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Editor's Word

Dear readers, we present the first issue of 2020. We were expecting a year full of successful achievements; unfortunately, we are all facing many constraints and problems currently, which represent challenges we need to adapt to and learn from.

This issue introduces a theme in Management Accounting that is very much debated in many places around the world, especially in Europe and the United States, though seldom addressed in Brazil, which is Management Accounting Creativity. Our associated editor Andson Braga and co-author Ricardo Suave wrote a paper proposing many ideas regarding this theme to our readers. I believe you will benefit from new concepts and research ideas.

The first of the papers was written by Arianne Raquel Axiole de Souza Câmara, Clayton Levy Lima de Melo, Andersol Luiz Rezende Mol and Magaly Aparecida Galvão Dantas de Melo. The authors analyze whether the European Customer Satisfaction Index (ECSI) model represents the determinants of satisfaction among Accounting Sciences graduate students in Brazil. The main conclusion is that the conceptual model of student satisfaction achieved appropriate goodness of fit indexes, remained stable and is appropriate to the study sample, explaining 96.6% of variation concerning loyalty and 80.6% of variation concerning graduate students' satisfaction.

The second paper was written by Kelmara Mendes Vieira, Daniela Pegoraro and Monize Sâmara Visentini. The study's objective was to propose an instrument to assess active and passive transparency among teaching institutions from the perception of social actors. The results indicate that the three constructs proposed (Institutional Management, Access to Information, and Passive Transparency) were appropriate and confirm the three hypotheses.

The next paper was written by Kleyverson dos Santos, Renan Guerra, Vagner Marques and Elizeu Júnior. The paper's objective was to analyze the relationship between Critical Audit Matters (CAM) and earnings management practices of Brazilian companies. The main results include: Assets Recovery, Contingencies and Revenue Recognition, which together account for 58% and 66% in 2016 and 2017, respectively. Additionally, a significant positive association was found between the amount of CAM and accruals and discretionary revenues and a significant negative association was found between the amount of reported CAM and earnings management proxy by operations through discretionary expenses.

The fourth paper comes from the field of accounting education and was written by Luis Paulo Guimarães dos Santos, Sheizi Calheira de Freitas and José Maria Dias Filho. The authors intended to verify whether one's understanding of the concept of profit and value is associated with his/her level of formal education in accounting. The results suggest that there is no significant relationship between one's understanding of the concept of profit and level of formal education in accounting, though being a woman may influence the way profit is understood.

The fifth paper, also from the field of education, was written by Deivson Vinícius Barroso, Sheizi Calheira de Freitas and José Sérgio Casé de Oliveira. The paper's objective was to verify which characteristics of Higher Education Institutions are related to approval rates of Accounting students in the Brazilian Accounting certification exam. The main results suggest that characteristics such as: having a good score on Enade; presenting a good IGC rate; being a program hosted by a public university; being located in a Brazilian capital; being well-ranked according to Folha's University Ranking; and also offering a graduate program in Accounting, are statistically significant and present a positive coefficient to explain the performance of HEI on the Exam.

Finally, the last paper was written by Guilherme Cardoso, Dannie Carr Quirós, Guilherme Santos Souza and Karem Cristina de Souza Ribeiro with the objective to assess inventory management and the performance of Brazilian firms. The main result suggests that Brazilian shareholders are not concerned with internal factors such as inventory management, but with whether firms are being profitably managed.

Note that REPeC publishes not only papers from the field of education, but also addresses various other fields, such as Financial, Management and Public Accounting, Auditing, and Taxes, among others.

Without further ado, I would like to thank all researchers who submitted their papers to REPeC. Congratulations to those who had their papers approved because the demand is quite high and the path up to final publication is arduous. I hope you all stay well in this difficult time and enjoy the reading.

Acknowledgement to all our readers and hope you enjoy this new issue.

Academic greetings.

Gerlando Lima, PhD.
Chief Editor.

Research on Creativity in Accounting Management: Overview and Opportunities for Research in the Brazilian Context

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Creativity represents a source of competitive advantage for organizations and, for this reason, has been widely studied in the fields of psychology and administration (Speckbacher, 2017). Despite its importance, the emphasis in accounting studies has been on examining the effects of managerial control systems on the performance of individuals in routine tasks, that is, programmable and repeatable tasks (Brüggen, Feichter & Williamson, 2018). Only recently, research in managerial accounting begun to concern itself with the effect of management controls on the performance of creative tasks, which are not repeatable and more difficult to foresee (Shields, 2015). There are no studies in the Brazilian context in the field of managerial accounting specifically addressing creativity. The importance of understanding the role of managerial controls in promoting creativity in the work environment is to allow managerial control systems to be appropriately designed to the level of creativity desired by an organization.

The purpose of this editorial is to provide an overview of studies addressing creativity in the sphere of managerial accounting and discuss opportunities for future research in the Brazilian context. In particular, the intent is to address the following questions: How has creativity been defined and operationalized in studies addressing managerial accounting? Are control and creativity conflicting objectives? What managerial controls are being examined to explain creativity? What are the opportunities to research this subject in Brazil? The discussion around these questions is proposed by researchers who have paid attention to the topic of creativity in managerial accounting, such as Michael Williamson, Isabela Grabner, and Gerhard Speckbacher, and in the psychology and management fields, including Teresa Amabile and Robert Eisenberger.

Creativity Concepts and Operationalization

There is no consensus on the definition of creativity in the literature (Amabile, 1983). For this reason, Amabile (1996) suggests that two complementary definitions, a conceptual and a consensual, are used. The conceptual definition focuses on the process, therefore, understands creativity as a process that results in something useful and innovating for a given group for some time. The consensual approach, predominant in research addressing the topic, focuses on the product, and therefore, specifies that a product is creative when different experts independently define it to be creative. While the process view is necessary to establish a theory of creativity, the product view is important to establish methods to assess it (Amabile, 1996).

There are, therefore, two main aspects of these two definitions of creativity: the first is characterized by terms such as innovating and different, while the second is characterized by terms such as acceptability, appropriateness, and usefulness. Hence, for something to be considered creative, it must be innovating on what is available, although it must also be useful and applicable. Note that even though there is a relationship between creativity and innovation, these two concepts are different because creativity, together with implementation, is necessary for innovation to exist (Axtell et al., 2000; Shalley & Gilson, 2004).

As with research in psychology and administration, the definition of creativity as a product predominates in accounting management research. But even though it emphasizes the definition of creativity as a product, accounting management has adopted distinct approaches to treat this subject, both in terms of theoretical approach and study design.

On the one hand, Williamson and colleagues (e.g., Kachelmeier, Reichert and Williamson, 2008; Kachelmeier & Williamson, 2010; Brüggen et al., 2018) employ an agency approach and use experimental designs to examine the effect of different incentive contracts on creative tasks. These studies define creativity as the production of original ideas that contribute to organizational innovation, adaptation, and growth (Kachelmeier et al., 2008). In operational terms, Williamson and colleagues have used different variations to capture the creativity of participants, with an emphasis on rebus puzzles (Kachelmeier et al., 2008; Kachelmeier & Williamson, 2010; Kachelmeier, Wang & Williamson, 2019), a creative use for an abandoned house on the university campus (Chen, Williamson & Zhou, 2012), and the development and brief description of new experimental tasks (Brüggen et al., 2018). In general, the performance of participants in creative tasks is assessed by 'experts' who are informed the participants were asked to create something new, innovative and useful. This procedure is directly linked to the definition of creativity as a product (consensual approach) in which experts establish what is creative (Amabile, 1996).

On the other hand, Grabner (2014; Grabner & Speckbacher, 2016) starts with organizational theories and employ a contingent approach to examine, using survey data, managerial control European organizations use to promote creativity. Grabner defines creativity as the importance organizations assign to creativity among their collaborators as a source of competitive advantage, while organizations that assign the greatest importance are called 'creativity-dependent firms'. In operational terms, Grabner develops a scale to measure firms' level of dependency on creativity based on five questions. This scale is based on interviews with experts from the field and presents statements related to creativity as a source of creation of value and revenue, in addition to commercial success and competitive advantage as being dependent on the creativity of collaborators.

While these two main approaches to creativity in the field of managerial accounting seem to have followed different paths in initial studies, more recent studies are starting to reconcile evidence obtained by each approach (e.g., Kachelmeier et al., 2019) and expand the scope of research on the topic. In this sense, Speklé, van Elten and Widener (2017) rest on organizational theories and define creativity as the generation of new ideas that facilitate adaptation so that organizations can survive and compete in constantly changing markets. Operationally, Speklé et al. (2017) capture creativity by surveying business units of European organizations in which respondents self-assess the extent to which they have developed new ideas and found solutions for problems associated with the performance of their tasks.

Note that, even though the focus on the definition of creativity remains on product, more recent studies in the field of managerial accounting have started considering creativity as a process. Kachelmeier et al. (2019) for instance, define creativity in their experimental study as a process that includes the following stages: initial preparation, incubation, and eventual gain accruing from creativity. Note the studies by Cools, Stouthuysen and Van den Abbeele (2017) and Davila and Ditillo (2017), who also adopt the perspective of process, but employ a qualitative approach to examine the role of managerial control mechanisms on encouraging creativity. Cools et al. (2017) introduce a multidimensional perspective of creativity in which two dimensions are differentiated depending on the type of problem. On the one hand, there is expected creativity, which is adopted when dealing with 'open' and 'self-discovered' problems. On the other hand, there is responsive creativity to deal with 'closed' 'unexpected' problems. Davila and Ditillo (2017) in turn see creativity from a multidimensional perspective that includes divergent creativity and convergent creativity. While divergent creativity is associated with the generation of ideas without any prior judgment, convergent creativity is associated with the assessment of ideas generated in a previous phase (Basadur & Finkbeiner, 1985). In particular, Davila and Ditillo (2017) examine convergent creativity, which incorporates innovation that requires less technical knowledge for the development of a product.

In summary, research on managerial accounting has broadened its scope in terms of including a growing variety of definitions for creativity, with consequent use of different forms to operationalize these definitions. In other words, there is not, in the literature addressing managerial accounting, a predominant and more widely accepted way to define and operationalize creativity so that such a definition and operationalization may be specific to each context (Speckbacher, 2017).

Is there a tension between Control X Creativity?

A frequent issue faced in research addressing creativity in managerial accounting is whether a more intense use of controls and the promotion of creativity are conflicting objectives (Speckbacher, 2017). In particular, the question is whether more creativity-dependent firms are also those that should make less frequent use of managerial control to monitor their collaborators and encourage them (Grabner & Speckbacher, 2016). Studies addressing creativity usually favor the perspective of incompatibility between control and creativity (Amabile, 1982; 1983). The two main arguments favoring this perspective are based on the hypothesis of intrinsic motivation and the fact that creative tasks have specificities that render control mechanisms little useful or even counterproductive (Speckbacher, 2017; Grabner & Speckbacher, 2016).

From the perspective of the first argument, creativity is conducted by a state of intrinsic motivation, while extrinsic motivation inhibits creativity (Amabile & Pillemer, 2012). As Speckbacher (2017) states, many of the control mechanisms such as the establishment of goals, budgetary controls, and performance-based compensation are used to influence an individual's extrinsic motivation, so that the expectation is that the use of managerial controls results in less creativity.

The hypothesis of intrinsic motivation, however, has been challenged by researchers, who suggest that extrinsic factors (e.g., incentives) may facilitate and promote creativity (e.g., Eisenberger & Cameron, 1996; Eisenberger & Rhoades, 2001). Eisenberger and Shanock (2003) suggest being possible to achieve motivation to pursue creative tasks by linking compensation to performance in terms of creativity. Many studies in the field of managerial accounting (e.g., Brüggen et al., 2018; Webb, Williamson & Zhang, 2013; Kachelmeier & Williamson, 2010) show that incentive contracts can facilitate the performance of creative tasks. Kachelmeier et al. (2008) for instance suggest that it is possible to encourage creativity in the presence of incentive contracts in comparison to a fixed salary. Grabner (2014) also states that performance-based compensation is an important control for creativity-dependent firms to productively promote creativity when complemented by a subjective assessment of performance.

As for the second argument, creative tasks are seen as having a high level of uncertainty, whether in terms of quantity of resources, expected actions, efficient use of resources, or in terms of the likelihood that a given outcome will result from creative tasks (e.g., Amabile, 1982; 1983). Given these measurement challenges, managerial controls would be inappropriate to promote creativity (Grabner & Speckbacher, 2016).

Once more, empirical evidence does not always support this second argument (Speckbacher, 2017; Adler & Chen, 2011). Grabner and Speckbacher (2016) note that a perceived lack of knowledge regarding the cause-effect relationship in a given task makes managers of creativity-dependent firms more frequently trust input controls in the form of employee selection processes.

In general, evidence suggests that it is important to take into account that managerial control systems exist not only to influence extrinsic motivation but also to facilitate decision-making when qualifying collaborators to achieve organizational goals (Sprinkle, 2003). Managerial controls can also influence intrinsic motivation, and thus, promote creativity (Cools et al., 2017; Davila & Ditillo, 2017). In this sense, a higher level of control and performance in creative tasks are not necessarily conflicting objectives and can co-exist in certain contexts and jointly contribute to the achievement of organizational goals (Speckbacher, 2017). It is also important to mention that firms that do not dependent on the creativity of their collaborators may establish managerial controls with the explicit objective to inhibit creativity while even creativity-depend firms need managerial controls to restrict creativity at a productive level, avoiding the 'art for art's sake' problem (Grabner, 2014; Grabner & Speckbacher, 2016).

Managerial Control and Creativity

Research on creativity has attempted to identify organizational factors, including managerial control mechanisms that can promote creativity (Shalley & Gilson, 2004). Among managerial control mechanisms, studies in managerial accounting have especially been attentive to the effect of incentive schemes on creativity. As previously mentioned, studies addressing creativity in managerial accounting have followed two different paths to discuss this topic. The first involves the studies by Williamson and colleagues, while the second includes the studies conducted by Grabner.

Williamson and colleagues analyze how incentive contracts affect creativity performance based on an agency approach. The main results from initial studies show that performance in creative tasks is superior in the presence of incentive contracts when compared to fixed salaries. When this incentive contract, however, is based on a measure of creativity, performance in creative tasks is inferior to incentive contracts based on productivity (Kachelmeier et al., 2008; Kachelmeier & Williamson, 2010). Later, studies broaden this initial perspective as they examine the role of incentive contracts on creativity in a group context (Chen et al., 2012), the role of additional control mechanisms such as the level of a goal's difficulty (Webb et al., 2013), or yet whether the is an input or output goal (Brüggen et al., 2018). In a recent study, Kachelmeier et al. (2019) examine the effect of different incentive contracts on creativity considering two stages of the creative process: the first, creative preparation and the second, incubation in which the gains accruing from the initial stage are realized. Kachelmeier et al. (2019) reinforce evidence of initial studies that, when one considers the stage in which gains are realized, performance in creative tasks is superior to when in the presence of incentive contracts based on productivity and in comparison to a fixed salary. In general, Williamson and colleagues suggest it is possible to use managerial control mechanisms, specifically, incentive schemes, to promote creativity, as opposed to the hypothesis of intrinsic motivation of creativity.

Grabner (2014; Grabner & Speckbacher, 2016) examines which managerial controls creativity-dependent firms adopt. Grabner (2014) shows that creativity-dependent firms more frequently use performance-based compensation to promote creativity when a subjective assessment of creativity is complementarily used. In a different study, Grabner and Speckbacher (2016) verify whether trust in managerial controls on the part of creativity-dependent firms is explained by factors such as intrinsic motivation and perception of lack of knowledge of the cause-effect relationship in a given task. In general, the results presented by Grabner evidence that creativity-dependent organizations use managerial controls to promote creativity, once more providing evidence that opposes the idea of conflicts between control and creativity.

Considering additional managerial accounting studies, Speklé et al. (2017) provide evidence for the absence of conflicts between control and creativity. Specifically, Speklé et al. (2017) employ the levers of control model provided by Simons (1995) to show that the intensity of managerial control mechanisms increases the managers' perception of empowerment, which in turn positively impacts creativity. Cools et al. (2017) also employ the levers of control model to show that budget can, on the one hand, encourage expected creativity when used interactively by creative firms, or encourage responsive creativity when used in a diagnostic manner. Hence, the results presented by Cools et al. (2017) suggest that even the diagnostic use of managerial control mechanisms can boost creativity.

The study by Davila and Ditillo (2017) also supports the perspective that managerial control mechanisms can facilitate, instead of inhibiting, performance in creative tasks. Specifically, in a working group context, Davila and Ditillo (2017) show that a set of control mechanisms is used to delimitate the scope of creativity among working groups (directional mechanisms) while another set is used to communicate a common vision for the creative efforts of working groups (inspirational systems). Note that directional controls are those that deal with the 'art for the art's sake' problem while inspirational controls are related to informal controls. Davila and Ditillo (2017) highlight the role of strategy to inform which managerial control systems are more important to promote creativity adherent to strategic demands.

In general, research addressing creativity in managerial accounting has broadened its scope in terms of control mechanisms, emphasizing not only incentive schemes but also taking into account more varied perspectives of managerial control, especially the levers of control model. Also worthy of attention is the expansion of the scopes of studies to address the relationship between control and creativity in terms of methodological approaches, relying on experimental studies, which favor internal validity, though are limited in terms of external validity (Aguiar, 2017); survey studies, more balanced in terms of internal and external validity; and qualitative studies, which enable analyses that consider specific contexts of organization.

Conclusion

There are many opportunities to address creativity in the field of managerial accounting considering there is a lack of such studies in the Brazilian context. First, creativity in the organizational context is perceived as an important source of competitive advantage (Shalley & Gilson, 2004; Webb et al., 2013). A work environment conducive to creativity is particularly important in organizational contexts in which creativity is a source of competitive advantage (Grabner & Speckbacher, 2016). Therefore, future studies can examine whether there are any differences in the managerial controls adopted by creativity-dependent firms in comparison to the remaining firms in the Brazilian context. Additionally, it is interesting to verify whether there are managerial controls specifically used to inhibit creativity in organizations not dependent on creativity. Such studies could provide a better understanding of whether managerial controls are commonly used in the Brazilian context to specifically encourage, delimitate or inhibit creativity in the work environment. These studies could also adopt a contingency approach, similar to that used by Grabner (2014; Grabner & Speckbacher, 2016).

Second, the argument explaining the existence of conflicts between control and creativity is that managerial controls are typically associated with extrinsic motivation (Speckbacher, 2017). While this argument makes sense in terms of formal control of results, the purpose of which is mainly to restrict behaviors, the same does not occur in terms of informal controls and/or inputs that influence behavior via self-regulation (Ouchi, 1979). Brüggen et al. (2018) for instance, state that informal goals and other forms of informal communication can promote creativity. Therefore, studies in the Brazilian context could address the role of managerial control in the performance of creative tasks beyond the traditional perspective of formal, diagnostic and coercive mechanisms when exploring a more comprehensive approach that include informal, interactive and/or facilitating controls (Ouchi, 1979; Simons, 1995; Adler & Borys, 1996). Studies such as those conducted by Speklé et al. (2017) and Cools et al. (2017) already take into account this perspective as they adopted the levers of control model. Future studies could examine, on the one hand, the effects of these different types of control on creativity and, on the other hand, verify the extent to which these different types of controls are used complementarily in creative-dependent firms. Such studies may be particularly relevant if they consider the specific definitions of managerial controls and creativity adopted in a certain organization (Speckbacher, 2017).

Third, part of research on creativity in managerial accounting emphasizes the effect of incentive contracts on creativity without considering the process through which this effect occurs (e.g., Kachelmeier et al., 2008; Kachelmeier & Williamson, 2010; Webb et al., 2013). Another share, however, considers this process by including mediating variables (e.g., Kachelmeier et al., 2019). Chen et al. (2012) for instance, examine whether group cohesion explains the effect of types of incentives on creativity in a group context. Speklé et al. (2017) in turn, verify whether empowering explains the intensity effect of the use of levers of control on creativity. Taking into account the previously mentioned more comprehensive perspective of managerial control, studies on the Brazilian context can attempt to identify processes through which managerial controls affect creativity. To identify potentially relevant mediating variables, such studies can seek the support of studies addressing creativity in the field of psychology and administration – which already explore the process through which creativity is affected— as they include variables such as intrinsic motivation (Eisenberger & Rhoades, 2001), interest in a task, in addition to immediate operational aspects (operational ownership) (Dorenbosch, Engen & Verhagen, 2005) and performance pressure (Eisenberger & Aselage, 2009). Alternatively, studies conducted in the Brazilian context taking into account mediating variables examined in other contexts within the field of managerial accounting can be also equally relevant for research addressing creativity. Literature in the managerial accounting has increasingly sought to understand the mediating role of social standards to explain the behavioral effects of managerial control mechanisms (e.g., Cardinaels & Yin, 2015; Maas & Van Rinsum, 2013).

Finally, creativity has been typically considered a variable that depends on the context of managerial accounting (e.g., Kachelmeier et al., 2008; Kachelmeier & Williamson, 2010; Chen, et al., 2012; Webb et al., 2013). In this sense, Speckbacher (2017) draws attention to a promising opportunity of research, which refers to the joint effect of creativity and control on different outcome variables, such as process efficiency and product quality, in addition to financial results. In particular, creativity is considered an antecedent of innovating processes (Axtell et al., 2000; Shalley & Gilson, 2004). Future studies can verify which managerial controls hinder or enhance the positive effects of creativity on innovating processes.

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13

Determinants of student satisfaction and loyalty among students from Brazilian Accounting Sciences graduate programs

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Abstract

Objective: To analyze whether the European Customer Satisfaction Index (ECSI) is suitable to verify the determinants of satisfaction and loyalty among graduate students from Accounting Sciences programs in Brazil.

Method: This survey was conducted among students from 29 graduate programs in the field of Accounting Sciences that were active in 2017 and assessed by Capes. A total of 331 responses were collected from 26 graduate programs and 311 were valid, reaching approximately 90% of the programs. Structural Equations Modeling was used in data analysis.

Result: The study met statistical criteria for validation and, after re-specifications, the conceptual model of student satisfaction met the appropriate quality adjustment indexes and was stable for the sample addressed, explaining 96.6% of the variation in student loyalty and 80.6% in student satisfaction.

Contributions: The structural model that portrays the determinants of student satisfaction is expected to promote a high level of student satisfaction with academic studies, so that students perform well, positively reflecting on the institution and the field of Accounting teaching as a whole.

Key words: Student Satisfaction, Loyalty, Student, European Model of Satisfaction

1. Introduction

In the decade beginning in 2005, an almost 100% increase was observed in the number of Brazilian graduate programs integrating the *Sistema Nacional de Pós-Graduação (SNPG)* [National Graduate Programs System]. Starting in the 2000s, a time when there were only four Master's programs in Accounting Sciences, all located in the Southeast, graduate programs in this field also presented considerable growth. In 2017, according to the Sucupira Platform, 13 out of the 29 existing graduate programs were located in the Southeast, followed by the South with 7 programs, Northeast with 5, and Midwest (CAPES, 2017).

The expansion in the number of graduate programs contributed to increase the Brazilian scientific production of papers and improved the quality of the education provided by Higher Education Institutions (HEI), providing new masters, doctors and experts to the Brazilian academy. Thus, education has gained a new perspective, being acknowledged as one of the most relevant factors, both in the training of people and as a stimulus to a country's educational development (Santos-Neto, 2016).

Numerous researchers deem important that a HEI is aware of the needs, expectations and desires of students to ensure the quality and continuity of its programs and courses (Ostergaard & Kristensen, 2005; Alves & Raposo, 2010; Turkyilmaz, Temizer & Oztekin, 2018). Souza and Reinert (2010) consider satisfaction to be an important aspect in all forms of learning, especially in academic life. The literature presents studies addressing student satisfaction, based on psychopedagogical approaches found in the Brazilian context and educational marketing in the international context.

Therefore, international research and recent Brazilian studies have used constructs based on the European Customer Satisfaction Index (ECSI) to verify the determinants and consequences of student satisfaction in the field of higher education, considering that the European model consistently and reliability explain student satisfaction at the different levels of learning and teaching.

The adapted version of the ECSI intended to identify the perception of students is an econometric structural model that relates the satisfaction of individuals to its conditioning factors, such as institutional image, students' expectations, perceived quality of services, perceived value and student loyalty. The latter is an indicator of performance that allows understanding the dimensions that compose student satisfaction and also presents the resulting factor of satisfaction.

Even though there are various studies addressing satisfaction, those focusing on student satisfaction, both in Brazil and internationally, mainly analyze the satisfaction of undergraduate students and mostly only at a local and institutional level. In general, there is a lack of studies addressing the satisfaction of graduate students at a national level; the same is true in the specific field of Accounting Sciences.

Considering the aforementioned evidence and the need for new studies addressing student satisfaction, the following question was asked: is the model provided by the European Customer Satisfaction Index suitable to analyze the determinants of student satisfaction and loyalty among graduate students in Brazilian Graduate Programs in the field of Accounting Sciences? To answer this question, this study's objective was to use structural equation modeling to verify whether the ECSI model is suitable to verify the determinants of student satisfaction among Master's and Doctoral students from Brazilian Graduate Programs in Accounting Sciences.

The relevance of this study lies in the need to understand the current needs of students and their future expectations, seeking to achieve academic excellence and strengthen the learning process as well as to complete a gap in existing knowledge concerning student satisfaction in Brazilian graduate programs in the field of Accounting Sciences.

Additionally, the measurement of an econometric model to analyze student satisfaction and the entire latent structure conditioning it and its consequences, presents aspects that are unique to this specific population, which should be analyzed to support the continuous advancement of teaching programs. From this perspective, the objective is to contribute to the discussion presented both in the Brazilian and international literature investigating student satisfaction and its implications, collaborating to the advancement of this topic.

The study sample represents 90% of the graduate programs current active in Brazil. These programs' students answered a structured questionnaire, based on the chosen model, composed of 44 questions.

The results show that the ECSI model is suitable to investigate the factors that discriminate student satisfaction and loyalty among Brazilian graduate students. Determination coefficients superior to 70% were found, indicating that the determinants of student satisfaction and loyalty include perceived value and perceived quality of human elements, which directly influence satisfaction and loyalty, while image and expectation constructs, along with perceived quality of non-human elements, serve as mediating dimensions.

2. Literature Review

2.1 The European Customer Satisfaction Index (ECSI)

Satisfaction is seen as a set of perceptions and attitudes that influence a given situation, that is, it is an affective response, over a certain period, resulting from the assessment of quality of a given service (Cunha, Gomes & Beck, 2016). Hence, satisfaction is a critical measure of service performance, weighted by one's expectations and needs.

Given the relevance of individuals' level of satisfaction for organizations and quality of life in general, various countries have a national index to measure and monitor individual satisfaction with organizations in various economic sectors.

The main national indices and barometers intended to measure satisfaction with services presented in the literature are: Swedish Customer Satisfaction Index (SCSI), American Customer Satisfaction Index (ACSI), Norwegian Customer Satisfaction Barometer (NCSB), and the European Customer Satisfaction Index (SARMENTO, 2010). Anderson and Fornell (2000) consider that their main advantage is the fact they are uniform national measures using a single process to estimate satisfaction, thus allowing for comparisons and verifications of how quality has improved at a national level (Fornell, et al., 1996).

The conceptual model this study and the hypotheses proposed here are based on is the same that originated the ECSI. This structural model relates satisfaction to its conditioning factors and consequences, which permits understanding the antecedents and effect on student satisfaction.

What differentiates the ECSI from the remaining satisfaction indexes presented in the literature is that institutional image is considered the first dimension to be operationalized because, in its context, the model expects the variable "image" to cause a direct and positive effect on client satisfaction (Cavalheiro, Tavares, Ferreira, Araujo & Stedile, 2014).

Martensen et. al. (2000) and Eskildsen *et al.* (2000) report that the European model consistently and reliably explained student satisfaction and can be used at different teaching and learning levels and segments, being able to answer the following questions: **How satisfied and loyal are students? How do student satisfaction and loyalty originate at your university? What are the satisfaction and loyalty indexes of students from a given university compared to students from other institutions?**

To support the choice of such a structural model, references list the empirical studies, which directly or indirectly suggest the use of these latent variables suggested by ECSI. Table 1 presents the model's constructs and the definition of each, as well as the authors and studies grounding the theoretical model.

Table 1

Theoretical Support of the European Customer Satisfaction Index (ECSI) model

Latent variables	Definition	Authors/Year
Image	It is the general impression an individual holds of a given service; the sum of all beliefs an individual holds regarding such a service.	Yugo and Reeve (2007); Alves and Raposo (2010); Duarte, Alves and Raposo (2010).
Expectations	It is an assessment of an individual's experiences and consists of one's expectations that a given event will be confirmed.	Voss, Gruber and Szmigin, (2007); Gruber, Reppel, Szmigin and Voss (2008)
Perceived quality	It is an assessment that reflects individuals' perception of specific factors or dimensions concerning the quality of a given service (whether it comes from human or non-human elements).	Sadiq-Sohail and Shaikh (2004); Telford and Masson (2005); Chiandotto, Bini and Bertaccini (2007); Lourenço and Knop (2011)
Perceived value	It is a general assessment of the utility of a service based on the perception of what is received in exchange (cost-benefit).	Parasuraman and Grewal (2000); McDougall and Levesque (2000); Ledden, Kalafatis and Samouel (2007).
Satisfaction	Satisfaction refers to a feeling of pleasure or disappointment that results from comparing a service's perceived quality (performance) with one's prior expectations.	Anderson, Fornell and Lehmann, (1994); Johnson, Gustafsson, Andreassen, Lervik and Cha (2001); Alves and Raposo (2006); Rodrigues and Liberato (2016)
Loyalty	Loyalty is the commitment of an individual to a given service, to keep choosing it and recommending it to others.	Eskildsen et al. (2004); Ostergaard and Kristensen (2005); Morgeson, Mithas, Keiningham and Aksoy (2011); Fernandes, Ross and Meraj (2013)

Source: developed by the authors based on literature review.

Note that the variables of the ECSI model are not directly observed. A set of observable indicators, in the form of a questionnaire with 44 questions, is associated with each of the latent variables to capture the specified behaviors.

In the light of the European Customer Satisfaction Index and empirical evidence, the following hypotheses were established according to this study's objective (Table 2), based on the theoretical review.

Table 2

Hypothesized relationships investigated in this study from the ECSI perspective

Study hypotheses	Empirical studies indicating this relationship
H1: The image of a graduate program positively influences students' expectations	Martensen et al. (2000), Johnson et al (2001), Cruz (2013), Cassel and Eklof (2001), Eurico, Silva and Valle (2015) and Cavalheiro et al. (2014)
H2: The image of a graduate program positively influences the value perceived by students	Martensen et al. (2000), Pereira et al. (2016), Cavalheiro et al. (2014), Palacio, Meneses and Pérez (2002), Alves and Raposo (2006; 2010), Kristensen, Eurico, Silva and Valle (2015) and Turkyilmaz, Temizer and Oztekin (2018).
H3: The image of a graduate program positively influences students' satisfaction	Eurico, Valle and Silva (2013), Egyir (2015), Turkyilmaz, Temizer and Oztekin (2018), Martensen et al. (2000), Pereira et al. (2016), Cavalheiro et al. (2014)
H4: The image of a graduate program positively influences students' loyalty	Alves and Raposo (2006;2010), Martensen et al. (2000), Pereira et al. (2016), Cavalheiro et al. (2014), Palacio, Meneses and Pérez (2002), Alves and Raposo (2006; 2010), Kristensen, Martensen and Gronholdt (1999), Eurico, Silva and Valle (2015) and Turkyilmaz, Temizer and Oztekin (2018)
H5: Students' expectations positively influence the perceived quality of a graduate program	Fornell et al. (1996), Zeithaml and Bitner (2003), Gonçalves-Filho, Guerra and Moura (2004), Cruz (2013), Cavalheiro et al. (2014) and Pereira et al. (2016)
H6: Students' expectations positively influence the value they perceive	Alves and Raposo (2006) and Cavalheiro et al (2014), Fornell et al. (1996) and Ostergaard and Kristensen (2005)
H7: Perceived quality directly influences students' perceive value	Fornell (1992), Telford and Masson (2005), Cruz (2013) and Pereira et al. (2016),
H8: Perceived value positively influences students' satisfaction	Alves and Raposo (2006), Gonçalves Filho, Guerra and Moura (2004), Turkyilmaz, Temizer and Oztekin (2018), Martensen et al, (2000) and Ostergaard and Kristensen (2005)
H9: Perceived quality positively influences students' loyalty	Turkyilmaz, Temizer and Oztekin (2018)
H10: Perceived value positively influences students' satisfaction	Alves and Raposo (2006), Egyir (2015), Gonçalves Filho, Guerra and Moura (2004), Ostergaard and Kristensen (2005), Eurico, Silva and Valle (2015) and Turkyilmaz, Temizer and Oztekin (2018)
H11: Students' satisfaction with their educational experience directly and positively influences their loyalty toward a graduate program	Martensen et al. (2000), Ostergaard and Kristensen (2005), Alves and Raposo (2006), Gonçalves-Filho, Guerra and Moura (2004), Duarte (2013), Eurico, Silva and Valle (2015), Henning-Thurau, Langer and Hansen (2001), Turkyilmaz, Temizer and Oztekin (2018), Cavalheiro et al. (2014), Faé (2016) and Pereira et al. (2016)

Source: developed by the authors based on research (2017)

From this perspective, research on student satisfaction and its dimensions is relevant to assess the efficiency of education services, contributing to quality indicators to measure the perception of service users, to identify an institution's image, and to understand students expectations concerning the perceived value one intends to obtain when choosing a program, that is, the aspects that enable institutions to identify their weaknesses and achieve satisfaction and loyalty.

Therefore, the objective is to contribute to graduate programs in Accounting Sciences by understanding the current needs of students and their future expectations, seeking to strengthen the learning process and to achieve academic excellence, improving the academic relationship between students and their respective graduate programs.

2.2 Empirical studies addressing student satisfaction from the ECSI perspective

We present references of empirical studies that directly or indirectly ground the use of these latent variables to support the choice of this structural model. Table 3 lists studies that have applied the ECSI, along with their main results.

Table 3

Recent studies using the ECSI model in the education context

Author/Year	Purpose and Method	Results
Martensen et al (2000)	To develop and apply a model of students' perceived quality, satisfaction and loyalty inspired in the ECSI model. The study addressed students from different programs at a public university in Denmark. Data were collected by mail with a 24% response index.	The authors concluded that the ECSI structure adapted to the educational context satisfactorily. The model was considered flexible enough to be used in higher education institutions.
Ostergaard and Kristensen (2005)	To evidence the potential application of the ECSI model to measure student satisfaction. The study was applied among college, Master's and doctoral students from the Aarhus School of Business in Denmark.	Among the exogenous latent variables, the study shows students' high expectations and poor perception of service quality. The students' perceptions in terms of the endogenous latent variables, perceived value and loyalty was higher than their satisfaction.
Alves and Raposo (2006)	To test an explanatory model of satisfaction among undergraduate students (ECSI) to understand the factors influencing student satisfaction. The model was tested, using structural equations, among undergraduate students from various fields of knowledge in Portugal.	The study reports that institutional image was the variable that imost strongly nfluenced satisfaction among undergraduate students, followed by perceived value and perceived quality. The study also shows that expectations negatively influences satisfaction while loyalty was reported as the main consequence of satisfaction.
Alves and Raposo (2010)	To analyze how institutional image influences student satisfaction and loyalty. Therefore, the study employed an adapted model of ECSI through structural equations addressing students from various fields of knowledge at public universities in Portugal.	The results indicate that institutional image strongly impacts student satisfaction, directly or indirectly. Institutional image influences loyalty to a lesser but significant extent; its influence becomes more important when indirect effects are considered.
Eurico, Valle and Silva (2013)	To better understand the factors influencing former tourism students working in the field. An adapted ECSI model was used.	The authors concluded that the ECSI is suitable to assess student satisfaction and the findings suggest that institutional image is the most significant predictor of student satisfaction, loyalty being a direct consequence of satisfaction.
Cavalheiro et al. (2014)	To assess the determinants of general satisfaction among undergraduate students at a private higher education institution located in the Northwest of Rio Grande do Sul, Brazil using the European model of student satisfaction.	The results indicate that perceived value, institutional image and expectations explained 78% of student satisfaction at the institution.
Egyir (2015)	To investigate antecedents of student satisfaction and loyalty among undergraduate students from Ghana. The sample included students from the University of Ghana and an adapted ECSI model was used.	The study shows that perceived value, institutional image and perceived quality are antecedents that positively influence student satisfaction levels. Additionally, satisfaction implies students' loyalty.
Pereira et al. (2016)	To propose and validate a student satisfaction model based on the ECSI. The sample was composed of students from the centers of applied social sciences at two private higher education institutions located in Rio Grande do Sul, Brazil.	The ECSI proved to apply to the Brazilian educational context. Institutional image directly and significantly influences perceived value, satisfaction, and loyalty of the students from the institutions addressed.

Source: developed by the authors based on research (2017)

The empirical studies presented in Table 3 present the applicability of the ECSI to investigate student satisfaction and loyalty both in Brazil and in the international context, supporting the use of this model in this investigation. Thus, it is important to note the lack of studies addressing graduate programs. Therefore, one of this study's objective was to expand studies directed at the target population: graduate students.

Hence, assessing students' satisfaction with their program is essential for institutions, as it permits reflecting on how students perceive the general quality of the institution's educational services, contributing to improve the programs' quality and continuity (Andrade, Tavares & Valle, 2000; Santos-Neto, 2016).

3. Methodological Procedures

In terms of its objective, this is a descriptive study with a quantitative approach. A structured questionnaire was used, adapted from the studies by Ostergaard and Kristensen (2005), Martensen, *et al.* (2000), and Paswan and Young (2002) and adopting the ECSI perspective. The instrument resulted in a survey with 44 associated questions and six latent variables, composing the determinants of student satisfaction and loyalty.

To build upon previous studies, this study incorporated the original instrument applied by Ostergaard and Kristensen (2005), with 31 observable variables intended to capture the determinants of student satisfaction and loyalty in light of marketing according to the ECSI, indicators that originated from Martensen *et al.* (2000) and Paswan and Young (2002). It presents a psychopedagogical aspect of student satisfaction, including more detailed questions addressing perceived quality, resulting in a survey with 44 associated questions and six latent variables that compose the determinants of student satisfaction and loyalty.

The original instrument is based on education marketing, which investigates satisfaction utilizing constructs and indicators, viewing students as consumers who hold expectations and behaviors toward a given service. The point of view of this psychopedagogical perspective analyzes student satisfaction by verifying specific indicators related to the student-professor interaction as well as the academic environment and behavior of professors when administering the content of courses.

The questionnaire used an ordinal seven-point Likert scale with randomly distributed questions, named in the first and last label according to each question to enable respondents to better understand what each question intends to capture. The categories of answers, labeled according to Weijters, Cabooter and Schillewaert (2010), are an important aspect because they may interfere in the results.

A nationwide non-probabilistic sample was used in this study. It is composed of graduate students from Accounting Sciences programs identified on the Capes website using the Sucupira platform. After applying filters to select the minor and major fields using the terms "accounting sciences, accounting, and controllership" to refine the search, 29 graduate programs were identified: 4 professional degree programs and 25 academic degree programs, with a population of 1,205 students in 2017. The link to the questionnaire was disseminated by e-mail to the addresses in the programs' registration on the Sucupira platform. The questionnaire was sent between October and December 2017, when the questionnaire was also posted on Google to receive responses.

The study reached respondents from 26 programs and 323 valid observations were collected. Assumptions used to apply multivariate analysis were verified according to methodological stages, treatment of missing data, inexistence of outliers, absence of multicollinearity, and multivariate normality.

Previous data analysis consisted of verifying missing data using descriptive analysis (frequency of variables) to verify central trend measures, sample distribution kurtosis, detecting two missing data in the observable variable (Q2), which represented 0.6% of total data. Therefore, as avoiding missing data would affect the variable's property, even though still within the parameters recommended by Hair, Black, Babim, Anderson and Taham (2009), i.e., not below 5 or 10%, we opted to remove the cases from the database. Thus, the observations concerning individuals 161 and 245 were excluded.

The procedure used to diagnose the presence of outliers was a visual diagnostic measure with boxplot chart and standard deviations to compare cases. The standardized scores of variables were considered, using a procedure in the statistical software that transforms each response score into standard deviation. We used the one proposed by Hair *et al.* (2009) to verify whether cases were between 2.5 and 4.0 deviations. There were 11 cases in which the individuals presented extreme responses below 4.0 standard deviations from the mean of the variable under study. Thus, individuals 40, 84, 103, 132, 133, 206, 209, 242, 248, 316, who presented extreme answers below the maximum value established for standard deviations, were considered outliers and removed from the database. After removing extreme observations, the database totaled 311 valid answers included in the data analysis.

Cronbach's alpha was used to verify the instrument's consistency. It measures a questionnaire's internal consistency on a scale between 0 and 1 ($0 < \alpha < 1$), verifying the coherence of answers assessing each item. Values above 0.7 indicate good consistency and above 0.8 indicate very good consistency. The coefficients calculated for each latent construct and their respective indicators present very good internal consistency, with alphas between 0.8 and 0.9, while the internal consistency of the entire questionnaire was equal to 0.98.

The Variance inflation factor (VIF) was used to verify the existence of multicollinearity using the parameter proposed by Gujarati (2011): one VIF≤10 indicates absence of multicollinearity. The VIF analysis using multiple linear regression indicated no multicollinearity in any of the exogenous variables as VIFs were well below 10. Hence, all variables were kept in the original model used to analyze student satisfaction and loyalty.

Finally, the last assumption measured was the Multivariate Normality Test, using distribution measures such as skewness (sk) and Kurtosis (ku). To accept the assumption of normality of data, we considered sk≤2 and ku≤7. The results concerning *sk* and *ku* show no serious violation of the normality assumption considering that all *sk* values were below 2 and *ku* values were below 7.

Hence, no extreme conditions of violation of normality were found, that is, we have no reason to question the quality of the adjustment indexes and estimated parameters. Thus, the Maximum Likelihood method was applied.

We then performed descriptive data analysis. Afterwards, multivariate analyses were conducted, including Exploratory and Confirmatory Factor Analysis using Structural Equation Modeling. Table 4 presents the statistical procedures and tests and the corresponding references to the literature.

Table 4

Multivariate techniques

Procedures	Statistical technique	Purpose	Author
Exploratory Factor Analysis	Exploratory Factor Analysis - Kaiser-Meyer-Okin (KMO) test	To seek underlying dimensions, aiming to find the most important or significant in a set of variables. To verify patterns of relationships and correlations over a large number of variables in the theoretical model to establish a factor through which differences among respondents are observed in an established test scale.	Hair et al (2009); Corrar, Paulo e Dias Filho (2007)
	Exploratory Factor Analysis – Bartlett's sphericity		
	Exploratory Factor Analysis - Communalities		
	Exploratory Factor Analysis – Anti-image correlation matrix		
	Exploratory Factor Analysis – Total variance explained		
	Exploratory Factor Analysis – Factor loading of components		
Structural Equation Modeling using Confirmatory Factor Analysis	CMIN/DF (Chi-square/degrees of freedom)	To test the hypotheses concerning the relationships of variables contained in the theoretical model proposed by the ECSI, assessing the model from a global perspective of analysis, validating assumptions on the collected data and mutual relationships.	Marôco (2014); Hair et al (2009)
	CFI (comparative fit index)		
	GFI (goodness of fit index)		
	TLI (Tucker-Lewis index)		
	RMSEA (root mean error of approximation)		

Source: developed by the authors based on the study's data (2017)

In agreement with this study's objectives, EFA was used to study underlying structures and relationships between the six latent variables with each respective observable variable; totaling 44 stated variables of the ECSI proposed to address the students. This procedure proceeds because this study builds upon previous studies adding other indicators to the original instrument applied by Ostergaard and Kristensen (2005).

Note that even though EFA is used, *a priori*, the latent structure of data is little known. This study was based on prior theoretical knowledge presented in Chapters 2 and 3. In that sense, this is not a complete exploratory factor analysis.

Extraction of the appropriate number of factors was performed using the Principal Components method with the eigenvalue criterion (*Eigenvalue* ≥ 1). To improve the interpretation of the factor solution, the Varimax orthogonal rotation was used, in which factors assume an independent basis in the vector space, contributing to minimize cross-loadings or vector ambiguity.

The recommendations by Hair *et al.* (2009) were considered, according to which the following statistical tests and measures should be analyzed while recommended values should be observed: i) factor loading of components ≥ 0.30; ii) the commonalities of each variable ≥ 0.50; iii) Kaiser-Meyer-Olkin test (KMO) ≥ 0.50, as Measure of Sampling Adequacy-MAS; iv) Bartlett's sphericity test < 0.001; v) percentage of cumulative variance of variables for the generated latent factor ≥ 60% and eigenvalue > 1. The anti-image correlation matrix was analyzed to access the sample adequacy measure for each variable, with all elements on the matrix diagonal being > 0.5 to justify their retention in the analysis.

After the exploratory analysis, a confirmatory analysis of factor structure was performed to confirm structural patterns, verifying goodness of fit indexes according to the references proposed by Marôco (2014) and Hair *et al.* (2009). The methodological steps developed in this stage were suggested by Marôco (2014) for structural equation modeling, which comprises: identification of the model, estimation of the parameters, assessment of adjustment criteria, re-specification and validation of the model based on the structural equation modeling.

REPeC – Revista de Educação e Pesquisa em Contabilidade, ISSN 1981-8610, Brasília, v.14, n. 1, art. 2, p. 14-33, Jan./Mar. 2020

22

4. Analysis of Results

4.1 Results of Exploratory Factor Analysis (EFA)

The results of the exploratory factor analysis of the models resulting from the variables tested in the ECSI model are presented in Table 5, as follows:

Table 5

Results of the exploratory factor analysis of the variables of the ECSI model

| Factor | Observable variable | Communalities | Factor loading | Kaiser-Meyer-Olkin (KMO) | Barlett's sphericity test | Anti-image matrix | | Total variance explained | |
						MSA Mean	Minimum value	Eigenvalue>1	(%)
Image	IM1	0.63	0.80	0.80	0.000	0.805	0.782	2.66	66.55
	IM2	0.61	0.78						
	IM4	0.70	0.84						
	IM5	0.72	0.85						
Expectation	E2	0.71	0.84	0.81	0.000	0.816	0.756	2.78	69.63
	E3	0.63	0.79						
	E5	0.65	0.81						
	E7	0.80	0.89						
Perceived quality (Human elements)	Q9	0.59	0.77	0.84	0.000	0.84	0.812	3.26	65.32
	Q10	0.73	0.85						
	Q11	0.67	0.82						
	Q12	0.61	0.78						
	Q13	0.67	0.82						
Perceived quality (non-human elements)	Q1	0.58	0.76	0.89	0.000	0.899	0.859	3.67	61.30
	Q3	0.29	0.54						
	Q6	0.71	0.84						
	Q8	0.63	0.80						
	Q14	0.72	0.85						
	Q15	0.75	0.86						
Perceived value	V1	0.72	0.85	0.80	0.000	0.798	0.752	3.15	63.09
	V2	0.70	0.84						
	V3	0.63	0.79						
	V4	0.58	0.76						
	V5	0.52	0.72						
Satisfaction	S1	0.85	0.92	0.92	0.000	0.921	0.903	4.62	77.03
	S2	0.82	0.90						
	S3	0.67	0.82						
	S4	0.68	0.82						
	S5	0.80	0.89						
	S6	0.81	0.90						
Loyalty	L1	0.84	0.92	0.86	0.000	0.872	0.806	3.65	73.15
	L2	0.60	0.78						
	L3	0.85	0.92						
	L4	0.76	0.87						
	L5	0.61	0.78						

Source: developed by the authors based on the study data (2017)

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23

The exploratory analysis resulted in the initial exclusion of 9 observable variables that presented low commonalities (<0.5), that is, the portion of data that is explained by common factors, namely: IM3(0.49), E1(0.48), E4(0.31), E6(0.44), E8(0.47), Q2(0.43), Q4(0.47), Q7(0.41), Q5(0.34). That is, common factors do not explain variance, indicating that these variables are not correlated, so that they should not be included in the factor analysis, as noted by Hair *et al.* (2005).

The EFA also shows that the psychometric characteristics of those variables in terms of perceived quality accrued from two latent factors. In this sense, the Theoretical Model of Departure was re-specified, incorporating human elements (HEPerceivedQ) and non-human elements of perceived quality (NHEperceivedQ). Therefore, the relational structure of ECSI was *adapted*, resulting in the model presented in Figure 1.
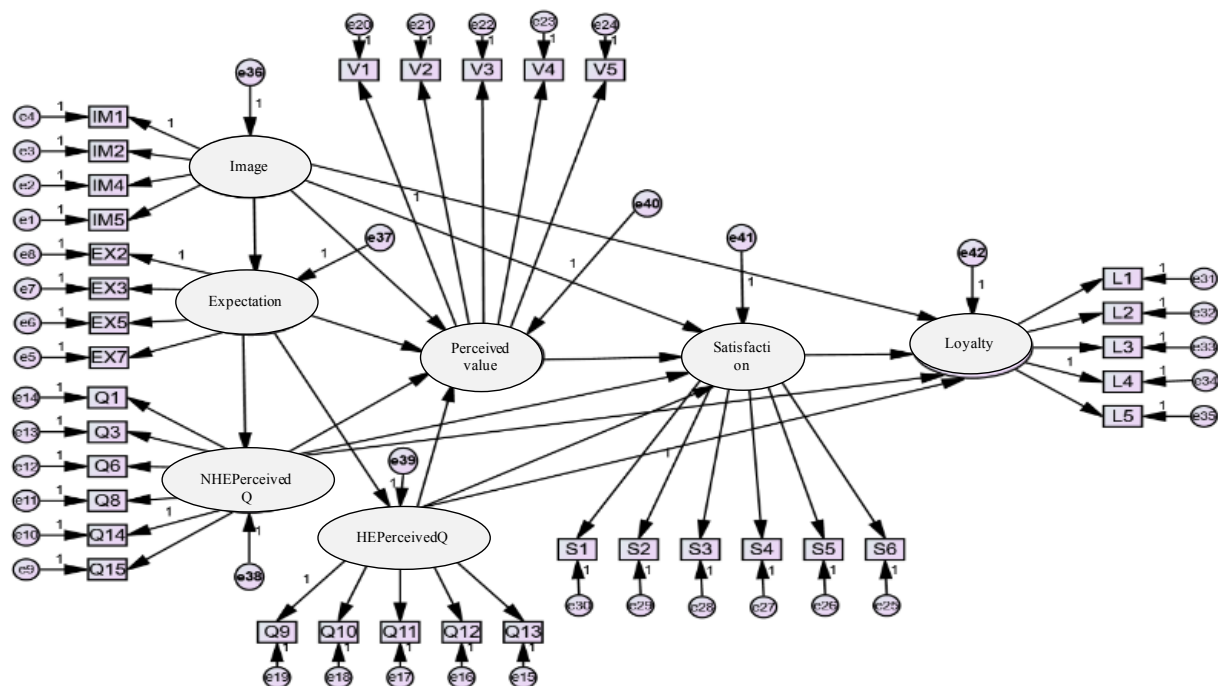
Figure 1. ECSI model proposed after EFA

Source: developed by the authors based on the study data (2017)

Martensen et. al. (2000) and Eskildsen *et al.* (2000), corroborated by Alves and Raposo (2006) and Ostergaard and Kristensen (2005), suggest separating the general factor perceived quality into two factors called: "hardware" perceived quality, composed of non-human elements such as studies, curricula, physical facilities, and "software" perceived quality, that is, human elements such as teaching and personal contact with faculty members, administration and employees.

Dividing perceived quality between human and non-human elements, as they are called in this study, is coherent in an educational institution, and the empirical study confirmed that this separation results in higher psychometric properties; hence, it is appropriate to this investigation (Martensen et. al., 2000) and shows that students consider different aspects when perceiving the quality of the educational services.

4.3 Confirmatory Factor Analysis (CFA) and Structural Equations Modeling (SEM)

Confirmatory Factor Analysis (CFA) was performed using the Maximum Likelihood method.

To achieve stability of the empirical model of student satisfaction, the following variables needed to be excluded: IM1 (image factor), EX5 (expectation factor), Q3 and Q15 (non-human perceived quality factor), Q9 (human perceived quality factor), S3 and S6 (satisfaction factor). Note that all the 35 stated variables were appropriate when individually analyzed in the EFA. When analyzing the complete structural model, with all factors together, however, these seven stated variables needed to be excluded to obtain convergence and stability for the model. The CFA's goodness of fit indexes show what Marôco (2014) and Hair *et al.* (2009) noted regarding reference values for the analysis, as presented in Table 6.

Table 6

CFA results for the study's structural model

Indexes	Results of the model's indexes	Acceptance levels
Adjustment tests		
Chi-square (X^2)	801.733	Menor melhor
Degrees of freedom (df)	335	≥ 1
p-value	0.000	> 0.05
Absolute indexes		
CMIN/DF	2.393	< 3
RMSR	0.080	< 0.08
GFI	0.844	> 0.90
Relative indexes		
CFI	0.935	> 0.90
TLI	0.927	> 0.90
Population discrepancy indexes		
RMSEA	0.067	< 0.08
Parsimony indices		
PCFI	0.829	> 0.60
PNFI	0.793	> 0.60

Source: developed by the authors based on the study's data (2017)

Analysis of the adjustment indexes enables verifying that GFI=0.844 for the model presented moderate adjustment. All the remaining quality indexes, though, achieved good levels, and all the latent and stated variables were significant at 1%. Therefore, in general, the indexes of the proposed model were within adjustment patterns considered to be adequate.

Additionally, as recommended by Marôco (2014), the construct validity indicator was analyzed to assess the quality of the structural model. Hence, the composite and convergent validity of the model's observable variables were verified. The aforementioned authors estimate that acceptable values for these indicators are ≥ 0.70 for composite reliability and ≥ 0.50 for convergent validity, as shown in Table 7.

Table 7

Results of the composite and convergent validity of factors

Factor	Composite Validity	Convergent Validity
Image	0,75	0,58
Expectations	0,75	0,56
Perceived Quality (Human elements)	0,80	0,59
Perceived Quality (Non-human elements)	0,80	0,60
Perceived Value	0,83	0,52
Satisfaction	0,80	0,74
Loyalty	0,83	0,69

Source: developed by the authors based on the study's data (2017)

The parameters present in Table 7 confirm the composite reliability and convergent validity of all the factors analyzed. The results concerning confirmatory factor analysis were incorporated in the proposed theoretical model validated through CFA, resulting in the model of satisfaction of graduate students from Accounting Sciences programs in Brazil.

Therefore, after obtaining the structural model of student satisfaction in the context of graduate programs, it is essential to present the explained variance of the factors integrating the final model. This analysis permits understanding the extent to which each variable is explained by the remaining latent variables.
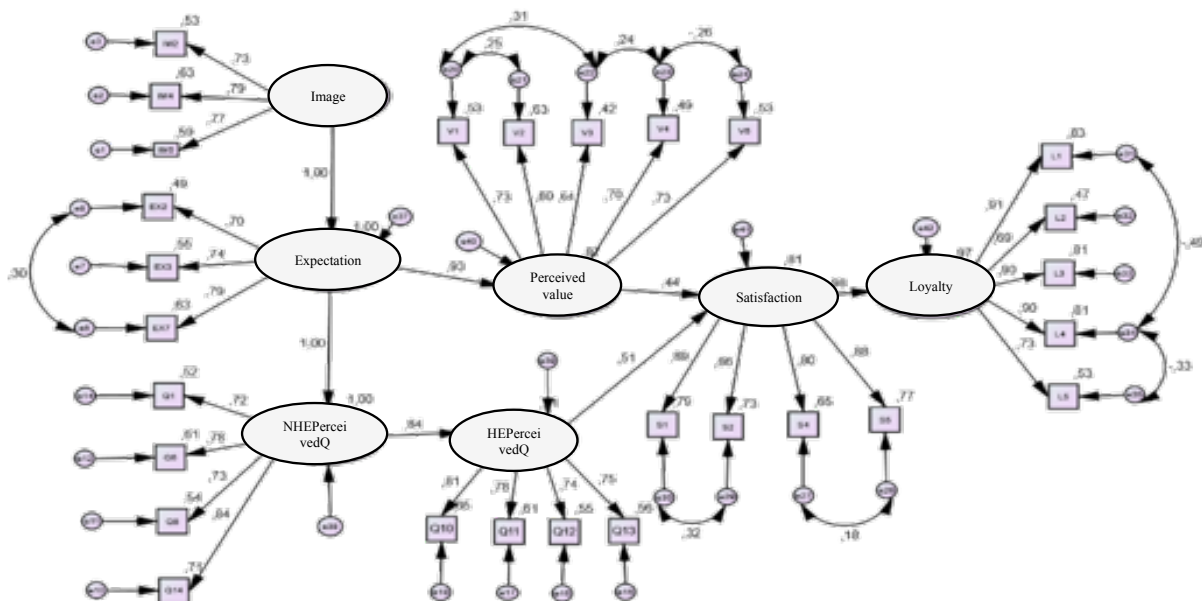
Figure 2. Research model after Confirmatory Factor Analysis

Source: developed by the authors based on the study's data (2017)

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26

Table 8

Explained variance of the endogenous latent variables

Endogenous latent variables	% explained variance of the model
Expectations	99,8%
NHEPQ	99,9%
HEPQ	71,2%
Perceived Value	87,4%
Satisfaction	80,6%
Loyalty	96,6%

Source: developed by the authors based on the study's data (2017)

The explained variance of the model's constructs presented in Table 8 shows that the conceptual model adopted in this study explains 96.6% of the variance concerning loyalty and 80.6% of student satisfaction verified among graduate students from Brazilian Accounting graduate programs. According to the ECSI's Technical Committee (1998, *apud* Ostergaard & Kristensen, 2005), the coefficient of determination, i.e., R^2 of consumer satisfaction must be at least 0.65, that is, the model has to explain at least 65% of what leads to satisfaction.

Thus, the prevalence of a model with high explanatory power is verified, considering that the variances indicate that student loyalty and satisfaction can be measured by changes in factors that integrate the student satisfaction model. The remaining 3.4% and 19.4%, respectively for loyalty and satisfaction, are attributed to constructs not considered in the model. Hence, the ECSI model adapted for students has high power to explain the dimensions that influence student satisfaction and loyalty among graduate students from Brazilian Accounting Sciences programs.

4.3.1 Analysis of the study hypotheses

Even though some relationships in the analysis of hypotheses did not present significance to be kept in the conceptual model as it was originally developed, after being re-specified, the ECSI model proved to be suitable to measure student satisfaction and loyalty among Brazilian graduate students. This corroborates results from similar studies and is coherent with the literature grounding this conceptual model.

The first hypothesis (H1) was not rejected, that is, a significant association was found between the image and expectations constructs. Emphasizing the importance of this relationship, the confirmation of hypothesis 1 shows that the image of a program held by students shaped their expectations. This result is in line with Martensen *et al.* (2000), Johnson et al (2001), Cruz (2013), Cassel and Eklof (2001), Eurico, Silva and Valle (2015) and Cavalheiro *et al.* (2014). The analysis also confirmed hypothesis 5 as it reports that expectations have a positive and significant effect on perceived quality, a result that is in agreement with Fornell *et al.* (1996), Gonçalves-Filho, Guerra and Moura (2004), Zeithaml and Bitner (2003), Cruz (2013), Cavalheiro *et al.* (2014) and Pereira *et al.* (2016), as they argue that expectations have a significant and positive impact on perceived quality. Hence, students are expected to create rational expectations to be coherent with the levels of quality they will experience when they enroll in the chosen program.

REPeC – Revista de Educação e Pesquisa em Contabilidade, ISSN 1981-8610, Brasília, v.14, n. 1, art. 2, p. 14-33, Jan./Mar. 2020

27

Hypothesis 6 was not rejected either, that is, there is a relationship between the students' prior expectations and perceived value, a result that is similar to Fornell *et al.* (1996), Ostergaard and Kristensen (2005), Alves and Raposo (2006), Cavalheiro *et al.* (2014) however, opposes those reported by Cruz (2013) and Pereira *et al.* (2016). This result shows that the perceived value students attach to an academic experience is closely linked with their prior expectations based on their needs. Additionally, there is a direct association between the perceived quality of human elements and satisfaction, confirming hypothesis 8, corroborating the results presented by Alves and Raposo (2006), Filho, Guerra and Moura (2004) and Turkyilmaz, Temizer and Oztekin (2018). All these authors found that perceived quality is a satisfaction antecedent, against the findings of Pereira *et al.* (2016), in which such a relationship was not significant.

In agreement with the studies by Alves and Raposo (2006), Filho, Guerra and Moura (2004), Egyir (2015), Ostergaard and Kristensen (2005), Eurico, Silva and Valle (2015) and Turkyilmaz, Temizer and Oztekin (2018), a positive association was found between perceived value and student satisfaction as predicted in hypothesis 10. As suggested by Woodruff (1997) and Gonçalves-Filho, Guerra and Moura (2004), the high level of satisfaction students may experience accruing from the perceived value of attending a graduate program, indirectly (mediated by satisfaction) reflects on student loyalty.

Finally, satisfaction was also found to be directly and significantly related to loyalty, which confirms hypothesis 10, that is, loyalty is a consequence of satisfaction, showing the importance of the construct satisfaction in determining student loyalty, contributing to improve a program's academic reputation. This result was previously reported by Martensen *et al.* (2000), Ostergaard and Kristensen (2005), Alves and Raposo (2006), Gonçalves Filho, Guerra and Moura (2004), Duarte (2013), Eurico, Silva and Valle (2015), Henning-Thurau, Langer and Hansen (2001), Turkyilmaz, Temizer and Oztekin (2018), Cavalheiro *et al.* (2014), Faé (2016) and Pereira *et al.* (2016).

Nonetheless, some relationships did not present significance to be kept in the model's original conception and the hypotheses that investigated direct relationships between institutional image and perceived value, satisfaction and loyalty, as confirmed by Martensen *et al.* (2000), Pereira *et al.* (2016), Cavalheiro *et al.* (2014), Palacio, Meneses and Pérez (2002), Alves and Raposo (2006; 2010), Kristensen, Martensen and Gronholdt (1999), Eurico, Silva and Valle (2015), Turkyilmaz, Temizer and Oztekin (2018) and Egyir (2015), were not significant in this study.

Results regarding relationships originating in the "institutional image" factor, were contrary to expectations based on the literature addressing student satisfaction from the ECSI perspective, according to which institutional image is the main driver of value perception, satisfaction and loyalty among students. These relationships, however, were rejected in this study as, according to the graduate students, the image of a program does not interfere in the perceived value, satisfaction or loyalty.

Note that the relationships between perceived quality (both of human and non-human elements) and perceived value, which were rejected in this study, diverge from the findings by Fornell (1992), Cruz (2013), Pereira *et al.* (2016) and Telford and Masson (2005), despite being similar to Eurico, Silva and Valle (2015). Likewise, the direct impact between perceived quality and student loyalty is not supported by data obtained in this study, so that this hypothesis was rejected, corroborating with the results reported by Martensen *et al.* (2000) and confirming that perceived quality and loyalty are not directly related in this sample.

5. Final Considerations

The literature addressing satisfaction defines it as a psychological state, which prevents its direct observation. Thus, satisfaction is considered a latent trait that should be analyzed based on the observation of related secondary variables that contribute to the development of its specific concept (Anderson, Fornell & Lehmann, 1994; Fornell et al., 1996; Tontini & Walter, 2011). The existence of latent dimensions such as perceived quality, expectations, institutional image, perceived value, loyalty and its relationships are considered aspects that compose satisfaction with all its implications.

The structural equation modeling was used to test the conceptual model proposed by Martensen *et al.* (2000), aiming to verify whether this model represents the determinants of student satisfaction and loyalty among graduate students enrolled in Brazilian programs in the Accounting Sciences field. The study sample included approximately 90% of the graduate programs in Accounting Sciences active in Brazil and, after treating the data, 311 valid responses were obtained.

The results show that six out of the 11 hypothetic relationships analyzed in this study were not rejected, based on empirical studies and theory based on the ECSI. These predicted relationships between image and expectations (H1), expectations and perceived quality (H5), expectations and perceived value (H6), perceived quality and satisfaction (H8), perceived value and satisfaction (H10), and satisfaction and loyalty (H11. As a result, an adapted empirical model was developed to measure student satisfaction based on the ECSI.

The results of determination coefficients revealed that the aforementioned dimensions are antecedents and explain 80.6% of satisfaction, indicating that the determinants of satisfaction are perceived value, perceived quality with human elements, directly influencing the constructs of image, expectations, and perceived quality of non-human elements as mediating dimensions. The model also shows that six dimensions explain 96.6% of the construct loyalty; satisfaction directly influences while the remaining factors exert an indirect influence.

The results obtained in this study are similar to the results obtained by previous studies at the extent that all the factors integrating the original ECSI model were kept after empirical analysis was conducted in the context of Brazilian graduate programs. Nonetheless, the relationships between the constructs integrating the model and their influences on the study's central constructs, satisfaction and loyalty, are not similar with those reported by preceding studies, revealing there is a difference between the perceptions hold by undergraduate and graduate students.

The differences between these groups of individuals mainly occurred between institutional image and perceived quality, which in previous studies, appear as primary dimensions composing the relationships between student satisfaction and loyalty. That said, this study's findings suggest that, the external institutional image of a program does not directly influence the satisfaction of graduate students, their loyalty toward the program or the value they perceive of their academic experience, differently from what happens among undergraduate students.

Another discordant point of view presented by previous studies refers to the dimensions permeating perceived quality students hold regarding the program they are enrolled in. The results show that, the perceived quality of an institution's structure facility elements, which serve as a support to studies, does not prompt the value perceptions, satisfaction or loyalty among graduate students from public universities (a representative sample in this study), showing that the faculty of public HEIs along with human relations, that is, the perceived quality of human elements, directly impact the satisfaction of students.

Therefore, an effort on the part of coordinators to improve the human elements of a program and, consequently, to improve the perceived quality of human elements, is a differential that leads to student satisfaction and, thereafter, student loyalty. Loyalty may be manifested by students committing to their programs, seeking, together with faculty members and coordinators, to constantly improve the program, obtaining expressive rates of attraction of future students and achieving high grades in the Capes program.

The conclusion, after identifying the dimensions that contemplate student satisfaction, as well as its implications, is that this study presents a differential when compared to earlier studies, as it proposed a nationwide analysis of student satisfaction and obtained the representativeness of 90% of graduate programs. Additionally, studies addressing student satisfaction in the scope of graduate program are rare. The results show that the ECSI model of satisfaction is suitable to analyze student satisfaction and loyalty among Brazilian graduate students, as it obtained good representativeness of programs and significant explanatory indexes.

Therefore, by revealing the structural model that portrays the determinant of student satisfaction and going beyond an assessment of programs' technical production, we intended to carefully look at the academic experience of graduate students. The results obtained here are expected to contribute to students' academic learning so they obtain a high level of satisfaction and good performance, translating in positive assessments of programs and the entire area of education.

The specific knowledge generated in this study concerning how graduate students in Accounting Sciences programs behave toward educational services is a differential for the field as it enables understanding the perspective of students on their academic experience. Thus, this information is expected to support constant improvement of processes to meet students' desires. Without exhausting the potential for the practical application of this study's results, monitoring student satisfaction can contribute to the improvement of programs (Capes grade) and continuity of programs in the field.

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32

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Perception of Active and Passive Transparency in Teaching Institutions: proposal and validation of a questionnaire

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Abstract

Objective: This study proposes an instrument to assess active and passive transparency among teaching institutions from the perception of social actors.

Method: The proposed questionnaire was applied to assess active and passive transparency from the perspective of social actors in a teaching institution. The questionnaire was validated in a sample of 1,070 stakeholders, based on techniques to analyze convergent and discriminant validity, along with tests of the reliability and one-dimensional nature of the questionnaire.

Results: The instrument was assessed using various validity measures and presented satisfactory results that indicate its applicability. A detailed method is presented for its application and classification, which allows teaching institutions to assess their transparency based on the instrument's dimensions (Institutional Management, Information Access) or to obtain an overall perception (Active Transparency and Passive Transparency).

Contributions: The instrument proposed here is a pioneer in the joint assessment of active and passive transparency among teaching institutions considering the perspective of social actors, which grants public managers a comprehensive view of transparency-related actions based on the assessment of these actors.

Keywords: Management; Universities; Scale; Law on Access to Information

1. Introduction

Transparency in public institutions is one of the basic mechanisms to obtain credibility and quality management (Relly, 2012). This premise consolidates legal actions applied by the Brazilian government in recent years, indicating considerable advancements in the search for transparency, such as Complementary Law No. 101 (Fiscal Responsibility Law, LRF, 2000), Complementary Law No. 131 (2009), Law No. 12,527 (Law of Access to Information, LAI, 2011), and Decree No. 8,777 (2016).

Complementary Law No.101/2000 is considered a landmark in public finances for having established transparency of information as one of its basis, thus, making it possible for the society to monitor public accounts (Rodrigues Jr. & Salgueiro, 2015). Thus, public entities started disseminating its plans, budgets and budget guidelines, accountability and respective reports, Fiscal Management Report and Summary Report on Budget Execution, as well as the simplified versions of these documents (Possamai & Schindler, 2017).

In 2009, Complementary Law No131, called Capibaribe or Transparency Act, was created to complement LRF with devices intended to detail the mechanisms of fiscal management Transparency. This law was determinant in the creation of transparency-content webpages by all entities in the Federation to disseminate budgetary and financial execution information of government actions, promoting more democratic management of public resources.

Consolidating advertising as a rule and secrecy as an exception, Law No.12.527/2011 establishes that transparency is the possibility of any citizen to request access to public information, with exception of confidential documents, according to rules, deadlines, instruments of control and resources as provided by law. Thus, it defines instruments and competencies that ensure the right to information, changing the way citizens relate with the Government and with the public sector, introducing the concept of passive transparency. The most recent policy of transparency, Decree No.8.777/2016, instructs institutions to make public data available without restrictions and in formats that allow them to be reused, regardless of the purpose.

This legislation also applies to public higher education institutions, while different stakeholders[1] have demanded greater transparency and accountability from these institutions given their level of autonomy (De La Torre & Torres, 2016). Additionally, universities need to redefine their online role in the society, building a sustainable, authentic and transparent, digital identity to provide information and dialogue with all those involved and participating in the construction of knowledge (Lara, 2009).

The disclosure of information on the part of universities through their webpages consolidates active transparency, provided for in Art. 8th of LAI, that is, public agents proactively disseminate information of interest to citizens without the need for a request. Active transparency benefits both citizens and public entities. The first is benefited because there is no need to request information from a public entity if it is already made easily accessible and institutions are benefited because it saves time and resources to the extent there are fewer requests for information (CGU, 2013).

Passive transparency, provided in Art. 10th of LAI, takes place whenever requests for information are submitted to channels such as the e-Sic [Electronic Services of Citizen Information] or Ombudsperson. In the words of Michener, Contreras and Niskier (2018, p.611), "passive transparency represents a 'more demanding test' of a commitment with public information access" and is employed when a public entity is requested by a citizen to provide non-confidential information that is of general or collective interest (CGU, 2013).

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1   Stakeholders include courts of accounts, Controller General of Accounts (CGU), Public Ministry of the Union, Ministry of Education (MEC), the National Institute for Educational Studies and Research Anísio Teixeira (Inep), among other public inspection and control agencies, in addition to civil society.

Assessments of LAI regulation performed by Brazilian public universities (Monteiro, 2014; Pessôa, Canuto, Costa & Almeida, 2018; Melo, 2019) show that these institutions need to advance concerning the implementation of transparency, as an information disclosure culture is not predominant. Such a scenario is not different from that portrayed by the analysis performed by Abello-Romero, Mancilla, Molina and Palma (2018) of Latin-American universities, which shows the low level of dissemination of information among these institutions.

Monteiro (2014) assesses the websites of 53 Brazilian federal universities and reports that none of these universities has fully complied with LAI devices, though some had disseminated relevant amount of information. Pessôa et al. (2018) analyzed the websites of 59 federal universities and identified an average level of information disclosure (66.32%).

More recently, Melo (2019) assessed the websites of the 20 largest Brazilian federal universities reporting that in general, they presented a low level of active transparency, as information provided was either incomplete or not sufficiently clear. The author notes the low engagement of these federal universities to comply with LAI since it was instituted, may explain, at least in part, the growing number of requests submitted by users/citizens to SIC [Citizen Information Service].

Based on these considerations, this study's objective was to contribute to institutional management, as an incentive or motivation, to improve the structure to obtain higher levels of efficiency in terms of transparency −e.g., qualification, punctuality and updating of information available in the websites of teaching institutions. Such efficiency reflects clear communication is established with society, facilitating access to information. For that, we seek to answer the following research problem: **How do we measure the perception of social actors about active and passive transparency among teaching institutions?** Based on this question, this study's general objective was to propose an instrument[2] to assess active and passive transparency among teaching institutions from the perceptive of social actors.

Because universities are also a means to achieve social change, more than ensuring compliance with legal standards, they should consider initiatives to implement transparency as a policy of responsible management that favors the exercise of citizenship. Understanding the effects of this policy is essential to monitor and qualify management. The central idea of the questionnaire validated here is to enable managers to identify how social actors perceive their institutions' transparency actions based on characteristics of active transparency, considering aspects inherent to institutional management, information access and passive transparency.

The innovative nature of the instrument we propose in this study lies in two aspects. The first is the fact it is a precursor in the assessment of transparency among teaching institutions from the perspective of social actors. No other studies with a similar proposal were found on the[3]. Existing studies (e.g., Monteiro, 2014; Pessôa, Canuto, Costa & Almeida, 2018; Melo, 2019) assess the websites of Brazilian public universities using a strategy to structurally observe LAI regulation, not taking into account the perception of users/citizens, which is the emphasis proposed here.

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2   In this paper, the words instrument and questionnaire are used interchangeably.

3   Capes Portal of Periodicals is a virtual library that gathers and makes available the best international scientific production to Brazilian teaching and research institutions. It currently has a collection of more than 45,000 periodicals with full texts, 13 reference bases, 12 databases exclusively dedicated to patents, in addition to books, encyclopedias, and reference works, technical standards, statistic and audiovisual content (Periódicos Capes, 2019).

The second aspect is directly related to the fact the instrument addresses two forms of transparency (active and passive transparency), enabling public managers to have a more comprehensive view on how successful transparency-related actions are based on the assessment performed by social actors. This additional aspect is in agreement with is proposed by Silva and Bruni (2019), that when measuring attributes that represent each form of transparency, one has a better understanding of transparency antecedents, considering that "the same public entity may have different results depending on whether the focus is on passive or active aspects, or both aspects" (p. 429). This proposed instrument is relevant given the complexity inherent to teaching institutions, which demand an ongoing assessment and control process so that this instrument can be used as a tool to monitor transparency indicators.

2. Theoretical framework

Some characteristics are reported in the literature as antecedents of the perception of active transparency such as those linked to institutional management. Flórez-Parra, López-Pérez and López-Hernández (2017) note that the level of perceived transparency depends on the universities' strategic plans and therefore, would be linked to the mission, vision and values of an institution. The authors also note that the mission represents the identity and personality of an institution and should be seen as the driver of social responsibility and sustainable development. It is linked to institutional policies, especially teaching, research (Eckel, 2008) and extension.

Visintin, Dechen and Neves (2009) also mention transparency is indispensable in all relations established with society, as it positively contributes to the management of social responsibility and sustainable development, considered ethical complementary actions in the role of universities. Additionally, there are indications that transparency impacts an institution's planning and organization, as when it establishes and disseminates its strategies and policies, an institution must also establish goals and deadlines and comply with both as society supervises its actions.

Bairral, Silva and Alves (2015) verified that to make their actions transparent, public entities providing education are very clear and exact in their account-giving, as demanded by law, such as LAI, e.g., reporting the use of financial resources, considering that it is a renowned practice in the fight against corruption. Nonetheless, as noted by Relly (2012), it is important to have in mind how society sees the relationship between transparency and the fight against corruption, considering that merely complying with a law determining access to information does not suffice to ensure that a true policy of transparency has been implemented nor that there is any interest in acting to dismantle corruption.

Communication established with society is central to institutional management for actions to be transparent, while one of LAI's premises is the active maintenance of communication and service to citizens (CGU, 2013). For this reason, these institutions must provide ample access to information by adopting channels that ensure efficient and efficacious communication (Saraite-Sariene, Rodríguez & Rosario, 2018).

Considering information access, the second construct associated with active transparency in this study, Saraite-Sariene et al. (2018) highlight the importance of disclosing information that concerns a university's organization and governance. Information includes distribution of management positions, policies and regulations (e.g., student mobility programs), selective processes, competitions and biddings, and management of resources (public or not).

Understanding the perceptions of citizens of such information and related procedures are essential for public managers, considering irregularities appointed by Dalto, Nossa and Martinez (2014), such as a lack of instruments of control used by Federal universities to account for the resources originating from agreements established with Support Foundations. The authors also note the notorious transfer of "responsibilities and tasks that are exclusive of Public Administration, such as organizing public competitions, purchasing goods and services, and outsourcing" (p. 19), from Federal universities to Foundations.

Alerts such as these contributed to include statements in this instrument concerning the perception of social actors about the transparency of student selection processes, public competitions, and use of public resources, elements that may be under the management of Support Foundations but neglected on the part universities' management. Understanding how society views transparency in terms of information access may be a way of university managers to acknowledge and address the need to improve institutional processes.

Concerning passive transparency, Alvarenga (2017) developed a ranking to classify the 63 federal universities existing in Brazil. Of these, 37 answered all requests of information within 20 days, though some neglected SIC as being "an instrument to interact and be transparent with society" (p. 1). However, worse than exceeding legal deadlines, some institutions did not respond to most of the requests. Considering 2016, the author notes that from a total of 9,903 requests, 157 requests were addressed per federal teaching institution on average.

These figures indicate the importance of establishing effective communication channels between institutions and society. The punctuality of answers, though, is not the only factor to be considered, as the quality of information is also relevant. Thus, with that in mind, this study assesses the characteristics of information provided by institutions, which may impact the satisfaction of applicants. CGU (2013) establishes that clear and objective language must be used, to ensure that communication meets the demands of applicants and the messages of public entities are fully comprehended.

Flórez-Parra et al. (2017) note there is greater demand for relevant and reliable information be provided by universities while Figueiredo and Santos (2013) add that social actors need to assimilate data provided so that entities need to ensure they provide information that is sufficient to satisfy the receiving audience. Thus, it is the responsibility of public institutions to provide clear, complete and easily understood information while information is considered transparent when all these requirements are met.

The constructs Institutional Management and Information Access are dimensions that compose Active Transparency, thus, might be associated. This association is apparent especially when variables concerning the management of public resources are added in both dimensions, considering that "accountability is a necessity as such information may be related to the proof of expenses or how resources were managed" (Dalto et al., 2014, p. 9). Additionally, Saraite-Sariene et al. (2018) note that information disclosure is related to aspects linked to the organization and governance of teaching institutions.

The literature addressed in this section also assumes the existence of a direct relationship between both dimensions of active transparency and perceived transparency. Thus, the following hypotheses emerge in the proposed model:

- **H1:** Access to information is associated with institutional management

- **H2.1:** Access to information impacts the perceived level of transparency

- **H2.2:** Institutional management impacts levels of perceived transparency

A general measure of perceived transparency was developed to assess hypotheses H2.1 and H2.2, in which respondents score from 0 to 10 their perceptions regarding an institution's level of transparency while 0 represents lack of transparency and 10 represents the perception of total transparency.

Also, considering documents and studies consulted (CGU, 2013; Figueiredo & Santos, 2013; Flórez-Parra et al., 2017), we understand that the construct Passive Transparency should be directed related with the general measure of Satisfaction with Answer Provided. Thus, we have the following hypothesis:

- **H3:** Passive Transparency directly impacts Satisfaction with Answer Provided.

A score, from 0 to 10, is assigned by applicants to classify their Satisfaction with Answer Provided, in which 0 means not satisfied and 10 completely satisfied. Figure 1 synthesizes the theoretical models presented in this section. Letter S represents the statements; letter E represents errors in each statement; while the constructs and latent dimensions are represented by their respective ellipses.
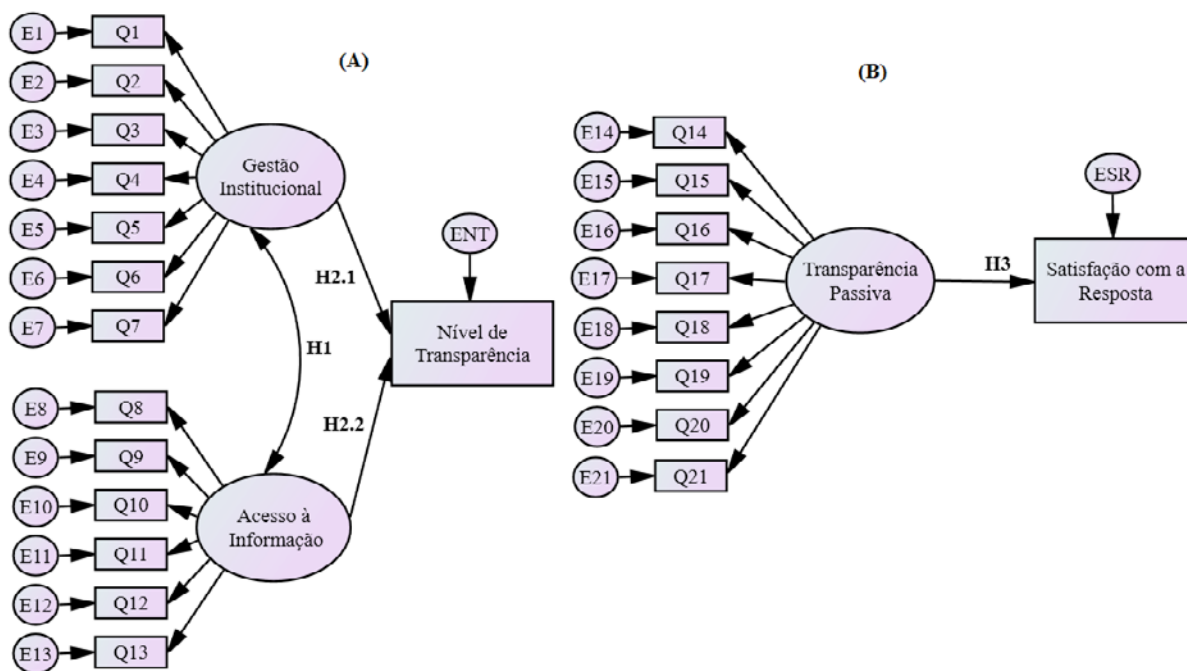
Figure 1. Theoretical Models of Active (A) and Passive (B) Transparency

Source: developed by the authors (2019)

Translation: Institutional Management; Information Access; Level of transparency; Passive transparency; Satisfaction with answer.

Representation (A) refers to the theoretical model of Active Transparency, composed of the constructs Institutional Management and Information Access, both associated (H1) and directly impacting Perception of Transparency (H2.1 and H2.2, respectively). Representation (B), refers to the model of Passive Transparency, a construct composed of eight statements, and which directly impacts Satisfaction with Answer Provided (H3). Concerning the different social actors, model represented in (A) is considered to apply to all actors, while the scale for Passive Transparency (B) applies only to individuals who request information via SIC, e-SIC or ombudsperson, sector of protocols or other channels.

3. Methodology

This section describes methodological procedures using in this study. The stages used to develop and validate this instrument are initially reported and afterwards, the sample and its application are explained in detail.

3.1 Questionnaire construction and validation

The instrument proposed in this study is based on the category active transparency, as a measure to estimate the perception of transparency and, the category of passive transparency is intended to measure the satisfaction of applicants with the answers provided by the institutions. An analysis of the institutional management and disclosure of organizational processes, dimension defined here as information access, is considered for active transparency. The assessment of passive transparency takes into account the characteristics of information provided to applicants according to the expected precepts of information of a public nature. The statements composing each of the three constructs contained in the model, as well as the measurement scale, were based on the theoretical framework as presented in Figure 2.

Statements	Construct	Scale
S1. The institution's* transparency contributes to fighting corruption.	Institutional management	
S2. The institution's transparency positively influences the institution's mission, vision and values.		
S3. The institution's transparency strengths teaching, research, graduate programs, and extension policies.		
S4. The institution's transparency contributes to an increase in social responsibility.		
S5. Transparency of the institution's actions is important in the communication established with society.		
S6. Transparency of the institution's actions impacts the institution's organization.		
S7. Transparency directly impacts accountability for the use of financial resources.		
S8. Criteria to allocate student resources are transparent.	Information access	1- Completely Disagree 2- Disagree 3-Indiferent 4- Agree 5- Completely agree
S9. The institution's student mobility programs are transparent.		
S10. The distribution of management positions within the institution is transparent.		
S11. The institution's processes to select students are transparent.		
S12. The institution's public competitions are transparent.		
S13. Information disclosed by the institution suffices to clarify the application of public resources.		
S14. Information met my needs.	Passive transparency	
S15. Information was sufficient.		
S16. Information was complete.		
S17. Information was sufficient and easily accessed.		
S18. Information was exact.		
S19. Information was credible.		
S20. Information included the requested data.		
S21. Information was easily understood.		

*We suggest replacing the term "institution" by the name of the institution when applying the instrument.

Figure 2. Definition of statements that concern constructs of active and passive transparency and respective scale

Source: developed by the authors according to the literature (2019)

Validation followed the constructs' theoretical development and was performed in two stages: the objective of the first was to obtain content validation and apply a pretest while the second stage, having the sample data in hands, was intended to verify the validity of the model.

Content validation is an essential step in the development of new measures because it represents mechanisms used to associate abstract concepts with observable and measurable indicators (Wynd, Schmidt & Schaefer, 2003). It consists of verifying the extension in which the items of a measure correspond to content (Rubio, Berg-Weger, Tebb, Lee & Rauch, 2003), that is, the extent to which a question/statement contributes to form a construct. As suggested by Lynn (1986), the content validation process followed the development and judgment stages. The stage of development included the construction of each construct, the generation of items, and the development of the instrument (Figure 2).

The judgment stage was conducted using the technique of expert committee, followed by a pretest among individuals with characteristics similar to those of the study's participants but from an institution different from that from where the study sample would be drawn. The committee was composed of three experts in the subject, who received the questionnaire along with an explanatory letter, providing clarification regarding the instrument's objectives, definition of the constructs, and instructions. The assessment showed that the version we proposed presented appropriate semantics and that the statements represented what they were intended to. No major changes were proposed, only small adjustment on the scoring.

A pretest was then performed with 15 individuals, students, professors, and administrative technicians in the field of education. Again, the questionnaire semantic assessment was considered appropriate and, according to the respondents, the statements were coherent to the social and occupational context.

After the first stage, the instruments were applied, initiating the second stage in which we adopted procedures to verify convergent validity, its one-dimensional nature, and discriminant validity of the constructs, as well as adjustment of the integrated model.

Convergent validity measures the extent to which a latent variable is positively related to the expressed variables intended to measure the same latent variable (Garver & Mentzer, 1999). An analysis of the reliability of the scales along with Confirmatory Factor Analysis was performed to check for convergent validity.

Assessment of reliability of a scale indicates the degree of internal consistency among the multiple indicators of a construct, that is, the extent to which an instrument produces coherent results based on the various measurements (Schumacker & Lomax, 1996). The analysis was conducted based on three indicators: Cronbach's alpha, Composed Reliability, and Average Variance Extracted (AVE). The Cronbach's alpha and the reliability index verify the internal consistency of the aggregated scale based on the mean correlation among pairs of indicators. AVE reflects the total variance of indicators accruing from the latent construct. High AVE indicates that the expressed variables represent the latent variables.

Confirmatory Factor Analysis (CFA) was also conducted for convergent validity, which involves the specification and estimation of one or more hypothetical models of factor structure, where each of the models proposes a set of latent variables that should be considered to obtain covariances in a set of observed variables (Koufteros, 1999). A variance-covariance matrix, maximum likelihood estimation and bootstrap method were used in the estimation process. Bootstrap estimation was chosen to obtain greater precision of the estimated values (Byrne, 2010). As suggested by Cheung and Lau (2008), bootstrap was estimated with a sample size of 1,000.

The convergent validity of each construct was analyzed by observing the magnitude and statistical significance of standardized coefficients as well as adequacy to absolute adjustment indexes. Figure 3 presents indexes of reliability and adjustment, their respective purposes and limits suggested.

Reliability	Purpose	Limits
Reliability index	Verifies internal consistency of an aggregate scale based on the mean correlation between a pair of indicators.	> 0.7
Cronbach's alpha		
Average variance extracted	Reflects the overall amount of variance in the indicator originated from the latent construct. The high average variance extracted indicates that expressed variables do represent the latent variables.	> 0.5
Adjustment indexes	**Purpose**	**Limits**
Chi-square (Value)	Significance of the differences between the observed matrix (Σ) and estimated matrix (ΣΘ). Large samples tend to be significant, hence the Chi-square test/ Degrees of freedom.	Chi-square / Degree of freedom < 5
Chi-square (probability)		
GFI – Goodness of Fit	It represents the general degree of adjustment, not being weighted in terms of the degree of freedom.	> 0.95
CFI – Comparative Fit Index	Global comparative measurement between estimated and null models.	> 0.95
NFI – Normed Fit Index	It indicates the proportion in which the adjustment of the proposed model is better than the adjustment of the null model.	> 0.95
TLI – Tucker-Lewis Index	It presents interpretation similar to NFI, including an adjustment measure for the complexity of the model.	> 0.95
RMSR – Root Mean Square Residual	To compare the adjustment of two different models developed using the same database.	< 0.06
RMSEA – R. M. S Error of Approximation	It represents the discrepancy between the matrix of covariance and estimated by degrees of freedom.	< 0.08

Figure 3. Reliability and Adjustment Indexes, their respective purposes and limits suggested

Source: Developed by the authors based on Hu and Bentler (1999), Byrne (2010); Hair, Black, Babin, Anderson and Tatahm. (2010); Hooper, Coughlan e Mullen (2008) and Kline (2011).

The one-dimensional nature of each construct was also assessed, that is, the degree in which a set of items represents only one construct (Garver & Mentzer, 1999). This assessment was performed by identifying standardized residue related to the indicators of each latent variable. Standardized residue with high values (higher than 2.58) may indicate items are not one-dimensional, thus, are inappropriate (Hair et al., 2010).

The test of difference of Chi-squares was used to verify discriminant validity between the model's constructs. This test consists of developing submodels for each possible pair of constructs of the measurement model. A fixed correlation, equal to one, is established in the first model (called restrict) between the pair of constructs while correlation is free in the second submodel. A significant difference between the Chi-squares of the respective models is evidence of discriminant validity (Pedhazur & Schmelkin, 1991, Anderson & Gerbing, 1988, Garver & Mentzer, 1999). When differences are higher than 3.84 (p<0.05 for one degree of freedom) we say there is discriminant validity.

To assess the integrated models, which include the constructs and relationships, the coefficients and respective significances were assessed along with adjustment indexes proposed in Figure 3. Finally, to facilitate the use of the instrument proposed here, a methodology was developed for its application (section 4.2), which allows the institutions using it to classify their level of transparency.

3.2 Sample and questionnaire application

The questionnaire was applied in person between October and November 2018 in a federal teaching institution located in Rio Grande do Sul, Brazil. This institution has a total of 4,068 stakeholders among professors, students, and administrative technicians in the field of education. Thus, for a sample error of 3%, with a 95% confidence interval and a finite population, we have a minimum sample of 847. At the end of data collection, we had 1,070 respondents for the statements concerning active transparency, 71 of whom had already used SIC, e-SIC or ombudsperson and also completed the questionnaire concerning passive transparency.

This number of respondents also meets the recommendations to apply the modeling technique of structural equations in which the minimum sample size should be significantly larger than the number of covariances or correlations in the data entry matrix. Landis, Beal and Tesluk (2000) consider that a minimum of five respondents is required for each parameter estimated (5:1), while a ratio of 10 respondents per parameter (10:1) is more appropriate. According to Hair et al. (2010), when data violate the assumption of normality, the ratio needs to be 15 respondents per parameter (15:1). Thus, considering the model of active transparency has a total of 55 parameters, the sample is appropriate even in the case of deviation from normality.

Concerning the profile of the 1,070 respondents, most were women (52.1%), single (74.8%), aged up to 20 years old (51.5%). About income, 41.8% have an income of up to R$5,875.75 and only one-eighth earn more than R$17,627.25. In terms of education, most (68.7%) had attended vocational high school, while (17.4%) had an undergraduate degree.

This study complied with ethical guidelines (CAAE: 98394718.1.00005346).

4. Results and Analyses

This section presents the results of this investigation, that is, the application of a questionnaire including its convergent validity, one-dimensional nature, the constructs' discriminant validity as well as adjustment of the integrated model. Finally, based on the results, we propose a method to assess transparency that can be adopted by institutional managers.

4.1 Validation of the model

The first stage of empirical validation consisted of the individual validation of the constructs, which involved convergent validity, reliability, one-dimensional nature, and discriminant validity

Initially, confirmatory factor analysis and reliability measures were used to analyze convergent validity and reliability. Table 1 presents the results of the measures in the initial and final estimation for each of the three theoretical constructs.

Table 1

Adjustment and Reliability Indexes of the Initial and Final Models for the constructs of Institutional Management, Information access, and Passive Transparency.

Indexes	Institutional Management		Information Access		Passive Transparency	
	Initial Model	Final Model	Initial Model	Final Model	Initial Model	Final Model
Chi-square (value)	234.170	11.916	210.863	9.583	47.800	25.546
Chi-square (probability)	0.000	0.218	0.000	0.143	0.000	0.111
Degrees of freedom	14	9	9	6	20	18
Chi-square / Degrees of freedom	16.726	1.324	23.429	1.597	2.390	1.419
GFI - Goodness of Fit	0.941	0.997	0.938	0.997	0.868	0.926
CFI - Comparative Fit Index	0.932	0.999	0.911	0.998	0.947	0.986
NFI - Normed Fit Index	0.928	0.996	0.908	0.996	0.913	0.954
TLI- Tucker-Lewis Index	0.898	0.998	0.852	0.996	0.925	0.978
RMR - Root Mean Square Residual	0.049	0.013	0.088	0.019	0.053	0.041
RMSEA - R. M. S Error of Approximation	0.119	0.017	0.142	0.023	0.141	0.077
Reliability index	0.868	0.857	0.834	0.816	0.952	0.952
Cronbach's alpha	0.853	0.853	0.854	0.854	0.951	0.951
Average Variance Extracted	0.488	0.467	0.457	0.426	0.713	0.713

Source: developed by the authors (2019).

The results for the initial models indicate that three constructs do not meet the Chi-square criterion and at least one of the adjustment indexes was below the recommended, 0.95. Hence, we opted for the strategy of an improved model in which, generally two main actions are recommended: the removal of items and the inclusion of correlation between the items' errors. In this case, we chose to include the correlations between errors of the items belonging to the same construct.

After this procedure, Chi-square became insignificant; GFI, CFI, NFI and TLI reached the recommended value of 0.95 (except GFI for Passive Transparency); RMR and RMSA were below 0.06 and 0.08, respectively; while the reliability index and Cronbach's alpha remained above 0.7. The Average Variance Extracted for the two constructs Institutional Management and Information Access was slightly lower than 0.5. However, because these constructs presented appropriate values in two other reliability measures, we considered them to be reliable.

The one-dimension nature of the three constructs was then verified. No standardized residue above 2.58 was found, indicating the constructs had one dimension. The test of difference of chi-squares was used for the discriminant validity. Table 2 presents the chi-square values and degrees of freedom for the restricted and free models, in addition to the difference of chi-squares.

Table 2

Test of Difference of Chi-Squares for the constructs Information Access, Institutional Management and Passive Transparency

Constructs	Restrict Model		Free Model		Difference of chi-squares
	Qui-square	GL	Qui-square	GL	Value
Information access and Institutional Management	262.22	57	151.93	56	110.30**
Institutional Management and Passive Transparency	193.51	83	162.67	82	30.84**
Information access and Passive Transparency	113.51	72	88.90	71	24.61**

** significant at 5%

Source: developed by the authors (2019)

All combinations between the three constructs were tested. The chi-square values of the restricted model were significantly higher than the free model values, confirming discriminant validity between the constructs. Therefore, the three constructs were considered to be appropriate and met criteria established for convergent validity, reliability, one-dimensional nature, and discriminant validity. Thus, the integrated model was then analyzed, which considers both the constructs as well as their relationships. Table 3 presents the adjustment indexes of the initial and final models and Figures 4 and 5 present the models for active and passive transparency, respectively.

Table 3

Adjustment indexes for the Models of Active and Passive Transparency

Indexes	Active Transparency	Passive Transparency
Chi-square (value)	207.932	28.107
Chi-square (probability)	0.000	0.303
Degrees of freedom	66	25
Chi-square / Degrees of freedom	3.150	1.124
GFI - Goodness of Fit	0.974	0.928
CFI - Comparative Fit Index	0.977	0.953
NFI - Normed Fit Index	0.967	0.992
TLI- Tucker-Lewis Index	0.969	0.994
RMR - Root Mean Square Residual	0.055	0.043
RMSEA - R. M. S Error of Approximation	0.044	0.042

Source: developed by the authors (2019).

All the adjustment indexes achieved appropriate limits for the model of Active Transparency, except the Chi-square, which was significant. Considering that one the problems presented by the chi-square refers to its sensitiveness to sample size (Garver & Mentzer, 1999), the ratio chi-square/degrees of freedom was analyzed, which presented a result below five, confirming the model is appropriate. All the adjustment indexes of the model Passive Transparency were appropriate as well.

Note there is a correlation of 0.63 (Figure 4) between the constructs Institutional Management and Information Access, which corroborates hypothesis H1 expected in the theoretical model and is in agreement with the discussion proposed by Dalto et al. (2014), which concern the bivalent role of transparency of accounts and public resources, which support both the development of policies and organizational management and allows the society to monitor how these resources are used. Note that articles 7th and 8th of LAI establish the mandatory disclosure of information concerning the transfer of financial resources, public expenditure, management of public assets, use of public resources and biddings, for instance.
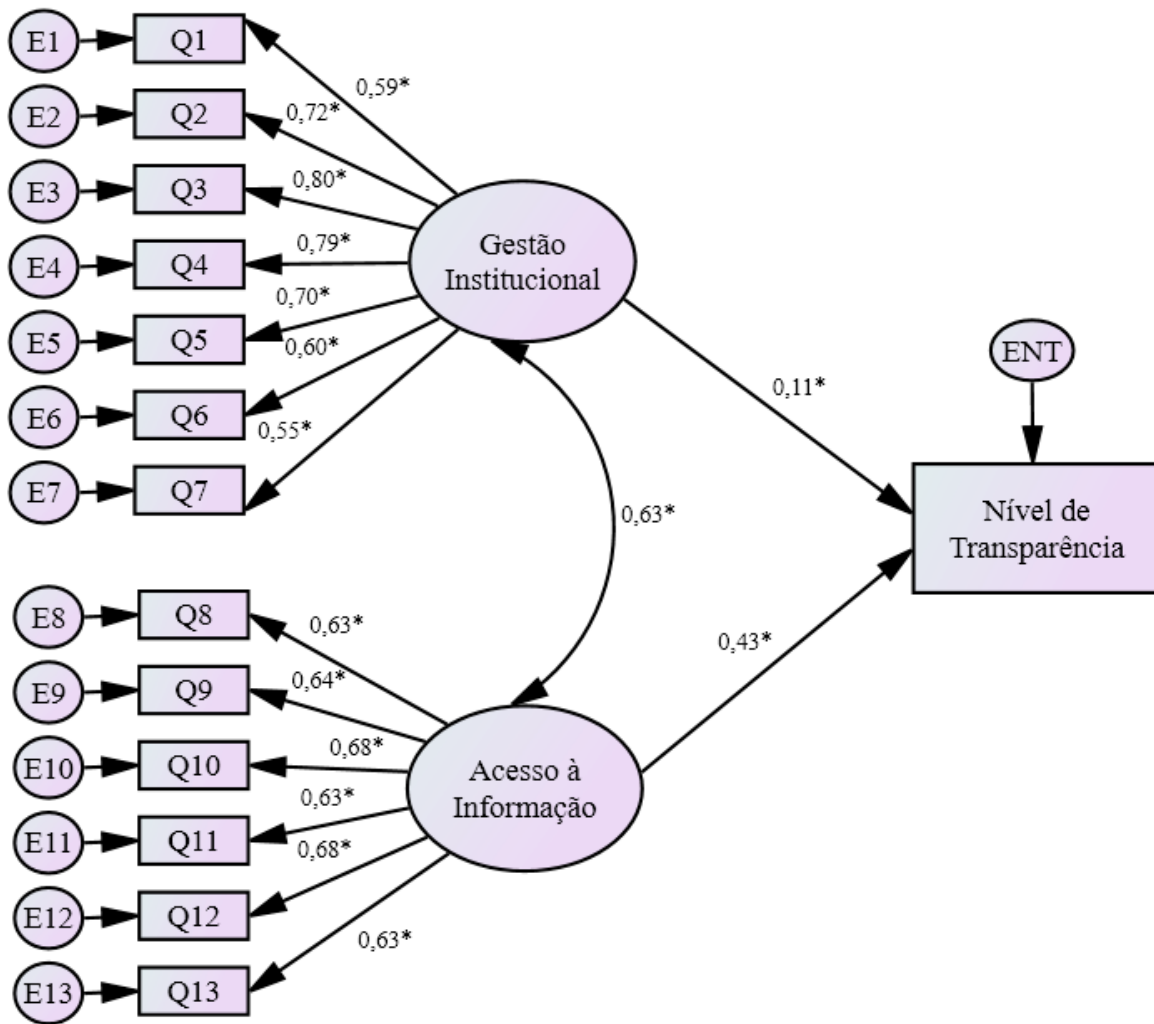
Significant at 1%

For simplicity, the correlations between errors were omitted, but are listed in Appendix A.

Figure 4. Standardized Coefficients and Significance for the Model of Passive Transparency

Source: developed by the authors (2019).

Translation: Institutional Management; Information Access; Level of transparency

Hypotheses H2.1 and H2.2 were also valid, indicating that Institutional Management and Information Access are antecedents of Perception of Transparency. Saraite-Sariene et al. (2018) highlight that universities understand the importance of allowing ample access to more generalized information but do not value the importance of responding to the growing demand for specific information concerning organizational structure, governance, management and financial issues, which directly impacts transparency. It reinforces this study's results, which suggest that the impact of the construct Information Access is superior to that of Institutional Management.

In this sense, CGU (2013) already instructed in its guidelines to apply LAI that clear communication that facilitates understanding of information and data on the part of citizens must be the goal of public entities. This way, by improving the systems concerning Institutional Management and Information Access, teaching institutions will positively impact the perception of transparency on the part of social actors.

Hypothesis H3 is accepted in the model of Passive Transparency, confirming there is a direct relationship between Transparency and Satisfaction with Answer Provided (Figure 5). Hence, social actors tend to be more satisfied with teaching institutions when they understand and positively qualify information that is provided (Figueiredo & Santos, 2013; Flórez-Parra et al., 2017).

Significant at level 1%
For simplicity, the correlations were omitted here but are listed in Appendix A.

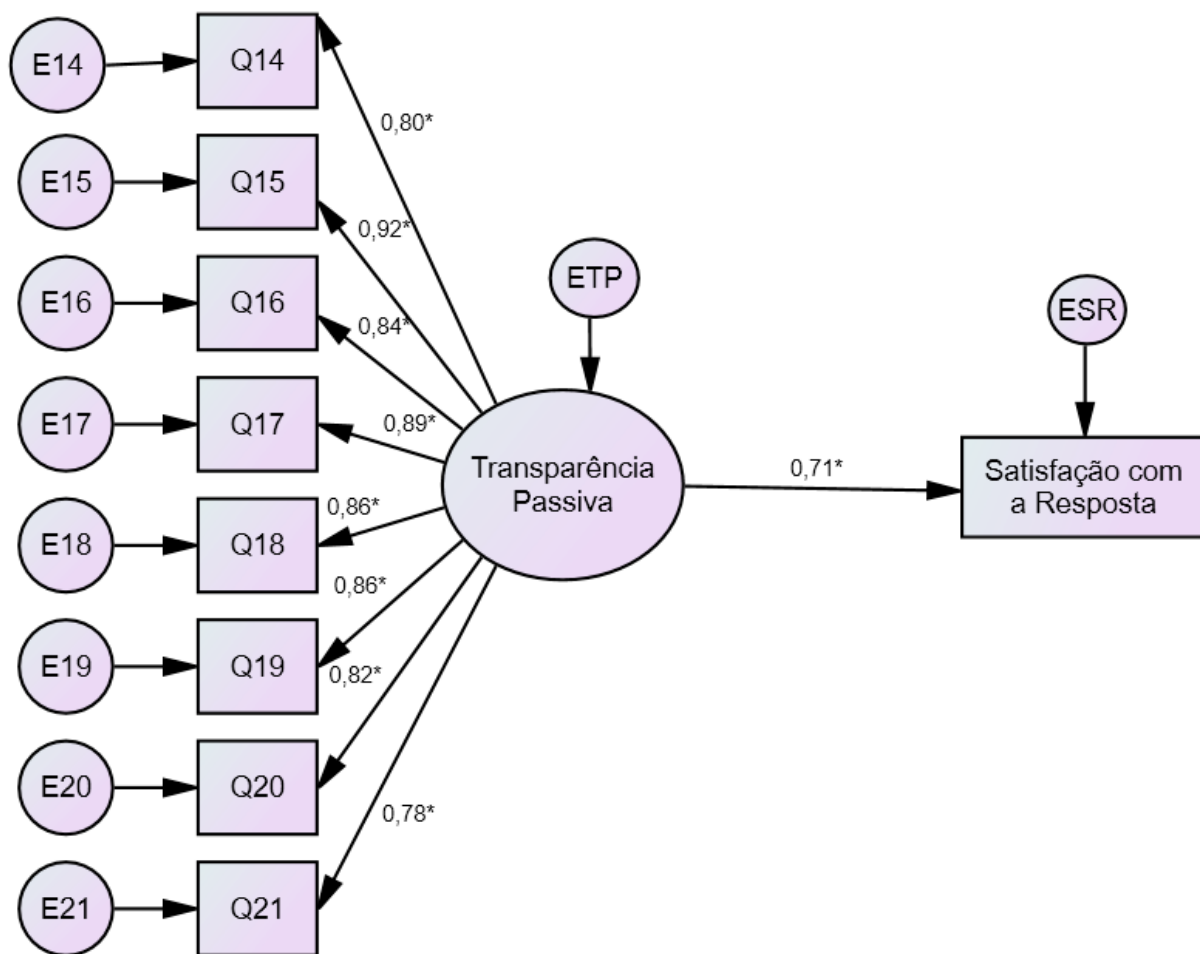**Figure 5.** Standardized Coefficients and Significance for the Model of Passive Transparency

Source: developed by the authors (2019).

Translation: Passive transparency; Satisfaction with answer

Finally, each of the respondents completed the instrument at once, which could lead to associations between factors due to the method bias (common method variance), a type of bias that tend to affect studies applying questionnaires (Chang, van Witteloostuijn & Eden, 2010; Gorrell, Ford, Madden, Holdridge & Eaglestone, 2011), so that Harman's single factor test (Podsakoff, MacKenzie, Lee & Podsakoff, 2003) was used, which indicated a percentage of variance extracted of 38.66%, suggesting there were no problems of common variance.

The conclusion, after performing these validation processes, is that the theoretical models proposed were confirmed according to empirical estimations, indicating that both the constructs and relationships were appropriate for the sample used.

4.2 Classification of Transparency: assessment methodology

To enable teaching institutions to acquire a view of perceived transparency based on the model proposed, we opted for developing a methodology to assess both the dimensions of transparency and the institutions' overall transparency. The results obtained in the sample in which this study was validated were used to propose this methodology.

Hence, the definition of weights, obtained by dividing the standardized coefficient of each statement by the sum of all standardized coefficients of the statements composing the construct, was used for calculating the constructs and overall assessment of transparency. Transformation into weights keeps the scale of constructs in an interval from one to five and allows one to consider the importance of each item in the composition of a construct. Table 4 presents the weights assigned to each statement in the composition of each measure.

Table 4
Standardized Coefficients and Weights of Each Statement in the Composition of Constructs

Construct	Statements	Standardized Coefficient	Weight
Institutional Management	S1	0.586	0.123
	S2	0.722	0.152
	S3	0.798	0.168
	S4	0.793	0.167
	S5	0.697	0.147
	S6	0.603	0.127
	S7	0.548	0.115
	Total	**4.747**	**1.000**
Information Access	S8	0.630	0.162
	S9	0.639	0.164
	S10	0.681	0.175
	S11	0.634	0.163
	S12	0.676	0.174
	S13	0.630	0.162
	Total	**3.890**	**1.000**
Passive transparency	S14	0.801	0.119
	S15	0.917	0.136
	S16	0.842	0.125
	S17	0.887	0.131
	S18	0.855	0.127
	S19	0.864	0.128
	S20	0.815	0.121
	S 21	0.775	0.115
	Total	**6.756**	**1.000**

Source: developed by the authors (2019).

The measures for each interviewee are constructed by multiplying weights by the answers provided by the participants, in mathematical terms:

$$GI_j = 0.123 \times S1_j + 0.152 \times S2_j + 0.168 \times S3_j + 0.167 \times S4_j + 0.147 \times S5_j + 0.127 \times S6_j + 0.115 \times S7_j \quad (1)$$

$$AI_j = 0.162 \times S8_j + 0.164 \times S9_j + 0.175 \times S10_j + 0.163 \times S11_j + 0.174 \times S12_j + 0.162 \times S13_j \quad (2)$$

$$TA_j = 0.208 \times GI_j + 0.792 \times AI_j \quad (3)$$

$$TP_j = 0.119 \times S14_j + 0.136 \times S15_j + 0.125 \times S16_j + 0.131 \times S17_j + 0.127 \times S18_j + 0.128 \times S19_j + 0.121 \times S20_j + 0.115 \times S21_j \quad (4)$$

where GI_j is the interviewee j's Perception of Institutional Management; AI_j is interviewee j's Perception of Information Access; TA_j is the interviewee j's Perception of Active transparency; TP_j the interviewee j's Perception of Passive transparency. The statements of the instrument ($_{kj}$) are the interviewee j's answers to statement k, which are scored as 1- Completely Disagree; 2- Disagree; 3-Indiferent; 4-Agree; 5- Completely Agree.

While the measures for the institution are obtained from the mean of interviewees' answers. For instance, for the construct Institutional Management (GI), we have:

$$GI_i = \frac{\sum_{j=1}^{n} GI_j}{n} \quad (5)$$

where i represents the institution and n the number of interviewees j who answered the instrument.

A similar expression is used to calculate the institutional scores obtained for the remaining constructs. The scores are on a five-point scale and the closer to the maximum score, the better is one's perception of transparency. Hence, Table 5 presents a classification of Perception of Active and Passive Transparency according to the scores obtained for the expressions.

This classification may be used both to assess one of the three constructs (Information Access, Institutional Management, Passive Transparency) and to assess Active Transparency. The descriptions represent the expected perception of most of the social actors classified in each category.

This methodology enables an institution to assess the perception of a social actor in the different dimensions of transparency and also to have a notion of the institution's overall transparency whenever the answers of a group of interviewees are compiled. Appendix B presents the methodology to apply the proposed model of Perception of Transparency in detail.

Table 5

Classification of Perception of Institutional Transparency

Score	Classification	Overall description	
		Active Transparency	Passive Transparency
from 1.00 to 1.99	Very poor	Social actors checked completely disagree or disagree for most of the statements, indicating that, according to their perceptions, the institution is far from meeting their demands in terms of transparency, and for this reason, should reassess its transparency policy in general.	The social actors checked completely disagree or disagree in most statements, indicating the need to generally reassess the policy concerning how demands accruing from SIC, e-SIC and/or ombudsperson are met.
from 2.00 to 2.99	Poor	Most of the social actors checked the options from completely disagree to indifferent, showing the institutions' transparency still requires considerable adjustments to meet the demands of social actors. In this case, a review of the institution's transparency policy is recommended.	Most social actors completely disagree or are indifferent concerning the statements, showing that information provided via passive transparency needs to be considerably adjusted to meet the demands of social actors. In this case, a review of the practices adopted is recommended as well as analyze whether perception differs between forms of requests (e-SIC, SIC or ombudsperson) to identify the weakest processes.
from 3.00 to 3.99	Good	On average, the social actors mostly checked the options from indifferent to agree, showing that the institution's transparency still needs some adjustments. To better identify which aspects need to be addressed, the institution can observe the means obtained in each statement and identify those rated the worst.	The social actors mainly checked the answer indifferent and agree. Thus, the management of information provided via passive transparency requires adjustment. To better identify the points that need to be changed, institutions can assess the means of answers provided in each statement to see which ones were rated the worst.
above 3.99	Excellent	The social actors checked either agree or completely agree in most statements. The institution has adopted transparency practices that meet the demands of social actors. There is possibly room for improvement, which can be verified by assessing those statements that obtained the lowest means or presented the highest variations (standard deviation).	The social actors checked agree and completely disagree in most of the statements, meaning the institution has satisfactorily answered to the demands of social actors. There is room for improvement, which can be identified by assessing the statements with the lowest means or greatest variations (standard deviation).

Source: developed by the authors (2019).

6. Final Considerations

Transparency has gained relevance in recent years both in Brazil and internationally and much has been achieved in terms of indicators to assess, mainly the transparency of public institutions and governments, with an eminently objective vision, the base theory of which are legal aspects. There is, however, a lack of studies assessing transparency from the perception of social actors, that is, the perception of the society to which transparency efforts are directed.

An institution intending to achieve excellence in terms of transparency is supposed to fully comply with legal requirements and qualify their scores in terms of objective measures, to maintain a policy that allows different social actors to identify its institutional efforts. In this sense, transparency cannot be an end in itself, rather it should drive institutional transformation to ensure accessibility and fully meet the demand for information on the part of society.

Seeking to fill in this gap, we propose a questionnaire to assess active and passive transparency among teaching institutions from the perception of social actors. The validity of the instrument was assessed by checking various measures, with satisfactory results indicating its applicability.

To simplify its use, we proposed a methodology that enables teaching institutions to assess transparency based on its dimensions (Institutional Management, Information Access) or overall transparency (Active Transparency and Passive Transparency), with the specific result of a given social actor (perception of one interviewee) or from the perception of various respondents. This is the greatest contribution of this questionnaire to be used by institutional managers to better understand an institution's level of transparency.

Note that we did not identify in the literature a questionnaire in the context of teaching institutions that includes both active and passive transparency, which is an innovation presented in this study. Its use will perhaps be more frequent among public teaching institutions required to comply with legal norms and subjected to the control of stakeholders, with a need to perform self-assessments. The model, however, is perfectly fit for private teaching institutions, for-profit or not, which desire to implement a model to assess its level of transparency.

Despite the efforts to validate the model using a representative sample of one institution, one of this study's limitations is lack of cross-cultural validation, which requires this study to be replicated to verify its applicability in other countries. Another limitation is the lack of validation in a sample different from the one used to estimate the model. In this sense, considerable advancement can be obtained by future studies intending to expand validation of this model and/or to adapt the model to other contexts

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53

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Appendix A

Correlations between Errors of Variables of the Constructs Information Access, Institutional Management and Passive Transparency

Construct	Correlated Errors			Correlation	
				Value	Sig
Institutional Management	E3	<—>	E1	0.159	*
	E5	<—>	E4	0.198	*
	E6	<—>	E5	0.291	*
	E7	<—>	E6	0.381	*
	E7	<—>	E5	0.110	*
Information Access	E9	<—>	E8	0.357	*
	E11	<—>	E9	0.109	*
	E12	<—>	E11	0.332	*
Passive Transparency	E14	<—>	E15	0.373	*
	E16	<—>	E17	0.591	*

* Significant at 1%

Appendix B
Methodology to Apply the Model of Perception of Transparency

Step 1: Instrument's application:
Develop a methodology to apply the statements with their respective scales among social actors. Observe that the scales Information Access and Institutional Management can be applied to all social actors while the scale Passive Transparency should be completed only by individuals who requested information via SIC, e-SIC or ombudsperson.

Step 2: Coding statements
Having an interviewee's answers, each statement should be coded according to the following scoring: Completely Disagree =1; Disagree=2; Indifferent=3; Agree=4; and Completely Agree=5.

Step 3: Calculate the score of each construct based on the following equations:

$$GI_j = 0.123 \times S1_j + 0.152 \times S2_j + 0.168 \times S3_j + 0.167 \times S4_j + 0.147 \times S5_j + 0.127 \times S6_j + 0.115 \times S7_j \quad (1)$$

$$AI_j = 0.162 \times S8_j + 0.164 \times S9_j + 0.175 \times S10_j + 0.163 \times S11_j + 0.174 \times S12_j + 0.162 \times S13_j \quad (2)$$

$$\mathbf{TA_j} = 0.208 \times GI_j + 0.792 \times AI_j \quad (3)$$

$$\mathbf{TP_j} = 0.119 \times S14_j + 0.136 \times S15_j + 0.125 \times S16_j + 0.131 \times S17_j + 0.127 \times S18_j + 0.128 \times S19_j + 0.121 \times S20_j + 0.115 \times S21_j \quad (4)$$

Step 4: Calculate the institution's perception of Transparency according to the following formulas:

$$\mathbf{GI_i} = \frac{\sum_{j=1}^{n} GI_j}{n} \quad (5)$$

$$AI_i = \frac{\sum_{j=1}^{n} AI_j}{n} \quad (6)$$

$$TA_i = \frac{\sum_{j=1}^{n} TA_j}{n} \quad (7)$$

$$TP_i = \frac{\sum_{j=1}^{n} TP_j}{n} \quad (8)$$

where GI$_j$ is interviewee *j*'s Perception of Institutional Management; AI$_j$ is interviewee *j*'s Perception of Information Access; TA$_j$ is interviewee *j*'s Perception of Active Transparency; TP$_j$ is interviewee *j*'s Perception of Passive Transparency.

Step 5: Classify the Perception of Transparency regarding the institution:
Having the scores obtained in step 4, identify in Table 5 the classification obtained.

Do Critical Audit Matters Matter? An analysis of their association with Earnings management

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Abstract

Objective: To analyze the relationship between Critical Audit Matters (CAM) and earnings management practices among Brazilian companies.

Method: This study's sample was composed of 96 companies listed in IBRX 100, data of which were collected from the Securities and Exchange Commission (CVM) and COMDINHEIRO database in 2016 and 2017, using descriptive statistics and panel data regression analysis.

Results: The most predominant types of CAM were: Assets Recovery, Contingencies, and Recognition of Revenues, which together accounted for 58% and 66% of CAM reported in 2016 and 2017, respectively. A positive and significant association was found between the number of CAM and accruals and discretionary revenues while a negative and significant association was found between the number of CAM and earnings management proxy by operations through discretionary expenses.

Contributions: These results have implications for the debate regarding this topic, especially, for the practices of accountants, auditors and regulators, as these findings present important insights regarding association between the disclosure of CAM and earnings management proxies by accruals and actual operations, showing the importance of disclosing CAM as red flags signaling the manipulation of accounting data.

Keywords: CAM, Earnings Management, Auditing.

1. Introduction

There is, among investors operating in the capital market and working in a corporate environment, especially minority shareholders, a growing search for mechanisms to reinforce the safety of investments (Choi & Wong, 2007). And, despite the condition of owners, what shareholder investors look at is the possibility of managers, hired to make decisions that maximize a company's value on the behalf of those who have the property, to make routine decisions concerning the functioning of a company that prioritize their personal interests instead (Ross, 1973; Brickley, Smith, & Zimmerman, 2016). According to Jensen & Meckling (1976), this misalignment between shareholders and managers is called an agency problem. That is, the management of a company is under the responsibility of hired managers who are supposed to maximize a company's value, however, given the opportunistic characteristics of individuals and incomplete contracts, managers may use information asymmetry – managers have greater access to information compared to shareholders – to meet their interests at the expense of the objectives for which they were hired for (Williamson, 1979; Jensen & Meckling, 1994).

Earnings management practices stand out among the various existing agency problems. Earnings management is defined in the literature as discretionary power of managers that result in biased accounting choices, or even, that changes the level of operations to achieve specific desired outcomes, negatively or positively affecting disclosed results.

Therefore, considering that shareholders do not have access to a company's daily information, auditors are supposed to verify and attest the reliability of financial statements to investors and all remaining stakeholders to reduce information asymmetry. For this reason, auditors have a role in mitigating agency conflicts between managers and shareholders (Brown, Beekes, & Verhoeven, 2011).

Therefore, intending to improve the quality of auditing services, regulatory bodies issued in 2016 the *Norma Brasileira de Contabilidade NBC TA 701* [Brazilian Accounting Standards], which deals with the assessment of Critical Audit Matters (CAM) identified for auditing financial statements. In general, it establishes that auditors highlight in specific fields of audit reports critical matters identified in their work. This is information with potential usefulness for different users, considering such matters may be associated with the agency problems previously mentioned and thus, enable investors and remaining stakeholders, including auditors themselves, to assess risks (Marques & Souza, 2017).

According to Marques and Souza (2017), the critical audit matters reported in 2017 by companies listed in Ibovespa in the last quarter of 2016 included: (i) asset recovery, (ii) contingencies, (iii) revenue recognition, and (iv) forecasts of future results. Note that CAM, because they deal with topics directly linked to the flexibility of accounting standards and/or accounting estimates, can be used or be associated with earnings management. At the international level, Church, Davis, and McCraken (2008) note the importance of auditors' opinions and communication with investors and potential investors, even indicating greater market efficiency. Segal (2017), on the other hand, reports in his study that the level of earnings management has not been affected by the opinion of auditors.

In this context, this study's objective was to answer the following question: **What is the relationship between Critical Audit Matters (CAM) and the practice of Earnings Management among Companies listed in the B³?** This study's general objective was to analyze the relationship between types of CAM disclosed by auditing firms and earnings management. This descriptive, documental and quantitative study addressed a sample of 96 companies listed in the IBRX 100. Data were collected from the Securities and Exchange Commission of Brazil (CVM) and refer to the period of 2016 and 2017, which comprises the first two years in which this norm became effective. The analysis includes descriptive statistics, tests of differences between means, and regression analysis using panel data.

Due to a lack of Brazilian academic studies addressing the relationship between the hypothesis of earnings management and CAM issued by auditors, this paper is intended to fill in this gap, seeking the results reported by international studies and considerations that contribute to analyze and interpret results considering that NBC TA 701 follows international standards on auditing.

Additionally, given the relevance of normative prescriptions, which aim at a more transparent communication between auditors and those using accounting information, this paper is intended to clarify, both from a theoretical and empirical perspective, the effects of auditing standards on the capital market.

Auditors, within an audited organization, are seen as an advisor of accounting standards, internal controls and corporative generalities (Beattie, Fearnley & Brandt, 2000). Thus, it is relevant to measure and analyze the degree of interaction between earnings management proxies and auditors' obligations to report the matters they considered to be the most relevant during the audit process. According to Dechow and Skinner (2000), regulators detect the occurrence of earnings management practices in accounting reports and that the use of these methods is more evident in firms with a low level of governance. This study, however, is intended to contribute to the assessment of the normative impact of CAM issued by auditors. Concerning this standard in international studies, even though Segal (2017) did not find a relationship between earnings management and CAM, he emphasizes that this type of disclosure contributes to establishing transparency between managers and stakeholders.

In addition to this introduction, this paper is divided into three sections. Section two presents the theoretical framework, in which the Efficiency-Market Hypothesis (EMH) and the role of auditors, and the hypotheses related to earnings management, are discussed along with the motivations and implications of firms disclosing CAM, also presenting results reported by previous studies. Section three presents the methodological procedures while Section four presents the analysis and discussion of results. Finally, the last section presents the final considerations, as well as this study's implications and limitations and suggestions for future research.

2. Theoretical Framework

2.1 Efficiency-Market Hypothesis and the Role of Auditing for the Capital Market

The Efficiency-Market Hypothesis was presented by Fama (1970) with the premise that the prices of assets reflect accounting information available to users. Thus, the set of information available (public and private) reflects the value of a company's assets, consequently, the value of a company.

Fama (1970) classifies the efficiency of a market into three categories: weak, semi-strong and strong. In a company's weak form, prices are established according to the set of historical information. In semi-strong companies, prices reflect past (historical) and current information. Finally, the prices of the assets of strong companies are a function of historical, current and private information.

In this context, the use of accounting methods that ensure the reliability of information may result in improved quality of information, ensuring that investors have relevant decision-making information available (Barth, Landsman & Land, 2008).

There is, however, according to the theory of Agency, the imminent possibility of agency conflicts because managers have greater access to information compared to shareholders and can use information asymmetry to benefit their own specific personal goals, or use information differently from the way shareholders expect (Jensen & Meckling, 1976).

This is a real possibility because, according to Jensen and Meckling (1994), agents have the following characteristics: i) evaluators; ii) maximizers; iii) resourceful, and iv) have unlimited wants. Therefore, the authors state that when agents act as maximizers, they assess the environment and give priority to their own wellbeing, meeting their always renewable desires; using their resourcefulness to overcome existing restrictions and achieve their objectives. Given these conditions, agents' accounting choices may be biased and negatively influence the decisions of shareholders and those using accounting reports (Beaver, 1998).

To mitigate agency conflicts, corporate governance practices are adopted. Governance practices consist of a set of mechanisms that contribute to ensuring the reliability of financial reports and internal control practices (Cohen, Krishnamoorthy, & Wright, 2004). Among these mechanisms, external audit stands out, the objective of which is to assess the reliability of financial statements, giving more credibility to financial reports and serving as a representative entity of the shareholders' interests (Marques & Souza, 2017).

According to Kothari, Ramanna and Skinner (2010), shareholders ground their decisions on a set of information, including reliable financial statements certified by auditors. Thus, auditors have specific tools to indicate whether certain management practices are conservative, neutral or fraudulent, not complying with or not following current accounting practices (Dechow & Skinner, 2000).

In this context, the manipulation of accounting information results in decreased investor protection that is normatively ensured by regulatory bodies. This occurs because protecting shareholders limits managers' freedom and/or incentives to manipulate accounting information, thus reducing the possibility of masking a firm's actual performance (Leuz, Nanda & Wysocki, 2003).

Vladu, Amat, and Cuzdriorean (2017) consider that increased accounting manipulation on the part of managers mainly accrues from three factors: abnormal increase in receivables; (2) increased indebtedness, and (3) decreased sales. Additionally, from an ethical point of view, the authors add that managers may justify the use of such accounting methods as if they were complying with "good practices", considering that principle-based standards do not determine how agents should measure and recognize accounting acts and facts, but rather, they are supposed to make the most appropriate judgment and chose the methods that meet the qualitative characteristics of accounting information.

2.2 Earnings Management Hypotheses

Despite the numerous definitions with different scopes, generally speaking, earnings management consists of managers making accounting and operational choices intending to meet specific outcomes (intended by the firms or of their interests). These choices may harm decision-making on the part of stakeholders due to a misperception of a company's economic situation, or even, influence contractual results that depend on accounting numbers (Alzoubi, 2016).

This might happen because, according to Watts and Zimmerman (1986), managers tend to be opportunists. This idiosyncratic characteristic to which individuals are prone indicates the primacy of searching for individual advantages (Williamson, 1979). Therefore, managers faced with situations in which they have the freedom to decide may opt for the accounting method that is most convenient for them, maximizing their wellbeing at the expense of all the remaining stakeholders, possibly harming a company's sustainability and the shareholders they represent. This process is partly explained by information asymmetry because an agent detains more information regarding a company than shareholders. Thus, accounting choices reflect the degree of measurement of these opportunities (Jensen & Meckling, 1976; Queiroz & Almeida, 2017). According to Watts and Zimmerman (1986), the bases for adopting earnings management result from three hypotheses: i) Incentive Plan hypothesis (IPH); ii) Debt Level hypothesis (DLH), and iii) Political Cost hypothesis (PCH).

IPH is a managers' practice of making accounting and/or operational choices that result in the manipulation of accounting numbers and/or level of operations. Information can be presented in a way in which losses are reduced (to increase current profit), increase losses (when a profit target is reached), or even smooth results, decreasing the volatility of financial indexes (Scott, 2011). Therefore, if a manager's remuneration is tied to a company's results, managers may seek to act opportunistically and anticipate future profits to the current period, manipulating accounting numbers (Gaver, Gaver, & Austin, 1995). Lewellen and Rosenfeld (1987) concluded that managers supposed to remain in their positions for a limited time tend to limit future spending to obtain more expressive results in the short term, and consequently obtain higher remuneration at present. Kauhanen and Napari (2012) show that executives at higher hierarchical levels have a greater incentive to promote remuneration according to the results presented.

DLH consists of using accounting and/or operational choices to mask the proportionality of debt in relation to equity, to cover accounting numbers so that there is no breach of contractual clauses (known as debt covenants) of loans. According to HassabElnaby (2006), these clauses reduce banks' agency costs, restricting a company's ability to adopt measures that reduce the present value of outstanding debt. Thus, this hypothesis presents the possibility of managers manipulating accounting data so that contracts are not violated, not incurring contractual breaches (Watts & Zimmerman, 1986). In this context, Dichev and Skinner (2002) found evidence that led to the conclusion that managers use accounting prerogatives to avoid contractual violations.

Finally, PCH is based on the premise that transactions are a political competition for the transfer of wealth. Generally speaking, this hypothesis predicts that companies subject to governmental investigation or greater stakeholder monitoring may have incentives to manage their results to reduce the likelihood of imposed wealth transfers (Makar & Alam, 1998). Hence, considering that certain firms are more closely observed in this process of wealth transfer, Watts and Zimmerman (1986) highlight that managers use accounting tools to reduce profits and/or expected profits. Setyorini and Ishak (2012) note that in the possibility of shareholders perceiving higher growth in relation to previous periods, there would be a greater expectation about dividends, thus affecting the political costs of the transaction of resources. An example is provided by Makar and Alam (1998), which reports the possibility of reducing a firm's results using accruals to decrease political costs associated with governmental investigations.

Arruñada (2010) observes that the agents (managers) themselves perform financial statements. Hence, to ensure the reliability of the information contained in these statements, an external audit is a mechanism able to mitigate the risk of earnings management, whether through accruals or actual operations.

Consequently, given the imminence of opportunistic behavior on the part of agents and discretion of managers to apply rules, regulation concerning the presentation of financial statements has demanded efforts to improve the quality and transparency of disclosed accounting information.

2.3 Critical Audit Matters: Motivations and Implications

According to Ishikawa and Bezerra Júnior (2002), the main role of auditing is to examine whether the financial statements of an audited firm comply with current accounting standards. That said, opinions regarding the reliability of these demonstrations are presented in the audit report. The objective is to make explicit the bases used in the analysis, as well as the matters that auditors deem relevant to highlight and present a more accurate overview of a firm's actual equity and financial situation.

In this sense, auditing has the role of mitigating agency conflicts by decreasing information asymmetry as it allows stakeholders to verify the veracity of a firm's accounting reports (Becker, Defond, Jiambalvo, & Subramanyam, 1998).

Even though the literature shows that there is not an optimal contract to eliminate agency conflict, from which we assume that regulation, corporate governance, and audit are not able to suppress it, auditing can, however, decrease the probability of occurrence of errors and frauds (Di Pietra, McLeay, & Ronen, 2014).

Therefore, there has been an effort to improve the quality of auditors' work. The Brazilian Federal Accounting Council (CFC) adhered to the International Financial Reporting Standards (IFRS), which resulted in the conversion of Brazilian auditing standards to the International Standards Auditing (ISA).

In this context, in 2010, the NBC TA 200, approved by the CFC, came into force. This document addresses the general objectives of auditors according to the Brazilian and international accounting standards, the objective of which is to improve the users' level of confidence in accounting reports. This is made possible through opinions issued by auditors regarding a firm's financial statements, attesting whether these follow the applicable financial report framework.

More recently, improved regulation was sought through the *Norma Brasileira de Contabilidade – Técnica de Auditoria* [Brazilian Accounting Standards – Audit Technics] NBC TA 701, which follows international accounting standards. This standard is a result of the International Standards Auditing 700 (ISA), that guides the disclosure of auditors' opinions regarding what were the most relevant matters identified during the verification of financial statements and the specific paragraph where such opinions are supposed to be expressed (Matos, Santos, Rodrigues, & Leite, 2018).

Therefore, since 2016, the NBC TA 701 requires auditors to express their opinions regarding Critical Audit Matters (CAM) or Key Audit Matters, that is, regarding the topics that demanded most attention during auditing, and address these matters in their reports, justifying why these were included in the report and explaining how these items were treated in the financial statements (Marques & Souza, 2017).

This norm is intended to make the audit report more transparent to stakeholders and even auditors, communicating them of potential risk factors. Therefore, according to Bédard, Gonthier-Besacier and Schatt (2014), auditors' opinions contributes with discussions regarding information reported in financial statements and improves transparency and accountability on the part of managers and audited firms. Auditors, however, have not found evidence in the French financial market that auditors' reports improve the quality of auditing information, as measured by earnings management.

Additionally, Brasel, Doxey, Grenier, and Reffett (2016) state that these notes on critical and important audit points can alert investors and remaining stakeholders about distortions in financial statements. Seeking to investigate the accountability of auditors in cases of financial frauds judged by a jury, the authors found evidence of decreased likelihood of verdicts due to the negligence of auditors when the problems being judged were reported by professionals following international standards. It shows that an auditor's report contributes to greater perception, on the part of stakeholders, of the predictability of certain types of distortions. As a consequence, the act of reporting CAM assigns both managers and auditors the responsibility of greater transparency, allowing users to decide, considering information provided, with greater assertiveness and with reasonable assurance as to the veracity of reports' content (Brasel, Doxey, Grenier, & Reffett, 2016; Marques & Souza, 2017; Boolaky & Omoteso, 2016).

In any case, studies intended to verify how auditing professionals have observed such standards, report an agreement on the part of these participants regarding the importance of mentioning the most critical matters. Therefore, it is even possible to reinforce the differences between the responsibilities of managers and auditors, in addition to explaining how such matters were treated during the auditing work (Dantas, Barreto, & Carvalho, 2017).

3. Methodological Procedures

This descriptive, documental and quantitative study adopted content analysis to categorize CAM reported by auditors, according to the categories proposed by Marques and Souza (2017). This categorization was necessary to quantify and assess CAM reported in auditing using the techniques proposed for this study, that is, descriptive and inferential analysis with regression analysis and tests of differences between means.

The study sample was composed of 96 companies that composed the IBrX100 B³. This intentional and non-probabilistic sample was chosen to gather the firms with the highest average performance of prices of the most tradable and representative assets in the Brazilian stock market.

Data were collected from the CVM's website on the COMDINHEIRO database and refers to 2016 and 2017. These two years were chosen because these were the first two years in which CAM was implemented, under NBC TA 701 from 2016.

3.1 Earnings Management Measures

According to Sincerre, Sampaio, Famá, and Santos (2016), the literature presents various tools to measure the levels of earnings management and most of these models are based on accruals, which consist of the difference between net profit and net operating cash flow. In this context, accruals may affect a company's profit, as these are based on accounting assumptions and estimates (Paulo, 2007).

Earnings management proxies adopted in this study were performed using the models presented in Table 1. For the proxy of earnings management by accruals, the Jones with ROA model, adapted by Kothari, Leone & Wasley (2005), was used. The authors argue that discretionary models can detect financial manipulations according to Model 1. The difference between this model and the Modified Jones, proposed by Dechow, Sloan and Swenney (1995), consists in using a new control to estimating non-discretionary accruals, taking into account the variables net revenue (NR), accounts receivable (AR), and return on assets (ROA). ROA was used to estimate accruals because it was the most consistent after the analysis of residuals. The model proposed by Roychowdhury (2006) was used to measure earnings management of operational activities, while this method has been used by other authors in the scientific literature, such as Zang (2012), Badertscher (2011), Cohen and Zarowin (2010) and Rodrigues, Paulo and Melo (2017).

Table 1

Models used to estimate earnings management proxies

Type/Names of proxies of earnings management (EM)	Equation
By accruals	
Modified Jones with ROA (1)	$AD_i = AT_i \; AD_i = AT_i \_ AND_i \, AND_i \, , AD_i = \varepsilon_i AD_i = \varepsilon_i$ $$AT_i = \alpha_1\left(\frac{1}{At_{it-1}}\right) + \alpha_2\left(\frac{\Delta RL_i - \Delta RC_i}{At_{it-1}}\right) + \alpha_3\left(\frac{Imob_i}{At_{it-1}}\right) + \alpha_4 ROA_i + \varepsilon_t$$
By Activities	
Discretionary DVGA (2)	$$\frac{DVGA_i}{At_{it-1}} = \beta_0 + \beta_1\left(\frac{1}{At_{it-1}}\right) + \beta_2\left(\frac{RL_i}{At_{it-1}}\right) + \varepsilon_t$$ $DVGADiscr_i = DVGA_i - \widehat{DVGA}_i$
Discretionary FCO (3)	$$\frac{FCO_i}{At_{it-1}} = \beta_0 + \beta_1\left(\frac{1}{At_{it-1}}\right) + \beta_2\left(\frac{RL_i}{At_{it-1}}\right) + \beta_3\left(\frac{\Delta RL_i}{At_{it-1}}\right) + \varepsilon_t$$ $FCODiscr_i = FCO_i - \widehat{FCO}_i$
Discretionary Revenue (4)	$$\frac{\Delta CR_i}{At_{it-1}} = \beta_0 + \beta_1\left(\frac{\Delta RL_i}{At_{it-1}}\right) + \varepsilon_t$$ $CRDiscr_i = CR_i - \widehat{CR}_i$

Note: AT_i Total Accruals measured by the difference between LL_i: Net Profit of the Year and FCO_i: Operating Cash Flow. Additionally, total accruals were measured by the difference between CGL_i: Net Working Capital and $Deprec_i$: Depreciation, Amortization, and Depletion, in which CGL= [(Current Assets – Available) – (Current Liabilities – Loans and Financing – Taxes Payable)]; At_{it-1}: Total Assets of previous year; RL_i: Net Revenue; $Imob_i$: Fixed Assets; AND_i: Non-Discretionary Accruals; AD_i: Discretionary Accruals; $DVGA_i$: Selling, general and administrative expenses: CR_i: Balance of accounts receivable.

To answer the question proposed here, this study adopted cross-section regressions year/sector to estimate earnings management proxies and panel data analysis to analyze the effect of CAM on earnings management, based on model 5.

The CAM variable was used to verify the association between the CAM regarding an audited firm and earnings management proxies. Considering that CAM refers to critical matters and potential risks to stakeholders (including auditors), companies with a larger number of CAM are expected to have higher levels of earnings management. A series of tests and modeling were used to achieve the final model, however, the one that proved to be the most adequate is presented in Model 5 with the logarithm of total CAM reported in the year.

The variables Executive Remuneration (Rem), Level of Indebtedness (NivEnd) and Company Size (Tam) are necessary controls associated with the earnings management hypothesis discussed in Section 2. The variable Executive Remuneration is intended to verify a company's performance. The reason is that having higher remunerations, managers seek firms' greater valorization (Sonza & Kloeckner, 2014), because when the hypothesis of executive remuneration is linked to a company's earnings, agents will be more prone to act opportunistically and anticipate profits to obtain greater remuneration, and possibly manipulate accounting numbers (Gaver *et al.*, 1995). The variable Level of Indebtedness (NivEnd) is determined by the proportion of a company's indebtedness, division of total liabilities (obligations) by the total assets (rights). In this sense, an attempt is made to substantiate the Political Crisis hypothesis by linking the level of debt with earnings management practices, indicating the possibility that managers use accounting prerogatives to smooth out expected profits and/or profits. The variable Asset is intended to measure the size of a company and its relationship with earnings management. Firms with greater total assets have lower indexes of earnings management, as they have robust internal controls and better-structured corporate governance mechanisms (Kim, Liu & Rhee, 2003).

Additionally, four other control variables were used: (i) Ownership Structure, (ii) Type of Auditor (Big4 or not Big4), (iii) Economic Sector, and (iv) Level of Governance. The variable Ownership Structure (EstrProp) is based on the proportion of independent members in the Administrative Council. This variable assumes that the smaller the number of company advisers, the greater the propensity of managers to use discretion.

The variable dummy Big Four (Big4) controls for the presence, or absence, of large audit firms, currently known as the Big Four, namely: Deloitte Touche Tohmatsu, Ernst & Young, KPMG and PriceWaterhouseCoopers. This is a relevant variable in terms of earnings management because, according to Almeida and Almeida (2009), it shows that clients from the Big Four present lower levels of earnings management.

The variable dummy Economic Sector (SegEcon) was included to verify whether there is any difference between the sectors in which the firms in the sample are classified in terms of auditors' opinions. Companies are classified as follows: Industrial Goods, Cyclical Consumer Goods, Financial and Others, Basic Materials, Public Utility, and Others. Additionally, the use of this variable configures the relationship between audit matters and the activities performed by companies.

The variable dummy Level of Governance (NivGov) was based on the classification according to criteria of B³, being divided into Traditional, Level 1, Level 2 and New Market. This variable is justified according to the study by Marques and Souza (2017), in which authors argue that the greater a company's level of corporate governance, the lower its propensity to issue a CAM of the category.

The assessment of the effect of CAM on earnings management proxies (models 1 to 4) was performed based on Model 5. The explanatory variable of interest (CAM) was tested in several specifications (dummy, proportion, etc.), however, only with the logarithm of total CAM, the model as a whole presented statistical significance; non-significant results are not presented.

Model 5

$$EM_{it} = \alpha + \beta_1 \ln(PAA's_{it}) + \beta_2 (Rem_{it}) + \beta_3 (NivEnd_{it}) + \beta_4 (Tam_{it})$$

$$+ \beta_5 (NivEnd_{it}) + \beta_6 (Tam_{it}) + \beta_7 (EstrProp_{it}) + \sum_{i=1}^{4} D_{ij} Big4$$

$$+ \sum_{i=1}^{9} D_{ij} SegEcon + \sum_{i=1}^{4} D_{ij} NivGov + \varepsilon_{it}$$

Where:

EM_{it}: Earnings Management Proxy by Accruals and Operational reported in Table 1: (i) DACC – Discretionary Accruals, (ii) DSGA – Discretionary Expenses, (iii) DPROD – Discretionary Production, (iv) DFCO – Discretionary Cash Flows, and (v) DREC – Discretionary Revenue. CAM_i: Natural logarithm of Critical Audit Matters reported by companies. Rem_i: Natural logarithm of executive remuneration reported in the reference form. At_i: Natural logarithm of companies' total assets. $NivEnd_i$: Natural logarithm of total liabilities divided by total assets. $EstrProp_i$: Natural logarithm of the proportion of independent board members. Big4: dummy variable that assumes value 1 when the company is audited by a *Big4* firm and 0 for the remaining. *SegEcon:* Dummy variable assumes value 1 when the company takes part in the ith economic segment and 0 for the remaining. *NivGov:* dummy variable assumes value 1 when the company takes part in the ith level differentiates the level of governance and 0 for the remaining.

Note that four models were applied in this study to answer the question of whether there is a relationship between critical audit matters and the earnings management hypothesis. For that, the models considered: i) accruals; ii) operating cash flow; iii) discretionary expenses, and iv) discretionary revenues.

4. Results and Analyses

4.1. Characteristics of CAM

Initially, we analyzed the distribution of CAM issued in 2016 and 2017, according to Figure 1. Audit reports of the companies included in the sample reported 349 CAM in 2016 and 330 in 2017.

Additionally, there is a concentration of 2 to 4 matters per company on average. Marques and Souza (2017) note that the number of CAM analyzed in isolation may not represent a problem but shows that, even if they do not initially represent a problem, accounting information endorsed by auditors may serve as parameters to guide decision-making.
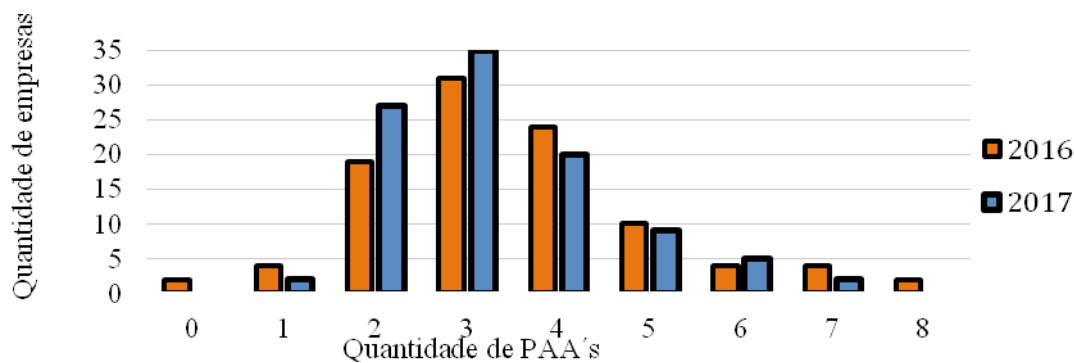
Figure 1. Distribution of frequency according to the number of CAM issued by a company

Source: study's data

Translation: Number of companies; Number of CAM

Subsequently, the types of CAM (Figure 2) were analyzed. Note that only three types of auditors' considerations (assets recovery, contingencies, and revenue recognition) include 58% of the observations reported in the paragraphs addressing CAM in 2016, while these same matters are present in 66% of the auditors' opinions issued in 2017. These data corroborate results reported by Colares, Alves, and Pinheiro (2018), as they analyzed the companies listed in the B3 in 2016, concluding that the matters "revenue recognition", "provisions" and "impairment of assets" were the most recurrent topics reported by auditors.

Note that the categories of CAM previously mentioned include estimates and/or issues that may be associated with earnings management practices, whether by an entity's accruals or operational activities. For this reason, Marques and Souza (2017) consider that this observation is an element to pay attention and risk for auditing when verifying the reliability of accounting information, considering that the discretion present in the regulation of accounting standards gives freedom for agents to chose, which may disfavor quality of information.
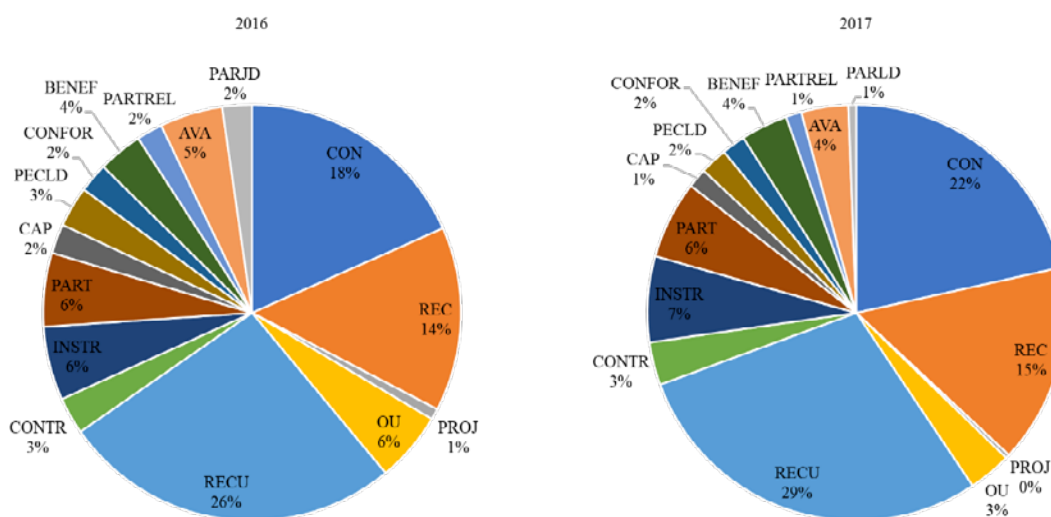
Note: AVA – Biological assets/Fair value/Premium; BENEF – Post-employment benefits; CAP – Capitalization of expenses in assets; CON - Contingencies; CONFOR – Risks related to compliance with laws and regulations; CONTR – Internal controls and information technology; INSTR – Financial instruments; PARLD – Administrative proceedings initiated/judicial recovery/ terminations; PART – Shareholding; PARTREL – Related parts; PECLD – Allowance for loan losses PROJ – Forecast of future results for realization of assets; REC – Recognition of revenue; RECU – Assets recovery; and OU – Others.

Figure 2. Distribution of types of CAM reported in 2016 and 2017

Source: study's data.

Concerning the distribution of the frequency of CAM per audit firms (Figure 3), companies audited by the Big4 reported a higher number of CAM. This result may be explained by the fact that the Big4 perform a larger number of auditing compared to other companies providing this service, representing 92.5% of the total of reports. Therefore, the larger the number of companies audited, the greater the likelihood of reporting CAM.

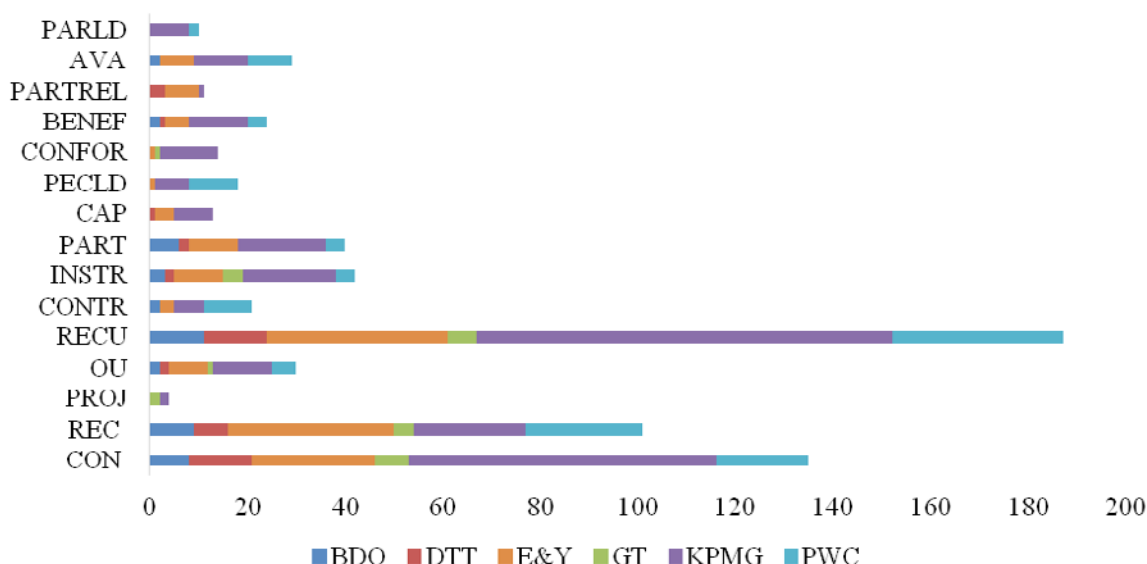**Note:** AVA – Biological assets/ Fair value/Premium; BENEF – Post-employment benefits; CAP – Capitalization of expenses in assets; CON - Contingencies; CONFOR – Risks related to compliance with laws and regulations; CONTR – Internal controls and information technology; INSTR – Financial instruments; PARLD – Administrative proceedings initiated/judicial recovery/ terminations; PART – Shareholding; PARTREL – Related parts; PECLD – Allowance for loan losses PROJ – Forecast of future results for realization of assets; REC – Recognition of revenue; RECU – Assets recovery; and OU – Others. Audit firms belonging to the Big Four: DTT – *Deloitte Brasil Auditores Independentes;* E&Y – *Ernst & Young Auditores Independentes; KPMG – KPMG Auditores Independentes; PWC – PricewaterhouseCoopers Auditores Independentes. Non-Big Four audit firms: BDO – BDO RCS Auditores Independentes;* and *GT – Grant Thornton Auditores Independentes.*

Figure 3. Distribution of types of CAM per audit firms in 2016 and 2017

Source: study's data

Additionally, in agreement with the study by Colares *et al.* (2018), among the Big4 audit firms, KPMG was the one that reported the highest number of CAM, issuing 3.5 paragraphs per audited company on average. Nonetheless, analysis of audit companies that do not belong to the Big4 shows that Grant Thorton and BDO issued on average, 4.16 and 3.75 CAM respectively per report, that is, above that reported by KPMG.

About the analysis of CAM reported by company/level of corporate governance (Figure 4) in 2016 and 2017, companies classified at the Traditional level present 3.38 per company on average while companies at Level 1 (among the four categories of governance level) presented a higher average number of CAM, with 3.93 CAM per company. Level 2 firms, in turn, presented an average of 3.46 CAM per firm. Finally, firms classified as New Market issued 3.21 CAM per firm on average.
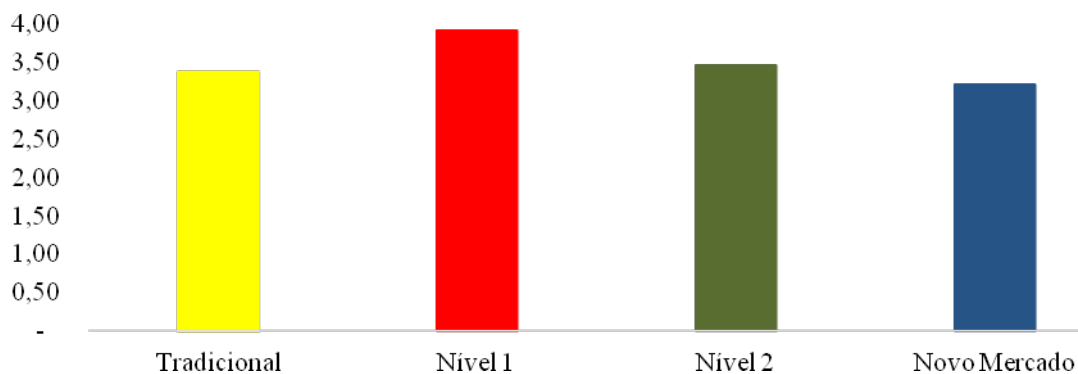
Figure 4. Average number of CAM reported by Company/Level of Governance

Source: Study's data.

Translation: Average, Traditional; Average, Level 1; Average, Level 2; Average, New Market

Therefore, companies with Level 1 and Level 2 of Corporate Governance issued a higher average of CAM. This is in agreement with Scott (2011), who states that higher levels of corporate governance mitigate agency problems, and consequently, information asymmetry.

4.2 Analysis of CAM and economic sectors

An analysis of the economic sectors in relation to the number of CAM reported (Figure 5) shows that, in general, the sectors that issued the highest number of auditing paragraphs were Public Utility and Financial while the ones that issued the smallest numbers were Non-Cyclical Consumer Goods and Industrial Goods. Additionally, CAM reported by companies in all economic sectors were: Contingencies (CONT), Revenue recognition (REC), Asset Recovery (RECU), Shareholding (PART) and other matters (OU). Companies classified as Industrial Goods, however, did not issue CAM on the forecast of future results, internal controls/information technology, risks related to compliance with rules and regulations, or post-employment benefits. Cyclical Consumer companies, in turn, just not issued CAM regarding the forecast of future results. Non-cyclical consumer companies, on the other hand, did not take a position on capitalization of expenses in assets, post-employment benefits, and administrative processes.
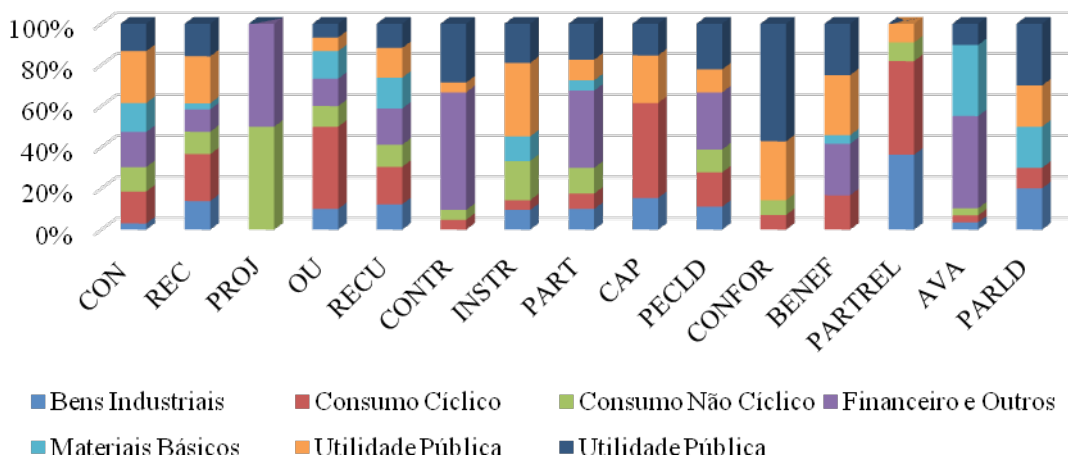
Note: AVA – Biological assets/ Fair value/Premium; BENEF – Post-employment benefits; CAP – Capitalization of expenses in assets; CON - Contingencies; CONFOR – Risks related to compliance with laws and regulations; CONTR – Internal controls and information technology; INSTR – Financial instruments; PARLD – Administrative proceedings initiated/judicial recovery/ terminations; PART – Shareholding; PARTREL – Related parts; PECLD – Allowance for loan losses PROJ – Forecast of future results for realization of assets; REC – Recognition of revenue; RECU – Assets recovery; and OU – Others.

Figure 5. Frequency of CAM and economic segment

Source: Study's data.

Translation: Industrial Goods; Basic Material; Cyclical consumer goods; Public Utility; Non-cyclical consumer goods; Public Utility; Financial and Others

Specifically, companies in the financial sector presented 10 out of the 15 types of CAM, with greater emphasis on Internal Controls and Information Technology (CONTR), Forecast of Future Results for Realization of assets (PROJ), Biological assets/Fair value/Premium (AVA), Shareholding (PART) and Allowance for loan losses (PECLD). Additionally, companies in the Basic Material sector were the ones that reported the highest number of CAM, however, did not report on forecast of future results (PROJ), internal controls (CONTR), capitalization of expenses in assets (CAP), allowance for loan losses (PECLD), Compliance (CONFOR) and related parts (PARTREL). Finally, entities classified as Public Utility did not issue CAM on future forecasts and assessments at fair value. All these considerations are aligned with Marques and Souza (2017), which reinforces the attention demanded by auditors considering that these are critical matters directly linked to the judgment of managers regarding accounting choices.

4.3 Analysis of association between CAM and earnings management by accruals and operational

To verify the four models of earnings management previously presented, earnings management proxies were estimated using panel data regression, with random effects on models (1), (2) and (4), while using fixed effects on the model (3). There is, according to the results of Model (1) in Table 2, a positive and statistically significant relationship ($p<0.01$) between CAM and discretionary accruals (according to the model by Kothari, Ramanna, & Skinner, 2010), showing that companies with a higher number of CAM present higher levels of discretionary accruals. This is coherent with the understanding of disclose of CAM, considering that CAM signal the risk of auditors associated with financial statements, in addition to the fact that most of CAM reported by the companies in the sample refer to events related to estimates and/ or revenues, both of which are addressed as subject to earnings management (Marques & Souza, 2017).

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69

Kleyverson Leonardo dos Santos, Renan Bittencourt Guerra, Vagner Antônio Marques, Elizeu Maria Júnior

Table 2

Statistics of earnings management models

	S.E.	Accruals	FCODiscr	DespDiscr	RecDiscr
		(1)	(2)	(3)	(4)
Intercept	?	0.187*	-0.409***	0.0732	0.0779
		(0.0974)	(0.112)	(0.100)	(0.0760)
LnCAM	+	0.0667***	-0.0126	-0.0340**	0.0534***
		(0.0118)	(0.0235)	(0.0149)	(0.00978)
LnRem	+/-	-0.00176	0.000758	0.00761*	0.00295
		(0.00347)	(0.0104)	(0.00401)	(0.00389)
NivEnd	+	0.0193	-0.145***	0.0746***	0.0639**
		(0.0299)	(0.0281)	(0.00965)	(0.0290)
Tam	+	-0.0107***	0.0172*	-0.00472	-0.0106***
		(0.00351)	(0.00885)	(0.00312)	(0.00267)
ROA	-	0.306***	-0.139***	-0.0125	0.185***
		(0.0910)	(0.0343)	(0.0476)	(0.0574)
Ri	-	-0.0159	-0.0299**	0.0351***	0.0226
		(0.0156)	(0.0127)	(0.00973)	(0.0159)
EstrProp	+	-0.000377***	2.04e-06	-0.000129	-0.000113
		(0.000101)	(0.000169)	(0.000271)	(0.000126)
Model		EA	EF	EA	EA
Wald x²		367.35***	79.10***	819.53***	73.19***
Notes		130	130	130	130
R² General		0.6027	0.191	0.2973	0.3982
Seg.Econ.		9	9	9	9

Note: robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1. EstrProp – Percentage of the largest shareholder; LnRem - Natural logarithm of executive remuneration in the period. NivEnd - Total liabilities divided by total assets; CAM – Logarithm of CAM reported; Ri – Market return calculated by the logarithm of the division between companies' current and previous market value; ROA – return on assets calculated from the net income divided by the average of assets; and Tam – Natural logarithm of companies' total asset. The variables Big4, NivGov and SegEcon were omitted, because they did not present statistical significance. The following tests were performed: Chow (Pooledvs Fixed Effects), BreushPagan (Pooledvs Random Effects) and Hausman (Fixed Effects vs. Random Effects), in this order. Mod.1 – Chow [Prob> F = 0.9510]; Breush Pagan [Prob>x² = 1.0000]; Hausman [Prob> x² = 0.9659]. Mod.2 –Chow [Prob> F = 0.0166]; Breush Pagan [Prob>x² = 1.0000]; Hausman [Prob> x² = 0.0003]. Mod.3 –Chow [Prob> F = 0.0290]; Breush Pagan [Prob>x² = 1.0000]; Hausman [Prob> x² = 0.0509]. Mod.4 –Chow [Prob> F = 0.1219]; Breush Pagan [Prob>x² = 1.0000]; Hausman [Prob> x² = 0.9830].

Additionally, when analyzing Model 1, presented in the first column of Table 2, a negative and statistically significant relationship (p<0.01) was found between size (Tam) and discretionary accruals, indicating that firms with a greater total asset tend to present lower levels of earnings management by accruals, suggesting their accounting information is of greater quality (Badolato, Donelson, & Ege, 2014). Concerning Return on Assets, firms with greater ROA are more likely to present lower earnings management by accruals. Additionally, a negative effect was found between the variable Ownership Structure and management by accruals, which, according to Alzoubi (2016), is explained by the fact that companies with greater ownership concentration tend to be more closely monitored by minority shareholders and regulating bodies. On the other hand, larger companies also present higher levels of discretion on FCO.

Analysis of Model 2, on the second column of Table 2, shows that the variable CAM did not present statistical significance, though suggests it is negatively related to earnings management by operations through FCO, indicating that audit reports may minimize opportunistic behavior on the part of managers in manipulating results by the means of operating cash flows. The model, however, shows that more indebted companies, with higher market returns (Ri) and ROA, present lower levels of FCO discretion. This result converges with theoretical expectation, because variability in FCO affects risk perception on the part of investors, generating a loss of value for companies. Therefore, managers are encouraged not to manage earnings through FCO (Kothari, Leone, & Wasley, 2005).

The results of Model 3, Table 2, which analyzes discretionary expenses, show a negative and statistically significant relationship (p<0.05) with CAM. This relationship may be explained by the fact that auditors are guided by accounting conservatism to prioritize the recognition of accounting expenses before expenses in the same category (Paulo, Antunes, & Formigoni, 2008). Additionally, the variable executive remuneration was statistically significant and positively related (p<0.1) with discretionary expenses, indicating that the greater the remuneration package, the higher the discretion of expenses, showing a certain fragility of remuneration packages in terms of mitigating agency problems and reliability of financial information (Ali & Kumar, 1993). About the relationship between the level of indebtedness and discretionary expenses, a positive and statistically significant effect (p<0.01) indicates that the higher the level of a company's indebtedness, the higher its discretionary expenses. In accounting terms, this relationship may be explained by the granting of discounts and other strategies that are geared towards a company's economic-financial recovery (Cupertino, Martinez, & Costa Jr, 2016).

Analysis of Model 4 shows a statistically significant and positive relationship between CAM and Discretionary Revenue (RecDiscr), indicating that the more frequent the issuing of auditing paragraphs, the greater discretionary revenues are, showing evidence of operational earnings management. This result is coherent if we considerer the main types of CAM (Figure 2), with areas in which there is potential for the manipulation of financial statements. Specifically, the results reinforce the need to consistently monitor revenue accounts, to the extent that companies that report a higher number of CAM tend to present greater discretion of revenues, a proxy of operational earnings management. The variable level of indebtedness presented a positive and statistically significant relationship (p<0.05), showing that companies with higher indebtedness tend to adopt measures that increase accounting revenues, thus, decreasing assessment of the risk of breaking contractual debt clauses, as verified by Mosebach and Simko (2010). Similar to what is found in Model 1, the negative relationship with Size indicates that larger companies present lower levels of earnings management by discretionary revenue. Finally, the ROA variable presented a statistically significant relationship (p<0.01), indicating that companies with a higher return on assets tend to manage earnings by the means of discretionary revenues, corroborating with the assumption that overestimated revenues tend to result in greater profitability and, consequently impact the index.

5. Final Considerations

This study's objective was to investigate the relevance of disclosing auditors' opinions on a specific paragraph according to the NBA TA 701 and verify the extent to which such opinions influence the use of earnings management mechanisms. This assessment is important because this standard guides auditors to emphasize critical audit matters found during the process of reviewing accounting reports of publicly held companies. This descriptive, documental and quantitative study presents an analysis of 2016 and 2017, the two first years in which NBA TA 701 became effective, of the 96 companies that composed the theoretical portfolio of IBRX100 of B³. The analysis included descriptive statistics and cross-section regression panel data for the econometric model, seeking to analyze the effect of these specific paragraphs on earnings management proxies.

Regarding the number of CAM that was issued by auditors, the results reveal an average of 3.49 CAM per company in 2016 and 3.30 CAM on average per company in 2017, showing a small decrease in the number of specificities appointed by auditors. The CAM most frequently reported were: (i) Asset recovery (RECU), (ii) Contingencies (CON), and (iii) Revenue recognition (REC), representing approximately 62% of CAM issued in the period under study. Note that companies that do not belong to the Big4 reported a higher number of CAM compared to audit firms that belong to the Big4. Additionally, companies from the sectors of Public Utility and Financial were the ones that issued the highest numbers of CAM. Companies in the New Market present a small number of CAM. These results are substantially in line with those reported by Marques & Souza (2017).

Concerning the relationship between the number of CAM and earnings management proxies, three out of the four models indicate a statistically significant relationship between variables. The models of discretionary accruals and discretionary revenues show a positive and statistically significant relationship at 1%, showing that companies that reported a higher number of CAM tend to present a higher level of earnings management. In the discretionary expenses model, on the other hand, there was a negative and significant relationship at 5%, indicating that firms with a higher number of CAM tend to present lower levels of discretionary expenses. Regarding the positive association between the number of CAM, accruals and discretionary revenues, the results are adjusted, considering that the matters most frequently reported by auditors were those that could indicate some type of manipulation of accounting information, such as "Assets Recovery" (RECU), "Contingencies" (CONT) and "Revenue Recognition" (REC). On the other hand, a greater reporting of CAM, which exposes potential risks of distortions of accounting information suggests that these mitigate the discretion on the part of managers.

Additionally, considering the Critical Audit Matters (CAM) issued by the Public Company Accounting Oversight Board (PCAOB), Gimbar et al. (2016) state that critical audit matters could be interpreted as exempting auditors from liability for the most subjective parts of financial statements, which are beyond reasonable control. This discussion corroborates this study's findings, as explained, in which the number of CAM was positively and significantly related to Accruals and Discretionary Revenue, that is, items which, due to discretion, may be recognized in financial statements according to judgment of agents (an entity's manager), influencing results and increasing the likelihood to be characterized as a critical and/or subjective matter, according to the skepticism and professional assessment of auditors, which in turn, should be reported to the audit committee.

The results should consider the conclusions of Chen, Hsu, Huang, and Yang (2013) and Church, Davis and McCracken (2008), in which they argue that the more information provided in Financial Statements, the less relevant they become, considering that stakeholders do not interpret information elements in their entirety. In this sample, however, an analysis of CAM shows that they can contribute to stakeholders, given the associations found, reinforcing the relevance of disclosing this information. Segal (2017) highlights that, as the most relevant procedures related to the companies' internal control are disclosed, auditors may indirectly show which are the most flawed procedures, generating distrust on the part of potential investors.

As pointed by Coram, Mock, Turner & Gray (2011), there is a concern on the part of regulatory bodies in improving the quality of the information provided in Accounting Reports by emphasizing auditors' opinions expressed in specific paragraphs, keeping a critical assessment of the practical results of expressing an opinion on specific paragraphs. In this sense, this study suggests that auditors, regulators, and remaining controlling bodies should reinforce the disclosure of accounting information, as this phenomenon subverts the purpose of accounting, jeopardizing the reliability of financial information.

This study was intended to present empirical evidence regarding the association between CAM and earnings management proxies. This study's results partly contribute to the Brazilian literature, considering that the standard addressed here is recent and empirical research is still incipient (Marques & Souza, 2017). This study also contributes to auditors and regulators in general to the extent that its results show that CAM is associated with earnings management. Therefore, the history of a company's reports may be an important red flag for agents when considering the quality of a company's information.

Despite its contributions and implications, this study presents limitations concerning sample size, the period studied, and modeling adopted. Therefore, future studies are suggested to use different modeling and earnings management models, or yet, to verify the association between CAM and the report of deficient internal controls. Another suggestion is to verify whether companies report different CAM over time to investigate whether the problems reported by auditors persist. Finally, we suggest analyzing whether there is an association between disclosure of CAM with the type of auditor's opinion, audit fees, change of auditors and quality of auditing.

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74

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Accounting education and the perception of the concept of profit: an exploratory study

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Abstract

Objective: The study's objective was to verify whether the understanding of the concept of profit and value expressed by individuals is associated with one's formal education in accounting.

Method: A group comparison design was adopted in this study and three samples of individuals with different levels of knowledge in accounting were compared. Other factors that possibly influence one's underlying understanding of the concept of profit were also investigated using a logistic model.

Results: The results suggest there is no significant relationship between one's understanding of the concept of profit and formal education in accounting. Nevertheless, the findings showed that being a woman might influence the way profit is understood, considering women more frequently than men, adopted an economic perspective of profit.

Contributions: These findings contribute to understanding how one's educational background is related to the learning of fundamental accounting concepts and might be useful for guiding teaching strategies and even political-pedagogical projects of Accounting Science programs.

Keywords: Profit; Accounting learning; Historical cost

1. Introduction

The concept of profit varies between Economics and Accounting so that its understanding differs among individuals. There is much criticism of the traditional model in which profit is measured based on the concept of historical cost (Solomons, 1961; Zeff & Keller, 1973; Hopp & Leite, 1988; Guerreiro, 1989; Schipper and Vincent, 2003; Ryan, 2007). Nonetheless, as stated by Kida & Hicks (1982), the accounting profession finds strong resistance to developing and operating a concept of profit that resembles a base value as in economics. The authors conjecture that this problem may be associated with the fact that the learning of accounting conditions one to use the concept of historical cost. According to Kida & Hicks (1982), if the teaching-learning process produces such an effect, it is likely that individuals who received formal training in accounting developed a concept of profit that resembles more the idea of historical cost than that the economic concept based on current value.

This phenomenon may be associated to the fact that students in the initial stage of the Accountancy program, or attending Financial Accounting courses offered by different undergraduate and graduate programs, are usually exposed to a set of concepts that are more frequently closer to the so-called accounting profit than to the concept of profit adopted in economics. In the field of corporate accounting, for instance, one of the first widespread rules is that the effects accruing from changes in equity on the result of a given period should not be recognized before they can be objectively measured. Thus, in such circumstances, it is to be expected that students will be more inclined to accept the idea that profit corresponds to the difference between revenue realized by sales and costs than to an increase in the value associated with assets, considering the latter generally incorporates a great dose of subjectivity. In a way, even from a psychological point of view, it is more comfortable to assume that assets should be valued based on their original costs rather than on the present value of future cash flows. Certainly, the simple fact that the production of such flows may not happen according to the magnitude expected, is already a reason for an individual to favor cost over value as a criterion to measure profit.

The Perception theory argues that there is a basic relationship between an individual's cultural context and knowledge accumulated over time and the way (s)he perceives and interprets phenomena. Even though many factors influence one's perception, it is known that concepts and messages that are more congruent with one's attitudes and opinions tend to be memorized to a greater extent than otherwise (Bartlett, 1932; Santaella, 1998). Studies show that, over time, an individual's memory selects the elements that are the most significant at the expense of discordant or culturally distant ones. If alongside the most important arguments favoring a given subject, opposing arguments are also presented, the latter tend to dissipate more rapidly than the favorable ones (Papageorgis, 1963).

From this perspective, the Perception theory allows us to infer that if students attending the initial stages of an Accountancy program are encouraged to value a given concept of profit at the expense of others, in the future, they may face difficulties to understand other meanings that may also be associated to the word (PROFIT). For instance, if someone was trained to understand profit as a mere value that results from the difference between revenue obtained by sales and costs, this individual may not easily admit that profit may also mean the difference between revenues and opportunity costs. This is particularly important for professors in accounting because it suggests that it may not be sufficient to properly selecting content to be taught.

Kida & Hicks (1982) report evidence suggesting that students with no prior knowledge in accounting more frequently hold a perception of profit that resembles economic concepts than students with some training in the accounting field. Their results also indicate that, after attending a certain number of courses emphasizing the idea of historical cost as a value base, students not only learned the system but also showed differences in the meaning they assigned to certain constructs related to this system. These differences persisted even after students were exposed to courses emphasizing economic concepts of value and profit. The authors consider this as an indication that students adhere to the learning of the rules and regulations of accounting based on historical cost so strongly that they become unable to see beyond it.

Thus, the following question emerged from the preceding discussion: Does one's level of formal education in Accounting[1]) influence the perception of profit from an economic or accounting perspective? This study's objective is to test whether people with distinct levels of knowledge in accounting present different perceptions of profit. Thus, a study was developed to compare groups in which individuals were identified as having three levels of knowledge in Accounting.

The results suggest there is no difference between the groups regarding their perceptions of the concept of profit, also revealing that the accounting approach based on historical cost, predominates among the participants. These findings suggest that the introjection of the accounting concept of profit based on historical cost does not depend on one's formal knowledge of accounting. This study presents evidence though that gender may influence the way profit is understood, considering that the perception of profit from an economic perspective was significantly more frequent among women.

Discussion concerning this subject is relevant because, even though the debate on the concept of profit is old, the role of formal education in the assimilation of its meaning is seldom explored, and thus, remains unclear. In this sense, this study is intended to broaden the understanding of this specific issue, contributing to existing literature. Advancing in this agenda is even more important in a context in which fair value accounting, based on current value, is more emphasized than that based on simple and pure historical cost, as provided in international guidelines (IFRS). The use and operationalization of profit are likely to depend on how it is perceived and interpreted. For this reason, identifying how the formal educational process relates to the understanding of this and other essential accounting concepts is important to support teaching strategies Accounting professors and even political-pedagogical projects of Accountancy programs adopt.

This topic also interests the market and the academic community in general due to its practical implications associated with the use of accounting concepts. Profit measured from the perspective of accounting may be used for managerial incentive purposes, taxation, investment decision-making, performance assessment, and to establish dividend distribution policies among others, while consequences may vary depending on the conceptual basis adopted in its definition and measurement. For instance, the economic concept of profit is likely more relevant to assess performance within firms and to establish incentive contracts when considering the horizon problem (Santos, 2015). Additionally, empirical evidence suggests that forecasts of analysts are more accurate when based on fair value accounting information (Liang and Riedl, 2014).

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1   "Formal knowledge" is understood here as knowledge acquired from specific academic undergraduate or graduate Accounting programs

On the other hand, accounting profit with an emphasis on historical costs seems to be more appropriate for contract purposes when the objective is to mitigate conflicts of interest between CEOs and shareholders and when there are debt contracts (Watts, 2003). Additionally, the empirical literature has discussed and documented the value-relevance of accounting information, especially profit measured according to the rule of financial accounting, based on historical cost, for the capital market (Lev, 1989; Lee, 1999; Kothari, 2001; Holthausen & Watts, 2001), a circumstance in which accounting profit is more appropriate to measure the performance of firms, as reflected in stock prices (Dechow, 1994).

The remainder of this paper is structured as follows: the elements of the Perception theory are presented in the second section, followed by a brief review of the concepts of profit and value from both the accounting and economics perspectives; the third section describes the study's method; the fourth section presents the results of the field survey; and finally, conclusions and final considerations are presented.

2. Background

2.1 Perception theory

Classified as a Semiotic theory (Santaella, 1998), perception has been defined as a process in which people overcome sensorial stimuli and develop a significant interpretation guided by knowledge, experiences, expectations and higher-order motivations (Feldman, 2015).

The Perception theory helps us understand that meaning is not a property of words as a physical element that any individual can identify, but a social construction that depends on context, cognitive references, past experiences and educational background (Ogden and Richards, 1938). Along the same lines, Berlo (1999) notes that the interpretation of a message or linguistic code is a psychological response determined by various factors, such as communicative skills, level of knowledge about some content, and about the sociocultural context an individual belongs to. Bakhtin (1997) shares this view, stating that communication and its meanings are strongly influenced by social structures. Thereby, the process in which messages are developed requires that signs and individuals be situated in a given context. To emphasize that the understanding of the word cannot be separated from the social context, the author states that there are as many meanings as contexts.

Hence, it is not surprising that the word *profit* elicits different meanings among people belonging to different groups. The opposite would be surprising. According to the Perception theory, this phenomenon is somewhat expected and should be seen as ordinary. What cannot be considered normal is that individuals receiving certain stimuli and supposedly being prepared to understand the various meanings assigned to a given linguistic code (profit) face difficulties similar to those people from other cultural contexts face.

In the Perception theory proposed by Peirce (1999), any sign, such as the word profit, for instance, can only represent something to a given interpreter if it is able of producing in one's mind something related to a given object or phenomenon. Hence, a sign can be understood as everything that fulfills the function of representing something. The correct interpretation of an object or phenomenon – in this case, the word *profit* – implies the existence of a well-established reference (thought) that is shared among the members of a given community. This relationship between sign and reference is determined, at least in part, by social and psychological factors (Coelho Neto, 1996). At this point, it is important to note that if a given sign does not "find" a properly qualified reference in an interpreter's mind, the object one seeks to represent cannot be satisfactorily understood.

Therefore, the Perception theory suggests that difficulty understanding the meaning of the word "profit" is greater among those who have not been previously prepared, especially if we consider that the monetary expression assigned to it is nothing more than an aggregate of positive and negative installments organized according to specific rules. To have a rough idea of the variety of meanings that can be assigned to the term "profit" we need to consider that, at least theoretically, such rules may go from the prosaic historical cost to more sophisticated measurement criteria that take into account a set of variables of purely economic nature.

Hendriksen and Breda (1999) consider that one of the reasons people do not always understand the concept of profit is precisely because it results from a set of rules and conventions that do not commonly correspond to phenomena from the real world. The authors explain that rules such as the accrual method, realization and comparison between revenue and expenses are generally misunderstood because they do not have meaning outside an accounting logic. The problem is even of more concern when not even individuals with an accounting background find references that allow them to understand profit in its complexity. If this is, in fact, the case, as this study's results suggest, teaching-learning strategies and programs' content linked to the curriculum of the Accounting Sciences program need to be urgently revised and discussed.

2.2 Concepts of Profit and Value: perspectives from accounting and economics

The scientific and professional literature reports diverse conceptual formulations for accounting profit, among which the one that considers the difference between revenue and expenses compared in a given period stands out. From this point of view, several meanings can be found for the term profit, which becomes a variant of the term Result, which in turn can also take on several denominations, such as Gross Income, Net Income, Operating Result, Non-Operating Income, Earnings Before Taxes, and Taxable Income, among others. Another accounting concept of profit is Comprehensive Result, which, according to Most (1982) is a term used to define changes in a firm's net worth during a period of transactions and other events and circumstances accruing from sources other than the owner's.

According to Schroeder, Myrtle & Jack (2001), despite the widespread use of the concept of profit, a considerable discussion lies in the relative importance of Balance Sheet and Income Statement in determining an entity's result. From the balance's point of view, profit is seen as an increase in the net value of assets during a given period while, from the income statement's perspective, profit is perceived as the product of certain activities that occurred in a given period. According to Schroeder, Myrtle & Jack (2001), in the transactions approach, the Balance Sheet represents only a list of items that remain in a company after its profit has been determined based on costs and revenues.

As Sterling (1979) points out, the two previous approaches reflect the accounting tradition in which the profit of an entity is seen as the difference between net assets measured at two different points in time. That is, it is the variation in a firm's net worth from one period to another. In this case, net worth corresponds to the residual value of the comparison between assets and liabilities based on historical cost. According to Lewis & Pendrill (2004), another way to establish Accounting Profit is to consider it as the difference between costs of the production of goods and services and revenue resulting from sales, while such revenues and costs are measured at historical values.

Belkaoui (2004) clarifies that profit is often considered a determinant in a firm's dividends distribution policy; a guide for decision-making and investments; a forecasting element; and finally, a basis for government taxation. From a tax point of view, profit is the basis for tax collection and distribution of wealth among people. From this perspective, it is calculated according to a set of rules issued by the tax authority.

Considering the accrual base of accounting, Belkaoui (2004) notes that when profit guides a firm's dividend distribution policy, the profit calculated in a given period will not always have its correspondence in cash to ensure the payment of dividends in that period. In this case, liquidity and the possibility of investment are important variables to establish a firm's dividend distribution policy. The author also states that profit is seen as investment and guides decision-making because investors seek to maximize the return of invested capital, considering an acceptable degree of risk. Thus, profit can be used to estimate a firm's ability to pay future dividend flows (cash flow) derived from an investment and the risk associated with it. Additionally, as a predictive tool, profit, based both on historical cost and current value, has been used to support the prognosis of profit and future economic events.

In addition to the issue of a semantic order, another relevant aspect in the discussion of profit from an accounting perspective concerns its measurement. According to Hendriksen & Breda (1999), the measurement of accounting profit presents important conceptual and practical problems, which are criticized for: i) not having a clear formulation for the concept of accounting profit; ii) not having a theoretical framework that makes it possible to make its calculation and presentation; iii) having the possibility of variations in the way profit is measured among different companies due to their accounting practices; iv) loosing its informative power due to variations in the level of prices, as it is measured in historical monetary terms; and v) having a lower relevance for investors and shareholders in terms of decision-making concerning investments in comparison to other types of information.

On the other hand, the economic approach is attempted to shed some light on the discussion concerning profit and value with consequent semantic and practical effects on the process of accounting measurement. In general, profit from the economics point of view corresponds to an increased net value of assets held by a firm and it is defined as the present value of future cash flows, discounted by the owners' cost of capital.

According to Scapens (1981), the concept of economic profit derived from microeconomics differs from the concept of economic income usually adopted in the accounting debate on profit and its measurement. According to the author, economic profit is defined in the microeconomics theory as an excess of benefits over the costs of productive activities in each period when all the relevant factors are measured in terms of opportunity costs. Economic income, in turn, is a product of capital and derives from the present value of a firm's future net cash flows (expected future benefits). The economic concept of profit, however, has a strong formal relationship with the neoclassic concept of economic income (in this paper, both are considered synonymous).

The origin of the concept of profit or economic income is associated with the studies by Irving Fisher (1867-1947) and John Richard Hicks (1904-1989) addressing interest, capital, and income. Over the years, the concepts of capital and income they developed have supported the definition and measurement of profit in accounting. It is based on the propositions of these economists that capital is defined as the present value of future net cash flows, while economic income represents the amount that can be consumed in a given period without decreasing the economic value of capital. Specifically, Fisher (1930) defined economic income as the flow of services generated by capital over time.

Many authors (e.g., Solomons, 1961; Jaedicke and Sprouse, 1972; Guerreiro, 1988; Hendriksen and Breda, 1999) supported by the ideas proposed by Fisher (1930) and Hicks (1946), argue that economic profit is nothing more than the variation of a firm's income measured between one period and another, so that, its calculation may derive from the present value of expected future net revenue. The measurement of economic profit may come from both net present value or only from the present value (PV). Elliott and Elliott (2011) explain that present value is a technique used to value cash flow in the future or to measure the monetary value of existing capital stock in terms of an *ad infinitum* cash flow forecast. This technique constitutes the nature of profit and capital in Economic theory, which started with Irving Fisher (1930) and was consolidated by the idea proposed by John Hicks (1946) that profit or economic income is what a firm or individual can consume without reducing capital stock, that is, a firm is as good today as it was yesterday.

Therefore, Besanko et al. (2009) explain that the concept of economic profit can be considered as a yearly measurement of a firm's present net value (NPV) because, in operational terms, the calculation of these measures is similar. Specifically in the situation in which periodic cash flow is constant and investment has an infinite useful life, a firm's NPV corresponds to the present value of economic profit generated by investments during its lifetime. According to the authors, this situation is valid including in the case in which cash flows are not constant and/or the useful life of an investment is finite.

Kreitzman and Williams (2008) also associate economic profit to a firm's NPV. They consider that a firm is a combination of investment projects (project portfolio) and the economic profits the firm earns and which can be measured by comparing investments and cash flows generated in its operations. In this case, one can use the discounted cash flow method to derive a firm's economic profit. The authors explain that, in this method, a firm's project or economic value is the result of its net cash flow and represents the difference between gross revenue minus disbursements related to all inputs consumed in the operations, discounted by the opportunity cost of invested capital and added by any residual value at the end of a project and capital additions.

Kreitzman and Williams (2008) present the following example to show that economic profit can be derived using the discounted cash flow method:

Table 1

Derivation of Economic Profit by the Discounted Cash Flow Method - Example 1

Consider a single project with a finite life that ends at period T, with all cash flows occurring at the end of period t, where $0 \leq t \leq T$. In this example, Π_t represents the project's total profit in period t and corresponds to operational cash flow minus economic depreciation. R_t is the cash flow in period t, I_{t-1} is the value of capital measured at the end of period $t-1$ and beginning of t. ΔI_t is the economic depreciation that occurred in period t, where $\Delta I_t < 0$. We assume that are no new investments in any period, the value of capital at the end of t can be calculated as $I_t = \Delta I_t + I_{t-1}$, and the relationship between Π_t, R_t and ΔI_t is given by equation:

$$\Pi_t = R_t + \Delta I_t \quad (1)$$

Considering an opportunity cost of capital k, which we assume to be constant over time, we may calculate economic profit π_t in period t using:

$$\pi_t = \Pi_t - kI_{t-1} \quad (2)$$

Replacing (1) in (2) we have:

$$\pi_t = R_t - kI_{t-1} + \Delta I_t \quad (3)$$

On the other hand, a project's total profit minus the initial value of investment corresponds to the traditional definition of NPV, namely:

$$VPL = \sum_{t=1}^{T} \frac{R_t}{(1+k)^t} + \frac{I_T}{(1+k)^T} - I_0 \quad (4)$$

Where I_0 represents the residual value of investment made at the beginning of a project. Now, replacing (1) in (4), we have:

$$VPL = \sum_{t=1}^{T} \frac{\Pi_t - (I_t - I_{t-1})}{(1+k)^t} + \frac{I_T}{(1+k)^T} - I_0 \quad (5)$$

Using the definition of economic profit in (2) it is possible to transform (5) into:

$$VPL = \sum_{i=1}^{T} \frac{\pi_t}{(1+k)^t} - \sum_{t=1}^{T} \frac{I_t}{(1+k)^t} + \sum_{i=1}^{T} \frac{I_{t-1}}{(1+k)^{t-1}} + \frac{I_T}{(1+k)^T} - I_0 \quad (6)$$

Canceling the second, third, fourth and fifth terms in (6), we have:

$$VPL = \sum_{i=1}^{T} \frac{\pi_t}{(1+k)^t} \quad (7)$$

Source: adapted from Kreitzman and Williams (2008)

Hence, Kreitzman and Williams (2008) show that a project's periodic economic profit may be calculated directly from (7), by simply multiplying NPV by k, or subtracting the economic depreciation from t's net revenue, calculated as VPL_t - VPL_{t-1}. Therefore, the period's economic profit can be defined as:

$$LE_t = (VPL_{t-1})k \quad (8)$$

or,

$$LE_t = \pi_t - (VPL_t - VPL_{t-1}) \quad (9)$$

Another aspect raised by Kreitzman and Williams (2008) concerns the issue of depreciation of base assets (investment). As shown by the standard NPV formula, the calculation of economic profit does not depend on the estimate economic depreciation. Comparing (3) and (4) allows us to observe that economic profit π_t depends on the calculation of ΔI_t, which can be wrongly estimated. NPV, however, does not depend on accounting measurements or calculation of economic depreciation because measurement of a project's total profit is more direct. As presented in (5), once NPV does not depend on estimates of economic depreciation, formula (7) shows that a project's present value of total economic profit is equal to NPV. Thus, the estimates of economic depreciation do not affect the present value of total economic profit. This is a critical difference between deriving economic profit from the present value of residual profit *ex ante* and the present value of expected future net revenues. The present value of future residual profits will only be equivalent to NPV if an appropriate scheme of depreciation and measurement of base asset is adopted over the useful life of such an investment.

Magni (2008) also provides a demonstration to prove that economic profit and NPV support a strong formal relationship. The author considers that NPV and economic profit are different names for the same idea and the maximization of one is equivalent to the maximization of the other. Economic profit is the difference between the factual profit that an entrepreneur receives and the counterfactual profit s/he should receive if s/he had invested in another business. To support these arguments, the author presents the following evidence, based on a hypothetical situation during a single period, which can be generalized for *n* periods:

Table 2

Derivation of Economic Profit by the Discounted Cash Flow method – Example 2

Consider W^0 being the cost of investment and W^1 the final result of time 1. $W^1 - W^0$ is the profit that may be reformulated as: rW^0 with $r = \frac{W^1 - W^0}{W^0}$ being rate of return. Also consider i being the relative rate of return for an alternative business and $W^0(1+i) - W^0 = iW^0$ the opportunity cost of this alternative.
Hence, economic profit π is given by:

$$\pi = rW^0 - iW^0 \quad (1)$$

Economic profit in (1) can be expressed as the difference between two future values, that is:

$$\pi = W^1 - W^0(1 + i) \quad (2)$$

From this perspective, π corresponds to NPV, given by the expression:

$$VPL = -W^0 + \frac{W^1}{1 + i} \quad (3)$$

Thus, the economic profit has a strong formal relationship with NPV because NPV is the present value of (1) or equivalent to the present value of (2) as shown below:

$$NPV = \frac{r}{1 + i} = \frac{1}{1 + i}(rW^0 - iW^0) \quad (4)$$

Source: adapted from Magni (2008)

In the same line of Kreitzman and Williams (2008) and Magni (2008), Demski (2008) argue that the concept of economic profit, derived from the economic theory, corresponds to the variation of a firm's present value or present value of a firm's sequence of future flow transactions. It implies that all future revenues and costs are treated in terms of their present value. Thus, the present value reflects the cash flow that occurs beyond t. Therefore, in period t, the value of cash flow that remains in simply PV_t. Hence, a firm's economic profit may also be defined as the change in the present value of net cash flow plus cash flow of period t, if the following are assumed: i) future cash flows that are discounted are cash flows between the firm and its owners; ii) firm keeps zero cash on the balance sheet, and iii) all the investment made by the owners is converted in production factors that can represent cash outflow in period t and beyond t.

To exemplify his arguments, Demski (2008) presents the following case:

Table 3

Derivation of Economic Profit by the Discounted Cash Flow Method – Example 3

Consider a situation in which a firm that operates in only three periods, uses three factors of production (z_1, z_2 and z_3), manufactures two products (q_1 and q_2), market cash prices of factors are P_1, P_2 and P_3, and the products' sale market cash prices are $\hat{P}_1$ and $\hat{P}_2$. The first and third factors are paid in period $t = 0$, and the second factor is paid in period $t = 1$. Product q_1 is manufactured, sold and received in period $t = 1$ while product q_2 is manufactured, sold and received in period $t = 2$. Based on this information, we have the following cash flow:

Cash Flow for Multiple Periods

	t = 0	t = 1	t = 2
Factor 1	$-P_1 z_1$		
Factor 2		$-P_2 z_2$	
Factor 3	$-P_3 z_3$		
Product 1		$\hat{P}_1 q_1$	
Product 2			$\hat{P}_1 q_1$
Net Cash Flow (CF_t)	$-P_1 z_1 - P_3 z_3$	$\hat{P}_1 q_1 - P_2 z_2$	$\hat{P}_1 q_1$

Based on data presented in Table 3, the firm incurs in the following total economic cost C and total revenue R considering a discount rate r:

$$C = P_1 z_1 + P_2 z_2 (1 + r)^{-1} + P_3 z_3 \quad (1)$$

$$R = \hat{P}_1 q_1 (1 + r)^{-1} + \hat{P}_2 q_2 (1 + r)^{-2} \quad (2)$$

From this, we have the following economic profit (I) in period t:

$$I_0 = \hat{P}_1 q_1 (1 + r)^{-1} + \hat{P}_2 q_2 (1 + r)^{-2} - P_1 z_1 - P_2 z_2 (1 + r)^{-1} - P_3 z_3 \quad (3)$$

That said, we observe that economic profit has a strong correspondence with PV of the future net cash flow, given by:

$$VP_0 = FC_1 (1 + r)^{-1} + FC_2 (1 + r)^{-2} \quad (4)$$

Hence, economic profit can be rewritten in $t = 0$ as:

$$I_0 = VP_0 + FC_0 \quad (5)$$

Considering the three periods, we have:

Economic Profit Period by Period

	NVP of Cash Flows	Economic Profit
t = 0	$VP_0 = FC_1(1 + r)^{-1} + FC_2(1 + r)^{-2}$	$I_0 = VP_0 + FC_0$*
t = 1	$VP_1 = FC_2(1 + r)^{-1}$	$I_1 = VP_1 - VP_0 + FC_1$
t = 2	$VP_2 = 0$	$I_1 = VP_2 - VP_1 + FC_2$

*since CF_0 is negative and represents the initial investment made by the owners, the economic profit in period $t = 0$ corresponds to the standard NPV calculation.

In this example, PV in period $t = 2$ is zero because the firm ends its operations at this time. Thus, the sum of the economic profit in the three periods is equal to the sum of cash flows.

Source: adapted from Demski (2008)

Demski (2008) adds that the economic profit, meaning the variation at the present value of future net cash flow, represents the cost of resources made available to the company. In this context, interest rate r corresponds to the market price of these resources and VP_t is its amount. Both are generally well known and this turns the calculation of economic profit, period by period, into a fairly simple task.

In addition to the conceptual aspects concerning the definition of profit, both from an economic and accounting perspective, even though not the focus of this paper, it is worthy noting the changes introduced in the Brazilian accounting guidelines following International Financial Reporting Standards (IFRS) issued by the International Accounting Standards Board (Iasb) considering this study's data were collected in this new regulatory context. Additionally, we cannot disregard the impact of adopting IFRS on the teaching-learning process in the Accounting field, as more recent studies have discussed (e.g., Carvalho and Salotti, 2013; Ryack et al., 2015; Alzeben, 2016; Beckman et al., 2017; Dong & Nanyan, 2019).

It is undeniable that many of the proposals formulated by economics and accounting classics regarding the measurement of profit have been accepted by international accounting standards. Most of these standards result from pressure on the part of market agents and by the world economic situation, with objectives that may vary in certain aspects but are always guided by the ideal of reducing information asymmetry and establish a more favorable business environment. In general, the aim is to improve the quality of accounting information, measurement criteria of assets and liabilities, comprehension, reliability, relevance, and comparability of accounting reports. It is assumed that harmonization of accounting standards produces economic benefits for organizations, insofar a common basis can be established for the registration of transactions, reducing the costs of raising funding in international markets and attract investments.

In Brazil, efforts to converge accounting standards with international ones became more effective with Law No. 11.6382007, followed by Law No. 11.941/2009. Anchored on these normative references, the *Comitê de Pronunciamentos Contábeis* (CPC) [Accounting Pronouncements Committee] has, since then, issued a set of technical pronouncements strongly aligned with the precepts contained in the IFRS. Concerning the recognition and measurement of economic transactions, for instance, there is great interest in giving privilege to essence over form, establishing conditions for Accounting to accommodate metrics more aligned with the concept of economic profit. As an example, we mention permission to register as a permanent asset, goods, which even though owned by a firm, are managed to generate revenues, being also responsible for controlling them and for associated risks. Additionally, it is worth mentioning the measurement of financial instruments and biological assets at fair value, the adjustment to present value of certain rights and obligations, the reduction of the recoverable value of certain assets (impairment), recognition of certain intangibles, criteria for recognizing revenues, costs and expenses of a concession contract, among others. It remains to know to what extent such regulatory improvements have contributed to changing the perception of the concept of profit, especially among individuals with a degree in Accounting.

3. Study Method and Design

This study was designed to verify whether one's level of knowledge in Accounting influences the underlying understanding of the concept of profit and value. Hence, three groups of individuals with different levels of knowledge in Accounting were compared, namely: GROUP I – Individuals with no prior knowledge in Accounting (coded as CONT_SEM); GROUP II – individuals with a bachelor's degree in a field other than in Accounting Sciences, but who reported having studied Accounting at some point of their academic training (coded as CONT_PARCIAL); and GROUP III – individuals with a bachelor's degree in Accountancy (coded as CONT).

REPeC – Revista de Educação e Pesquisa em Contabilidade, ISSN 1981-8610, Brasília, v.14, n. 1, art. 5, p. 77-99, Jan./Mar. 2020

88

To assess their understanding of the concept of profit, the same strategy adopted by Kida & Hicks (1982) was used here. A test with five problems addressing profit concepts based on historical values and current values called accounting approach and economic approach, respectively, was administered (see Table 4). These problems presented two alternative answers: one corresponding to the accounting approach of historical cost and the other to the economic approach based on value. Only one alternative could be selected in each question. The assumption was that the alternative chosen by the respondents would indicate their understanding of profit concepts.

Table 4
Problems formulated to Assess Conceptions of Profit

Situation 1
On January 1st 2009, Alfa company bought 100 units of goods and paid $400 in cash. On the same day, the goods' market value was $430. Considering only information provided here, check the alternative that best expresses the result of this operation:
a. Alfa company obtained a gain of $30
b. Alfa company had no gain nor loss

Situation 2
On January 1st 2008, Beta company had a stock of merchandise whose market value was $500. On January 31st 2008, the merchandise market value was $600. The company had no inventory maintenance costs and inflation was zero. Considering only information provided here, check the alternative the best express the result of this event (inventory maintenance):
a. Beta company obtained a gain of $100
b. Beta company had no gain nor loss

Situation 3
On February 1st, 2008, Gama company acquired 50 units of merchandize and paid $200 in cash. On this same day, the market value of the merchandise was equal to the value paid. On February 15th, 2008, the company sold the stock and received $550 in cash. On the sale date, the merchandize market value was $300. Inflation in the period between February 1st, 2008 and February 15th, 2008 was zero. Considering only information provided here check the alternative that best expresses the result of the sales operation:
a. Gama company obtained a profit of $250
b. Gama company obtained a profit of $350

Situation 4
Lambda company uses a piece of specific equipment to manufacture its products. This equipment was bought on June 2nd, 2007 and paid $5,000 in cash. It has a useful life of 5 years. The company had the option to rent the equipment instead of buying it. For 5 years, it would pay a rent equivalent of $5,500 (this is the value the company would pay on June 2nd, 2007, already deducted any maintenance costs). Considering only information provided here check the alternative that best expresses the value of the equipment of Lambda company on June 2nd, 2007:
a. $5.500
b. $5.000

Situation 5
On January 5th, 2008, you bought a piece of land where you intend to build a house for your family for $70,000 in cash. Assume this is your only patrimony. On December 31st, 2007, its value increased to $80,000. Assume inflation was zero. Considering only information provided here check the alternative that best expresses the value of your patrimony on December 31st, 2008:
a. $ 70.000
b. $ 80.000

Source: developed by the authors

The first problem (situation 1) concerns the *moment in which the income is recognized*. Alternative *a* indicates concept that is closer to the economic concept and *b*, closer to the accounting concept. The same reasoning is adopted in situations 2, 3 and 4. Concerning question 5, there is an inversion in which the approaches are presented. Alternative *a* indicates an approximation of the accounting concept and *b*, of the economic concept.

Problems 1, 2 and 3 explore the concept of *replacement cost* or *current entry cost* as a measure of value and calculation of profit. This is an approach that more closely approaches the economic concept of profit and has been one of the most important bases of valuation in accounting (Hendriksen & Breda, 1999), as opposed to the accounting approach to historical cost as value base. Problem 4 addresses the concept of the discounted value of future cash flows as a criterion for measuring profit and value base in contrast to the traditional accounting approach of the original (historical) cost and deals with a situation of defining the value of fixed assets in the same way as problem 5.

To assess the predominant concept among the participants and the behavior of groups according to their answers, we took into account the total number of answers per conception, regardless of the problem. Then, a scale ranging from -5 to +5[2] was developed according to the following rule: answers that did not denote an economic view were rated +1 and answers that denoted an accounting view were rated -1. The following step was to calculate the total score of each individual and establish a final mean. Individuals with negative scores were classified as "Predominantly Accounting Approach (CONT)" and those with positive scores were classified as "Predominantly Economic Approach (ECO)". Based on this procedure, the responses were organized and submitted to the Kruskal-Wallis test to check whether there was a significant difference in the patterns of the responses between the three groups.

The participants were selected using non-probabilistic sampling, an intentional sampling method. Data were collected using a form sent by email and also applied face-to-face in a traditional graduate program in the business field located in São Paulo, SP and a federal university located in the state of Bahia, Brazil.

4. Results – Analysis and Discussion

4.1 Description of the sample and sociodemographic data

Data were collected at three points in time (between 2009 and 2010, in 2012 and 2015), resulting in 137 valid instruments (total sample): 44 from Group I (CONT_SEM), 55 from Group II (CONT_PARCIAL) and 38 from Group III (CONT). Considering that the discussion in Brazil about converging to the IFRS was established in 2007 with Law No. 11.638/2007 and with the possibility of public capital companies to voluntarily adopt international standards in 2008 and 2009, and also because many teaching institutions had already started addressing accounting international standards in their curricula, even before this period, because the European Union had adopted the IFRS in 2005, it is likely that the participants had already become familiar, at some extent, with the normative set that became mandatory in 2010.

All the individuals in group I (CONT_SEM), reported having never studied Accounting before, while 37 of these were students attending the first week of the first semester of a brick-and-mortar undergraduate program in Accounting Sciences. All the individuals in group II (CONT_PARCIAL) had already graduated or were attending a specialization between 2010 and 2015. All the individuals in this group reported having studied Accounting at some point in their academic training. The participants in group III (CONT) graduated from an undergraduate program in Accounting between 2009 and 2010.

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2   In this scale potential scores are -5, -3; -1, +1, +2, +3.

The total sample was composed of 82 men and 55 women. Group I was composed of approximately 73% men and 27% women. Group II was composed of approximately 55% of men and 45% of women while Group III had approximately 53% of men and 47% of women. A total of 50% of the individuals in Group 1 were working in a company at the time of data collection while this percentage in Groups II and III was 95% and 100%, respectively. Thus, 112 (82%) individuals from the total sample were working in an organization at the time of data collection.

Concerning a potential association between having education in Accounting and understanding of profit, tables 5 and 6 present the results of the Kruskal-Wallis test.

Table 5
Distribution according to ranks of answers

		N	Middle rank
	CONT_SEM	44	67.34
Groups	CONT_PARCIAL	55	69.83
	CONT	38	69.72
	Total	137	

Source: Developed by the authors

Table 6
Results of the Kruskal-Wallis test for intergroup comparisons

	Concept of profit
Chi-square	0.118
Degrees of freedom	2
P-value	0.943

Source: Developed by the authors

For a significant level of 5%, the p-value (asymptotic significance) found was 0.943, indicating there was no statistically significant difference between the groups as the distribution of answers is similar among them. This result is corroborated by the Chi-square of independence test, which presented a statistical test of 0.305 with a two-tailed *p-value* equal to 0.859 (Table 7 presents a distribution of frequency and proportions per groups). Thus, the results of the statistical tests suggest there is no association between one's formal education in Accounting and conception of profit. The results obtained by the sample addressed in this study indicate that assimilation of the accounting approach precedes one's formal education in Accounting because the proportion of answers that denote the historical cost approach prevailed in two groups, while the difference was minimal in one group (Table 7).

To broaden the understanding of the results of the inferential test, a detailed descriptive analysis is presented. Tables 7 and 8 present the distribution of answers per group and per problem in each group.

Table 7

Distribution of answers between groups

CONT_SEM			CONT_PARCIAL			CONT		
ECO	CONT	TOTAL	ECO	CONT	TOTAL	ECO	CONT	TOTAL
46%	54%	100%	51%	49%	100%	47%	53%	100%
17	20	**37**	28	27	**55**	18	20	**38**

Notes: (i) CONT_SEM, CONT_PARCIAL and CONT refer to the groups that compose the total sample. (ii) ECO and CONT refer to the conception of profit selected in the problems presented in the instrument developed to collect data.

Source: study's data.

Table 8

Proportion of Answers per Problem in Each Group

Approach	CONT_SEM					CONT_PARCIAL					CONT				
	P1	P2	P3	P4	P5	P1	P2	P3	P4	P5	P1	P2	P3	P4	P5
ECO (%)	38.6	50.0	31.8	29.5	77.2	60.0	56.4	25.5	21.8	72.7	52.6	47.4	31.6	28.9	73.7
CONT (%)	61.3	50.0	68.1	70.4	22.7	40.0	43.6	74.5	78.2	27.3	47.4	52.6	68.4	71.1	26.3

Notes: (i) CONT_SEM, CONT_PARCIAL, and CONT refer to groups that compose the total sample. (ii) ECO and CONT refer to the conception of profit selected in the problems presented in the form developed to collect data.

Source: study's data.

Table 7 shows that the proportion of individuals in the three subsamples who selected the concept of profit according to the accounting approach is larger than those who chose the economic perspective. It suggests that, regardless of one having formal knowledge in Accounting, people more frequently adopt a concept of profit that is closer to the accounting context. This phenomenon is found even among those who reported no prior knowledge in Accounting. This result may be related to the fact that all the participants in this subsample were students from the Accounting Sciences program attending their first week of classes, which may be a strong source of selection bias. The fact that an individual was recruited from an undergraduate program in Accounting may have conditioned the meaning one assigns to profit.

As shown by Table 8, the answer that corresponded to the economic concept of profit prevailed only in problem 5. Note that this problem refers to the situation in which the statement is personal, that is, the respondents were not assessing the situation of a company, but a situation of their own. It may indicate bias regarding the judgment of profit and value. Because the accounting language is universal and institutionalized in the business environment, there is the possibility that individuals are induced to consider that in this milieu what matters is the accounting conception.

Table 8 shows that answers denoting the economic concept of profit were chosen only for problems 1, 2 and 5, while the answers to problem 5 were unanimous among the three groups, and the economic concept prevailed in groups "CONT_PARCIAL" and "CONT", and "CONT_PARCIAL" and 'CONT_SEM', for problems 1 and 2, respectively.

When analyzing the count of answers for problems 1 and 2, note that individuals regardless of their level of knowledge in Accounting did not make an association between the time when the result was recognized and recognized according to the variation of asset values from one period to another. That is, the respondents are closer to the economic approach as they acknowledge that there is a gain in transactions other than only the sale of products (accounting approach) but disregard that from this same perspective one can acknowledge gain from the variation of asset held by a company.

Still, concerning the problems individually analyzed, from the perspective of inferential analysis, no statistically significant difference was found between the groups. Table 9 summarizes the results of the Kruskal-Wallis test to compare the groups in each of the problems presented.

Table 9
Results of the Kruskal-Wallis test to compare the groups in each problem

	P1	P2	P3	P4	P5
Chi-square	4.482	0.809	0.619	0.940	0.280
P-value	0.106	0.667	0.734	0.625	0.869

Source: study's data

4.2 Additional analyses

Some studies, from the perspective of Upper Echelons Theory, suggest that one's position and management experience plays a role in how managers use information and knowledge of accounting practices to make different choices that affect organizational results (e.g., Demerjian et al. 2013; Krishnan and Wang, 2015; Callaghan, 2015; García-Meca & García-Sánchez, 2018; Ferdinand et al., 2018; Mendes et al., 2019). Additionally, many studies have analyzed the influence of gender in the learning of accounting (Trinkle et al., 2016; Myers et al., 2018; Eames et al., 2018; Martí-Ballester, 2019; Nouri and Domingo, 2019). Hence, the role of gender, managerial experience, and background in the financial field, on the conception of profit and value were investigated because these factors may influence the way people perceive this construct. For that, the logistic model described in equation 1 was used:

$$P_j = \frac{1}{1 + e^{-(b_0 + b_1 CONT\_PARCIAL + b_2 CONT + b_3 Trabalha + b_4 Ger + b_5 Fin + b_6 Gen)}}$$ (Equation 1)

where:
1. P_j is a dependent variable that can assume values 0 and 1. In this study, 0 was assigned to indicate a predominantly accounting concept of profit and 1 was chosen to indicate a predominantly economic concept;
2. b_0, b_1, b_2, b_3, b_4, b_5 and b_6 and are parameters of the model;
3. the model's covariates are presented by dummy variables that assume value 0 or 1, where 1 indicates the individual has an undergraduate degree in areas other than accounting (*Cont_Parcial*); a bachelor's degree in Accounting Sciences (*Cont*); is working (*works*); occupies a managing or other leadership position (*Man*); works in the financial field (*Fin*); is a man (*Gen*), and 0 for the remaining cases.

A logistic regression using the "Enter" method was performed because all the variables were considered in the model, considering the objective was to identify which variables would be significant and explain the concept of profit. Table 10 presents the results.

Table 10

Logistic Model's Results

	b	Standard error	Wald	Sig.	Exp(B)
Cont_parcial	0.197	0.510	0.149	0.700	1.217
Cont	-0.140	0.608	0.053	0.818	0.870
Works	-0.510	0.568	0.804	0.370	0.601
Man	0.157	0.459	0.116	0.733	1.170
Fin	0.453	0.476	0.906	0.341	1.573
Gen	**-0.797**	**0.375**	**4.509**	**0.034**	**0.451**
Constant	0.605	0.494	1.500	0.221	1.832

Source: study's data.

In the regression analysis, the constant represents the individuals of GROUP I (Cont_Sem). Considering that the coefficients of the variables *Cont_Parcial* and *Cont* were not significant, the results serve as a robustness test for the Kruskal-Wallis and Chi-Square results.

As shown in Table 10, only the variable "*Gen*" presented asymptotic significance (*p-value*=0.034 for significance at 0.05) with a coefficient of -0.797. It suggests that the men in the sample were more conservative than women regarding the understanding of the concept of profit. The coefficient -0.797 indicates that being a man (woman) reduces (increases) the likelihood of adopting an economic approach of profit. The value Exp(B) of variable *gen* indicates that men's Odds Ratio, in comparison to women, to predominantly chose an economic concept of profit in the test is only 0.45. Approximately 40.24% of the men (33 out of 82) predominantly presented an economic view of profit while among women this percentage was 60% (33 out of 55).

To verify whether there are any statistically significant differences between the proportions of groups, we also performed a Chi-square of Independence. The value of the statistical test was 5.146 with a p-value equal to 0.023, suggesting that gender in this study sample, is associated with the concept of profit and may condition the way individuals perceive it.

On the other hand, the fact that almost 82% of the individuals were working in a firm was not associated with their underlying concept of profit. Considering that every meaning assigned to an object or phenomenon is influenced by references and knowledge an individual accumulates over time, as indicated by the Perception theory and Upper Echelons Theory, it is surprising that no significant differences were found among the participants concerning the conception of profit, particularly among those occupying leading positions. Some studies suggest that one's high level of managerial skills and experience affect the way they use accounting information to influence corporate results (Demerjian et al. 2013; Krishnan and Wang, 2015; García-Meca & García-Sánchez, 2018; Ferdinand et al., 2018; Mendes et al., 2019).

Under normal conditions, one would expect that individuals with greater managerial experience would present a broader understanding of the concept of profit. After all, these individuals are expected to be familiar with a set of knowledge that would allow them to understand the various possibilities of measuring a firm's profit and each alternative is linked to rules used to measure assets, liabilities, revenues, and expenses. Nonetheless, the opposite was identified here, that is, a unidirectional view associated with the concept of profit was found as understanding linked to the historical cost approach predominated. Note that individuals with a bachelor's degree in Accounting are practically leveled with individuals with no background in accounting.

REPeC – Revista de Educação e Pesquisa em Contabilidade, ISSN 1981-8610, Brasília, v.14, n. 1, art. 5, p. 77-99, Jan./Mar. 2020

94

The distance between the results found here and what was expected is explained by the Perception theory. First, it is important to bear in mind that individuals entering the university are not a blank slate; rather, people possess prior knowledge about many things. When they enter a higher education program they are likely to have experienced many events that contributed to sediment the idea that profit is only the difference between revenue accruing from the sale of a product and the price by which it was acquired. Likewise, one cannot rule out the hypothesis that this understanding is being reinforced in the first semesters of the Accounting program, or even during the entire program. Differently from other programs in the so-called Applied Social Sciences, Accounting Sciences perhaps is among those that provide the least theoretical knowledge to students. This is one especially important point that deserves being further investigated in future studies. Why is that the teaching of Accounting does not support students in the establishment of a broader perception of profit consistent with current regulatory standards?

5. Final Considerations

This study was intended to investigate the relationship between formal education in Accounting and the underlying understanding of the concept of profit. Despite criticism concerning the limitations that are generally assigned to accounting profit, both in semantic and practical terms, this study's findings suggest that the historical cost approach used as the base value was dominant among the individuals addressed here. The individuals in the three groups more frequently presented an accounting conception of profit, considered as the value that results from comparing revenue with costs or expenses measured according to the historical cost. There was no evidence that the level of one's formal education in Accounting is related to the underlying conception of profit. This study, however, revealed that being a woman might influence the way profit is understood. Future research may clarify this finding.

Given the exploratory and descriptive nature of this study, none of the hypotheses was formally established. Based on anecdotal evidence, however, we expected that individuals with a background in Accounting Sciences would present a broader understanding of the concept of profit compared to those who had never studied Accounting or had only initiated in this field of knowledge. Concerning individuals who do not belong to the world of accounting, theoretically less vulnerable to the bias of historical cost, they were expected to be mentally freer to interpret phenomena in the world of business from a predominantly economic perspective. All the subgroups, however, presented a conception of profit attached to the concept of historical cost, thus, a very conservative view of profit.

Considering that the interpretation of phenomena, that is, everything that touches human consciousness, is influenced by knowledge, prior experiences, expectations, and other cognitive references, as suggested by the Perception theory, we expected significant differences would be found between the subgroups in terms of the concept of profit. Contrary to expectations and the theory itself, however, we observed a disconcerting alignment among the individuals, that is, regardless of one's background in Accounting, the results suggest there are no important differences among the participants about what they understand of profit.

About individuals who are culturally distant from the accounting universe, one cannot demand mental flexibility able to harbor multiple conceptions of profit. Due to individual experiences built in the business world or even due to one's background, it is understandable that "common people" feel more comfortable with a conservative version of the meaning of profit. In principle, there is not a problem at all, considering the consequences of errors accruing from decisions based on this metric are restricted to one's personal life.

The same cannot be said about individuals versed in Accounting because these usually seek to serve the corporate world. A broader view is expected from individuals who have already been exposed to the literature addressing various conceptions of profit and the multiple possibilities of measuring equity components. It is not admissible that alumni from Accounting Sciences programs are not able to recognize that different managerial purposes may demand the application of differentiated concepts of profit. Yielding to the temptation of operating with a single concept of profit, even more when linked to the idea of historical cost, is equivalent to minimizing the informative potential of Accounting and shut down to the multiple opportunities in the market. To mention only one example, individuals not able to understand profit, other than the difference between revenue and expired cost, will certainly face difficulties when attempting to support an investor whose greatest interest is usually related to the future value of his/her patrimony.

Considering that most countries, including Brazil, are already moving towards fair value accounting based on the market due to the adoption of IFRS, it is perhaps interesting to discuss with greater emphasis value-based economic concepts in Accounting Sciences programs. The results found in this study shed light on this issue as they suggest that the concept of historical cost is part of people's archetype, regardless of their level of accounting knowledge. Therefore, future studies should investigate whether one's understanding of profit and other accounting concepts differ from before and after IFRS was mandatorily adopted in Brazil.

This study's findings are an alert for those responsible to decide on pedagogical projects and curricular guidelines relevant to Accounting Sciences programs. The assumptions of the Perception theory suggest that when students are encouraged to value a certain concept of profit over others in the initial phase of their academic training, they may face difficulties understanding and applying other relevant concepts to certain users of Accounting services in the future.

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97

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99

CFC Exam and Accounting Education: An analysis of HEI characteristics and approval indexes

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Abstract

Objective: to verify which characteristics of Higher Education Institutions (HEI) are related to the approval of students in the CFC certification exam.

Method: The institutional characteristics of 741 HEI taking the Exam's two editions of 2017 were analyzed. Inflated Beta Regression analysis was used to treat data.

Results: the institutional characteristics that were positively correlated with higher approval indexes in the CFC exam include: ENADE score; IGC score; belonging to a public university; being located in a Brazilian capital; being well ranked in the Folha University Ranking; and offering graduate programs in Accounting. The variables negatively correlated were: Professors' work regime, Academic organization, and location in the Midwest, Northeast or North.

Contributions: The expansion of Accounting Sciences in Brazil may not be associated with the obtaining of knowledge that is necessary for professional practice, as the exploratory variable RUF suggests. These results enable HEI managers to identify the institutional attributes that contribute to students' good performance in the Exam, supporting the management of factors that can be changed, resulting in improved training in accounting.

Keywords: Education, Higher; Higher Education Institutions; Accounting Programs; CFC Exam.

1. Introduction

The performance of Accounting students in certification exams has been studied in international academic research. Fogarty, Zimmerman, and Richardson (2016) studied this relationship and verified that the results of professional exams are taken into account by universities' faculty when assessing the quality of Accounting programs in the United States.

In the same line, Morgan, Bergin, and Sallee (2012) concluded that students from Accounting programs highly rated by an American association of accreditation and quality assurance achieved significantly higher approval rates in the CPA certification exam. This positive relationship between CPA approval rates and quality accreditation levels of Higher Education Institutions had also been reported by Morgan, Bergin, and Sallee (2008).

In Brazil, the Exame de Suficiência do Conselho Federal de Contabilidade (CFC) [Sufficiency Examination of the Federal Accounting Council (CFC)] is the means to obtain professional certification that is necessary for professional practice in accounting. Results of professional exams concerning recently graduated students reveal increasingly lower approval rates.

The Brazilian Federal Council of Accounting (CFC) presented a statistical report showing that only 35.87% of the graduated students who took the exam between 2011 and 2017 were approved. The most recent edition – 1st edition of 2019 – reports a quite disheartening result: 65.07% of the candidates failed in the exam (CFC, 2019).

As a result of programs intended to expand the number of universities and undergraduate programs adopted by the Brazilian government, Accounting Sciences became popular. It was the most demanded program among private higher education institutions. In 2006, there were 57,257 students in Brazilian Accounting programs (INEP, 2007); while in 2018 this number corresponded to 359,840 students enrolled in brick-and-mortar and distance learning Accounting Sciences programs (INEP, 2019).

Based on these findings and understanding that the CFC Exam represents an important step in the career of former Accounting students and a concern for current undergraduate students, we believe it is important to identify which elements may be associated with good performance in the exam. In the international context, the institutions and Accounting programs, the former students of which obtained a satisfactory performance in professional exams are likely to be better acknowledged in the job market (Fogarty, Zimmerman & Richardson, 2016).

There is, however, no evidence in Brazil about the existence of a relationship between the performance of candidates in the certification exam and receptivity in the job market, something we intend to verify using an exploratory variable, to contribute with the Brazilian literature in the field of accounting education.

In 2017, the Federal Council of Accounting provided statistical data concerning the performance of Accounting students in the exam per HEI, so that it is possible to verify which institutional characteristics are related to the approval of candidates in the accounting certification exam. Given the preceding discussion, we present the following research problem: What are the institutional factors associated with the approval of Accounting graduates in the CFC exam?

There are very few studies in the accounting field addressing the CFC exam, especially because, up to 2017, the responsible agency did not disseminate results per HEI regularly. This is contrary to what happened with ENADE data, which has been reported yearly since 2004. For this reason, the Brazilian literature addressing accounting education reports various institutional characteristics positively or negatively related to the performance of accounting students in the ENADE. This national exam of student performance is intended to assess the quality of Brazilian higher education institutions, however, the same does not occur with the Accounting certification exam.

Therefore, this study is expected to contribute to the literature in the field of education and accounting research. It grants knowledge on institutional factors, associated with approval rates in the CFC exam. Furthermore, it permits comparisons with the results of previous Brazilian and international studies addressing student performance and training in accounting. Additionally, we will also verify the factors that more significantly contribute to approval or failure in the CFC exam.

Finally, this study's results are expected to support HEI managers in the identification of institutional attributes that contribute to the good performance of students in the Brazilian accounting certification exam. Thus, they can work to maximize approval rates by managing factors that can be changed.

2. Literature Review

2.1 Historical Perspective

Vocational Accounting teaching in Brazil was first established with the arrival of the Portuguese Court at the beginning of the 19th century. The first trade courses arose in Brazil in 1809. The actions of the Crown, such as opening the ports to "friendly nations" and the diversity of goods and commerce modalities on Brazilian soil, introduced the use of basic accounting techniques. These included the double-entry bookkeeping system and consequently, the use of accounting books for commercial bookkeeping (Oliveira, 2010).

As highlighted by Nossa (1999), the teaching of accounting in Brazil at the beginning of the 20th Century, in 1901, was marked by the establishment of the Escola Prática de Comércio de São Paulo [Commerce Practical School of São Paulo], later called Escola de Comércio Álvares Penteado [Álvares Penteado Commerce School]. The title of Accountant was achieved upon completion of the program. In 1926, Decree No. 17.329 created the undergraduate program in Economic and Commercial Sciences.

Silva (2004, p. 34) explains that, in 1931, Decree No. 20,158 "instituted the Accounting Technical program with a duration of two years to train Bookkeepers, and with a duration of three years to train Accountant Experts". Silva notes that only in 1945 the Decree-Law No. 7,988 instituted the Actuarial Accounting Sciences program, with the first class graduating in 1949 at the Álvares Penteado Foundation (Silva, 2004).

Saes and Cytrynowicz (2001) report that the creation of the Actuarial and Accounting Sciences program contributed to the establishment of the School of Economics, Business and Accounting (FEA) at University of São Paulo (USP) in 1946, which launched the basis of the first research center in the accounting field in Brazil, with important contributions. Later, this institution implemented the first Brazilian graduate program in Accounting.

The Brazilian Federal Council of Accounting (CFC) was also established in 1946, a government-owned legal entity, which approved the Regulamento Geral dos Conselhos de Contabilidade [Accounting Council General Regulation] in the entire Brazilian territory. Its objective, among others, is to "guide, regulate and supervise the practice of the accounting profession through Regional Accounting Councils" (CFC, 2017). Based on Law No. 12,249, from 2010, the Council is also responsible for regulating Continuing Professional Education Programs for accounting professionals, establishing actions to enable, control and inspect compliance to the Program on the part of the Council's members (CFC, 2016).

According to Nossa (1999), in 1998, there were 384 Brazilian undergraduate programs in Accounting. At the time, "41.4% are hosted by universities, 49% of which in public universities and 51% in private universities. Isolated facilities, federations, and integrated colleges account for 58.6% of the programs, 15% in public institutions and 85% in private ones" (Nossa, 1999, p. 38).

Since the early 21st century, however, the number of universities and undergraduate programs has grown at an accelerated rate in Brazil. This growth is associated with the country's economic development and the consequent emergence of companies and other commercial activities. It is also linked to globalization and access to information as a result of the emergence of new technologies, in addition to the country's greater role in international markets. Additionally, in recent years, public policies for the internalization and expansion of higher education culminated in an increase of slots supply in Brazilian Accounting programs. Currently, 1,489 accounting programs are offered in the entire country, both in the brick-and-mortar and distance modalities (INEP, 2019).

To verify whether students are acquiring the content provided in the programs, Law No. 12,249/2010, later regulated by CFC Resolution No. 1,486/2015, established that the Certification Exam (currently performed twice a year) would be a requirement for obtaining professional accounting certification.

2.2 Previous Studies

Among the few recent efforts, which have set out to study aspects related to the CFC Exam, the following stand out: Rodrigues, Pinho, Bugarim, Craig, and Machado (2018) and Bugarim, Rodrigues, Pinho, and Machado (2014). The first used logistic regression to identify factors associated with approval rates of graduates from accounting programs in the CFC exam performed in 2012 and found that being a male candidate; the region where one attended the program; HEI quality; and age were positively correlated with good performance in the exam.

Bugarim et al. (2014) in turn, based on cluster analysis, analyzed the performance of candidates in the Exam according to the area of accounting knowledge versus Brazilian federative units, which in the results were assigned to two groups: units with the highest percentage of correct answers and units with the lowest percentage of correct answers.

The practice of the accounting profession in the United States is also linked to approval in an internationally renowned certification exam, the CPA. Regarding the performance of undergraduate students in Accounting Sciences in this exam, differently from what happens in the Brazilian context, various studies are found in the literature.

Bline et al. (2015) attempted to identify an association between accounting faculty's characteristics and students' performance in the CPA, concluding that programs with a high percentage of professors with expertise in the fields addressed in the exam, research productivity, and the existence of CPA certified professors, are factors positively correlated with students' performance in the exam.

The study by Bunker and Harris (2014) addressed the relationship between modality of accounting teaching and approval rates in the CPA exam and verified that students coming from predominantly online programs performed significantly worse than students coming from traditional and/or brick-and-mortar modality programs.

Still, concerning approval rates in the CPA exam, Briggs and He (2012) analyzed whether different requirements from American states in terms of higher education workload, necessary to enroll in the CPA exam, were related to approval rates. Results were inconclusive given the variability of performance per field of accounting specialization and the fact that some states with less required workload stand out.

Finally, Barilla, Jackson, and Mooney (2008) for instance compared the performance of graduates from higher education institutions accredited to an association of American business schools and graduates from other institutions. They verified that the likelihood of being approved in the first attempt was correlated with the candidates' institutional origin.

3. Method

According to reports disclosed by the Federal Council of Accounting on Overall Results per HEI, of the 1,684 undergraduate programs in Accounting Sciences active in 2017, 1,524 HEI had their students taking the Certification Exam in the first semester of 2017 and 1,581 HEI in the second edition of the same year. All the HEIs with students taking the exam in both editions of 2017 correspond to this study's population.

Two initial filters were used in the sample. First, the HEI with candidates enrolled in both editions of the exam in 2017 were identified. Then, only the programs with at least ten candidates enrolled in each of the editions were included, considering that programs from HEI with fewer students would be potential outliers; we found that 297 HEI with fewer than 10 students taking the exam's 1st edition presented a 0% approval rate. The same filter was used in the 2nd edition and this time, 270 HEI with fewer than 10 students taking the exam obtained a 0% approval rate.

Hence, in this study, we analyzed 741 programs in Accounting Sciences from Higher Education Institutions with at least ten participants in the two editions of the Certification Exam in 2017. This sample represents 44% of the Accounting Sciences programs active in Brazil in December 2017.

The initial phase of data analysis started with the descriptive statistics of the variables. After this analysis, inflated beta regression models were estimated using the HEI institutional data. Zero and Zero One Inflated beta regression are the most appropriate techniques for this study's data because the dependent variable is an indicator that represents approval rate (approval in the CFC exam), with an interval that ranges from 0 and 1, not allowing negative results or results higher than 1 (100%).

As Ferrari and Cribari-Neto (2004) explain, beta regression is indicated when the dependent variable is beta distributed (interval from 0 to 1). Additionally, according to Ospina and Ferrari (2010), when beta presents an interval between 0 and/or 1, an inflated beta regression is needed, which can be inflated at 0, 1, or 0 and 1, in case there are data in the sample that represent 0%, 100%, or both, respectively.

Because there were programs with 0% approval and programs with 100% approval in the 1st edition of 2017, a Zero One Inflated Beta Regression was used. In the 2nd edition, there were institutions with 0% of students approved though none of the institutions achieved 100% of approval; thus, the model was estimated using Zero Inflated Beta Regression. Log and logit link functions, default of gamlss package, available at CRAN, were used for the sub-models used in the regression. The proposed statistical tests were performed using R.

Note that a regression analysis with an OLS estimator was performed beforehand and heteroscedasticity was identified in the model. The problem, however, is solved by inflated beta regression because it is robust for heteroscedasticity, as it models the mean and precision.

This study's dependent variable (CFC) is the Approval index, per Higher Education Institution, in the Accounting Certification Exam (editions 2017/1 and 2017/2). The approval indexes per HEI of the 1st and 2nd editions of 2017 in the certification Exam was reported by the Federal Council of Accounting on its website through the spreadsheet "Relação Apuração Resultado Geral por IES" [List of Overall Result per HEI].

A search was performed in the literature to identify the main institutional factors associated with the performance of accounting students reported by previous studies. The objective was to identify the attributes most frequently investigated both in Brazilian and international studies correlating institutional characteristics to performance in exams, to establish the independent variables. The independent variables, as well as the studies in which they were originated, are presented in Table 1.

Table 1

Independent variables

Variable	Acronym	Measurement	Base studies	Database
Performance in the ENADE program	ENADE	Continuous grade from 0 to 5	Lemose Miranda (2014); Ferreira (2015); Santos (2012); Pandolfi (2017).	Preliminary program's grade (CPC) 2015
Infrastructure	INFR	Standardized grade from 0 to 5	Andriola (2009); Moreira (2010); Lemos and Miranda (2014); Ferreira (2015); Lacerda (2015)	CPC 2015
No. of professors	PROF	No. of professors working in the HEI (from 0 to 163)	Abjaud (2014); Lepchak, Oliveira, Fragalli, and Scarpin (2016). Pandolfi (2017).	CPC 2015
Faculty degrees	DOC	Standardized grade from 0 to 5	Moreira (2010); Santos (2012); Lemos and Miranda (2014); Cruz (2012).	CPC 2015
Professors' work regime	REGIM	Standardized grade from 0 to 5	Santos (2012); Lemos and Miranda (2014); Lacerda (2015).	CPC 2015
Program's workload	HORA	Program's total workload	Exploratory variable	2016 Higher Education Census
No. of students enrolled	MAT	No. of Enrollments in 2016	Andriola (2009); Abjaud (2014); Lepchak, et al. (2016); Pandolfi (2017).	2016 Higher Education Census
Time since the program's implementation	AGE	HEI Program's No. of years functioning	Lepchak et al. (2016).	2016 Higher Education Census
Region	REG	Dummy variable: 0 - Southeast (constant); 1 - Midwest 1 – Northeast; 1- North; 1 – South	Cruz, Moreira (2010); Cruz (2012); Abjaud (2014).	2016 Higher Education Census
Academic organization	ORG	Dummy variable: 0 - University (constant); 1 – University; 1 - College; 1 – Federal Institute	Moreira (2010); Abjaud (2014).	2016 Higher Education Census
Administrative category	CAT	Dummy variable: 0 - Private; 1 - Public	Moreira (2010); Cruz (2012); Abjaud (2014).	2016 Higher Education Census
Programs located in capitals	IN_CAP	Dummy variable: 0 – HEI is not located in a capital; 1 – HEI is located in a capital.	Exploratory variable	2016 Higher Education Census
HEI with graduate programs	POS	Dummy variable: 0 – HEI does not have a graduate program in Accounting 1 – HEI has a graduate program in Accounting	Exploratory variable	Sucupira Platform
Market opening	RUF	Dummy variable: 0 – HEI is absent in the RUF Employer Ranking 1 – 0 – HEI is present in the RUF Employer Ranking	Exploratory variable	Folha's University Ranking 2018
Halo effect	HALO	IGC continuous – 1 to 5	Fogarty, Zimmerman, Richardson (2016).	IGC 2016

Source: developed by the authors (2018).

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105

4. Results

4.1 Descriptive Statistics Of The Dependent Variable

The variable analyzed, as shown in Table 2, was the study's dependent variable, Approval index in the Accounting Certification Exam (CFC).

Table 2
Descriptive Statistics

N: 741 HEI	Mean	Median	Mode	Variance	Standard Deviation	Minimum	Maximum
1st edition CFC/2017	27.57%	25.00%	0.00%	325.241	18.034	0.00%	100.00%
2nd edition CFC/2017	28.42%	25.00%	20.00%	309.484	17.592	0.00%	97.14%

Source: Study's results.

Note that students from HEI included in the sample obtained a mean equal to 27.57% of approval in the exam's first edition. This result is slightly higher than the mean of all the 1,524 programs with students taking the CFC exam's 1st edition in 2017, which was 25.26% and below the general mean of approved candidates since its 1st edition in 2011, 35.87%. The mean approval among the programs included in the analysis increases slightly in the exam's 2nd edition, with 28.41% of approval.

Descriptive statistics of the independent variables were verified in unpublished reports. These variables presented values consistent with those reported in the literature.

4.2 Results of Zero and Zero One Inflated Beta Regression

The results presented below were obtained using an exhaustive comparison procedure of various adjusted models, taking into account different possible combinations of independent variables. The results from models with a better fit, according to AIC and SBC, are analyzed and reported.

No multicollinearity problems were identified among the variables, and differently from models estimated via OLS, because inflated beta regression is a model based on likelihood, it does not require various assumptions to certify its validity, the main hypothesis of which is that the modeled variable follows the distribution assumed for the estimation.

4.2.1 Main Regression

Zero One Inflated Beta Regression was used for the 1st edition of the Certification exam because in this edition there were programs with 0% and 100% approval, while Zero Inflated Beta Regression was used in the exam's 2nd edition because there were programs with 0% of approval but none with 100% of approval.

Table 3 reveals the variables with statistical significance to explain the average performance of HEI in the exam's 1st edition, while Table 4 presents the variables statistically significant in the exam's 2nd edition.

REPeC – Revista de Educação e Pesquisa em Contabilidade, ISSN 1981-8610, Brasília, v.14, n. 1, art. 6, p. 100-117, Jan./Mar. 2020

106

Table 3

Outputs Zero One Inflated Beta – 1st Edition 2017

Variables	Estimate	Standard Error	t-value	Significance
(Intercept)	-193.591	0.15505	-12.486	***
ENADE	0.37220	0.03510	10.605	***
INFR	-0.04717	0.02188	-2.156	*
DOC	0.05891	0.02381	2.474	*
REGIM	-0.08842	0.02017	-4.383	***
HALO	0.12291	0.05602	2.194	*
CAT	0.35309	0.08608	4.102	***
Dummy_ORG_FAC	-0.19094	0.05535	-3.450	***
Dummy_Reg_Midwest	-0.39723	0.07773	-5.111	***
Dummy_Reg_Northeast	-0.29683	0.06362	-4.666	***
Dummy_Reg_North	-0.54872	0.09162	-5.989	***
Dummy_Reg_South	0.11141	0.05913	1.884	.
IN_CAP	0.12801	0.04850	2.640	**
RUF	0.20565	0.05622	3.658	***
POS	0.67587	0.14141	4.779	***

Significance levels: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1
AIC (-1029.327); SBC (-918.7346).

Source: Study's results.

As presented in Table 3, 14 variables were statistically significant to explain the Approval Indexes of HEI in the CFC Exam's 1st edition in 2017. With exception of the south (in comparison to the southeast), all the variables present at least 5% of statistical significance (most significant at 0%).

Analyzing the estimation of coefficient (estimates), the variables with higher coefficients are more relevant to explain the mean performance of HEI in the CFC exam. The first variable that stands out is POS. With the highest coefficient estimate with a high level of statistical significance, this result indicates that, on average, HEIs with graduate programs in Accounting obtain the highest rates of approval in the CFC Exam. This result is very representative because only 3.2% of the HEI offers these programs.

This result suggests that factors as being regularly assessed by MEC (for accreditation to maintain graduate programs), faculty greater qualification (who usually teach in both undergraduate and graduate programs), and research experience may lead to a superior quality of teaching, which would directly reflect on the students' learning and, consequently, in the HEI success in tests, assessments, and exams, as is the case of the CFC.

The second most relevant variable to explain the mean performance of HEI in the CFC exam was the North region variable. This variable was significant with a negative coefficient estimate, indicating that if a program belongs to an HEI located in the North, it is less likely to obtain high approval rates in the CFC exam.

Likewise, the Midwest and Northeast present significant negative estimates compared to the performance of HEI located in the southeast, also indicating students from HEI located in these regions are less likely to be approved in the exam. The only region with a statistically significant positive coefficient estimate is the south, indicating students from HEI located in this region are more likely to be approved in the exam, with statistical significance at 10% in the exam's 1st edition in 2017.

This finding is in line with studies analyzing other educational exams. Miranda (2011) for instance, analyzed determinant factors of an HEI's score in the ENADE for Accounting Sciences and found results indicating the north presented the lowest scores in the 2009 Exam, while the south and southeast presented the best performances.

ENADE is the next variable with the most relevant and positive statistically significant coefficient estimate. This variable shows that the better one's performance in the HEI program verified in the ENADE exam, the higher one's likelihood to be approved in the CFC exam, with statistical significance at 0%. Thus, if the programs in this sample score well in the ENADE, its students will be more likely to succeed in the CFC exam.

The Academic category is the 5th most relevant variable to explain the performance of students in the CFC's exam. The results suggest that a student from a public institution, included in this sample, is more likely to be approved in the CFC exam. Descriptive statistics had already revealed a higher mean of approval in the CFC exam among public HEI, which are positively correlated to performance in the programs analyzed in this exam. This result is coherent with that reported by Ferreira (2015), who verified that private HEIs tend to perform worse public HEI in educational exams.

The RUF variable revealed that accounting programs of HEI that are preferred by employers are those with the highest number of alumni approved in the CFC exam, given its positive correlation significant at 0%. Therefore, alumni from institutions with more positive results in the CFC exam are more likely to belong to programs highly rated by employers, according to this sample data. This finding is aligned with those reported by Fogarty, Zimmerman, and Richardson (2016), which highlights the importance of Accounting programs keeping a positive relationship with the companies composing the job market.

The only item from the variable "Academic Organization" that was significant in the Exam's 1st edition was College. With a negative coefficient estimate, this variable shows that programs from HEI classified as "Colleges" present worse performance in the CFC exam than those classified as Universities (constant in the model). This result may be related to the process in which HEI are created and "College" is the first stage of an HEI, hence, it tends to present less robust characteristics than a "University" or "University Center", which may result in differences in terms of teaching. In this same line, Abjaud (2014), based on the Higher Education Census, reports that the average performance of Colleges in institutional assessments is poor.

The results related to the variable "IN_CAP" revealed a significant positive correlation, among the HEIs included in the sample, between being a student of a program located in a Brazilian capital and performance in the CFC exam. This may be explained by the level of urbanization and economic development that primarily takes place in the capitals before moving on to cities in the interior of states.

The next variable analyzed was "HALO". This variable is intended to verify whether HEIs rated as having high quality overall correspond to those HEI with programs that score the highest in the CFC exam. In other words, whether an HEI considered having high-quality programs in general, also has an Accounting program with the highest rates of approval in the CFC exam.

This variable was operationalized using IGC, which represents an overall assessment of HEI, as described in Table 1. Table 3 shows that the variable presented a significant positive estimate in the exam's 1st edition, suggesting that HEI considered to have greater quality in its overall assessment are those that also obtain good results in the CFC exam for the programs analyzed.

With statistical significance, but with a negative coefficient estimate (albeit low), the variable Professors' work regime shows that the higher the proportion of professors working part-time or full-time, the lower an HEI approval index in the CFC exam. This result seems to contradict previous studies that identified a positive correlation between the greater workload of professors and the better performance of students in institutional assessments (Santos, 2012; Lacerda, 2015).

The result, however, is coherent with that reported by Wilson (2002), when addressing exogenous determinants of students in financial exams. The author reports that this is a "surprising" finding and rejected the paper's initial hypothesis, as a contrary effect was expected. Not controlling variables at the students' level probably contributed to this correlation.

The variable related to the professors' degrees (DOC) presented a significant positive coefficient to explain the behavior of the dependent variable. This result suggests that alumni from programs with a faculty composed of professors with the highest degrees are more likely to be approved in the CFC exam. This finding is in agreement with those reported by Brito (2015), Ferreira (2015), Lemos and Miranda (2014), when addressing the determinant factors of ENADE results. Miranda (2011) reveals that the regions with fewer masters and doctors are those with the lowest indexes in the ENADE, especially the North.

Finally, the Infrastructure variable presented statistical significance in the exam's 1st edition with a negative coefficient estimate, indicating that the better an HEI's infrastructure is rated, the worse its approval indexes are for the sample under study. This result may indicate that some institutions primarily invest in their physical facilities as a strategy to attract students, but do not necessarily present higher levels of teaching quality. Another aspect worth noting is the fact that public HEIs are often unsatisfactorily rated in terms of infrastructure due to a lack of investment on the part of governments.

Following the analysis of the results of the main regression, Table 4 presents the variables and their relationships with the approval indexes of students from HEI included in the sample in the CFC 2nd edition of 2017.

Table 4

Outputs Zero Inflated Beta Regression – 2nd Edition 2017

Variables	Estimate	Standard Error	t-value	Significance
(Intercept)	-2.161.858	0.152897	-14.139	***
ENADE	0.301095	0.032995	9.125	***
PROF	0.003841	0.001369	2.806	**
REGIM	-0.041893	0.018860	-2.221	*
HALO	0.180746	0.052325	3.454	***
CAT	0.482748	0.085164	5.668	***
Dummy_ORG_FAC	-0.102523	0.053942	-1.901	.
Dummy_Reg_Midwest	-0.359453	0.071232	-5.046	***
Dummy_Reg_Northeast	-0.281750	0.056652	-4.973	***
Dummy_Reg_North	-0.589614	0.085879	-6.866	***
IN_CAP	0.076950	0.045651	1.686	.
RUF	0.253609	0.053534	4.737	***
POS	0.445294	0.147487	3.019	**

Levels of significance: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1
AIC(-1086.345); SBC (-989.5771)

Source: Study's results.

Statistical significance in 12 independent variables of the initial model was found in the exam's 2nd edition of 2017. Similar to the 1st edition, most variables are statistically significant at 5% at least, except IN_CAP and Academic Organization: College variables, which are statistically significant at 10%, which reasonably explains the behavior of the dependent variable.

The first significant variable to be highlighted in the exam's 2nd edition presents a negative coefficient estimate, which is the North. This result is similar to that found in the exam's 1st edition, and likewise, Midwest and Northeast follow presenting significant negative coefficients in comparison to the performance of HEI located in the southeast, considering previous analyzes.

Academic Category is, in the CFC exam's 2nd issue, the second most relevant variable explaining the performance of students in the exam. Similar to the 1st issue, the coefficient estimate is positive, reinforcing the conclusion that a student from a public institution, included in this sample, is more likely to succeed in the certification exam.

The POS variable also presents positive significance in the exam's 2nd issue, being the third variable with the greatest ability to explain the performance of students in the exam. It is worth noting its representativeness because, even though few HEI in the sample offer graduate programs in accounting, this variable remains significant and positive in both of the CFC exam's issues.

The next variable with a significant positive estimated coefficient in the exam's 2nd issue of 2017 is the variable ENADE. The result is coherent with that found in the exam's 1st issue and reinforces the relationship between performance obtained in both exams.

The RUF variable, as well as the CFC exam's 1st issue, presented a significant and positive coefficient conferring robustness to the analysis that HEI included in this study with a reputation of training better professionals from the perspective of employers are those with the highest approval indexes in the certification exam.

The variable HALO in the exam's 2nd edition also presented a significant positive coefficient estimate, reinforcing the fact that HEIs well rated by IGC have a larger number of approved candidates in the CFC, among the institutions under study. Concerning the "Academic Organization" variable, similar to the 1st edition, the only significant configuration was College, when compared to University. The coefficient estimate remains negative, suggesting that alumni of the Universities in the sample present higher approval indexes.

The variable "IN_CAP" also presented a result similar to the 1st edition, suggesting that the fact students are from programs located in Brazilian capitals is correlated with improved performance in the CFC exam. As previously discussed, similar to Table 3, the variable Professors' work regime presents a significant negative coefficient estimate.

Finally, the last variable with statistical significance to explain the performance of HEI in this study sample in the exam's 2nd edition was No. of professors in the Institution. The variable presents a positive coefficient, indicating that the higher the number of professors in the program, the greater the likelihood of students succeeding in the CFC exam for the HEI analyzed here. Greater diversity of professors and experts may be a potential explanatory factor for this relationship, suggesting that such diversity would expand learning possibilities and consequently the quality of teaching. Brito (2015) also found a positive relationship between the number of professors and students' performance in educational exams.

4.2.2 Complementary Results

Zero and/or Zero One Inflated Beta Regression, in addition to the main model, for the mean, presents additional results concerning data that complement the analysis of influence between the variables studied in the exam's two editions. Table 5 presents the estimates of the sub-model for precision, denoted by σ, which, opposed to the variance, indicate the precision of the relationship among the programs analyzed.

Table 5

Outputs σ – 1st CFC Edition

Variables	Estimate	Standard Error	t-value	Significance
(Intercept)	-1,54E+03	1,02E+02	-15.087	***
ENADE	2,26E+02	4,13E+01	5.471	***
MAT	-5,45E-01	9,35E-02	-5.836	***
RUF	1,44E+02	7,09E+01	2.028	*

Levels of significance: 0 '***' 0.001 '**' 0.01 '*'

Source: Study's results.

Table 5 reveals that three independent variables explain the heterogeneity in the performance of the programs from the HEI analyzed in the exam's 1st edition. The number of enrollments per program presents a negative significant coefficient estimate, that is, there is greater variation in the programs' results. This finding is somewhat expected considering that the higher the number of students in a program, the more likely results concerning approval and failure will differ, that is, there is a greater potential for variation.

The ENADE variable was also significant, however with a positive coefficient estimate, indicating that the higher the score obtained in the ENADE, the more homogeneous the results will be in the CFC exam among the HEI included in the sample. This interpretation is also valid for the RUF variable, which also presented a significant positive coefficient estimate. This reveals that being highly rated by employers also leads to more similar results in the CFC exam.

In the exam's 2nd edition, however, (Table 6), the variables that were statistically significant for the precision of results among the HEIs analyzed were ENADE, Administrative Category, and the number of individuals enrolled in the program. The ENADE variable, differently from the relationship found in the CFC exam's 1st edition, presented a negative estimate, indicating that the better the performance in the ENADE, the most dispersed the results in the exam are. A potential explanation for this variation in the results may be related to aspects linked to the profile of the students who took the exam in both 1st and 2nd editions.

Because it was not possible to control data concerning the students given a lack of access to microdata, we could not identify the students' characteristics that would help to explain this difference. Variation in terms of access to higher education programs may influence student performance though. Students who obtain the best scores in the entrance exam enter the undergraduate program in the first school semester and consequently, tend to apply for the certification exam the year immediately following the program's conclusion. On the other hand, students entering college in the second semester need to attend another semester before completing the curricular requirements. Only then are they able to take the certification exam.

As shown in Table 6, the variable Academic Category was also significant and with a negative coefficient estimate, indicating the fact that being from a private HEI increase dispersion in the performance of students in the CFC Exam, among the programs in the sample. The MAT variable, in turn, even though presented statistical significance in the exam's 2nd edition, presented a positive coefficient estimate very close to zero, which reveals its lower relevance in the precision of the 2nd edition results.

Table 6

Outputs σ – 2nd CFC Edition

Variables	Estimate	Standard Error	t-value	Significance
(Intercept)	32.997.442	0.1609124	20.506	***
ENADE	-0.3072978	0.0662832	-4.636	***
CAT	-0.5530677	0.1618758	-3.417	***
MAT	0.0008370	0.0002422	3.455	***

Levels of significance: 0 '***'

Source: Study's results.

Table 7 presents the coefficients of the sub-model for the mixing parameter *v*, that is, the variables related to a 0% likelihood of approval in the CFC exam.

Table 7

Outputs *v* – 1st CFC Edition

Variables	Estimate	Std. Error	t-value	Significance
ENADE	-110.920	0.33709	-3.291	**
INFR	0.48405	0.19346	2.502	*
PROF	-0.15199	0.03697	-4.112	***
IN_CAP	-140.150	0.64755	-2.164	*

Levels of significance: 0 '***' 0.001 '**' 0.01 '*'

Source: Study's results.

The coefficient estimate with the greatest representativeness is the IN_CAP variable and because it is negative, it reveals that in this sample the fact that a program belongs to an HEI located in a Brazilian capital is less likely to have students approved in the CFC exam's 1st edition. Likewise, the variables ENADE and PROF present a very high negative coefficient estimate. This result shows that the better the performance of students in the ENADE, the less likely students are to be approved in the exam. The variable PROF, in turn, reveals that the higher the number of professors, the less likely that an HEI will obtain a 0% approval index in the Exam.

The Infrastructure variable presented a significant positive coefficient, showing that the better an HEI's infrastructure, from the students' perception, the more likely of a 0% approval in the Exam.

Despite a 100% approval in the CFC 1st edition, the sub-model for the mixing parameter τ revealed that none of the variables are relevant to explain the chance of all students being approved in the exam.

Zero Inflated Beta Regression was performed in the CFC exam's 2nd edition. Table 8 presents the coefficients of the sub-model for the mixing parameter v, showing the variables that were significant to explain the HEI's 0% approval in the CFC exam.

Table 8

Outputs v – CFC 2nd Edition 2017

Variables	Estimate	Standard Error	t-value	Significance
REGIM	0.473732	0.222125	2.133	*
HALO	-1.151.640	0.343107	-3.357	***
IN_CAP	-1.422.848	0.771691	-1.844	.
MAT	-0.011766	0.004032	-2.918	**

Levels of significance: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.'

Source: Study's results.

The results show that variables with greater relevance are HALO and IN_CAP. The HALO variable, which presented a negative coefficient estimate, reveals that the better an HEI's overall assessment, the less likely it is to obtain 0% approval in the CFC exam

The IN_CAP variable, which also presented a negative coefficient estimate, indicates that an HEI's location in a state capital decreases the likelihood of obtaining a 0% approval in the Exam, among those included in this sample. In turn, the MAT variable also presented a statistically significant negative coefficient estimate, revealing that the higher the number of students enrolled, the less likely that an HEI will obtain 0% approval in the Exam.

Finally, the variable REGIM suggests that the higher the number of professors working full-time and part-time, the higher the likelihood of an HEI in this sample presenting 0% of approval. As mentioned in the discussion regarding the main regression, this result contradicts previous studies that identified a positive correlation between greater faculty workload and better performance among students in educational exams.

It is important to note that the study design comprised variables that represent institutional characteristics, rather than variables related to the students. The fact that the latter were not controlled in this study given a lack of data may have influenced the results reported here.

The literature also shows that the characteristics of students strongly influence performance in exams, however, these characteristics are less subject to the control and management on the part of the institutions. Therefore, identifying institutional factors that can influence the success of students in the Accounting certificate exam may support the program managers' decision making.

5. Final Considerations

Assessment of educational programs should be a continuous process intended to improve the identification of the positive and negative aspects that concern the object under study. The objective is to enable institutions to identify the factors that support the good performance of students, reinforcing such factors and correcting those that can be changed and do not contribute or contribute very little to the training of students.

This study's methodological design added some exploratory variables to the independent variables usually adopted in the revised studies, to verify whether they influence the performance of students in the CFC exam.

The POS variable stood out in terms of its relevance for the performance of students as few HEIs enable students to given continuity to their studies in Accounting by offering Master's and Doctoral programs in Brazil. But despite this small number, this variable was positively significant in this study sample.

Generally, HEIs offering graduate programs in the Accounting field are older institutions, with a more qualified faculty, regularly assessed by MEC. These aspects reinforce the idea that graduate programs not only enable the development of Accounting in Brazil due to research but also benefit the training of undergraduate students attending undergraduate Accounting programs.

The RUF variable, also an exploratory variable, requires attention because it shows that employers may be attentive to the performance of students from various HEI in the CFC exam. In this sample, this becomes apparent at the time of hiring accounting professionals, that is, employers prefer HEI with the best performances in the CFC exam. Therefore, the more renowned a program is in the job market, the more likely it is to present the best approval indexes in the exam.

Finally, the IN_CAP variable, which revealed that among the programs in the sample, those located in Brazilian capitals are more likely to obtain higher approval indexes, is brought back to the discussion. This variable is related to the fact that economic development generally takes place in primarily metropolitan areas. Hence, it attracts a greater demand for higher educational training, which leads to greater competition in the selection process, more heavily demanding for good professionals given the large contingent of candidates per slots.

This study was only possible after 2017 when the Federal Council of Accounting started disclosing the results of the exam per HEI. Therefore, this study's results are the first efforts toward a better understanding of aspects related to the success of graduates in Accounting Sciences in the Brazilian certificate exam.

Through the results generated, this study also supports program managers and coordinators as it presents potential institutional attributes that increase the likelihood of students being successful in the exam. Thus, managers may implement actions intended to maximize the characteristics identified as those that boost greater approval rates in the exam, which is expected to also improve the training of future accounting professionals.

The approval rates of graduates of Accounting Sciences in the CFC exam in recent years have been far below the desirable while, at the same time, a considerable number of Accounting programs (both in the brick-and-mortar and distance modalities) have been accredited in Brazil.

While this expansion is very positive because it increases accessibility and creates opportunities to different social classes and regions in Brazil, it needs to be more judiciously analyzed on the part of regulating agencies and teaching institutions, so that the professionals graduated in these HEI meet the expectations of the job market, training professionals that gather the competencies and skills expected in the accounting practice, which is not occurring considering the results of the last exam's editions.

It is also worth noting that more robust analyses concerning the performance of students in the exam require access to the candidates' microdata, which the CFC has not made available yet. Considering that the regressions present evidence that contradicts the literature, findings could be better understood if students' variables had been also analyzed.

This study's limitations include the fact that only programs from Higher Education Institutions that had students applying for the exam's two editions in 2017 were included in the sample so that not all the Accounting Sciences programs active in Brazil at the time were included. Another limitation is the fact that students who graduated in different times, in which HEI might have presented different characteristics, may have taken the exam's 1st and 2nd editions in 2017 and been "labeled" as having the current attributes of an institution.

REPeC – Revista de Educação e Pesquisa em Contabilidade, ISSN 1981-8610, Brasília, v.14, n. 1, art. 6, p. 100-117, Jan./Mar. 2020

114

Finally, we suggest future studies include a longer time frame and also address the students' characteristics, which may represent different relationships with their performance in the CFC exam. For that, however, the Federal Council of Accounting needs to expand its access policy to the exam data.

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116

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117

Inventory management and performance of Brazilian firms listed on B3

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Abstract

Objective: Decisions concerning inventory management involve a trade-off in which firms must choose between keeping high inventory levels, thus decreasing the risk of product shortage, or keeping low inventory levels and applying excess cash in other investments. Therefore, this paper addresses the relationship between inventory management and performance.

Method: This sample is composed of non-financial firms listed on Brazil's stock exchange operator B3, from 2010 to 2018. Because inventory is not relevant for all the companies included in the initial sample, we applied a procedure using simple linear regression to refine the sample. Only firms with a significant relationship between inventory and sales continued in the sample. A quantitative approach based on regression analysis was used to test the research assumptions.

Results: The results of the model that considers performance measuring from the perspective of aggregate value show no relationship between inventory and performance. Robustness was verified using ROA to measure performance from the perspective of profitability. We found an inverted U relationship between profitability, the net trade cycle, and its square. That is, we found a non-linear relationship between the variables, corroborating the idea that there is an optimal level between inventory and profitability.

Contributions: As far as we know, this is the first study investigating whether there is a point of inflection of inventory management and performance among Brazilian firms. The results present relevant and practical guidelines for Brazilian firms and researchers addressing performance related to the net trade cycle, as they suggest that Brazilian shareholders are not concerned with internal factors such as inventory management, but rather with whether a firm is being profitably managed.

Keywords: Inventory Management, Performance, Point of Inflection.

1. Introduction

Inventories are assets that make up the largest volume of short-term investments both in industry and retail firms. Decisions concerning inventory management are complex because excess cash invested in inventory overwhelms firms with high maintenance and opportunity costs. High inventory levels, on the other hand, may increase sales revenues as costumers enjoy more flexibility in making purchasing decisions, decreasing the risk of going out of stock (Deloof, 2003). Therefore, efficient inventory management influences a firm's operational efficiency in seeking lower storage costs and greater costumer loyalty.

Taking into account the dynamics of a firm's investment decisions, much has been discussed about the trade-off between investing in an asset and its impact on performance. Companies expect to maximize their utility through inventory management frameworks that enable profitable options between different classes of assets. When dealing with inventory management, one should bear in mind the costs and variables that might influence investment in terms of acquisition, handling and sales. Thus, choosing between technology and outsourcing may be a strategic decision that changes little in the long term (Chauhan, 2019).

Based on these assumptions, Baños-Caballero, García-Teruel, and Martínez-Solano (2014) suggest the existence of an inflection point of inventory and performance. This implies the existence of an optimal level of investment in working capital, which balances costs and benefits and maximizes a firm's value. According to Kieschnick, Laplante, and Moussawi (2013), the expectation of future sales significantly influences working capital management. As a result, companies are concerned with the possibility of product shortage. As shown in Corsten and Gruen (2004), up to 43% of costumers are likely to opt for another store when products are lacking.

Baños-Caballero et al. (2014) note that the assessment of inventories should take into account not only indexes that measure its turnover. Credit policies available to costumers and from suppliers are important as well. Therefore, this study addresses inventory management considering the net trade cycle (NTC). In this context, we attempt to verify how a trade-off in terms of inventory management affects firms. What is the difference between keeping high inventory levels and decreasing the risk of stock-outs, or keeping low inventory levels and applying excess cash in other investments? This paper's objective is to assess the effects of inventory management on the performance of Brazilian firms and identify an inflection point in the net trade cycle of these firms.

The sample is composed of non-financial Brazilian firms listed on B3 from 2010 to 2018. Because inventory may not be a relevant factor in the revenues of all the companies included in the initial sample, simple linear regression was performed to refine the sample to keep only those firms with a significant relationship between inventory and sales. To test the research assumptions, we used a quantitative approach based on regression analysis. The results show that, from a profitability perspective, there is an inverted U relationship between profitability, the net trade cycle, and its square. This means that a non-linear relationship exists between the variables, corroborating the idea of an optimal level of inventory and performance.

These findings present relevant practical guidelines for Brazilian firms and researchers investigating performance concerning the net trade cycle. First, Brazilian shareholders are not concerned with internal factors such as inventory management, but rather with whether a company is being profitably managed. Second, there is evidence of a non-linear effect of inventory management on performance, which corroborates the idea that there is an optimal level between inventory and performance. Third, we present a statistical tool to select relevant firms for this study to avoid selection bias. Inventory is an asset that represents a relevant amount of short-term investments. This justifies an investigation about the ideal level of investment in inventory, performance and the creation of value, as it may improve our knowledge of whether there is an ideal level of inventory. Finally, robustness tests were performed to decompose the sample and variables, together with the generalized method of moments to deal with endogeneity issues.

The remainder of the paper is organized as follows: the second section presents the theoretical framework; the third describes the method and sample; the fourth section discusses the results, and the last section presents the final considerations, as well as limitations and suggestions for future studies.

2. Theoretical framework

2.1 Working capital management

Companies exist in an uncertain context in which working capital management plays a key role in maintaining their financial health during the normal course of business (Scherr, 1989). A firm may choose to allocate its working capital strategically and follow specific business models appropriate to its comparative advantages such as a firm's control over its resources, including management, or the adoption of a specific technology in its specific sector (Chauhan, 2019). Therefore, efficient working capital management is an essential part of the overall strategy of any firm to create value for its shareholders (Almeida & Eid Jr, 2014). As stated by Schiff and Lieber (1974), both production and credit terms may change over time due to seasonal changes in the demand curve and the establishment of rules to respond to that demand. Acknowledging the interface between credit and inventory management results in improved decision-making.

Companies subject to seasonal demand should be able to respond to expected demand deviations. Operational responses available include a change in prices, implementing extra capacity to change the rate of production, and establishing customer or product queues (Emery, 1987). Companies facing a process of seeking resources for investment may adopt an aggressive working capital policy, pressing for lower inventory levels and decreasing customer credit policies (Palombini & Nakamura, 2012). Investment in accounts receivable and inventories represents a considerable part of corporate assets, while commercial credit is an important source of resources for many companies (Baños-Caballero et al., 2014).

Deloof (2003) notes that many firms have a large amount of money invested in working capital, and the way these resources are managed has a considerable impact on companies' performance. With large amounts invested in working capital, the management of these assets is expected to affect the performance of companies considerably, and as a result, companies strive to obtain optimal working capital, paying their bills as late as possible, delivering products quickly and collecting accounts receivable. This inflection point, however, may vary according to conditions (Enqvist, Graham, & Nikkinen, 2013), and the impact of the institutional context on the net working capital depends on its current level (Baños-Caballero, García-Teruel, & Martínez-Solano, 2019).

A complete measure of the net trade cycle that considers accounts receivable and inventory turnover measure in the concept of operating cycle is a more appropriate way to represent liquidity management compared to indicators of current liquidity or acid test ratio. Accounts receivable, inventory and accounts payable are the main components of a company's operating working capital. The ability of its financial manager to deal with these variables optimally (Prasad, Narayanasamy, Paul, Chattopadhyay, & Saravanan, 2019) determines the success of a firm. Entrepreneurs should choose between profitability goals and risk control. Working capital management is extremely important for firms with restricted access to capital, but also when firms are expanding their investments in times of economic recovery (Le, 2019). Kieschnick et al. (2013) add that the net trade cycle does not only concern cash management but also net operating capital management, thereby, accounts receivable, inventory and use of commercial credit.

2.2 Inventory management and performance

Inventory management is one of the oldest concerns addressed in management studies. Companies must adjust price and production processes according to seasonal markets and put up products for sale (Scherr, 1989). Inventory management means understanding the context of business and making decisions that balance current demand with future needs while maintaining overhead and operating costs at a minimum. An inventory includes a firm's raw material, processing products, inputs used in its operations, and finished goods (Muller, 2011). The availability of cash flow may favor companies, improving their performance, extending credit to costumers, increasing inventory in stock and paying in advance to obtain cash discounts (Afrifa & Tingbani, 2018).

According to Deloof (2003), shareholder value can be created by decreasing the number of days accounts receivable and keeping inventories to a reasonable minimum, while the negative relationship between accounts payable and performance is consistent with the view that less profitable companies wait longer to pay their bills. Excessive and unnecessary investment in inventory and accounts receivable may not benefit a company and may result in low cash flow. Efficient management, however, may minimize investment in inventory and accounts receivable and improve cash flow. Consequently, efficient working capital management improves internal financing sources to decrease external debt. Short-term loans are subject to more frequent monitoring on the part of creditors. More frequent monitoring, then, may decrease information asymmetry and refinancing risks (Gill, Amiraslany, Obradovich, & Mathur, 2019).

According to Costa, Macedo, Câmara, and Batista (2013), the net trade cycle represents the period in which a firm will effectively demand financing for its activities. This cycle measures cash flow, covering all its payments and receivables. The day sales outstanding, day sales of inventory, and days payable outstanding respectively represent the ratio between the number of accounts receivable and sales in days, between inventory and sales in days, and between accounts payable and sales in days. The following formula is used to calculate this index:

$$NTC = DSO + DSI - DPO \qquad (1)$$

Where: NTC = Net trade cycle; DSO=Day sales outstanding; DSI = Day sales of inventory; DPO = Days payable outstanding.

Baños-Caballero et al. (2014) report an inverted U relationship between firms' working capital and performance. The authors suggest that an optimal level of investment in inventory and credit balances costs and benefits and maximizes performance. A firm may choose to keep very low inventory levels due to the adoption of technology that permits just-in-time production. Another firm in the same industry may choose to outsource its production and work with minimum fixed assets, keeping its stock of finished products as a guarantee. Choosing between technology and outsourcing may be a strategic consideration that changes little over time (Chauhan, 2019). Therefore, firms should attempt to keep their inventory levels as close as possible to this point to avoid a shortage of products and loss of performance.

The trade-off in terms of inventory management affects companies, however, whether a firm should keep high inventory levels and decrease the risk of a shortage of products, or keep inventories low and apply excess cash in other investments is not a direct concern of shareholders. As stated by Jensen and Meckling (1976), shareholders are rather concerned about how firms behave, that is, with whether the value of a firm increases in the long run. Additionally, even if there is an ideal working capital level, companies in emerging markets may not be able to achieve that level given financial or managerial constraints (Chauhan & Banerjee, 2018). Therefore, the following hypothesis is proposed:

H0: There is no relationship between inventory and performance

Inventories' main role is to buffer firms against uncertainties. Hence, a company keeps inventory to cope with uncertainties concerning market demand and, according to Baños-Caballero et al. (2014), high inventory levels may decrease supply costs and price fluctuations and prevent product shortages. The idea of special orders of missing items with no additional cost to costumers, assuming there will be increased sales and decreased inventory shortage, may increase profitability. Greater variability in demand when manufacturers have additional pricing flexibility may be favorable (Gupta, Gurnani, & Chen, 2010). Higher inventory levels protect firms from adversities related to inputs' price fluctuations and minimize the loss of sales due to a potential shortage of products in stock (Panda & Nanda, 2018).

There is, however, a downside to the decision to keep high inventory levels. The reason is that high inventory levels prevent the adoption of technology that would enable a company to produce just in time and decrease costs (Chauhan, 2019). Additionally, excessive inventory decreases a company's ability to respond to a constantly changing market, possibly harming sales (Kim & Kim, 2016). Higher levels of working capital indicate a need for additional capital that involves financial and opportunity costs; high levels of capital also represent greater expenses with interest as a result, and therefore, greater credit risk (Kieschnick, LaPlante, & Moussawi, 2006). Additionally, keeping high levels of working capital means that money is committed with short-term activities (Deloof, 2003), that is, large investments with working capital may also harm a company's ability to work with other projects that aggregate value.

Verifying this trade-off between investing or not in short-term assets and the performance of Brazilian firms means that an inflection point of inventory and performance exists. Decisions related to inventory management are complex, considering that excess money invested in inventory overwhelms firms with high maintenance and opportunity costs. High inventory levels, however, help increase sales as clients have more flexibility to make purchasing decisions and firms decrease the risk of a shortage of products for sales. Based on these assumptions, the following hypotheses were established:

H1: There is a positive relationship between lower inventory levels and performance.

H2: There is a negative relationship between higher inventory levels and performance.

3. Method

3.1 Sample and data

This study's sample is composed of Brazilian companies listed on B3 between 2010 and 2018. All companies active any time during the study period were considered for inclusion to avoid selection bias, also known as survival bias. Data were imported from the Economática database. This period was chosen because 2010 was when Brazilian companies started adopting the International Financial Reporting Standards (IFRS). Additionally, this study only considered non-financial companies given the accounting and financial characteristics inherent to financial firms, while accounting values were deflated according to the *Índice Preços ao Consumidor Amplo* (IPCA) [Extended National Consumer Price Index]. The values were deflated due to changes in the general price level during the period. Uncorrected numbers are misleading as they give the wrong impression of a real increase in the stock market.

Previous studies (Elsayed & Wahba, 2016; Gill et al., 2019; Kroes & Manikas, 2014; Shah & Shin, 2007) addressing the inventory and performance issue assign different degrees of importance to a sector's specific environment. Hence, this study refined the sample to include only companies that present a significant relationship between inventory and revenue. This approach leads to more precise results on how a company's performance may be affected by its inventory level. The reason is that there are companies, or even sectors, such as Software and Programming, in which inventories are not important for revenues.

A statistical procedure was applied to maintain this separation. Simple linear regression was used between total sales and inventory to determine which companies had significant levels of inventory over their sales considering a level of significance at 10%. The initial sample consisted of non-financial companies and, after applying the technique, the sample was restricted to those companies with a significant relationship between inventory and operation, in which 1,050 observations were identified. Table 1 presents a detailed summary of the data collected from this sample and the refining process.

Table 1
Sample summary

	Period								
	2010	2011	2012	2013	2014	2015	2016	2017	2018
Firms	436	438	431	428	420	406	403	396	386
Financial firms	(36)	(39)	(39)	(39)	(40)	(39)	(37)	(35)	(35)
Non-financial firms	400	396	392	389	380	367	366	361	351
Inventory-related firms	128	132	135	129	124	121	124	121	118

Note: Detailed summary of sample data collection and refinement process. Data provided by Economática.

3.2 Definition of variables

This paper is based on the study of Baños-Caballero et al. (2014), which addresses the relationship between inventory management and performance of Brazilian non-financial companies. The net trade cycle (NTC) is considered as an explanatory variable. NTC corresponds to the number of day sales outstanding plus day sales of inventory minus days payables outstanding. According to the study used to ground this paper, inventory assessment should not be seen only from the perspective of indexes that measure its turnover, but credit policies available to costumers and from suppliers should also be taken into account.

The model-dependent variable is Performance (PERF), which is the ratio of market value equity and the book value of debt and the book value of assets and is used in previous studies addressing the relationship between net trade cycle and performance (Baños-Caballero et al., 2014; Kieschnick et al., 2013).

Four additional control variables were added to ensure a better fit of the model, namely:

(a) Size of the company (SIZE): the size of a company may influence its working capital management. Larger companies may demand higher investments in working capital given higher levels of sales, and also because of their size, these firms may be able to establish relationships with suppliers, which are important to decrease investments in working capital (Kieschnick et al., 2006). In this study, the firms' sizes were calculated using the logarithm of total assets.

(b) Leverage (LEV): the degree of debt influences decisions related to inventory management. Gill, Biger, and Mathur (2010) present a significant negative relationship with performance, which means that the higher a firm's leverage, the worst its performance. In this study, leverage was calculated by the ratio between total debt and total assets.

(c) Profitability (PROFIT): profitability is measured using gross operating profit, defined as sales minus cash cost of sold products and is divided by the total assets minus financial assets (Deloof, 2003). In this study, PROFIT refers to the operating profit on total assets

(d) Growth opportunity (GROW): in this study, the growth opportunity is measured by the ratio of the book value of intangibles, assets, and total assets, as reported in Baños-Caballero et al. (2014). This variable shows investment in assets that provide new sources of growth.

The variables used in this study are represented in Table 2:

Table 2
Summary of variables

Variables	Acronym	Definition	Expected Signal	Base Studies[a]
Explanatory Variable				
Net trade cycle	NTC	Sum of days sales outstanding, day sales of inventory and days payable outstanding	(+) (-)	(1) (6)
Dependent Variable				
Performance	PERF	Ratio of the sum of the market value of equity and the book value of debt to the book value of assets		(1) (2) (7)
Control Variables				
Firm Size	SIZE	Natural logarithm of sales	(+)	(1) (2) (3) (4)
Leverage	LEV	Ratio of total debt to total assets	(-)	(1) (3)
Profitability	PROF	Return on assets	(+)	(1) (4)
Growth Opportunities	GROW	Book value of intangible assets to total assets	(+)	(1)

Note: (a) Underlying studies: (1) Baños-Caballero et al. (2014); (2) Kieschnick et al. (2013); (3) Palombini & Nakamura (2012); (4) Deloof (2003); (5) Afza & Sajid (2008); (6) Shin and Soenen (1998); (7) Almeida & Eid Jr (2014).

3.3 Technical analysis model

This study's data were treated in Stata using Multiple Regression and panel data, which according to Wooldrige (2016) simultaneously analyzes variations of individual units over time. The following multiple regression model was proposed to test non-linearity of inventory behavior with performance and its significance among non-financial Brazilian companies listed on B3:

$$PERF_{i,t} = \beta_0 + \beta_1 NTC_{i,t} + \beta_2 NTC_{i,t}^2 + \beta_3 SIZE_{i,t} + \beta_4 LEV_{i,t} + \beta_5 ROA_{i,t} + \beta_6 GROW_{i,t} + \sum_{j}^{j-1} \beta_j YEAR + \varepsilon_{it} \quad (2)$$

Tests were performed for this regression model to verify the best model to be used and also to detect and treat the presence of outliers, multicollinearity, heteroscedasticity, and autocorrelation. Additionally, NTC square was included to show the influence of NTC non-linearity on performance, following the approach of Baños-Caballero et al. (2014). We also used the generalized moment method to deal with endogeneity issues based on the estimator proposed by Arellano and Bond (1991).

Therefore, it is possible to determine the inflection point of performance using the net trade cycle coefficients, which is calculated according to the formula:

$$Turning\ point = -\beta1/2\beta2 \quad (3)$$

Where: $\beta1$ is the coefficient of a variable in the linear form and $\beta2$ is the coefficient in the square form. The point of inflection is a point in the curve where the sign of curvature changes and, in this case, the optimal size of the inventory. In this stage, a different relationship of signs between the first and second angular coefficient is expected, following a non-linear approach that represents the presence of an inflection point of inventory and performance.

4. Results

This section presents a discussion of the results. The objective is to show the relationship between inventory management and performance. We intend to verify the existence of a non-linear relationship between variables, due to the existence of an inflection point in this relationship. Finally, this paper presents an analysis of results concerning verification of robustness. Data in this study were obtained from the Económatica database and the sample corresponds to non-financial Brazilian firms listed on B3 from 2010 to 2018. Outliers were treated with the winsorization technique at 0.05 in each tail.

4.1 Descriptive statistics

Before analyzing the results, we present descriptive data, showing the composition of data in the proposed model. Table 3 presents the number of observations, mean, standard deviation, maximum and minimum, and some descriptive statistics in the regression model, which show that the average performance is 0.98%, with an average net trade cycle of 104.43 days.

Table 3
Descriptive statistics

Variables	Observations	Mean	Standard Deviation	Minimum	Maximum
PERF	1,194	0.9829984	1.19344	-.2577339	24.18373
NTC	1,143	104.4276	138.0656	-391.6232	531.4668
SIZE	1,412	21.04444	2.217196	10.52451	26.79697
LEV	1,442	0.3340592	0.3235645	0	7.009169
PROF	1,441	0.6208512	22.83619	-10.35011	866.7535
GROW	1,252	0.2397398	4.749309	-3.727607	121.8832

Notes: Variables: PERF – Performance; NTC – Net trade cycle; SIZE – Logarithm of sales; LEV- Leverage; PROF – Profitability; GROW – Growth Opportunities.

Table 4 presents the correlation matrix of the proposed model. Data show that variables have a low mutual correlation (all below 0.5), which corresponds to a good endogeneity index and autocorrelation of regressors. Additionally, VIF was used to check for multicollinearity between the variables. The mean VIF in the model was 3.20, which shows that there is no multicollinearity problem.

Table 4
Correlation Matrix

	PERF	NTC	SIZE	LEV	PROF	GROW
PERF	1.0000					
NTC	-0.1785***	1.0000				
SIZE	0.1640***	-0.2287***	1.0000			
LEV	-0.0136	-0.0223	0.1410***	1.0000		
PROF	0.4339***	-0.2264***	0.3511***	-0.0806***	1.0000	
GROW	0.1430***	-0.2384***	0.2852***	0.0236	0.3668***	1.0000

Notes: Variables: PERF – Performance; NTC – Net trade cycle; SIZE – Logarithm of sales; LEV- Leverage; PROF – Profitability; GROW – Growth Opportunities.
*, **, *** Significant at 10%, 5% and 1%, respectively.

4.2 Effects of net trade cycle on the performance of aggregate value

Non-linear regression with fixed effects was used to check the relationship between performance and net trade cycle. This model was chosen based on the tests proposed in the method section and the results are presented in Table 5. It is important to note that the net trade cycle represents lower inventory levels and that its square refers to higher inventory levels. The idea of a non-linear approach is to show the point on the curve in which the sign changes, i.e., optimal inventory size.

The results obtained in the proposed model confirm this study's null hypothesis (H0), in which there is no relationship between the net trade cycle and the performance of Brazilian non-financial firms. It implies that there is no inflection point between the performance and net trade cycle of Brazilian non-financial firms in the period under analysis as the two coefficients of the net trade cycle (NTC and NTC^2) were not significant. This finding may be analyzed from the perspective of inventory shortage. Inventory levels affect a company's performance due to a shortage of products and the likelihood of losing clients, and thereby sales, as shown in Corsten and Gruen (2004).

As the results show, the variables introduced in this study to control for potential influences on the performance of companies, were significant. Therefore, there are three significant variables in the proposed model. The size of firms is significantly negative while the level of debt and profitability are significantly positive for the firms' performance. Additionally, note that size, leverage, and profitability are strongly related to performance measured by the firms' values.

Note that other factors related to inventory management and credit policies affect the performance of Brazilian non-financial firms in the period under analysis. Therefore, the companies in the analysis did not present an inflection point with the net trade cycle and performance, which would indicate an optimal level of inventory.

Table 5
Estimated Results

Model Variables	PERF – Performance (Tobin's Q)	
	Expected signal	Fixed effects model
Intercept		3.5309***
NTC	(+)	-0.0449
NTCSQ	(-)	0.0041
SIZE	(+)	-0.1343***
LEV	(-)	0.6055***
PROF	(+)	1.2100***
GROW	(+)	0.0208
Observations		1050
Year Dummy		Yes
Adjusted R-Squared		0.148

Notes: PERF is Tobin's Q; NTC is the net trade cycle divided by 100 and NTC^2 is its square; SIZE the size; LEV the leverage; GROWTH the growth opportunities; and ROA the return on assets.
*, **, *** Significant at 10%, 5% and 1%, respectively.

4.3 Robustness Check

To verify the results' empirical and theoretical robustness, the same analyses were performed using Return on assets (ROA) as the dependent variable. Baños-Caballero et al. (2014) use this same approach to verify robustness and the same results were found when performance was analyzed from the perspective of value and profitability, while Deloof (2003) presents a significant negative relationship between gross operating income and net trade cycle.

Table 6 shows that the use of performance measured by ROA implies that there is an optimal point in inventory management and performance because the regression results show an inverted U relationship between profitability, net trade cycle, and its square. Therefore, these results corroborate the findings of Baños-Caballero et al. (2014), Baños-Caballero et al. (2019), Le (2019) and Panda and Nanda (2018). Thus, the coefficients of the net trade cycle variable allow us to determine in this sample an inflection point between the firms' performance and net trade cycle. The inflection point found here was 256.62 days, i.e., the model's inflection point that represents the optimal structure of NTC in terms of performance.

The results show that lower levels of inventory improve performance due to the possibility of firms increasing and improving their sales and credit policies as shown by Baños-Caballero et al. (2014), Baños-Caballero et al. (2019), Le (2019), and Panda and Nanda (2018). The second time when higher inventory levels are related to a fall in performance shows that higher inventory levels result in low working capital, too long credit policies and cost of opportunities lost. These results corroborate the findings reported by Baños-Caballero et al. (2014); Deloof (2003); Kieschnick et al. (2013). When assessing performance from a profitability perspective, hypotheses H1 and H2 would be confirmed, in which low inventory levels are positively related to performance and high inventory levels are negatively related to performance.

Table 6

Estimated results of the robustness check

Model Variables	Value Outlook	Profitability Outlook
	PERF - Tobin's Q	ROA – Return on assets
Intercept	3.5309***	-0.2200
NTC	-0.0449	0.0349**
NTCSQ	0.0041	-0.0068***
SIZE	-0.1343***	0.0139*
LEV	0.6055***	-0.0995**
PROF	1.2100***	
GROW	0.0208	0.0469***
Observations	1050	1241
Year Dummy	Yes	Yes
Adjusted R-Squared	0.148	0.142

Notes: The PERF is Tobin's Q; NTC is the net trade cycle divided by 100 and NTC^2 is its square; SIZE=size; LEV=leverage; GROWTH=growth opportunities; and ROA=return on assets.
*, **, *** Significant at 10%, 5% and 1%, respectively.

Therefore, this study shows that the relationship between the net trade cycle and the performance of Brazilian firms is not significant when portrayed from the perspective of value, meaning that shareholders only consider whether a company is being profitable. An analysis of Brazilian companies from the perspective of profitability reflects companies' decision-making, which is based on increased performance to achieve objectives. Companies also take into account the net trade cycle as an important variable that presents an optimal level of performance.

Additionally, the independent variable was divided to test part of the NTC separately and verify whether the results are confirmed (Table 7). The results corroborate the idea that efficient inventory management reflects on firms' operational efficiency in seeking lower inventory costs and greater customer loyalty because valorization of inventory should not be analyzed only taking its turnover into account; credit policies to clients and from suppliers should be taken into account as well. Therefore, these results show that a non-linear relationship is not presented in terms of inventory separately, but as a whole, in combination with credit policies for clients and from suppliers.

Table 7

Estimated results of the robustness check (decomposition of independent variables)

Model Variables	Value Outlook			Profitability Outlook		
	PERF	PERF	PERF	ROA	ROA	ROA
Intercept	3.4512***	3.4035***	3.6423***	-0.2938*	-0.2024	-0.2084
DSO	-0.1629			0.0044		
DSOSQ	0.0454*			0.0003		
DSI		-0.2014			-0.0111	
DSISQ		0.0490			-0.0039	
DPO			-0.3870**			-0.1285***
DPOSQ			0.1541*			0.0518***
SIZE	-0.1288***	-0.1263***	-0.1364***	0.0181**	0.0145*	0.0159**
LEV	0.6175***	0.6181***	0.6335***	-0.1076***	-0.1080***	-0.1005**
PROF	1.1910***	1.1881***	1.0978***			
GROW	0.0305	0.0147	0.0208	0.0507***	0.0472***	0.0466***
Observations	1050	1050	1050	1241	1241	1241
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-Squared	0.151	0.150	0.156	0.127	0.135	0.155

Notes: The PERF is Tobin's Q; DSO is days sales outstanding divided by 100 and NTC2 is its square; DSI is days sales inventory divided by 100 and NTC2 is its square; DPO is days payable outstanding divided by 100 and NTC2 is its square; SIZE the size; LEV the leverage; GROWTH the growth opportunities; and ROA the return on assets.
*, **, *** Significant at 10%, 5% and 1%, respectively

Finally, the generalized moments method(GMM) was used to deal with potential endogeneity problems as mentioned in the method section. Based on Arellano and Bond (1991), the models were estimated using the GMM estimator in two stages, which permit controlling for endogeneity using instruments. Specifically, the dependent variables were lagged in four periods and used in the models as instruments in the different equations, following the procedures of Baños-Caballero et al. (2014). This approach concerns endogeneity problems, in that the relationships between firms' performance and specific characteristics only reflect the effect of independent variables on their performance. The results are in agreement with previous results, as shown in Table 8, concerning a non-linear relationship between inventory and profitability, but not the aggregated value variable. This corroborates the idea that Brazilian shareholders are not concerned with internal factors, such as the role of inventory management as a factor that creates value.

Table 8

Estimated results of the endogeneity check using GMM models

Model Variables	Value Outlook	Profitability Outlook
	PERF - Tobin's Q	ROA – Return on assets
Intercept	3.9944***	0.1766
L1.IV	0.2811**	0.3388***
L2.IV	-0.2163**	-0.1286**
L3.IV	-0.0188	0.0872*
L4.IV	0.0379	-0.0732
NTC	-0.0364	0.0535***
NTCSQ	-0.0218	-0.0077***
SIZE	-0.1543***	-0.0068
LEV	0.5237	-0.1175*
PROF	0.3405	
GROW	0.1463***	0.0517***
Observations	453	579
Wald Chi-Square	42.29	82.36
Prob. Chi-square	0.00	0.00

Notes: The instrumental variables used are the four lagged dependent variables ranging from L1.IV to L4.IV; PERF is Tobin's Q; NTC is net trade cycle divided by 100 and NTC2 is its square; SIZE=size; LEV=leverage; GROWTH=growth opportunities; and ROA=return on assets.
*, **, *** Significant at 10%, 5% and 1%, respectively.

5. Conclusions

This study's objective was to assess the effects of inventory management on firms' performance and identify the existence of an inflection point of net trade cycle among non-financial companies listed on B3 from 2010 to 2018. Non-linear multiple regression was used and data were collected from Económatica. The sample is composed of Brazilian non-financial companies listed on B3. Simple linear regression was applied to each company and all companies presenting a significant relationship between inventory and revenue were selected. The final sample consisted of 92 companies with 557 observations per firm/year.

The results confirm hypothesis H0, that is, there is no relationship between net trade cycle and performance. The reason is that the model using Tobin's Q to measure performance does not present a significant relationship between net trade cycle (NTC and NTC^2) coefficients and performance measured from the firms' value perspective. When firms are assessed from the perspective of profit (ROA), however, the results show the presence of an inverted U relationship between the net trade cycle and performance. These results are in line with Baños-Caballero et al. (2014), who shows the existence of an optimal inventory level. In this study, this level corresponds to 256.62 days.

These results present relevant practical guidelines for Brazilian companies and researchers analyzing performance related to the net trade cycle. First, as the results show the presence of an inflection point of net trade cycle and profitability, companies can optimize asset management in the short term. Second, these results indicate differences between value and profitability perspectives in Brazilian firms. They suggest that Brazilian shareholders are not concerned with inventory management, but rather with whether a company is profitably managed. Inventories are an asset that represents a relevant amount of investments in the short term. Therefore, identifying the existence of an optimal level between investment in inventory and performance and value creation is important because it contributes to improving our understanding of whether there is an optimal inventory level.

This study's limitations include the fact that external factors that influence decision-making concerning performance, such as macroeconomic events and regulation policies, were not addressed in this analysis. Thus, they may have influenced the results. Therefore, we should bear in mind that not only factors inherent to working capital management and inventory management influence performance.

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Guidelines for Authors

1. Paper Submission Guidelines

To submit articles to the *Journal of Education and Research in Accounting* – REPeC authors should follow the standards and criteria set by REPeC. From January 2013, the guidelines of the American Psychological Association (APA) with regard to citations and references should be followed. Submissions not complying with the standards will be rejected.

Articles submitted to the journal must be original, i.e., cannot have been published or submitted to another journal.

Articles may be written in Portuguese, English, with at least 5,000 and maximum 9,000 words, including tables, figures, notes and references. A maximum of 5 (five) authors are allowed per article. All papers accepted will be translated and published in two languages: Portuguese and English.

Articles containing tables or figures, they [the tables and figures] should be in a format that allows them to be edited. In case some of these Figures or Tables have been imported from other programs such as Excel, Power Point etc.., the source file must also be sent as Supplementary File.

Do not use expressions like id., ibid., op. cit., loc. cit. and the like, or reference notes and footnotes. Notes at the end of the text are acceptable, but should be avoided.

The submission of articles should be done electronically, through the www.repec.org.br website. At the end of the submission an electronic message will be sent by e-mail, confirming receipt of the article.

2. Content and Formatting of Papers

At the moment of submission, the articles should contain:

- The **title** in the language of origin of the article (Portuguese or English) without identifying the author(s);
- An **abstract** written in the language of origin of the article (Portuguese or English) with at least 150 and at most 200 words, single space between lines, in four paragraphs containing the following elements, highlighted: **Objective, Method, Results and Contributions**. At the end of the abstract should be placed **three to five** keywords;

Objective: this study was aimed at investigating the relevance of accounting education and research for the growth of the Brazilian economy during the first decade of the 21st century.

Method: to collect the data, a structured questionnaire was used, elaborated based on the relevant literature. The questionnaire was tested and applied to a sample of Brazilian accountants and businessmen during 2017. In the analysis of these data, content analysis was applied and statistical tests were used to establish relations between the answers obtained.

Results: the main findings of this study indicate that the expansion of accounting education and research in Brazil was essential for the growth of the economy, according to the respondents' perception, despite the impression that accountants and businessmen need to make better use of the accounting information.

Contributions: from the academic viewpoint, the evidences from this research contribute to fill of an important existing gap in the Brazilian literature. What the market is concerned, they contribute by providing evidence that, despite its perceived relevance, its users need to make better use of the accounting information.

Key words: Education: Research; Accounting.

- The article itself, written in Portuguese or English, with at least 5,000 and at most 9,000 words, including tables, figures, notes and references.
- The pages of the articles should be properly numbered in the upper right corner, typed with Word for Windows, under the following conditions:
  - A4 paper (210 x 297 mm);
  - Times New Roman, size 12;
  - Spacing: single;
  - Paragraph input: 1.25;
  - Margins: 3cm top, 2cm bottom, 3cm left, 2cm right;
  - Tables and figures in Times New Roman, size 10;
  - Citations and references must comply with current standards of the APA (American Psychological Association).

3. Tables and Figures[1]

Tables and figures should be used in articles whenever their information make text comprehension more efficient, without repeating information already described in the text.

3.1 Tables

The table should usually show numeric or textual information organized in an orderly exposition of columns and rows. Any other statement should be characterized as textual figure.

The table should be displayed with its information visible and sufficient for their understanding and should be formatted as follows:

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1   Most of these guidelines were adapted from the Manual for Submissions of the *Revista de Administração Contemporânea* – RAC, available at www.anpad.org.br.

Table editor	Word for Windows 97 or superior. In case authors have drawn their tables in Microsoft Excel or in a similar program, please remake the tables using the feature in Word.
Font	Times New Roman, size 10.
Line spacing	Simple.
Spacing before and after paragraphs	3 pt.
Table colors	Use only black and white (grayscale).
Title	The table title must be brief, clear and explanatory. It should be placed above the table, in the top left corner, and on the next line, just below the word Table (with a capital initial), followed by the number that designates it. The tables are presented with Arabic numerals in sequence and within the text as a whole. Eg: Table 1, Table 2, Table 3, and so on.
Citation of tables	When citing tables in the text, type only the number referring to the table, for example Table 1, Table 2, Table 3 and so on. (the word 'Table' should be presented with the first letter capitalized). Never write 'table below', 'table above' or 'table on page XX' because the page numbers of the article may change while formatting.
Table notes	The font used in the notes of the table should be Times New Roman, size 10, single spaced. The notes should be described in the footnote of the table, and they serve to indicate the Source of the information of the table, and other information important to understanding the table.

3.2 Figures

The figure should show a flow chart, a chart, a photograph, a drawing or any other illustration or textual representation.

The figure should be displayed with its information visible and adequate for its understanding, and should be formatted as follows:

Font	Times New Roman, size 10.
Figure colors	Use only black and white (grayscale).
Format	Figures should be submitted in an editable format.
Title	It explains the figure concisely, but discursively. The title should be placed under the figure and numbered with Arabic numerals in sequence, preceded by the word Figure (with initial capital). Eg: Figure 1, Figure 2, Figure 3, etc. After the title, any other information necessary for clarification of the figure or source must be added as a note.
Captions	The caption is the explanation of the symbols used in the figure and must be placed within the limits of the figure.
Size and proportion	Figures must fit the dimensions of the journal. Therefore, a figure should be drawn or inserted into the article so that it can be reproduced in the width of a column or page of the journal to which it will be submitted.
Citations in the main text	When citing a figure in the text type only the number referring to the figure, e.g. Figure 1, Figure 2, Figure 3 and so on. (the word 'Figure' should be presented with the first letter capitalized). Never write 'figure below' figure above ', or even 'figure on page XX' because the page numbers of the article can be changed during formatting.

4. Citations and References

For the full version of the standards of citations and references according to APA (American Psychological Association), access http://www.repec.org.br/index.php/repec/article/view/1607/1237.