation to environmental performance levels.

Over the course of this study, researches related to the use of graphical resources were found, whose aim did not involve analysing selectivity or graphical distortions via the relationship between the use of graphs/charts and performance. For example, Muiño and Trombetta (2009) examined the impact and quality (distortions) of the graphs and charts on the cost of capital of companies listed on the Madrid stock exchange between 1996 and 2002. The graph and chart proxies were used as independent variables and the cost of capital as a dependent variable. It was verified that, for higher disclosure levels, graphical distortion increases the cost of capital and the use of graphs and charts does not have a significant impact on the users' decisions. Goundar (2009) verified whether

companies in New Zealand use impression management to influence the presentation of performance in the annual reports of companies that are close to changing its CEO. The author examined the use of graphs and charts in the reports, as well as the graphical distortions in them, via the presence of KFVs and the distortion index, finding evidence of impression management. Rahman et al. (2014) proposed establishing the nature and extent of the voluntary disclosure of graphical information in Malaysia in a 30-year period with 10-year intervals (1974, 1984, 1994 and 2004). Most of the companies prefer to use bar charts and there was considerable growth in the amount used over the course of the period. Bastardo (2015) examined the use of graphs and charts in all of the companies listed on the Euronext Lisbon in 2013. Despite the extensive use of graphs and charts, the author did not identify any indications of selectivity, but did identify distortions by measure and orientation.

5 Research hypotheses

5.1 Hypotheses based on selectivity

Beattie and Jones (1992) state that, at its most basic level, selectivity firstly involves the decision to use or not graphs and charts for disclosing information. As in the example given by Uyar (2011), they investigated the relationship between the quantity of graphs and charts used with financial performance and company size.

According to Galani et al. (2011), the theory in general suggests that there is a positive association between the quantity and quality of information disclosed and a companies' financial performance. Uyar et al. (2013) related this phenomenon to agency theory and signalling theory. For agency theory, Soliman (2013) states that the managers of profitable companies reveal a greater amount of information to show to stakeholders that they act in accordance with the market's best interests, as well as to increase the investor confidence and preserve their position. A greater quantity of information is also disclosed, according to signalling theory, because when financial performance is positive, companies are more inclined to signal their quality to investors (Uyar et al., 2013).

Mather et al. (2000) state that a way of investigating the presence of selectivity is by analysing whether the choice of variables reported through graphs and charts is related to company performance. Thus, consistently with the studies from Steinbart (1989) and Beattie and Jones (1992, 1997, 2000b), Mather et al. (2000) formulated the following hypotheses:

- H1 There is a significant statistical association between the quantity of graphs and charts and company financial performance.
- H2 There is a significant statistical relationship between the quantity of graphs and charts that report KFVs (net income, net revenue and dividends) and company financial performance.
- H3 There is a significant statistical relationship between the quantity of graphs and charts that report KFVs and changes in company financial performance.

Although the authors expected the existence of a relation between performance and quantity of graphs (H1), reporting of KfV (H2) and change in performance (H3), it could be speculated that a negative relation would indicate that the company would be using

graphs as a factor of distraction, avoiding drawing the user's attention to its poor performance.

5.2 *Hypotheses related to improved presentation*

As Muiño and Trombeta (2009) argue, the company's size is often used as a proxy for the availability of information (Soliman, 2013; Uyar et al., 2013). Bigger companies tend to disclose a greater quantity of information than smaller companies. According to Soliman (2013), this occurs because bigger companies face higher agency costs since they require a greater volume of external capital to fund their investments and a higher level of disclosure reduces these costs. In addition, the cost of accumulating and disclosing information is greater for smaller companies (Galani et al., 2011). Akerlof (1970) states that being evaluated in the market as a 'lemon' also implies costs for companies, so they have incentives to disclose better information.

Taking into consideration those preparers of information can deliberately violate some principles of graphical construction in order to convey a better impression of the company or hamper the understanding of certain information (Beattie et al., 2008), bigger companies are expected to use fewer distorted graphical resources. This practice in the literature is called improved presentation and, as mentioned before, it can be verified, for example, via the presence of three-dimensional resources or the use of a greater-than-zero baseline in the graphs used. Thus, based on previous studies (Muiño and Trombeta, 2009; Uyar, 2011), the following hypothesis is presented:

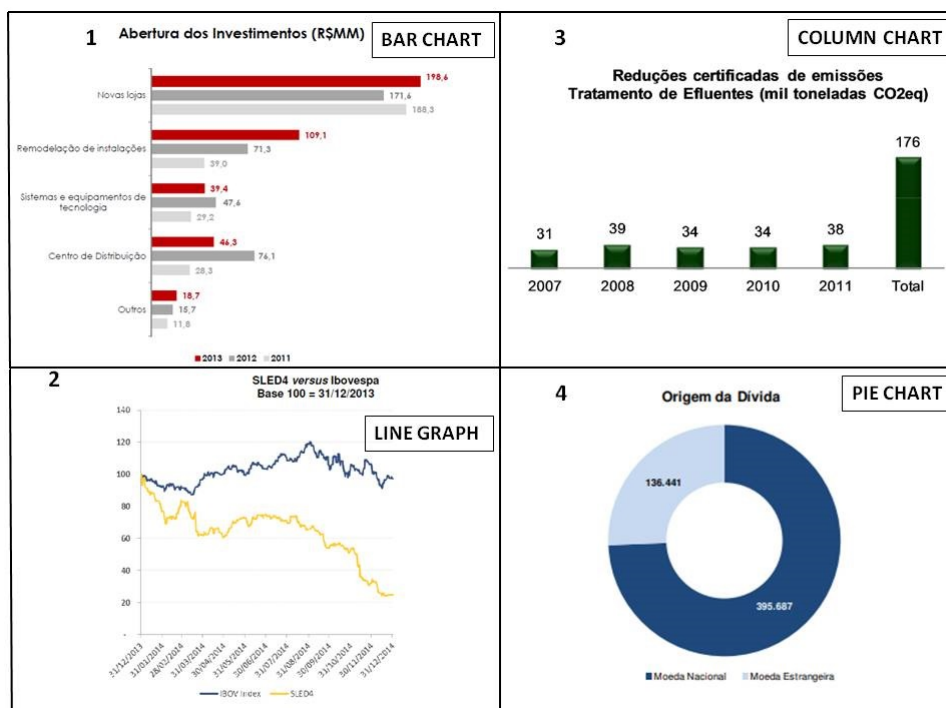
- H4 There is a negative statistical relationship between the company's size and the quantity of enhanced or improved presentation graphs and charts used in the ARs of Brazilian publicly-traded companies.

6 **Methodological procedures**

The universe of this study covers 620 Brazilian companies with stocks registered at the Brazilian Securities and Exchange Commission (*CVM*), an entity that regulates the local stock market, in February 2016. The selection criterion adopted covers all companies whose public listing requests had been granted until 1997 and that were not in receivership. It was also established as a selection criterion that all the management reports, where the graphical information is presented in Brazil, were made available in the 18-year period. This reduced the quantity of companies to 180, totalling 3,240 annual reports between 1997 and 2014. The first year of the research was established by the availability of financial information at the *CVM*.

The characteristics related to the graphs were analysed. Firstly, they were classified according to the main graphical forms identified in financial reports and indicated by Beattie and Jones (1992) as being bar, column and pie charts and line graphs. In Figure 1 it is possible to verify the differences between these types of graphs and charts via some examples extracted from the sample.

Figure 1 Types of graphs and charts (see online version for colours)

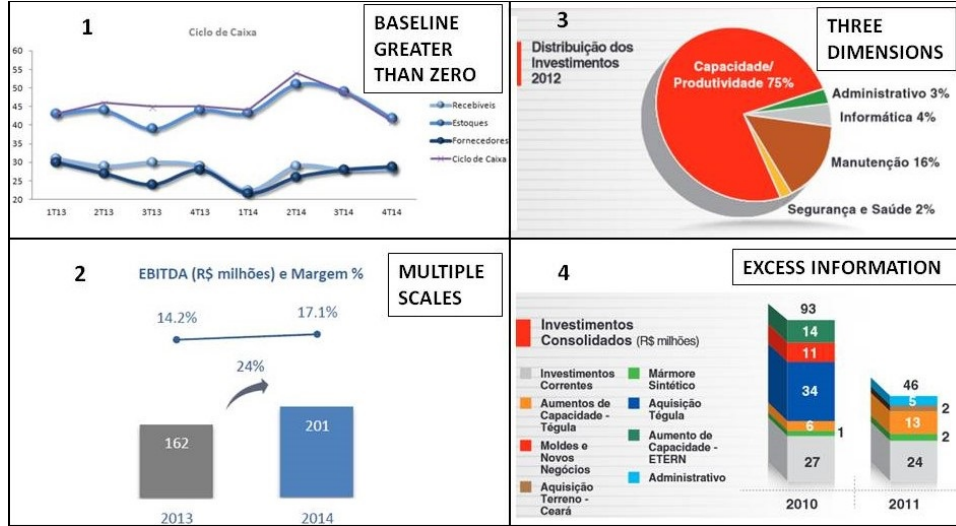


Notes: 1 bar chart – public listing (R\$MM): shops; remodelling of installations; technological systems and equipment; distribution centre; others
 2 line graph – SLED4 versus Ibovespa: Baseline = 31/12/2013
 3 column chart – certified reductions in emissions sewage treatment (thousand tonnes CO2eq)
 4 pie chart – origin of debt: national currency; foreign currency.

Source: Companies' management reports: 1) bar chart: Lojas Renner S/A (2013, p.11); 2) column chart: Saraiva S/A (2014, p.17); 3) line graph: Celulose Irani S/A (2013, p.16); 4) pie chart: Portobello S/A (2014, p.5)

Besides the types of graphs and charts, situations of improved or enhanced presentation were also compiled. In Figure 2 it is possible to observe graphs and charts that presented some type of enhancement, extracted from the reports analysed in the study. The graphical feature in Figure 2 is an example of a line graph whose baseline differs from zero, with the y axis starting with a numerically higher value. The second is a column chart with line enhancement and indication of multiple scales for the same information. The third is a pie chart and is presented in three dimensions. The last chart in the figure is an example of informational excess that hampers the reader's analysis by indicating data related to nine different investment items.

Figure 2 Types of enhanced presentation (see online version for colours)



Notes: 1 greater than zero baseline – cashflow cycle: receiveables; stock; suppliers; cashflow cycle
 2 multiple scales – EBITDA (R\$ million) and margin %: South America wholesale
 3 three dimensions – investment distribution 2012: capacity/productivity; administrative; computing; maintenance; health and safety
 4 Informational excess – consolidated investments – R\$ million: current investments; increase in capacity – tégula; moulds and new businesses; land acquisition – ceará; synthetic marble; acquisition tégula; increase in capacity – ETEI; administrative.

Source: Companies’ management reports: 1) Dimed S.A Distribuidora de Medicamentos (2014, p.11); 2) Coteminas S.A (2014, p.11); 3) Eternit S.A (2011, p.6); 4) Eternit S.A (2012, p.6)

The content reported by the graphical resources gathered was also compiled. The subjects were classified into results, expenses, market, debt, resources, equity, assets, revenues, and others. This typology arose based on the data gathered. The graphs and charts that reported KfVs were also separated in order to verify whether there are indications of selectivity in the choice of this information. In order to verify whether there is a relationship between the inclusion of graphs and charts in the management report and financial performance, the non-parametric chi-square significance test will be applied, as in previous studies (Beattie and Jones, 1992, 1997; Mather et al., 1996). With regards to the second aspect related to selectivity, the relationship of the quantity of graphs and charts that reported KfVs was investigated using the econometric model described below. The same method was used to identify impression management based on improved or enhanced graphical presentation. It was taken into consideration that the same graph or chart can present more than one type of unfaithfulness, then to avoid double counting of the same graph or chart and to smooth extreme values so that these can be used for time series prediction, the following index was developed to be tested as a dependent variable, defined via the expression:

$$GIEP = \left(\frac{G3D}{TG}\right) + \left(\frac{GB > 0}{Tg}\right) + \left(\frac{GL}{TG}\right) + \left(\frac{GE}{TG}\right)$$

where *GIEP* = graphs and charts with improved or enhanced presentation; *G3D* = three-dimensional graphs and charts; *GB > 0* = graphs with a baseline greater than zero; *GL* = graphs and charts with lines indicating multiple scales; *GE* = graphs and charts with excess of information; and *TG* = total graphs and charts.

Table 1 Description of the independent variables

<i>Variables</i>	<i>Description</i>
Profitability	<i>ROA_{i,t}</i> The association between profitability and disclosure of financial information has been widely investigated in the literature (Inchausti, 1997). Companies with higher earnings have a greater tendency to reveal good news (Cormier et al., 2011). The studies have used return on assets (ROA) as a measure of profitability, as seen in Brammer and Pavelin, (2008), Cormier et al. (2011), Galani et al. (2011) and Mohamad (2014). In this study, ROA was calculated using the relationship between net income and assets.
Improved economic situation	<i>IES_{i,t}</i> The variations in net income from one year to the next were used to capture the possible relationship between the inclusion of graphs and charts and changes in performance, as in Steinbart (1989), Mather et al. (1996), Beattie and Jones (2000b) and Dilla and Javrin (2010).
Company size	<i>LnS_{i,t}</i> The biggest companies are more structured to generate and disclose their financial information, besides having more interest in the relationship with their stakeholders. In this study the logarithm of total assets was used, which is in line with Brammer and Pavelin (2008), Uyar (2011) and Galani (2011).
Company age	<i>LnA_{i,t}</i> According to Akhtaruddin (2005), older companies may have better developed their disclosure practices and have an interest in strengthening their reputation and image. It is expected a positive association between the company's age and the quantity and quality of the information disclosed (Hasan and Hosain, 2015). This characteristic has been used as a control variable in various studies carried out in emerging markets, such as Choi (1973), Owusu-Ansah and Yeoh (2005), Uyar et al. (2013), and Ferchichi (2013), besides the studies from Roberts (1992), Soliman (2013) and Galani et al. (2011).
Publication period	<i>T</i> This variable aims to verify the evolution of disclosure over time. It is assumed that over the years, companies have published more information and more graphs and charts. These two dummy control variables used are based on the work of Rodrigues (2012), with T1 being the period between 1997 and 2002, T2 2003 to 2008 and T3 2009 to 2014.
Report size	<i>SIZER_{i,t}</i> Based on Milne and Adler (1999) and Rodrigues (2012), a positive relationship is expected between the quantity of graphs and charts and the volume of information, measured by the quantity of words.

For the verification of hypotheses 2 and 3, related to the dependent variable that indicates the quantity of graphs and charts that report KFVs, the following econometric model was used:

$$KFV_{i,t} = \alpha + \beta_1 ROA_{i,t} + \beta_2 IES_{i,t} + \beta_3 LnA_{i,t} + \beta_4 SIZER_{i,t} + \beta_5 T_1 + \beta_6 T_3 + \varepsilon$$

The $KFV_{i,t}$ variable was obtained by the sum of the graphs and charts from each report that reported information regarding the entity's net income, net revenue and dividends alone, with no other graphs or charts being considered for this analysis. As for the aspects related to the graphical distortions addressed by hypothesis 4 of this study, these were analysed using the following equation:

$$GIEP_{i,t} = \alpha + \beta_1 ROA_{i,t} + \beta_2 LnS_{i,t} + \beta_3 LnA_{i,t} + \beta_4 SIZER_{i,t} + \beta_5 T_1 + \beta_6 T_3 + \varepsilon$$

The variables used were extracted from the financial statements and registration information made available. These variables and their descriptions are displayed in Table 1.

7 Results

7.1 Preliminary analysis

16,936 visual resources were found in the 3,240 reports. Of these, 45.3% were graphical resources, totalling 7,669 graphs and charts, 8,634 were tables and 173 were illustrations (organisational charts, photos, maps of geographic activity and awards/representations logos). Only 82 photos were identified in the whole analysis period (Table 2).

The use of visual resources also rose over the years. While the general total used in 1997 was only 1.58% of the total of 16,936 items, in 2014 the number of items corresponded to 9.13% of the total. It was possible to verify that the quantity of companies that did not use these resources in their reports decreased over the years. In Table 3, it is also possible to verify the quantity and quality of these elements by operating sector.

In the research period, 66.54% were from reports of companies that presented profit, as presented in Table 4. Of the 2,156 reports that indicated profit in the financial period, 38% of them made use of graphical resources, while only 241 reports out of the 1,084 with negative financial performance used these elements. It is possible to perceive an evolution in the use of these resources over the years, especially with regards to the profitable companies. In 1997, 9% of the 114 reports had some type of graphical resource, while for 2009, 2010, 2011 and 2012, more than half of the reports from each financial period made use of this type of resource. To sum it up, of the 7,669 graphs and charts collected, 6,223 of them were from years that reported profit; that is, 81% of the total.

A total of 5,202 graphs and charts were found with some type of enhanced or improved presentation, which corresponds to approximately 68% of the total. The most widely used enhancement is the presentation in three dimensions. These characteristics are shown in Table 5.

It is possible to observe in Table 6 that most of the graphs and charts from a total of 1,836 reported information regarding the companies' revenues (42%), which is consistent with previous studies (Beattie and Jones, 1992, 1999; Mather et al., 1996), indicating that companies use more graphs and charts to report KFVs.

Table 2 Quantity of visual resources by year

Year	Graphs and charts			Tables			Illustrations			Photos			General total	%
	Mean	Max	Total	Mean	Max	Total	Mean	Max	Total	Mean	Max	Total		
1997	0.49	16	88	1	10	180	0	0	0	0	0	0	268	1.58
1998	0.44	12	79	1.09	13	196	0.01	1	1	0	0	0	276	1.63
1999	0.73	13	131	1.28	14	231	0.02	1	3	0	0	0	365	2.16
2000	0.89	17	161	1.51	11	272	0.05	3	9	0	0	0	442	2.61
2001	1.18	13	212	1.77	16	319	0.06	3	11	0.01	1	1	543	3.21
2002	1.41	17	253	1.89	26	341	0.07	3	13	0.01	1	1	608	3.59
2003	1.72	20	309	2.21	23	397	0.14	5	25	0	0	0	731	4.32
2004	2.18	24	393	2.32	26	417	0.09	3	17	0	0	0	827	4.88
2005	2.56	21	461	2.25	24	405	0.14	4	26	0	0	0	892	5.27
2006	2.56	21	461	2.66	35	478	0.26	10	46	0	0	0	985	5.82
2007	2.89	20	521	2.91	35	523	0.24	15	44	0	0	0	1,088	6.42
2008	2.87	29	516	3.01	55	541	0.28	11	50	0.03	4	5	1,112	6.57
2009	3.31	75	596	3.5	50	630	0.31	10	55	0.05	9	9	1,290	7.62
2010	4.12	36	742	4.1	42	738	0.34	10	61	0.06	10	11	1,552	9.16
2011	3.8	32	684	3.59	64	646	0.24	7	43	0.07	7	12	1,385	8.18
2012	3.73	36	672	4	62	720	0.32	10	57	0.06	5	11	1,460	8.62
2013	3.83	33	690	4.51	138	811	0.25	7	45	0.11	12	19	1,565	9.24
2014	3.89	45	700	4.38	51	789	0.25	7	45	0.07	9	13	1,547	9.13
<i>Total</i>			<i>7,669</i>	<i>Total</i>		<i>8,634</i>	<i>Total</i>		<i>551</i>	<i>Total</i>		<i>82</i>	<i>16,936</i>	<i>100.00</i>

Table 3 Quantity of visual resources by operating sector

Operating sector	Graphs and charts			Tables			Illustrations			Photos			Total	%
	Mean	Max	Total	Mean	Max	Total	Mean	Max	Total	Mean	Max	Total		
Adm and participations	1.28	28	1,060	1.8	36	1,492	0.07	5	65	0	1	1	2,618	15%
Commercial	3.47	75	1,438	3.19	34	1,322	0.13	7	58	0.1	12	41	2,859	17%
Construction and infrastructure	3.53	36	2,520	2	26	2,148	0.33	15	169	0.05	5	19	4,856	29%
Financial	1.57	35	481	1	9	249	0.08	5	28	0.01	1	3	761	4%
Services	0.66	16	131	0	6	73	0.08	5	19	0	0	0	223	1%
Public utility	4.53	33	2,039	7	138	3,350	0.45	10	212	0.04	9	18	5,619	33%
	<i>Total</i>		<i>7,669</i>	<i>Total</i>		<i>8,634</i>	<i>Total</i>		<i>551</i>	<i>Total</i>		<i>82</i>	<i>16,936</i>	<i>100%</i>

Table 4 Quantity of graphs and charts by performance

Year	Profit				Loss			
	Qt.	ARs	Qt. with graphs and charts	%	Qt.	ARs	Qt. with graphs and charts	%
1997	114	10	50	9%	66	8	38	12%
1998	107	12	47	11%	73	7	32	10%
1999	103	20	77	19%	77	13	54	17%
2000	115	26	120	23%	65	8	41	12%
2001	118	31	150	26%	62	13	62	21%
2002	98	26	140	27%	82	24	113	29%
2003	119	42	230	35%	61	16	79	26%
2004	132	49	346	37%	48	9	47	19%
2005	126	54	395	43%	54	12	66	22%
2006	132	55	426	42%	48	8	35	17%
2007	135	63	463	47%	45	10	58	22%
2008	125	57	418	46%	55	17	98	31%
2009	140	71	572	51%	40	8	24	20%
2010	132	71	677	54%	48	10	65	21%
2011	121	62	522	51%	59	17	162	29%
2012	105	54	477	51%	75	25	195	33%
2013	120	58	551	48%	60	17	139	28%
2014	114	54	562	47%	66	19	138	29%
Total	2156	815	6223	38%	1084	241	1446	22%

Table 5 Graphs and charts with enhanced or improved presentation

Year	3D			Baseline > 0			Line			Excess information		
	Mean	Max	Total	Mean	x	Total	Mean	Max	Total	Mean	Max	Total
1997	0.247	16	44	0.017	3	3	0.006	1	1	0.141	8	25
1998	0.292	10	52	0.017	2	3	0.017	1	3	0.153	10	27
1999	0.287	9	51	0.006	1	1	0.034	1	6	0.243	8	43
2000	0.331	9	59	0.062	6	11	0.096	4	17	0.153	8	27
2001	0.522	11	94	0.044	2	8	0.100	5	18	0.251	8	45
2002	0.522	9	98	0.044	8	18	0.100	6	30	0.251	6	38
2003	0.648	15	116	0.173	9	31	0.201	7	36	0.225	6	40
2004	0.844	21	152	0.144	10	26	0.183	6	33	0.330	9	59
2005	0.967	20	174	0.100	9	18	0.467	11	84	0.397	9	71
2006	0.906	17	163	0.167	17	30	0.406	11	73	0.441	10	79
2007	1.056	19	190	0.122	13	22	0.522	10	94	0.486	10	87
2008	0.933	22	168	0.144	14	26	0.239	10	43	0.480	11	86
2009	1.272	75	229	0.112	14	20	0.683	69	123	0.520	9	93
2010	0.994	23	179	0.222	13	40	0.539	17	97	0.866	16	155
2011	1.094	12	197	0.178	12	32	0.367	7	66	0.626	9	112
2012	1.172	35	211	0.161	14	29	0.339	9	61	0.553	11	99
2013	1.122	32	202	0.144	14	26	0.250	10	45	0.760	17	136
2014	0.922	21	166	0.261	23	47	0.567	12	102	0.626	9	112
<i>Total</i>			<i>2,545</i>			<i>391</i>		<i>Total</i>	<i>932</i>			<i>1,334</i>

Table 6 Content of the reports

Year	Result			Expenses			Market			Resources			Liabilities		
	Mean	Max	Total	Mean	Max	Total	Mean	Max	Total	Mean	Max	Total	Mean	Max	Total
1997	0.033	1	6	0.044	2	8	0.039	2	7	0.033	3	6	0.028	4	5
1998	0.072	3	13	0.033	2	6	0.056	3	10	0.028	1	5	0.028	4	5
1999	0.100	3	18	0.061	3	11	0.144	5	26	0.028	1	5	0.061	4	11
2000	0.194	5	35	0.061	2	11	0.228	6	41	0.044	3	8	0.072	4	13
2001	0.239	5	43	0.083	3	15	0.244	4	44	0.050	3	9	0.072	4	13
2002	0.256	4	46	0.067	3	12	0.278	6	50	0.078	3	14	0.050	5	9
2003	0.272	5	49	0.083	2	15	0.439	5	79	0.111	4	20	0.083	5	15
2004	0.400	6	72	0.089	3	16	0.461	9	83	0.122	5	22	0.122	5	22
2005	0.489	6	88	0.122	3	22	0.661	11	119	0.106	6	19	0.117	3	21
2006	0.417	4	75	0.117	2	21	0.611	11	110	0.133	6	24	0.183	4	33
2007	0.611	6	110	0.189	5	34	0.583	11	105	0.117	5	21	0.139	7	25
2008	0.533	6	96	0.156	5	28	0.617	11	111	0.139	5	25	0.167	7	30
2009	0.567	7	102	0.244	8	44	0.556	8	100	0.122	5	22	0.150	6	27
2010	0.767	14	138	0.339	12	61	0.694	12	125	0.167	4	30	0.311	9	56
2011	0.711	10	128	0.400	12	72	0.572	7	103	0.200	4	36	0.222	9	40
2012	0.760	9	136	0.402	13	72	0.581	8	104	0.218	9	39	0.173	7	31
2013	0.861	12	155	0.333	7	61	0.494	14	89	0.200	5	36	0.228	7	41
2014	0.737	13	133	0.408	8	73	0.575	12	103	0.229	6	41	0.263	9	47
Total			1,443	Total		582	Total	1,409		Total	382		Total		444

Table 6 Content of the reports (continued)

Year	Equity			Revenues			Assets			Others		
	Mean	Max	Total	Mean	Max	Total	Mean	Max	Total	Mean	Max	Total
1997	0.033	1	6	0.044	2	8	0.039	2	7	0.033	3	6
1998	0.072	3	13	0.033	2	6	0.056	3	10	0.028	1	5
1999	0.100	3	18	0.061	3	11	0.144	5	26	0.028	1	5
2000	0.194	5	35	0.061	2	11	0.228	6	41	0.044	3	8
2001	0.239	5	43	0.083	3	15	0.244	4	44	0.050	3	9
2002	0.256	4	46	0.067	3	12	0.278	6	50	0.078	3	14
2003	0.272	5	49	0.083	2	15	0.439	5	79	0.111	4	20
2004	0.400	6	72	0.089	3	16	0.461	9	83	0.122	5	22
2005	0.489	6	88	0.122	3	22	0.661	11	119	0.106	6	19
2006	0.417	4	75	0.117	2	21	0.611	11	110	0.133	6	24
2007	0.611	6	110	0.189	5	34	0.583	11	105	0.117	5	21
2008	0.533	6	96	0.156	5	28	0.617	11	111	0.139	5	25
2009	0.567	7	102	0.244	8	44	0.556	8	100	0.122	5	22
2010	0.767	14	138	0.339	12	61	0.694	12	125	0.167	4	30
2011	0.711	10	128	0.400	12	72	0.572	7	103	0.200	4	36
2012	0.760	9	136	0.402	13	72	0.581	8	104	0.218	9	39
2013	0.861	12	155	0.333	7	61	0.494	14	89	0.200	5	36
2014	0.737	13	133	0.408	8	73	0.575	12	103	0.229	6	41
<i>Total</i>			<i>1,443</i>	<i>Total</i>		<i>582</i>	<i>Total</i>	<i>1,409</i>		<i>Total</i>		<i>382</i>

7.2 Testing the hypotheses

This study's first hypothesis was tested with the help of the Pearson test for reports that presented graphs and charts *versus* those that did not present them in relation to the reported financial result (profit or loss), as summarised in Table 7.

Table 7 Summary graphical reports by performance

<i>Reports</i>	<i>Profit</i>	<i>Loss</i>	<i>Total</i>
With graphs and charts	808	248	1,056
Without graphs & charts	1,403	781	2,184
Total	2,211	1,029	3,240

The value of the chi-square test (= 49.5) indicates that there is a significant statistical association between the quantity of graphs and charts used and the companies' financial performance and corroborates with the results found by Beattie and Jones (1992, 1997, 2000a).

Empirical tests with panel data were used, with a time series of 18 periods and cross section of 180 companies, totalling 3,240 observations. For this study, the pooled regression was used. Assumptions underlying this method were established to guarantee the adequacy of the results obtained (Gujarati, 2006): error terms of the regression function must be homoskedastic, the covariance between the error terms over time must be zero, normality of the residuals and multicollinearity. Two regressions were carried out relating the independent variables (profitability, variation in the result, company size, company age, report size and passage of time) with the dependent variables KfV and GIEP – graphs or charts with improved or enhanced presentation. The results of the empirical tests and the use of the KfVs as an indication of impression management are presented in Table 8.

Table 8 Results of the regression for hypotheses 2 and 3

<i>Model tested</i>		
$KfV_{i,t} = \alpha + \beta_1 ROA_{i,t} + \beta_2 IES_{i,t} + \beta_3 LnA_{i,t} + \beta_4 SIZER_{i,t} + \beta_5 T_1 + \beta_6 T_3 + \varepsilon$		
<i>Variables</i>	<i>Coefficients</i>	<i>p-value</i>
Constant	-0.250783	0.0349
ROA	0.001334	0.0463
VR	7.14E-05	0.7000
LNA	0.097560	0.0016
SIZER	5.08E-05	0.0000
T1	-0.072530	0.0084
T3	0.144273	0.0000
R ²		0.043015
R ² adjusted		0.041113
DW		0.565067
F statistic		22.61663
P-value (F)		0.000001

For the second hypothesis, regarding the statistical relationship between the use of graphs and charts with KFVs (income, net revenue and dividends) and financial performance, it is important to observe the angular coefficient for the ROA variable, a proxy for profitability, since the other independent variables are used as control variables. As shown in Table 8, the results favour the non-rejection of hypothesis 2, corroborating with the findings obtained by Beattie and Jones (1992, 1999, 2000a) and Cho et al. (2012). As for the variables with the annual variation in the result (VR), no significant statistical relationship was found. Thus, hypothesis 3, which states that there is a relationship between the quantity of graphs and charts involving KFVs and a change in financial situation, is rejected.

For the analysis of hypothesis 4, which verifies whether there is a relationship between the use of graphs and charts with improved or enhanced presentation and the company's size, the results of the regression shown in Table 9 were obtained.

Table 9 Results of the regression for hypothesis 4

<i>Model tested</i>		
$GIEP_{i,t} = \alpha + \beta_1 ROA_{i,t} + \beta_2 LnS_{i,t} + \beta_3 LnA_{i,t} + \beta_4 SIZER_{i,t} + \beta_5 T_1 + \beta_6 T_3 + \varepsilon$		
<i>Variables</i>	<i>Coefficients</i>	<i>p-value</i>
Constant	-0.127408	0.0052
LNS	0.012229	0.0001
ROA	0.000913	0.1069
LNA	0.037761	0.0000
SIZER	3.39E-05	0.0000
T1	-0.083108	0.0000
T3	0.007488	0.7052
R ²		0.110496
R ² adjusted		0.108845
DW		0.645074
F statistic		66.93468
P-value (F)		0.000000

It is observed that the LNS variable presented significance for the quantity of improved graphs and charts, a proxy for impression management. However, this relationship was expected to be negative, where bigger companies present better levels of disclosure, with fewer distorted graphs and charts. Thus, hypothesis 4 is rejected.

Regarding the control variables, it was possible to observe in the two models that the LNA and SIZER variables presented a significant statistical relationship so that the older the company and bigger the report, more graphs and charts involving KFVs and enhanced graphs and charts are used in the management reports. These relationships were expected for the first model; however the positive relationship between the company's age and the GIEP variable in the second model was consistent with the previous theory that older companies tend to have more developed disclosure practices due to the need to preserve their image in the market (Akhtaruddin, 2005).

The ROA variable in the second model did not present a significant statistical relationship. This means that the company's financial performance does not explain or

influence the use of visually distorted graphs or charts. Regarding the T2 and T3 variables, involving the time period in which the reports were published, a relationship is verified for KFVs in T3 and an inverse relationship in T1, indicating that in the first period, the companies publish fewer graphs and charts reporting income, revenues and dividends, and that there was an increase in the use of graphs and charts for the most recent years. For the model that tested the relationship with GIEP, an inverse relationship was again observed for T1 and no significant relationship for T3, indicating no relationship between the quantity of these graphs and charts used and the most recent years. In Table 10, it is possible to verify a summary of the expected and observed behaviours of the independent variables in relation to the KfV and GIEP variables, taking into consideration that the LNS variable was not tested for the first model or the VR variable for the second one.

Table 10 Summary of the signs found

<i>Variables</i>	<i>KFVs</i>		<i>GIEP</i>	
	<i>Expected</i>	<i>Observed</i>	<i>Expected</i>	<i>Observed</i>
LNS	NA	NA	-	+
ROA	+	+	+	
VR	+		NA	NA
LNA	+	+	-	+
SIZER	+	+	+	+
T1	-	-	-	-
T3	+	+	+	

Finally, Table 11 presents the summary of the results for the hypotheses raised in the study:

Table 11 Results for the research hypotheses

<i>Hypotheses</i>	<i>Results</i>
<i>Hypothesis 1</i> There is a significant statistical association between the quantity of graphs and charts and the company's financial performance.	Accepted
<i>Hypothesis 2</i> There is a significant statistical association between the quantity of graphs and charts that report key financial variables (net income, net revenue and dividends) and the company's financial performance.	Accepted
<i>Hypothesis 3</i> There is a statistical association between the quantity of graphs and charts that report key financial variables and changes in the companies' financial performance.	Refuted
<i>Hypothesis 4</i> There is a negative statistical association between the company's size and the quantity of graphs and charts used in ARs with enhanced or improved presentation.	Refuted

The results presented show that hypotheses 1 and 2 were accepted while hypotheses 3 and 4 were refuted, thus revealing evidence of impression management in the management reports published by publicly-traded Brazilian companies in the form of graphical selectivity and improved presentation.

8 Final remarks

In this study, four hypotheses were investigated in order to verify whether there are indications of impression management in the reports analysed. The results are consistent with what has been found in previous studies involving the subject (Beattie; Jones, 1992, 1999, 2000a; Cho et al., 2012). However, no relationship was observed between changes in performance and the quantity of graphs and charts involving KFVs, unlike what was found by Steinbart (1989), thus resulting in the rejection of hypothesis 3. With regards to improved or enhanced presentation in graphical resources, no significant relationship between the dependent variable and the company's size was expected; however, the results found led to the rejection of this hypothesis. A relationship was also found between the dependent variables used as measures of the quantity of graphs and charts (KFVs and GIEP) and the independent variables related to age and report size. However, this result was not expected for the second model, which revealed that older companies have used more distorted graphs and charts. Also, no relationship was found between the quantity of graphs and charts with distortions and the company's financial performance.

In general terms, the findings of this study indicate that graphical resources are not being used altruistically solely to facilitate the communication of financial information. The evidence found regarding selectivity and improved graphical presentation indicates that impression management may be occurring. As the findings of experimental studies indicate that the user's perception is affected by the presence of graphical unfaithfulness, the results of this study could indicate the need for guidance from the regulator to minimise the problems derived from biased information.

Regarding the limitations of this study, there are those related to the methodology. It is known that content analysis is subjective; that is, by grouping the various contents reported by the graphs into categories to facilitate analysis, there is a risk that they will not reflect categories in the same way. However, this problem was minimised, because a group of three students were asked to analyse a set of reports, trying to classify the graphs in the elaborated categories, which have contributed to the standardisation in the analysis process. Another limitation point is that the results obtained are restricted to the companies selected for the sample, making it impossible to generalise. Finally, it should be emphasised that, although the results indicate the possibility of impression management, it is necessary to take into account the chance that the evidence found is not due to the intentionality, but to the lack of competency or attention of the preparers of the annual reports (Beattie and Jones, 2008), an investigation that was not covered by the scope of this research.

This kind of research, in addition to drawing the attention of regulators about impression management in annual reports, whose graphs are currently unaudited and unregulated in most Western countries (Beattie and Jones, 2008), can be a warning to financial statements users, in particular for stakeholders and shareholders. The excessive use of impression management, which can be ultimately strongly associated with some sort of attempt to manipulate users perception, may result in an over-reaction of the market, as it have been highlighted by previous research.

In addition, this study provides some contributions to the academic community by investigating the usefulness of graphs and charts in the reports of companies listed on the stock market of a non-developed country and enabling future studies to be carried out in order to verify possible differences related to the management practices that influence disclosure patterns in different cultures. This study has also addressed in depth the

question of improved presentation, one of the three aspects of graphical unfaithfulness, but which is less explored than the others in the studies.

For future researches, it is suggested that new hypotheses should be raised to test impression management standards through graphic resources and the inclusion of other variables in the model, in order to verify if characteristics such as sector performance and audit quality, for example, have some impact on how financial charts are built. It is also suggested that distortions of the graph's physical dimensions, another aspect of graphic infidelity, should be investigated for the sample of this research, duly adjusted to the time horizon. Another possibility would be to investigate the differences between the use of graphics in reports of a market such as Brazil's, where there is still no specific regulation on the issue, and the use of such resources in countries which already have guidelines for the elaboration and dissemination of graphic information (Rahman et al., 2014).

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