▪ Advances in Scientific and Applied Accounting, ▪ ISSN 1983-8611 ▪ São Paulo ▪ v.14, n.3 ▪ p. 085-098 ▪ Sep. / Dec. 2021.
▪ DOI: 10.14392/asaa.2021140303

Beyond the financial audit: factors that can influence the presence of the largest accounting firms in the assurance market of sustainability reports in Brazil

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Edited by:
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Abstract

Purpose: The purpose of this paper is to analyze the factors that can influence the presence of the largest accounting firms in the assurance market of Sustainability Reports in Brazil.
Method: The sample includes 47 public companies that assured their sustainability reporting from the period 2012-2018. Data were analyzed using the statistical techniques Anacor, HOMALS and hierarchical logistic regression for panel data.
Findings: The evidence supports that the provision of audit and sustainability assurance services, as well as mimetic isomorphism, are factors that positively affect the entry of the largest accounting firms in the assurance market of sustainability reports in Brazil. These results suggest a potential competitive advantage for the largest accounting firms over other providers in this emerging market.
Research implications: This work has important practical implications for professionals and standardization bodies in the accounting area, because the notarization of accounting professionals in the assurance market of sustainability reports should promote interest in developing institutional support for this practice.

Keywords: Sustainability reporting Assurance. Assurance providers. Brand reputation of the Big-4 firms.

How to cite:

Silveira, G. B. ., Van Bellen, H. M. ., & Mussoi Ribeiro , A. (2021). BEYOND THE FINANCIAL AUDIT: FACTORS THAT CAN INFLUENCE THE PRESENCE OF LARGEST ACCOUNTING FIRMS IN THE ASSURANCE MARKET OF SUSTAINABILITY REPORTS IN BRAZIL. Advances in Scientific and Applied Accounting, 14(3). Retrieved from https://asaa.anpcont.org.br/index.php/asaa/article/view/831

Received: August 06, 2020
Required revisions: October 09, 2021
Accepted: November 20, 2021

Introduction

The number of companies reporting information related to environmental and social performance has increased in recent years. The disclosure of sustainability reports (SR) by the 250 largest companies in the world grew from 35% in 1999 to 93% in 2017 (KPMG, 2017). However, the lack of public trust (Dando & Swift, 2003) and the lack of consistency and integrity of this information (Adams & Evans, 2004) have triggered the growing demand for more reliable information. SRs, when they do not provide performance measures based on real contributions to sustainability, can be characterized as "greenwashing" tools (Papoutsi & Sodhi, 2020).

To bolster trust and mitigate stakeholder skepticism in sustainability information, companies have started voluntarily to externally secure their SR (Simnett et al., 2009). According to O'Dwyer (2011), the external assurance of SR aims to examine, assess and report the reliability and integrity of information about an organization's sustainability performance. Thus, when it is carried out independently, the public's perception of the credibility of SRs increases (Hodge, Subramaniam & Stewart, 2009; Simnett et al., 2009).

External assurance of SR has become a promising market and an expanding area of professional practice for different providers, mainly accounting, certification and consultancy firms specializing in sustainability (Fernandez-Feijoo et al., 2016). At this point, accounting providers demonstrate to be highly adaptable and able to innovate in dynamic and competitive markets (Andon et al., 2015). The four big accounting firms – commonly referred to as the Big-4 (PWC, KPMG, Ernest & Young and Deloitte) – operate on a global level. Therefore, due to their size, they can operate in economies of scale and invest in research and development in different forms of auditing (Farooq & de Villiers, 2017).

Despite competition from different professionals, several studies have documented that large accounting firms have become dominant competitors in the SR assurance market (Simnett et al., 2009; Fernandez-Feijoo et al., 2016; Hummel et al., 2017; Martínez-Ferrero & García-Sánchez, 2018). The domain of the accounting profession in this market can be related to important professional attributes, such as the technical competence to properly understand the specific nature of the sustainability information disclosed by companies (Accountability, 2005; Park & Brorson, 2005; Cohen & Simnett, 2015) and the ability to act independently (Green et al., 2017).

It is noteworthy that most research on external assurance of SR has focused on the differences between accounting and non-accounting providers (Gillet, 2012; Jones & Solomon, 2010; Martínez-Ferrero & García-Sánchez, 2018; O'Dwyer & Owen, 2005; Simnett et al., 2009) and there is little evidence on which attributes favor the presence of large accounting firms in this market, considering the differences in the performance of each firm (Fernandez-Feijoo et al., 2016).

Based on the above, this study aims to analyze the factors that can influence the presence of large auditing firms in the external assurance market of SR in Brazil. Specifically, this analysis aims at a set of characteristics related to the reputational capital of Big-4 firms derived from the joint provision of accounting audit and external assurance of the SRs, sector specialization and mimetic isomorphism. To test the research hypotheses, a panel data set of publicly traded Brazilian companies that ensured their SR in the period 2012 to 2018 was used.

In this research, it is argued that Big-4 accounting firms can be perceived as experts in SR external assurance work, due to attributes arising from experience in providing traditional auditing services, such as the application of standards and procedures (Simnett et al., 2009; Martínez-Ferrero & García-Sánchez, 2018), the fulfillment of professional conduct and independence requirements (Peters & Romi, 2014), in the in-depth and comprehensive understanding of its clients' operations (Gillet, 2012) and in the specialization in the activity sector of the reporting companies (Green et al., 2017).

This study is justified by the need to reinforce and expand the previous results of the emerging literature on the SR external assurance market, providing additional insights on how large accounting firms expand the field of professional practice into new domains of practices adjacent to the sector. auditing and in different contexts. Based on the evidence documented by Fernandez-Feijoo et al. (2016), the research seeks to understand the effects produced by the reputation of Big-4 firms, as a practice of mimetic isomorphism, which are perceived by reporting companies in a specific social context (sector), and to discuss the underlying reasons for these firms engage in SR assurance services.

The selection of the Brazilian case is based on structural factors (the voluntary and unregulated nature of the disclosure and assurance of SR) and political factors (loss of attributions of the environment portfolio, reduction of civil society participation and the flexibility of environmental inspection) and, also, in the reputational crisis of companies seen as "references" in sustainability (for example, Vale, Petrobras and Odebrecht) that bring to light the credibility and reliability of reporting initiatives and practices related to Corporate Social Responsibility (CSR) (Zhang & Chen, 2019). It is also important to mention that credibility and trust are concepts with meanings and implications that can vary considerably between countries and cultures (Fonseca, 2010), which reinforces the motivation of studies with national samples (Perego & Kolk, 2012). Considering these aspects, the Brazilian context is exciting, although so far little explored (Silveira & Alberton, 2020).

The social role of SR's external assurance focuses on the provider's ability to ensure that the interests and expectations of stakeholders, especially external ones, related to CSR are met (Manetti & Toccafondi, 2012); therefore, the assurance professional's credibility is a relevant factor that affects the public's trust and their perception of the reliability of reported information (Hodge et al., 2009).

In this sense, considering the absence of regulation and specific standards to be adopted by accounting professionals (Martínez-Ferrero & García-Sánchez, 2018), the evidence from this study can be useful for entities that guide and regulate the accounting profession reflect on forms of institutional development for this field of action

2 Theoretical Foundations and Hypotheses

In the SR external assurance processes, an independent professional is hired by the reporting company's management to provide an opinion on the adequacy of the information reported to other stakeholders of the organization (Farooq & de Villiers, 2019). In this perspective, for companies, the external assurance of SR is a mechanism whose objective is to generate trust in other stakeholders (Jones & Solomon, 2010). In most jurisdictions, assurance is a voluntary process. And the market is open to different providers that compete for market share (Farooq & de Villiers, 2019).

In this context, the literature has identified two broad groups of providers, classified as accounting and non-accounting (Simnett et al., 2009; Fernandez-Feijoo et al., 2016; Martínez-Ferrero & García-Sánchez, 2018; Farooq & de Villiers, 2019). The group of accounting providers mainly comprises the four large accounting firms – PWC, Ernest & Young, Deloitte and KPMG (Big-4) – while those of a non-accounting nature represent a more diversified group, such as engineering and sustainability experts.

Regarding the execution of SR external assurance processes, no specific qualification is required for the professional to perform this type of service (Ruiz-Barbadillo & Martínez-Ferrero, 2020). Therefore, there is no consensus on which category of provider would be more qualified for the job or if there is a more appropriate approach for this process (Farooq & de Villiers, 2019).

O'Dwyer and Owen (2005) explain that the competitiveness of firms resulted in divergences regarding the nature, scope and approach of assurance between accountants and non-accountants. These differences stem from their knowledge and experience in procedures and in the assurance process as a whole, in the industry, in the businesses and operations of their clients, and also in the object of assurance (Adams & Evans, 2004).

Despite market competition, the audit professional has become the dominant provider in the SR assurance market worldwide (Simnett et al., 2009; Martínez-Ferrero & García-Sánchez, 2018) while factors related to attribute professionals can affect the company's decision about which provider to hire. And this choice becomes complex, as it includes arguments based on economic and collective rationality (DiMaggio & Powell, 1983).

International standards, for example ISAE300 (IAASB, 2013) and AA1000AS (AccountAbility, 2005), describe independence and technical competence as basic requirements for SR assurance providers to perform an efficient work. Technical competence refers to the set of specific skills and experience required to understand the sustainability issue and the methods used to measure and report this information (Cohen & Simnett, 2015). In this sense, hiring the auditor of the financial statements to ensure the SR can be beneficial to the assurance process. The experience and knowledge developed in its audit tasks – such as those related to areas of operating environment, business risk, internal control systems – can be transferred internally to other activities offered to the same client (Ruiz-Barbadillo & Martínez- Ferrero, 2020).

The joint provision of accounting auditing and SR assurance services allows for savings in scope, which includes reducing the time needed to obtain knowledge about the reporting organization (Park & Brorson, 2005) and lower assurance rates (Byus et al., 2013). Jones and Solomon (2010) and Gillet (2012) found that SR assurance is perceived as a logical extension of financial auditing and the natural domain of auditors. Therefore, hiring the same professional for both services would be beneficial in terms of cost and time, since the auditor would already be familiar with the sector, business and operations of its clients.

Jones and Solomon (2010) explain that the objectives and methodology used in the SR's external assurance process are strongly inspired by financial auditing, which is why auditing firms can benefit from using the same information verification techniques in their works. Fernandez-Feijoo et al. (2016) concluded that there is a competitive advantage for a Big-4 firm to enter this market when it is also an auditor of financial statements. The authors documented evidence that each Big-4 accounting firm uses its network of financial audit clients as a gateway to external SR assurance, as well as significant differences in the performance of each large accounting firm.

Considering that sustainability information is a highly specific component associated with each company, due to the diverse, complex, unique and extensive content of issues related to the company's social, ethical and environmental problems (Park & Brorson, 2005), and that the technical competence required to perform an efficient assurance work must also assess the particularities of each organization (Ruiz-Barbadillo & Martínez-Ferrero, 2020), the first research hypothesis is formulated.

H1: The presence of large accounting firms (Big-4) in the SR external assurance market is positively affected by the joint provision of accounting audit and SR assurance services.

In the context of financial auditing, one of the ways in which audit quality is differentiated is the firm's degree of specialization (Mayhew & Wilkins, 2003). Casterella et al. (2004) explain that industry experts develop deeper knowledge than non-specialists as a result of their greater experience and understanding of clients, as well as knowledge sharing practices and the use of standardized audit programs for that industry. Thus, these authors claim that experts are more accurate and effective than non-specialists in their judgments, as their understanding of their clients' businesses and sectors allows for the creation of customized audit procedures.

Specialization by industry can represent a competitive advantage (Carson et al., 2004) by providing an argument for the design of strategies for the insertion of accounting firms in the SR assurance market. In this sense, it is worth noting that the diversity and complexity of sustainability information are closely related to the business sector in which companies operate (Sun et al., 2017). Gürtürk and Hahn (2016) note that most sustainability practices, models and techniques for evaluating information may be relevant in some sectors, but not in others. Therefore, the set of specific skills and competencies required to secure SR varies considerably across sectors (Pflugrath et al., 2011).

The efficient provision of SR assurance services requires providers to acquire a specific level of specialization for the client-company sector (Green et al., 2017). Able to invest in research and development in different forms of auditing (Farooq & de Villiers, 2017), Big-4 firms, by concentrating investment in resources and technology in a specific sector, obtain knowledge about the main aspects of a given business activity, which are fundamental for understanding the company's sustainability policy (Ferguson & Pündrich, 2015) and for offering high-quality assurance services (Martínez-Ferrero et al., 2018). So, if a particular warranty provider is a specialist in a particular sector, companies in that sector will be more likely to hire him, with the expectation of obtaining a higher quality of service (Fernandez-Feijoo et al., 2016).

Martínez-Ferrero and García-Sánchez (2018), when examining the impact of the reputation and specialization of the providers sector in the work of SR assurance, concluded that the probability of detecting material errors and omissions in an SR is higher if verified by a Big-4 and by an industry expert. Experience in providing audit services and the relevant skills and training provided by Big-4 firms, as well as the knowledge and experience of industry experts, increase the propensity to report more accurate opinions on SR. Consistent with these arguments, the second research hypothesis is established.

H2: The presence of large accounting firms (Big-4) in the SR external assurance market is positively affected when the contracted provider is specialized in the reporting company's sector.

Considering the perspective of collective rationality, the decision of companies about which provider to hire can be motivated by informal mechanisms that make it possible to reinforce their social reputation (Fernandez-Feijoo et al., 2016). Furthermore, Pflugrath et al. (2011) found greater credibility, perceived by investors, for assurances made by accounting professionals, typically attributed to Big-4 firms. In this regard, due to their experience in providing traditional audit services, the main accounting firms are perceived as experts in SR assurance work (Farooq & De Villiers, 2019).

The "brand" or reputational capital effect of Big-4 firms can be considered or perceived as sufficient to transfer credibility to SRs (O'Dwyer & Owen, 2005; Hummel et al., 2017; Martínez-Ferrero & García-Sánchez, 2018). The recognition of large audit firms in the accounting field and their well-established business networks increase their legitimacy and their dominance over the SR assurance market (Perego, 2009; Kolk & Perego, 2010; Fernandez-Feijoo et al., 2016). In this sense, Boiral et al. (2020) pointed out that the highly professionalized and structured nature of financial auditing in terms of standards, training, external recognition, codes of conduct and competences is used as a kind of quality label to legitimize the activity of large accounting firms in this market.

Possible explanations could be provided by the legitimacy theory, since companies also emphasize the social context in which they operate (Bansal, 2005) and are likely to strive for more legitimacy by demonstrating to the public that they can trust the content disclosed in their reports (Hummel et al., 2017). In this logic, social pressure (Alrazi et al., 2015) may be an underlying reason for Big-4 firms to operate in the SR external assurance market, as companies may be subject to an environment of legitimacy. And organizational legitimacy can result from isomorphic or mimetic behaviors when a practice is widely adopted in the same sector or country (Meyer & Rowan, 1977).

DiMaggio and Powell (1983) add that mimetic behaviors result from uncertainty, a force that encourages imitation. In emerging contexts, such as the SR external assurance market, in which the doubt hovers about which competent provider to hire, it is possible that these mimetic mechanisms lead companies, in a specific context, to behave in a similar way in relation to the choice of provider (Fernandez-Feijoo et al., 2016).

Sierra-García et al. (2013) suggested that the decision to hire an accounting auditor to ensure SR may be related to the sector. In this regard, Peters and Romi (2014) found evidence that companies become similar in their assurance practices when such practices are widely adopted in their sector.

As it turns out, if a warranty provider has a high reputation in a particular industry, this reputation is likely to motivate other companies to hire it, which allows for the formulation of the third and final research hypothesis:

H3: The presence of large accounting firms (Big-4) in the external assurance market for sustainability reports is positively affected by mimetic isomorphism.

Although the attributes of Big-4 firms suggest possible benefits for the SR external assurance process, the discretionary and unregulated nature of SR external assurance allows reporting companies to control the most critical aspects of the process, for example: the choice of provider, the scope of the audit and access to information (Boiral et al., 2019).

In this regard, independence is critical to ensuring public confidence in sustainability information as it refers to the provider's ability to provide an impartial opinion on SR (Boiral & Heras-Saizarbitoria, 2020). However, due to economic and professional interests in entering this market, providers can be persuaded to prioritize customer satisfaction over professional skepticism and impartial verification (Boiral et al., 2020; Ruiz-Barbadillo & Martínez-Ferrero, 2020).

It is noted that, often, the external assurance of SR tends to be driven by the interests and objectives of companies and not by the demand of other interested parties for more transparent and reliable information (O'Dwyer & Owen 2005; Boiral et al., 2019). And, often, companies are concerned with seeking an independent opinion about their SR for image management purposes and not to improve their sustainability weaknesses (Jones & Solomon, 2010; Hummel et al., 2017).

3 Methodological Procedures

3.1 Sample selection and collected data

This study initially examined a total of 391 companies listed on Brazil, Bolsa and OTC (B3) in 2019 to identify which companies externally ensured SR. The sample comprises companies that have published assured sustainability information in a stand-alone format (publication of an independent report), which are available on websites and have the necessary data to operationalize the study variables in the period from 2012 to 2018.

The sample cut and the selection of the time frame for analysis were based on the "External Communication 017/2011 – DP" from B3, which guides listed companies to report, as of 2012, in their Reference Form (FR) (item 7.8 – Social and Environmental Policies), disclosure and external assurance of sustainability information is carried out, and, if not, its justification.

It is noteworthy that the SRs do not follow regular disclosure standards and, therefore, the analysis period ended in 2018, since, until the time of collection (October 2019 to March

2020), only one company had published the report referring to the year 2019.

After identifying the companies, it was decided to exclude 8 companies that belonged to the oil (1), health (2) and telecommunications (2) sectors in all years of analysis and cyclical consumption (3) between the years 2012- 2016, since the low representation makes it difficult to identify specialist providers in these sectors. In this regard, companies were classified according to the list of segments of B3 (described in subsection 4.1 of this work) and the minimum number of three (3) companies per sector was considered representative.

Overall, the number of companies participating in the survey was 47 companies. However, the sample composition was not the same for all years. Observing the discretionary nature of SR's external assurance, the analysis relied on an unbalanced set of panel data, resulting in 249 observations, as not all companies in the sample contracted external assurance services in all years.

Information on the nature of assurance providers was obtained by examining the SRs of each company's website. The data related to the provision of Big-4 accounting audit services were extracted from the financial statements made available on the B3 website. Finally, accounting and financial information (total assets, ROA and liabilities) were collected from the Economática® database.

3.2 Definition of study variables

The assumed dependent variable BIG4 consists of a binary or nominal variable coded as 0 and 1 (dummy). Thus, when the reporting company hires a Big-4 firm (KPMG, PWC, Deloitte and Ernst & Young) as a provider of external assurance of its SR, 1 is assigned, and for cases where companies have not contracted such a provider, 0 is assigned. This is a common measure in the literature to assess the factors that influence the decision of companies to hire accounting firms to ensure their SR (Simnett et al., 2009; Fernandez-Feijoo et al., 2016; Martínez- Ferrero & García-Sánchez, 2018). Information about the nature of the providers was verified in the external assurance reports attached to the SR.

To understand which attributes related to the accounting providers' reputational capital can affect the event of research interest, three independent variables were tested, based on previous research, which represent the joint provision of accounting audit and SR assurance services (H1), specialization in the sector (H2) and mimetic isomorphism (H3).

In addition, the control variables Size (TAM) were used; Profitability (RENT) and Indebtedness (ENDIV). It is argued that larger and more profitable companies tend to have the necessary financial resources to promote activities related to sustainability, since voluntarily ensuring SR entails additional costs for companies. Table 1 demonstrates the independent variables and how they were based and measured

Tabela 1: Definitions of research independent variables

Variable	Measurement	Basis
Joint provision of accounting audit and SR assurance services (AUDIT_ASSURANCE)	Dummy variable that takes the value 1 if the Big-4 "X" that ensured the SR also audited the financial statements, and 0 otherwise.	Park and Brorson (2005); Jones and Solomon (2010); Gillet (2012); Byus et al. (2013) e Fernandez-Feijoo et al. (2016).
Industry Specialization (SPEC)	Dummy variable that takes the value 1 when the assurance is entrusted to an expert in the sector as a provider, and 0 otherwise.	Casterella et al. (2004); Chen, Lin and Zhou, (2005); Fernandez-Feijoo et al. (2016) and Martínez-Ferrero and García-Sánchez (2018).
Mimetic isomorphism (ISOMORPH)	Number of companies in the same sector that hired the same provider to ensure their SR.	Sierra-García et al., (2013); Peters and Romi (2014) and Fernandez-Feijoo et al. (2016).
Size (TAM)	Logarithm of total assets.	Simnett et al., 2009; Hummel et al., 2017 and Martínez-Ferrero and García-Sánchez, 2018.
Profitability (RENT)	Return on Assets (ROA).	
Indebtedness (ENDIV)	Sum of Current and Non-Current Liabilities divided by Total Assets.	

Source: Research data.

It is noteworthy that, although sector specialization (ESPEC) is not directly observable in SR external assurance studies, previous literature on financial audit employed several proxies to measure it. Most of these proxies are based on market share. Due to the availability of data, this work used, as a measurement basis for the market share of the assurance provider in a given sector, the value of the clients' assets (Chen et al., 2005), which consists of the ratio between the sum. the total assets of all customers of a given provider that belong to the same sector, and the sum of the total assets of all companies in the respective sector.

The sector specialist is the one who has a notable performance in a particular sector. Thus, the study used the 20% margin of market shares to characterize a given provider as a specialist (Craswell et al., 1995; Casterella et al., 2004; Chen et al., 2005). In addition to the competition from different providers in the SR external assurance market, sector specialization is not a characteristic restricted to Big-4 firms. Therefore, this research considered as possible experts in the sector both the Big-4 accounting auditing firms and the other providers operating in this market.

The mimetic isomorphism variable (ISOMORPH) assumes that a company can hire a Big-4 firm to ensure its SR to imitate and/or resemble the behavior of other participants in the same social environment. Thus, the measure proposed by Peters and Romi (2014) is adopted, which represents the number of companies in the same sector that hired the same provider to ensure their SR.

3.3 Data Analysis Technique

The statistical technique used consisted of a statistical hierarchical logistic regression model for panel data, as this research aimed to estimate the probability of a company hiring a Big-4 firm as an external assurance provider for SR in the period 2012-2018. It is noteworthy that this event may or may not occur; after all, several types of providers operate in this market, depending on the explanatory variables inserted in the model.

According to Hox (2010), hierarchical models efficiently estimate the standard error of regression coefficients, as they consider the assumption that observations within a cluster can be correlated. Therefore, the use of this model is recommended for samples with nested data or with repeated measures. Furthermore, the model allows that certain data from a company, which do not vary over time, can be compared with data from another company, allowing the researcher to assess the different influences on the behavior of the dependent variable (Fávero & Belfiore, 2017). The data structure with repeated measures for the sample of this research was defined at two levels, considering the independent variables of company i that “vary over time” (level 1 - time) and the independent variables of company i “fixed in time" (level 2 - company).

Equation 1 describes the hierarchical logistic regression model for the analysis of panel data used to test the research hypotheses:

$$\log[prob(BIG4it)/(1\text{-}prob(BIG4it)]=a_i+\beta_1 AUDFIN_{it}+\beta_2 ESPEC_{it}+\beta_3 REPUT_{it}+\beta_4 TAM_{it}+\beta_5 RENT_{it}+\beta_6 ENDIV_{it}+ \mu_{0t} \quad (1)$$

BIG4it represents the dummy dependent variable, which assumes: 1 when the external assurance of SR is performed by a Big-4 accounting firm; and 0 otherwise. Besides, a_i is the equation intercept; β_1, β_2, β_3, β_4, β_5 β_6 and β_7 are the respectively estimated parameters with the following explanatory variables: Joint provision of accounting audit and SR assurance services, Specialization in the sector, mimetic isomorphism, Size, Profitability and Indebtedness; and μ_{0t} is the random term of the regression.

The results of the regression described above and additional tests, such as correspondence analysis (Anacor) and homogeneity analysis (HOMALS), were obtained using statistical software: R version 3.6.3 for Windows, packages “lme4” and “nlme”, and Stata® 15. Regarding the additional tests, Table 2 shows the categorization and levels of association attributed to each variable of interest used to characterize the individual performance of each of the Big-4 according to the joint provision of accounting auditing and SR assurance services and the reporting company's activity sector.

Tabela 2: Categorization and levels of association of variables

Variables	Definition	Association level
BIG4	Big-4 “X” (KPMG or PWC or Deloitte or Ernest & Young) is the contracted provider to guarantee the SR.	Hired
		Not hired
AUDFIN	Big-4 “X” that audited the financial statements was also responsible for ensuring the SR.	Hired
		Not hired
SETOR	Field of activity in which companies operate in the Brazilian stock market, which were classified according to the listing in B3: 1- Public Utility, 2- Non-Cyclic Consumption, 3- Cyclic Consumption, 4- Basic Materials, 5- Industrial Goods and 6 - Financial.	Belonging
		Not belonging

Source: Research data.

It is noteworthy that Anacor portrays the correspondence of categories of qualitative variables, and this correspondence is the basis for the development of perceptual maps that allow the visualization of distance measures in a two-dimensional space. In this technique, the Chi-square test is used to assess the existence of significant associations between research variables from a contingency table that calculates the differences between expected and observed frequencies (Fávero & Belfiore, 2017). For visual representation of the perceptual maps of the associations between the variables, the HOMALS analysis was used. In Figure 1, the theoretical model of the research is presented, which highlights the influence of attributes related to the reputational capital of large auditing firms on their participation in the SR assurance market.

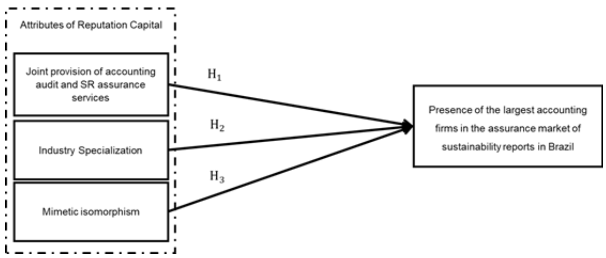

Figure 1. *Theoretical research model*

Source: *Own elaboration.*

Specifically, this article argues that the positive effects of the joint provision of SR auditing and assurance services, sector specialization and mimetic isomorphism in hiring large auditing firms as providers of external SR assurance attest to the mastery, “tenure”, of these professionals in this emerging market.

4 Results and Discussions

4.1 Descriptive statistics and testing of research hypotheses

The survey of data included the examination of 249 sustainability reports assured between the period 2012-2018 in 6 different sectors of B3. The sample distribution according to provider and sector is shown in Table 3.

Tabela 3: Sample distribution according to provider and sector

Sector	KPMG	PWC	EY	Deloitte	Others	Total Big-4 %
Public utility	38	11	3	7	16	78.67
Non-cyclic consumption	10	1	9	-	8	71.43
Cyclic consumption	4	-	-	-	3	57.14
Basic materials	11	2	-	-	28	31.71
Industrial goods	9	1	6	5	7	75.00
Financial	31	18	8	13	-	100.00
Total	103	33	26	25	62	187
% over Total	41.37	13.25	10.44	10.04	24.09	-

Caption: % = Percent.
Source: Research data.

Note that Big-4 auditing companies have a 75.1% share (187/249) in the SR assurance services performed. Overall, KPMG and PWC stand out, with a percentage of 41.37% (103/249) and 13.25% (33/249), respectively. As for the performance of providers by sector, it appears that the Big-4 were present in more than 50% in most sectors of the sample, while the non-Big-4 providers (Others) had the largest market share only in the sector of basic materials. KPMG, considerably, was the Big-4 with the greatest performance in all sectors, with an emphasis on the public utility and financial sectors.

The visual representation presented in Figure 2 characterizes the individual actions of each Big-4 according to the joint provision of accounting auditing and SR assurance services (Chi-square = 58.67, p>0.05) and sector of activity of the reporting company (Chi-square = 110.02, p>0.05) in the period 2012-2018.

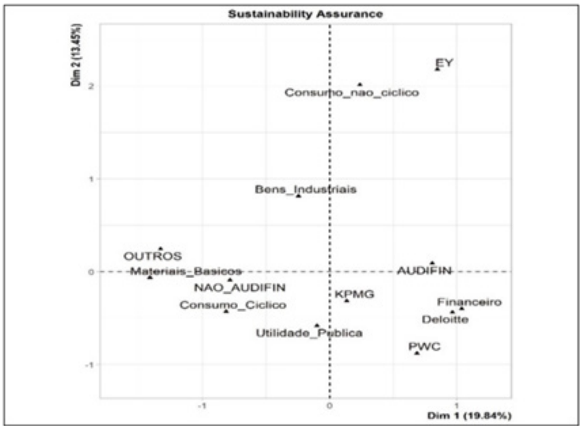

Figure 2. Perceptual map of individual performances by Big-4
Caption: NAO_AUDIFIN = He is not an auditor of the financial statements; AUDIFIN = auditor of the financial statements.
Source: Research data.

Regarding distribution by sector, it should be noted that finance is more associated with contracting the joint provision of accounting auditing and SR assurance services, with Deloitte being the closest Big-4. The public utility sector was most associated with Big-4 KPMG, PWC and Deloitte; however, less directed towards hiring the auditor of the financial statements than the financial sector. Cyclical consumption, basic materials and industrial goods are the sectors most associated with hiring non-Big-4 professionals, despite cyclical consumption and industrial goods remaining close to KPMG. The non-cyclical consumption sector is more associated with Ernst & Young. In addition, the sectors of cyclical consumption and basic materials are the ones that are the furthest away from taking the accounting auditor as a provider.

It is also observed that Deloitte, KPMG and PWC are more associated with using their network of auditing clients to enter the SR external assurance market than Ernst & Young. On the other hand, non-Big-4 "Other" providers, predominantly composed of engineering consulting firms, certifications and sustainability specialists, are more associated with not being auditors of financial and financial statements, as only accounting professionals are enabled for this function.

Table 4 describes the frequency of financial statement auditors and specialists as providers of external assurance of SR.

Table 4: Relative frequencies of qualitative variables

Qualitative variables	Frequency	%
BIG4		
0	62	24.90
1	187	75.10
AUDIT_ASSURANCE		
0	126	50.60
1	123	49.40
ESPEC		
0	99	39.76
1	150	60.24
Provider - Industry Specialist	Frequency	%
KPMG	91	60.67
PWC	19	12.67
EY	6	4.00
Deloitte	5	333
Outros	29	19.33

Caption: % = Percentage; AUDIT_ASSURANCE = Joint provision of accounting audit and SR assurance services; SPEC = Specialization in the sector.
Source: Research data.

According to Table 5, almost half of the SR in the sample (49.4%) were assured by the same Big-4 auditing firm that audited the financial statements, which represents 65.77% of the total assurances carried out by the Big -4. Of the contracted assurances, 60.24% correspond to work carried out by specialist professionals in the sector. Of these professionals, KPMG is the Big-4 company with the most specializations, specializing in the following sectors: public utilities (every year), non-cyclical consumption (2013-2018), cyclical consumption (2014-2018), basic materials (2012), industrial goods (2012, 2013, 2015, 2017 and 2018) and financial (every year). PWC is the second Big-4 company with more specializations, for the following sectors: cyclical consumption (2014), industrial goods (2014) and financial (every year); followed by Ernst & Young with specializations in the sectors of non-cyclical consumption (2016 and 2018), cyclical consumption (2012 and 2013), industrial goods (2013, 2014 and 2015). Finally, the Big-4 Deloitte represents 3.33% of the total specializations identified for the industrial goods sector alone (2012, 2014, 2015, 2016 and 2018).
Also, regarding the specialization for non-Big-4 companies, the providers "Others" correspond to 19.33% of the total specializations, being a specialist in the public utility sectors (2012, 2016, 2017 and 2018), non-cyclical consumption (2012), cyclical consumption (2012 and 2013) and basic materials (every year).
In Table 6, descriptive statistics are reported along with the correlation matrix between the variables of interest. Univariate statistics support the previous data in Table 5, indicating that Big-4 audit firms dominated the Brazilian market for external assurance in SR with a percentage of 75.1%.

Tabela 5: Estatísticas descritivas e matriz de correlação

Variables	Mean	DP	1	2	3	4	5	6	7
1. BIG4	0,751	0,433	1						
2. AUDIT_ ASSURANCE	0,493	0,500	0,439**	1					
3. ESPEC	0,602	0,490	0,158*	-0,0344	1				
4. ISOMORPH	2,726	1,759	0,340**	0,1435*	0,5469**	1			
5.TAM	17,089	1,717	0,136*	0,1471*	0,3665**	0,2461**	1		
6. ENDIV	0,698	0,208	0,120	0,3451**	0,0039	-0,037	0,2841**	1	
7. RENT	0,032	0,064	0,246**	0,0133	0,0199	0,0336	-0,1277*	-0,4347**	1

Caption: SD = Standard Deviation; AUDIT_ASSURANCE = Joint provision of accounting audit and SR assurance services; SPEC = Specialization in the sector; ISOMORPH = mimetic isomorphism; TAM = Size; ENDIV = Indebtedness; RENT = Profitability.
*Note: * and ** correspond to 5% and 1% of significance level, respectively.*
Source: Research data.

The average value of the ISOMORPH variable, which refers to the number of companies in the same sector that contracted the same guarantee provider, indicates that 2.72 of the SR are insured by the same provider. On average, 3.09 reports reported by companies in the same industry during the period 2012-2018 were secured by a Big-4, while non-Big-4 providers averaged 1.65. KPMG secured, on average, 4.07 reports from companies in the same sector. Whereas PWC, Ernst & Young and Deloitte had averages of 2.21, 1.46 and 1.88, respectively.

Through the correlation matrix, shown in Table 6, it is verified that there are no high values for the coefficients between dependent and independent variables or between independent variables, considering that the correlations are presented, for the most part, as moderate (0.40 to 0.69) and low (0.01 to 0.39), and this indicates that the model does not present multicollinearity problems.

The Hosmer-Lemeshow Test = 37.71 (p-value of 0.7711) indicated evidence of association and considers that the model presents a good fit. The logistic model classified 77.51% of the analyzed observations ([159 + 34]/249= 0.7751) and obtained sufficient discriminatory capacity (ROC curve = 0.8791). The results of mixed-effect panel logistic regression are summarized in Table 6.

Table 6: Results of logistic regression in mixed effect panel

<table>
<tr><td rowspan="5">BIG4</td><td colspan="6">Random effects</td></tr>
<tr><td>Groups</td><td>Name</td><td>Variance</td><td colspan="3">Standard deviation</td></tr>
<tr><td>Companies</td><td>Constant</td><td>23.08</td><td colspan="3">4.805</td></tr>
<tr><td colspan="6">Fixed effects</td></tr>
<tr><td>Odds Ratio</td><td>Coefficient</td><td>Standard error</td><td>z-value</td><td>p-value</td><td>Significance</td></tr>
<tr><td>Constant</td><td>0,0003</td><td>-8,0667</td><td>11,3201</td><td>-0,713</td><td>0,4761</td><td></td></tr>
<tr><td>AUDIT_ ASSURANCE</td><td>182,1524</td><td>5,2048</td><td>2,0852</td><td>2,496</td><td>0,0126</td><td>*</td></tr>
</table>

ESPEC	0,4212	-0,8646	1,0518	-0,822	0,4110	
ISOMORPH	3,1589	1,1502	0,4741	2,426	0,0153	*
TAM	1,5099	0,4121	0,6900	0,597	0,5504	
ENDIV	2,4370	0,8908	4,5346	0,196	0,8443	
RENT	7.502.123,00	15,8307	9,0247	1,754	0,0794	
Observations	249					
Log likelihood	-55,6					
Deviance	111,2					
BIC	155,3					

Caption: AUDIT_ASSURANCE = Joint provision of accounting audit and SR assurance services; SPEC = Specialization in the sector; ISOMORPH = mimetic isomorphism; TAM = Size; ENDIV = Indebtedness; RENT = Profitability. BIC is the Bayesian information criterion, based on - 2 log pseudo-likelihood.
*Note: * statistically significant at 95% confidence.*
Source: Research data.

The results described in Table 7 suggest that the probability of a Big-4 firm being chosen to ensure the SR is positively affected by the fact that the same Big-4 is also the auditor of the financial statements (5.2048, p<0, 05), as well as for its high reputation in a given sector (1.1502, p<0.05). The odds ratio or exponential coefficient (Odds Ratio) indicates that the chances of choosing a Big-4 as a provider are approximately 182 times greater in companies where this Big-4 also audits the financial statements. As for ISOMORPH, which reflects the number of companies in the same sector that contracted the same provider, the probability of a Big-4 ensuring SR is increased by around three times when this provider acts with notoriety in a specific context, such as a sector.

4.2 Discussion of Results

The results of this study point to the predominance of Big-4 auditing firms in relation to other providers, as these firms are responsible for 75.1% of the work performed and active in more than 50% in most sectors of the sample. This study suggests that this domain may be related not only to the likelihood of Brazilian companies hiring the Big-4 auditing firm that audited their financial statements to ensure their SR, but also to the fact that this type of professional is perceived as a legitimate provider in certain social contexts, which, in this research, refers to the sector in which the company operates.

The statistical significance of the coefficient of the AUDIT_ASSURANCE variable, which refers to hypothesis H1(5.2048, p<0.05), indicates that Big-4 companies find, in their network of financial audit clients, an opportunity to provide services of external assurance of the SR. This result reinforces the conclusion of Fernandez-Feijoo et al. (2016) on the Big-4's potential competitive advantage, as this strategy encourages their engagement in assurance contracts and adds barriers to the participation of other providers in this market.

Possible explanations are pointed out in the literature for the competitive advantage of Big-4 firms in the SR external assurance market. There is the perspective that companies consider that the auditor of the financial statements has knowledge about their operations and experience in audit work necessary to carry out the warranty work, which allow for economy of scope, reduction of assurance rates and higher quality of the assurance work (Jones & Solomon, 2010; Gillet, 2012; Martínez-Ferrero & García-Sánchez, 2018).

On the other hand, economic dependence and the link with the reporting company may be important underlying reasons for this relationship (Boiral et al., 2020; Ruiz-Barbadillo & Martínez-Ferrero, 2020). In this regard, it is necessary to reflect that the lack of independence affects the provider's ability to perform the work objectively, compromising the quality of the work performed, which would result in a distorted opinion for SR users (Farooq & de Villiers, 2017). This fact seems to suggest questions about the added value of SR's external assurance work. In addition, important ethical implications regarding corporate conduct and professionals working in this market arise if these services are used as a strategy employed in image management (Jones & Solomon, 2010; Hummel et al., 2017).

Similar to Martínez-Ferrero and García-Sánchez (2018) and Fernandez-Feijoo et al. (2016), this research identified the occurrence of specializations for Big-4 firms. In short, there is a predominance of KPMG in the utilities and finance sectors, PWC in the finance sector, and finally Deloitte and Ernst & Young in the industrial goods sector. However, the results provided by the regression analysis do not support evidence that the specialization in the sector (H2), ESPEC, observed under the aspect of customer size and complexity (Chen et al., 2005), favors the presence of the Big-4 in the SR external assurance market (-0.8646, p = 0.4110).

On the other hand, this research argued that the Big-4 can be considered experienced in a certain field based on its reputation in the perception of most companies in a certain sector (ISOMORPH), referring to hypothesis H3 (1.1502, p< 0.05). Thus, the decision to hire a Big-4 to ensure SR may be related to informal mechanisms, such as the reinforcement of corporate reputation and mimetic isomorphism (Sierra-García et al., 2013; Peters & Romi, 2014; Alrazi et al., al., 2015; Fernandez-Feijoo et al., 2016).

From the point of view of companies, the reputational capital or effect of the "brand" of Big-4 companies is capable of attributing greater credibility to the external assurance of SR, when mostly perceived in a given social context (Martínez-Ferrero & García- Sánchez, 2018). In emerging and deregulated markets, such as external assurance of SR, it is possible that the uncertainty about which provider is better able to carry out a higher quality work will encourage companies to adhere to similar practices and, thus, hire a specialist based on their reputation high in a particular sector (Fernandez-Feijoo et al., 2016). At this point, exploratory analyzes showed that KPMG, PWC, Deloitte, and Ernst & Young are differently distributed among the sectors in the sample, demonstrating that companies can distinguish between the Big-4 based on the general perception of their sector.

5 Conclusions

The analysis of the effects of explanatory factors in the presence of large auditing firms in the SR external assurance market revealed that the joint provision of auditing and external assurance of sustainability information and mimetic isomorphism have positive effects, while specialization in the sector and the control variables (size, indebtedness and profitability) showed statistical insignificance.

These findings characterize the competitive advantage of Big-4 firms, as these providers can use their auditing clientele as a strategy for entering this market. In addition, the reputational capital of these professionals allows companies in the same sector to have a common perception that this type of provider is the most suitable to provide the highest quality external assurance. In individual performances, KPMG was the Big-4 with the largest performance in Brazil, standing out in several sectors of the sample. Complementary analysis showed that Big-4 companies are differently distributed across sectors in the sample, also revealing that Deloitte, KPMG and PWC are more associated with using their network of auditing clients than Ernst & Young.

In short, due to the free competition of the SR external assurance market and the controversial literature on which provider would be better able to carry out this work, even though the decision to hire a Big-4 firm may be related to the effects of the symbology of the "brand ", this research contributes to improve the knowledge produced in the literature that denote the attributes of Big-4 accounting firms as a tool to attribute credibility to SR (O'Dwyer & Owen, 2005; Park & Brorson, 2005; Simnett et al., 2009; Jones & Solomon, 2010; Gillet 2012; Fernandez-Feijoo et al., 2016). It also provides evidence that reinforces the theoretical-empirical pillars regarding the role of SR external assurance providers and the legitimacy of organizations, since the reputation of Big-4 firms, perceived in a broader social context (eg, sector), can be characterized as a legitimation strategy employed mainly in emerging markets (Meyer & Rowan, 1977; Alrazi et al., 2015).

Furthermore, this study has practical implications for professionals and regulators in the accounting area, as the recognition of auditing companies in the external assurance market of SR should promote the interest of regulatory institutions in providing institutional support for this practice. The SR's external assurance practice, in general, does not have specific auditing standards for reviewing information as "comprehensive" such as sustainability. ISAE3000 (IAASB, 2013) is a generic standard developed for any work, different from auditing accounting and financial statements, and does not specifically address information about the sustainability performance of organizations. Therefore, professional improvement on the subject of "sustainability" should be a concern for the accounting class.

Another point refers to the lack of regulation of SR external assurance contracts, due to the strong influence of reporting companies on these contracts. The creation of mechanisms that specifically regulate these contracts could mitigate the risks of loss of auditor independence.

It should be clarified that this research is subject to some limitations. Based on the results of this research and on the pre-existing literature, there is an expectation that some of the attributes of large accounting firms can contribute to a higher quality of SR external assurance work. However, the nature of a provider may not be able by itself to substantiate this fact. In this regard, this study did not directly test whether Big-4 firms affect the quality of these works, but whether the attributes that characterize them as such are perceived in this market.

Furthermore, the use of a national database and the voluntary nature of the SR's external assurance processes create restrictions on the number of observations. Due to the low diversity of subsectors and segments, the sample is restricted to only six specific sectors. Therefore, it is recommended for future research that the limitations described be somehow challenged.

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