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Revista Catarinense de Ciência Contábil is a quarterly publication by Santa Catarina State Board of Accountancy whose mission is to disseminate the scientific production, in the area of Accounting, of professors, researchers, students and professionals from Brazil and abroad, who are selected according to the quality and contribution to the development and dissemination of knowledge in this field.

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Summary

Editorial

Ongoing learning allows us to enhance and value the profession. Therefore, the focus of the Santa Catarina State board of Accountancy is providing permanent education and giving visibility to researches, studies and articles developed by the accounting class. This publication has been an important instrument for the strengthening and dissemination of scientific production in the field. When going through another evaluation before the Coordination of Improvement of Higher-Education Personnel (CAPES), this Journal was classified as B2. This qualification ensures greater prominence and better ranking to the researchers releasing their works.

Since 2015, when it was classified as B3, the Editorial Board has sought innovation and improvements for enhancing the Journal. The result of this effort came now, in 2017, with an even better classification. In January this year, RCCC has changed the publication standards from the Brazilian Association of Technical Standards (ABNT) to the American Psychological Association (APA) Standards, as tot citations, references, tables and figures, with a view to its internationalization.

It has also started being indexed in Redalyc (Rede de Revistas Científicas de América Latina y el Caribe, España y Portugal), an important indexer that increases visibility and accessibility. Another innovation is the publication of the Journal in the English language, thus facilitating the indexation in international bases as well as the access of readers and researchers from all over the world.

All of this a result of a demanding and intense work of the team coordinating this publication, the technical staff, the teachers and the evaluators, who collaborate with the CRCSC on this journey. The responsibilities increase even more. However, they are rewarding and serve as a lever to continue the serious work in favor of the development of accountants.

In this edition we have once again a diversity of themes that reveal how the possibilities of Accounting Science studies have expanded, both in the private sector and in the public sphere, in addition to training. One of the articles presents a comparative analysis between distance and classroom students, contributing to rethink teaching-learning models based on the storage of information in order to encourage the development of autonomous skills.

On another front, a study shows how human capital can influence the performance of companies that provide accounting services. The third article shows the impacts of payroll taxation on an Information Technology company.

In the environmental area, we have two articles in this issue. One addresses the Environmental Disclosure Index (IDA) and performs an analysis of the application of this indicator. Another purpose is to check the influence of environmental investments and economic and financial indicators on the selection of companies to make up the Corporate Sustainability Index (ISE), in 2014.

Finally, we have a study on the Brazilian stock market based on a sample comprising companies listed in the São Paulo Stock Exchange (BMF&Bovespa), testing the sectorial pricing capacity of risk factors and, subsequently, the motivations, abilities and competences of the controller, in the perception of students who study post-graduation in Controllership.

Good reading!

Accountant **Marcello Alexandre Seemann**
President of CRCSC

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SELF-REGULATED LEARNING IN ACCOUNTING: A COMPARATIVE ANALYSIS BETWEEN CLASSROOM AND DISTANCE MODALITIES*

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ABSTRACT

This research has conducted a comparative analysis of the profile of classroom and distance Accounting students as to the use of self-regulated strategies in learning. Through the sample of 302 students from two private higher-education institutions located in Bahia, it was verified how the mode of teaching, the semester, the age and the gender can be associated with the use of self-regulated learning strategies. Data has been treated by means of tests of averages (t test), descriptive analysis and factor analysis. The results showed that the strategies most employed by accounting students were the setting of goals, planning and learning. When explaining self-regulated strategies, through the teaching, semester, age and gender modes, the results indicate that the averages are significantly different for teaching and age modes. The study contributes in the sense of rethinking the teaching-learning models based on the storage of information aimed at encouraging the development of autonomous skills that promote the permanent learning based on the grounds of teaching for learning or learning how to learn, which are characteristics indicated by international bodies and necessary for professional excellence.

Keywords: Accounting. Self-regulation. Learning. Teaching in accounting.

1 INTRODUCTION

Learning relationships have been historically established by the simultaneous occurrence of the learning subjects in previously defined space and time. The advent of higher education additionally to the insufficiency of the offer of higher education courses has opened space for the emergence of distance education characterized by the separation of teachers and students in order to require more autonomy in learning processes (Gatti, 2001).

Autonomy is one of the particularities pointed out by the international bodies Accounting Education Change Commission (AECC) (1990) and the American Institute of Certified Public

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Accountants [AICPA] (2000) as desirable in the development of permanent learning characteristics. According to Chen and Paul (2003), in distance education learners are active in the learning process, because they control the rhythm of studies and determine the sequence of activities.

In this perspective, Zimmerman and Martinez-Pons (1986) state that individuals who control their learning are self-regulated if they select learning methods and strategies. These individuals are still able to structure their study context and adapt their learning strategies to their academic goals.

Several studies have pointed out that individual characteristics affect learning (Chen & Paul, 2003; Dias & Leite, 2010; Cavanaugh, Lamkin, & Hu, 2012; Bergamin, Ziska, Werlen, & Siegenthaler, 2012). Self-regulation is associated with different academic outcomes (Lynch & Dembo, 2004). Other studies point out that there are significant differences between self-regulated students and others who need external regulation in learning (Arias, Barca Lozano, Gonzalez Cabanach, & Núñez Pérez, 1999; 2010). Self-regulated individuals are decided, persistent, adopt strategies, and evaluate their progress; Different from those who do not set educational goals and consequently end up with a cognitive dependence, thus, little self-regulated in learning (Zimmerman, 2001).

Lima, Lima and Bruni (2015) have assessed the self-regulated learning strategies of accounting students in two public universities in Bahia and associated them by gender, age and semester. The results indicate that there is little adherence to self-regulated strategies as the current semester progresses, a fact that has raised the concern of the authors, since the more advanced students of the course are expected to show greater appropriation of self-regulated strategies. Thibodeaux, Deutsch, Kitsantas, and Winsler (2016) have analyzed the use relationship of self-regulated strategies and academic success insofar as 589 students advanced in psychology and biology at a major American university. The results have shown that, in the first semester, students have gradually used the planning strategy, since they spent more time with socialization, a fact that reflects a lower academic performance.

The purpose of this study is to perform a comparative analysis of the Accounting Sciences students' profile, both from classroom and distance modalities, as to the use of self-regulated learning strategies. In order to achieve the general goal, the following specific objectives are highlighted: a) to analyze self-regulating learning strategies adopted by classroom and distance accounting students; b) to associate the adherence to self-regulated strategies to gender, age, semester and distance and classroom teaching modalities; c) to verify the figures associated with the modality of education, semester, age and gender.

This study aims to contribute to the development of an updated literature review on self-regulation of learning and its relationships with accounting students. Accounting education needs to use attributes that promote students 'independence, even in undergraduate studies, so that subsequent changes in the measurement, recognition, and disclosure of accounting standards are learned without major difficulties, and thus create perspectives for students' preparation (Schleifer & Dull, 2009; Martin & Dowson, 2009). In this paper, we present the results of the study. In this context, it is imperative to teach accounting students how to learn or learn how to learn, in order to promote the development of lifelong self-regulating learning skills recommended by the international bodies (AECC, 1990; AICPA, 2000) to accountants and desirable for professional success.

2 THEORETICAL REFERENCE

2.1 Self-regulation of learning

According to Sternberg (2013), cognitive psychology is the area of study that analyzes how the individual perceives, learns and thinks the information, so as to understand, for example, why certain individuals remember some facts while others do not. Researchers identify two approaches that seek to understand these aspects: the first occurs through internal experiences that seek the understanding of the nature of rationalism by introspection; while the other seeks the understanding based on scientific studies of vital functions by empirical

methods, so that rationalism and empiricism are the foundation for the understanding of the human mind (Sternberg, 2013).

For Eysenck and Keane (1994), the development of communication has fostered discussions on the communication systems' theories that would later serve as basis for the emergence of cognitive psychology. For Lefrançois (2008), Cognitive Psychology analyzes the higher mental processes, such as perception, memory, concept formation, language, thinking, problem solving and decision making in order to infer the mental processes that are learned as meaning.

In the 1970s there were discussions in the theoretical field of psychology about aspects that linked the relation existing between memory and learning, deriving the study of metacognition (Lima & Bruni, 2012). In this sense, metacognition was defined as the domain that the individual has over his own knowledge; and still in the same decade it is understood as the domain of cognitive processes and products (Flavell, 1976). Among several definitions about metacognition, there is a similarity that addresses a common feature of mechanisms, which results in the control and self-regulation of the intellectual process.

Understanding that intellectual self-regulation is possible from metacognition, the research led by Zimmerman aimed at understanding self-regulation in learning or Self Regulated Learning (SLR). With influences of constructivist paradigms, which have the individual as a learning agent (Arias *et al*., 1999; Xu *et al.*, 2010; Richter & Schmid, 2010), Zimmerman (2001) argues that individuals are considered to be self-regulated when these are persistent, determined, strategic and capable of assessing their progresses; those who are more cognitively dependent are therefore less self-regulated. For Ribeiro (2003), the self-criticism, the personal reflection, the ability to conduct self-criticism, the modification of study habits are characteristic of metacognitive strategies.

For Simons and Beukhof (as quoted in Figueira, 1994), self-regulation is the ability of the individual to be 'self-taught', able to prepare, facilitate and regulate learning in order to generate feedback and judgment about the process. According to Costa (2001), self-regulation is characterized by the degree of active involvement in the learning process (metacognition, motivation and behavior); cyclical changing behavior (control of effectiveness, involvement and reflection of results); and dependence on motivational aspects (level of involvement with regards to controls and beliefs).

2.2 Model of self-regulated learning proposed by Zimmerman

The model of self-regulation proposed by Zimmerman (2000) is divided into phases, components and processes able to produce learning outcomes. The first phase addresses the anticipation / preparation and establishes the goals and plans to achieve the targets set and occurs with the influence of motivational aspects (self-efficacy), the objective is to value learning. In the second phase there is the execution and control that aims to fulfill the objectives outlined in the first stage. There is a need for self-monitoring through the use of learning strategies and attention control. The last step takes place with the self-reflection and self-reaction, which involves the judgment, the self-assessment and the attribution of causes to targets established in the first phase, resulting in satisfaction or dissatisfaction, in the presence of reactions (self-reflection) and defenses, with resistance and abandonment or satisfaction and personal valuation. These three phases correspond to a cyclical process that, through feedback, enables changes and continuous improvements (Polydoro & Azzi, 2009; Zimmerman, 2000).

Self-regulated learning promotes autonomy, in which the identification of errors is essential to aggregate new knowledge, so as to lead in a pleasurable way to success and to the growth of new learning. For Jones, Alexander and Estell (2010), the student is expected to have self-regulating behaviors, motivation and the ability to regulate learning so that it is possible to self-monitor and self-manage learning. Self-regulated learning was grounded in Psychology and Sociology, and Korkmaz & Kaya (2012) present a context in which students define tasks, set goals, create plans, use tools, tactics, and strategies to carry out their activities. For Zimmerman (2000), the development by teachers of self-regulating strategies is key in the promotion of self-

regulated learning (Zimmerman, 2000) and can be passed on to students throughout the course. It is integrated as self-regulatory training (Zimmerman, Bonner, & Kovach, 1986).

Zimmerman and Martinez-Pons (1986) have developed 14 self-regulated learning strategies. According to these authors, the use of these strategies gives the student valuable tools. Its use is highly correlated with academic success rates. The strategies are: a) self-evaluation; b) organization and transformation; c) establishment of objectives and planning; d) information search; e) notes; f) environmental structure; (g) self-claims; h) repetition and memorization; i) help from teachers; j) help from close peers; k) help from experts; l) review of annotations; m) review of tests; and n) review of the bibliography.

When comparing the level of self-regulated learning between classroom and distance students in higher education, Sizoo, Malhotra and Bearson (2003) have failed to find significant differences between the two modalities, except that, in distance modality, when female students have presented higher frequencies in the appropriation of self-regulated strategies than in the classroom.

Barnard-Brak, Paton and Lan (2010) carried out a study in higher education, in the distance modality, having identified the presence of five self-regulated learning profiles ranging from super-regulation to no or little self-regulation. The results have showed that the five profiles directly influence the academic performance of the interviewees, so that those with little or no self-regulation have lower academic performances compared to those who tend to be super-regulated.

In general terms, there is a consensus among researchers that learners' self-regulating capacity is essential for the best quality of learning, performance, decision making, problem solving and time use (Schunk, 2001; Zimmerman, 2002; Boruchovitch, 2004; Dias & Leite, 2010; Frison & Moraes, 2010; Rosário, Nunes, Magalhães, Rodrigues, Pinto, & Ferreira, 2010; Bergamin *et al*., 2012; Lima & Bruni, 2012; Simão; Frison, 2013).

In this sense, aimed at relating the current semester and self-regulating strategies, Thibodeaux et al. (2016) have examined the association of the use of self-regulating strategies and the academic success, as 589 students advanced in psychology and biology courses at a large American university. The results have showed that, in the first semester, students have used gradually the planning strategy, once they spent more time with socialization, a fact that reflected lower academic performance.

Castel, Murayama, Friedman, McGillivray and Link (2013) have developed researches associating the age of the individual with the self-regulation of learning. The authors have analyzed how youths and adults use metacognitive learning strategies and related them to the study period. The result has showed that adults have greater self-regulating control in study strategies and in time management. On the other hand, Bembenutty (2007) has probed surveys that involved self-regulation and gender. Said author has found that self-regulation strategies and academic performance vary according to genres and ethnicities in a university course. The results pointed out that the final grade of the course and the strategies of self-regulation did not present differences when observed the ethnicity and the gender.

Castro (2016) has analyzed characteristics of self-regulation of learning in higher education in the distance modality. The results pointed out that students of the analyzed modality develop typical self-regulation learning skills and attitudes aimed at maximizing their educational processes. Lima et al. (2015) have analyzed the learning strategies proposed by Zimmerman and Martinez-Pons (1986) and related them to gender, age and current semester in 249 students of the classroom modality of two universities in Bahia. They found that gender and age are factors that influence the student's level of self-regulation. Women and younger students tend to better levels of self-regulated learning. However, nothing could be found on the relation between semester and the adoption of self-regulated strategies throughout the course.

3 METHODOLOGICAL PROCEDURES

The methodology used was hypothetical deductive and exploratory, as it seeks greater familiarity with the phenomenon (Gil, 1991) between the possible relations between classroom and distance learning self-regulation.

The scope was formed by approximately 1000 students enrolled in the first half of 2015 at Viscount de Cairo Foundation (FVC), located in the municipality of Salvador (BA) and Norte do Paraná University (UNOPAR), in the municipality of Feira de Santana (BA). Data collection was carried out through printed questionnaires arranged in two blocks: the first questioning the personal characteristics of the interviewee and the second, in a scalar response interval ranging from 1 (never) and 7 (always), the Students' reactions to learning situations in light of the strategies identified by Zimmerman and Martinez-Pons (1986) on self-regulated learning (Table 1).

Table 1

Self-regulated learning strategies identified by Zimmerman and Martinez-Pons (1986) and equivalent propositions questioned

Self-regulated strategies (Zimmerman and Martinez-Pons, 1986)	Propositions questioned
1. Self-evaluation	1. After completing a work, I always double-check to make sure it is good.
2. Organization and transformation	2. I always try to draw up a plan (scheme) before starting a work.
3. Setting goals and planning	3. If I have a test, I start studying as soon as possible, to be rested and calm on the day.
4. Data Collection	4. Before starting a work, I always go to the library (and other research channels, whether by physical or digital means) to gather as much information on the subject as possible.
5. Taking notes	5. I always try to write down vast notes of a text read or the teacher's lecture.
6. Environmental structure	6. For greater focus, I always look for distraction-free environments.
7. Self-Consequences	7. When I perform a test, if i do well I give myself a reward; otherwise, I have to give up on something I wanted.
8. Repeating and memorizing	8. I use strategies to memorize the matter (or formula) until I know the subject by heart.
9. Help from Teachers; 10. Help from close peers; 11. Help from Experts	9. When difficulties arise and I cannot solve myself, I seek external help (teachers, colleagues, others).
12. Review of notes; 13. Review of tests and 14. Review of bibliography	10. I evaluate my performance; I see what I must improve, in order to prepare myself for a test.

Note. Source: Adapted from Lima, R. N., Filho, & Bruni, A. L. (2012). Self-Regulated Learning in Accounting: Diagnosis, Dimensions and Explanations. Anpad Meeting Yearbook (EnAnpad), Rio de Janeiro, RJ, Brazil, 36.; Zimmerman, B.J., & Martinez-Pons, M. (1986). Development of a structured interview for assessing student use of self-regulated learning strategies. American Educational Research Journal, 23, 614-628.

The sample consisted of 335 students present in the classroom in the first half of July 2015, including distance-learning students. Thirty-three questionnaires that were not fully answered were discarded, resulting in the analysis of 302 cases.

To perform data analysis, three quantitative procedures were used to achieve the specific objectives: the descriptive analysis, to identify self-regulated learning strategies; the parametric test of average (t-test) to analyze how the strategies can be explained from the teaching modality, stage (semester), age and gender; and the factorial analysis to verify the figures associated with the teaching modality. In the parametric test of averages, the sample was divided into two groups: by gender (male and female), by current semester (up to the fifth semester and from the sixth semester), by modality of the course (classroom or distance) and age (up to 24 years and above 24 years).

It should be noted that previous research has used the same criterion to analyze the segregation of semester (Lima et al., 2015), the age (Mayville, 2007, Lima et al., 2015), the gender (Bembenutty, 2007, Lima et al.) and the teaching modality (Castro, Miranda, & Leal, 2015).

The hypotheses that guided the fulfillment of the specific targets (b), which seeks to relate the adherence to self-regulated strategies to gender, age, semester and distance and classroom teaching modalities, as well as the theoretical support (according to the theoretical reference) grounding the hypothesis, are shown in Table 2.

Table 2

Hypotheses associated with the objectives of the studies and theoretical grounds

Hypotheses	Grounds
H1 - The female sex presents a greater adoption of self-regulated learning strategies.	Pavesi (2015); Lima and Bruni (2012); Bembenutty (2007)
H2 - Distance modality appropriates strategies that are self-regulated in a similar way as classroom modality	Sizoo *et al.* (2003)
H3 - Age influences the adoption of self-regulated learning strategies.	Lima and Bruni (2012) Mayville (2007)
H4 - There is no relation between the greater use of strategies and the current semester.	Lima and Bruni (2012)

Note. Source: Prepared by the authors (2017).

4 RESULTS AND ANALYSIS

This research carried out a comparative analysis of the profile of 302 students of Accounting Sciences, in classroom and distance modalities, regarding the adoption of self-regulated learning strategies, from two private higher education institutes located in Bahia. The characteristics of the analyzed sample are shown in Table 3.

Table 3
Characteristics of the sample studied

Gender		**Male**		**Female**					**Sum**
	Classroom	**Distance**	**Classroom**	**Distance**					
Fi	41	77	90	94					302
Fi %	13,58	25,50	29,80	31,13					100,00
Age	**Up to 20**	**21 to 25**	**26 to 30**	**31 to 35**	**> 35**				
Distance (Fi)	12	29	56	37	37				171
Fi %	9,60	9,60	18,54	12,25	12,25				56,62
Classroom (Fi)	10	33	32	27	29				131
Fi %	3,31	10,93	10,60	8,94	9,60				43,38
Semester	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Soma**
Distance (Fi)	33	19	26	23	26	12	12	20	171
Fi %	10,93	6,29	8,61	7,62	8,61	3,97	3,97	6,62	56,62
Classroom (Fi)	37	0	0	0	30	6	44	14	131
Fi %	12,25	0,00	0,00	0,00	9,93	1,99	14,57	4,64	43,38
Sum	70	19	26	23	56	18	56	34	302
Sum Fi%	23,18	6,29	8,61	7,62	18,54	5,96	18,54	11,26	100,00

Note. Source: Research data (2017).

Table 3 shows that over 60% (Simple-Fi Frequency) of undergraduate students in accounting courses are female, which converges and ratifies the findings of Lima et al. (2015) on the female representativeness in the courses of Accounting Sciences in the classroom courses. The greater participation of women in accounting courses is an important finding, as it promotes diversity, above all, by exploring the skills in the various areas of accounting practice. However, it is also necessary to encourage the participation of women in scientific production and in the participation of events in accounting area, since, according to Luca, Gomes, Corrêa and Domingos (2011), female participation is relatively low in publishing scientific events compared to male, specially in USP and ANPAD events.

When analyzing the age of the sample, no large disparities between the modalities of classroom or distance learning are observed. However, the data indicates that over 70% of analyzed individuals are older than 26, diverging from the findings of Lima et al. (2015) in two public institutions in Bahia, where 73% of the sample was aged up to 25 years. Such comparison leads to infer that the type of Higher education Institution (public or private) and the modality of education attract different audiences in accounting courses in the state of Bahia.

With this reasoning, students up to 25 years old seek out courses in public universities while those over the age of 26 choose private institutions and / or distance learning. Such choices can be explained by employment needs and / or constitution of family, for example.

The analysis of Table 3 also support that the sample is made up of 56.62% of students from the University of Paraná (UNOPAR), studying Accounting Sciences in the distance modality and 43.38% of students who attend the same course in the classroom modality at Visconde de Cairo Foundation, both at night-time. The growth of distance education in Brazil is undeniable, but the quality of education is cause for doubts and fears. In this context, Nascimento and Junqueira (2011) have assessed whether there is a significant difference in the performance of the discipline “Introductory Accounting” between the students of the distance and classroom modalities, having concluded that there are no such differences, as the final averages analyzed were not significantly different for the two modalities.

The first specific objective of this study is to analyze self-regulated learning strategies adopted by accounting students in classroom and distance learning in two Private Institutions from Bahia that offer the Accounting Sciences course: Visconde de Cairo Foundation (FVC) and Norte do Paraná University (UNOPAR). The results are presented in Table 4, arranged for both modalities.

Table 4 shows that strategy 1 (E1) is the most adopted by students of the classroom (90.1%) and distance (88.3%) teaching modality. Thus, accounting students of both modalities tend to often perform self-assessment when they complete / perform an activity. The greater adoption of this strategy corroborates with part of stage three addressed by Zimmerman (2000) and Polydoro and Azzi (2009), which consists of self-reflection and self-reaction that involve the judgment, evaluation and analysis of established objectives that result in satisfaction or Dissatisfaction. For Melchior (1994), the self-evaluation is the ability to analyze the efforts expended in relation to their capacities and the results obtained to what was requested. It contributes to improving the development of self-assessment or in other situations. Thus, the use of this strategy by accounting students provides a valuable tool for the development of a critical sense of the knowledge learned during the course, an essential strategy in the exercise of the profession for preparing and granting data and financial statements.

Table 4
Use of self-regulated strategies with adoption of a midpoint

Type of modality	Midpoint	Strategies (%)									
		1	2	3	4	5	6	7	8	9	10
Distance	Lower than 4	11,7	18,7	28,1	19,3	25,1	14	71,9	37,4	13,5	5,8
	Greater than 4	88,3	81,3	71,9	80,7	74,9	86	28,1	62,6	86,5	94,2
	Total	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
Classroom	Lower than 4	9,9	30,5	55	21,4	20,6	15,3	66,4	38,2	8,4	17,6
	Greater than 4	90,1	69,5	45	78,6	79,4	84,7	33,6	61,8	91,6	82,4
	Total	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0

Note. Source: Research data (2017).

The average point of data collection instrument used in this research corresponded to the average 4 (four), according to Table 4, as a point of segmentation between greater or lower adoption of analyzed strategies. It can be seen in Table 6 that in distance modality all strategies are used with an index higher than 60%, with the exception of strategy 7 (E7) "self-consequences", so that "self-assessment" and / or "self-punishment" are not used by virtue of success or failures in the performance of an activity. This strategy (E7) is the least used by students in the classroom modality, likewise there was little indication of the use of strategy 3 (E3) "goal setting and planning" (45%), which indicates that most students of classroom modality are not prepared in advance for the performance of tests / evaluations. These latter findings are alarming, since the planning and preparation for accomplishing a goal directly influences the results of the execution. Thibodeaux et al. (2016) point out that students poorly prepared and planned performed less than those who plan an activity. The low adherence of the

E3 strategy by students of the classroom modality can be explained by the use of time in remunerable activities, since, according to Table 4, it consists of a more mature public that usually have established families.

In general, through the descriptive analysis, about 75% of distance students and 71% of students in the classroom use more than 50% of the strategies found in students considered as self-regulated. The general percentage of adoption of strategies between the two modalities did not present great discrepancies, which is in line with the findings of Sizoo et al. (2003), which state that there are no significant differences between the two modalities.

The second specific objective sought to analyze whether the adoption of the strategies can be explained based on gender, age and semester in both education modalities under study. In this analysis the t test for independent samples was applied using self-regulated learning as an independent variable. To perform the tests, the variables analyzed were separated into two groups: gender - male and female; Age - up to 30 years and over 30 years; Semester in progress - until the 4th semester and from the 5th to the 8th semester; and teaching modality - classroom and distance (Tables 5-7).

Table 5

Average equality tests for internship in the course for classroom and distance modalities

					t-Test			**Levene Test**	
	N	Average	Standard Deviation	Standard Error	t	Degree of Freedom	sig.	F	sig
Semester									
Distance									
Up to 4	101	5,3970	0,82601	0,8219	0,960	169	0,339	0,229	0,633
5 to 8	70	5,2714	0,86362	0,10322	0,952	144,227	0,343		
Classroom									
Up to 4	37	5,5216	0,69046	0,11351	2,158	129	0,033	5,478	0,021
5 to 8	94	5,1277	1,02143	0,10535	2,544	96,901	0,013		

Note. Source: Research data (2017).

F-test in the distance modality was 0.229, with significance level (sig.) of 0.633, and 5,478 in the classroom modality, with significance of 0.021 (Table 7). As the sig.> 0.05 the null hypothesis H0 of equality is accepted and it is assumed that the samples were extracted from the population with the same variance for the distance modality; While in the classroom it is accepted that there are significant differences between the averages.

In the distance modality it is not possible to notice an increase or decrease in the use of self-regulated strategies and to study the beginning or end of the course, since the level of significance was above 5%. These results indicate the absence of incentives / development of self-regulated attitudes that promote greater autonomy of the learning during the course of graduation in the distance modality. This finding converges with the results found by Lima and Bruni (2012), indicating the impossibility of establishing a relationship between the analyzed variables. These results suggest that if the development of self-regulating skills is more or less successful (Zimmerman & Martinez-Pons 1986), and if there is no incentive to develop these skills, the students will leave higher education with the same skills they already had when entered it, which is undesirable according to the international bodies of (AECC, 1990) and (AICPA, 2000) for the development of lifelong learning. Gonçalves and Vagula (2012) agree that in the face of the explosion of alternative sources of knowledge and the short time to work all this information, the teacher should also foster the development of autonomous skills in the students, as mediator-teacher, and ensure permanent learning. Thus, it becomes necessary to rethink the role of the teacher in the classroom in order to promote, also, the development of self-regulating skills in accounting students and / or other fields.

However, when the classroom modality average tests were analyzed, it was possible to verify that the semester of students influences the use / adoption of self-regulating strategies.

The average for students up to the fourth semester of accounting was 5.5216 (significance of 3.3%), while those between the fifth and the eighth semester presented an average of 5.1277 (significance of 1.3%). Although there is little difference between the averages, it can be noticed that classroom students up to the middle of the undergraduate course tend to use more self-regulating strategies.

These findings allow us to reject the hypothesis (H2) supported by Sizoo et al. (2003), which establishes the similar appropriation of a self-regulated learning strategy between the classroom and distance learning modalities when analyzing the current stage; as well as to accept the hypothesis (H4) indicated by Lima and Bruni (2013), arguing that there is no relation between the use of strategy and the current semester, except for the course in the classroom modality, with greater use of strategies in initial periods.

Table 6 presents the average equality test when analyzed the female and the male genders and the use of self-regulating strategies in the classroom and distance modality. In both types of teaching it is not possible to establish a relationship between the use of strategies and the gender of accounting students (sig> 5%). This result indicates the rejection of hypothesis 1 (H1), supported by the findings of Pavesi (2015), Lima and Bruni (2012) and Bembenutty (2007), who defend that the female is the one that most adhere to self-regulating strategies. Gonçalves and Vagula (2012), when studying the structural cognitive modifiability, affirm that the stimulus to knowledge of a new object determines whether the individual possesses more or less structure of rigid structural modifiability. Thus, gender is not expected to be a skill-distinction factor, but rather the stimuli that have been developed throughout the life of the individual.

Table 6

Average equality tests for genders in classroom and distance modalities

					t- Test			Levene Test	
	N	Average	Standard Deviation	Standard Error	t	Degree of Freedom	sig.	F	sig.
Gender									
Distance modality									
Male	77	5,2442	0,86686	0,09879	-1,432	169	0,154	0,253	0,615
Female	94	5,4287	0,81513	0,08407	-1,423	158,159	0,157		
Classroom modality									
Male	41	5,0805	0,98697	0,15414	-1,286	129	0,201	0,045	0,833
Female	90	5,3111	0,93526	0,09858	-1,260	73,864	0,211		

Note. Source: Research Data (2017).

Finally, the average equality test was carried out to analyze whether the age influences on the greater or lower use of self-regulating strategies in classroom and distance modalities, according to Table 7. In the distance learning, it is not possible to perceive any relation between ages and the use / adoption of self-regulating strategies, since the level of significance was greater than 5%.

Table 7

Average equality tests for age in classroom and distance modalities

	N	Average	Standard Deviation	Standard Error	t- Test t	Degree of Freedom	sig.	Levene Test F	sig
Age									
Distance modality									
Up to 30	97	5,3021	0,88117	0,89947	-0,774	169	0,440		
> 30	74	5,4027	0,78844	0,09165	-0,786	164,692	0,433	1,820	0,179
Classroom modality									
Up to 30	75	5,0653	0,96443	0,11136	-2,457	129	0,015		
> 30	56	5,4714	0,89640	0,11979	-2,483	122,915	0,014	0,561	0,455

Note. Source: Research Data (2017).

However, when the students of the classroom teaching modality were analyzed, the results of the average equality test have showed significant differences between the self-regulated learning ratio and the age of the students analyzed. Thus, students older than 30 have presented higher average (5.4714, significance of 1.5%), if compared to those younger than 30 (5.0653, significance of 1.4%). These findings are in line with the findings of Lima and Bruni (2012) and Mayville (2007), as they state that age influences the appropriation of self-regulated strategies, therefore, the hypothesis 3 (H3) is accepted. This finding may be explained by the greater development of self-regulatory skills accumulated by older individuals, important characteristics of permanent knowledge.

The Factor Analysis (Table 8) was used to verify the figures associated to the variables: teaching modality (classroom or distance), semester, age and gender. The main function of the different techniques of factor analysis is to reduce a large number of variables observed in a smaller number of factors (Figueiredo & Silva Júnior, 2010).

Table 8

Main Components

Component	Initial Proprietary Values			Square loads extraction sums		
	Total	% variation	% cumulative	Total	% variation	% cumulative
1	**3,454**	**34,543**	**34,543**	**3,454**	**34,543**	**34,543**
2	**1,130**	**11,299**	**45,842**	**1,130**	**11,299**	**45,842**
3	,902	9,019	54,861			
4	,851	8,510	63,371			
5	,811	8,107	71,478			
6	,724	7,237	78,714			
7	,660	6,605	85,319			
8	,580	5,805	91,123			
9	,486	4,858	95,982			
10	,402	4,018	100,000			

Note. Source: Research Data (2017).

The extraction of factors by the Latent Root criterion is the most used in the factorial analysis, admitting Eigen values use greater than one. Thus, the first component can explain 35.54% of the total variance of this modality, while the second component explains only 11.30%.

Table 9

Rotating component matrix with varimax method

Component	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
1	**,712**	**,735**	**,579**	**,615**	**,476**	**,422**	-,147	,292	**,566**	**,617**
2	-,124	,054	,308	,220	,427	,343	**,791**	**,632**	,088	,340

Note. Source: Research Data (2017).

Menezes (2006) addresses factor loading exclusion criteria aiming at a more homogeneous distribution of the model items: the absolute value of the factor loading is lower than <0.32; similar factor loading in the same factor are lower than 0.1 (<0.1) and a factor is formed by more than one item.

According to this model, items P5 (Score) and P6 (Environmental Structure) were excluded because the values were lower than 0.1, when the two components are compared. Question 7 was also excluded from the study because the average of responses was below the midpoint (4). It does not characterize an adopted strategy, besides the level of significance of the Pearson coefficient being greater than 0,05 in correlation to other questions. Thus, the first component (Table 9) relates to the planning and control of self-learning strategies used by students, and the second component corresponds to the use of rote learning techniques as a self-learning device. Table 10 presents the use of the factors found through the factorial analysis divided by the teaching modality.

Table 10

Factors of self-regulated strategies by education modality

Student's teaching modality		N	Minimum	Maximum	Average	Standard Deviation
Distance	Factor 1: planning and control	171	3,00	7,00	5,7710	,93620
	Factor 2: Memorizing	171	1,00	7,00	4,7193	1,80282
	Valid N (from list)	171				
Classroom	Factor 1: planning and control	131	2,33	7,00	5,4504	1,03501
	Factor 2: Memorizing	131	1,00	7,00	4,9160	1,73222
	Valid N (from list)	131				

Note. Source: Research Data (2017).

Table 10 shows the existence of planning and memorizing factors, as indicated by the factor analysis. It is noticed that the students of the distance modality tend to use more frequently the factor of planning and control, whereas the students of the classroom modality use strategies linked to the memorizing. The quality tests of these data can be observed in Table 11. These findings may reflect the characteristics of each teaching modality. For Niemi, Harju, Vivitsou, Viitanen, Multisilta and Kuokkanen (2014), distance learning students learn to manage time and to become active in the learning process, a statement that may explain the factor reduction in the use of the planning and control, essential to the teaching modality in question. On the other hand, classroom students are constantly subject to verification of learning, usually without the aid of study materials, which may explain the greater use of memorizing strategies.

Table 11

Data quality in factor analysis

Dimensionality	Reference	Result
Kaiser-Meyer-Olkin (KMO) Index	Greater than 0,7 = Desirable	0,820
	Between 0,5 and 0,7 = Acceptable	
	Lower than 0,5 = Unacceptable	
Bartlett sphericity test	Significance level <0,05	0,000
Reliability	**Reference**	**Result**
Cronbach alpha	Greater than 0,60 = Reliable	0,762

Note. Source: Research Data (2017).

For dimensionality analysis, the Kaiser-Meyer-Olkin test was used to verify the suitability index of the sample. The result found was 0.820, which is considered desirable, according to Menezes (2006). Another test referring to dimensionality was Bartlett's sphericity, for which the result of the level of significance was lower than 0.05 (Table 11). In general, the profile of the self-regulated students was identified by means of the average of the answers, according to Table 12.

Table 12

Profile of self-regulated through the average

	N	Minimum	Maximum	Average	Standard Deviation
Self-regulated strategies	302	2,29	7,00	5,5137	,97026

Note. Source: Research data (2017).

Table 12 indicates that the average of students in the classroom and distance modalities was 5.5137 higher than the midpoint of use of strategies by accounting students, data that suggest a high level of use of self-regulation strategies. It is noted that the standard deviation is low (0.97026) demonstrating that the data are not divergent and with low dispersion. This is an important finding, however, it is emphasized that individuals tend to react to the required cognitive needs (Gonçalves & Vagula, 2012) so that the more self-regulated skills are still exercised in the undergraduate accounting studies, the greater the professional success and preparation to deal with information speed and quantity.

5 CONCLUSION

In the light of fourteen self-regulating learning strategies identified by Zimmerman and Martinez-Pons (1986), a comparative analysis was made of the use of self-regulated learning strategies in undergraduate students in Accounting in classroom modality and the distance in two Higher Education Institutions located in Feira de Santana-BA (UNOPAR) and in Salvador, Bahia (FVC).

We sought to analyze the self-regulating learning strategies adopted by students of accounting in classroom and distance modalities and to relate the adoption of self-regulated strategies to gender, age and semester in the respective modalities.

In general, it was not possible to perceive significant differences between the modalities when analyzing the characteristics of self-regulated learning used by students of accounting, a fact that raises concern, since it is desirable (above all) from students of the distance modality a greater autonomy to plan, structure and organize their learning.

Approximately 70% of the sample indicated the use of more than 50% of self-regulating learning strategies in both modes of teaching. The results have indicated that "self-consequence" (E7) is the least used strategy for accounting students, so that there is no "self-assessment" and / or "self-punishment" for success or failures in performing an activity. In the classroom modality, more than half of the sample indicated low use of goal setting and planning

strategy (E3), which indicates that students of this modality do not prepare themselves in advance for the performance of tests / evaluations. Such behavior may influence the results of the evaluations carried out, as it is essential to systematize and practice the contents to be studied in accounting, and "last minute" studies may not be enough and result in lower performance. In the distance modality, the sample has indicated to use more than 70% of self-regulating learning strategies, except for the "self-consequence" strategy (E7).

The average equality tests have indicated the impossibility of establishing relations between the use / adoption of self-regulating learning and semester, gender and age for the distance modality, whereas in the classroom modality students until the middle of the course and those older than 30 years old tend to make better use of self-regulating strategies. The non-adherence to self-regulating strategies throughout the course can be an indication of concern in the continued education of the trainees in accounting, as it is a science that is constantly changing normative, for example.

Factor analysis allowed us to find the presence of two factors: planning and memorizing. It was evidenced that students of the distance modality tend to use with greater intensity the factor of planning and control while the students of the classroom modality use strategies linked to memorizing. However, in general, students of accounting presented a strong use of self-regulating strategies.

The finding of this study and those related to other researches (presented throughout the article) on self-regulation of learning, allow us to converge to the theory of Zimmerman and Martinez-Pons (1986), which relates the potential presence that self-regulating skills provide to the academic life of students. With this finding, it is essential to promote studies that indicate how to work the development of self-regulatory skills in undergraduate courses in accounting sciences. It is also interesting to conduct studies that explore how the use of self-regulating strategies has influenced the performance of accounting professionals.

This study presents some limitations, as the sample studied consists of only two private educational institutions located in Bahia, and analyzes only the variables of gender, age and semester. It is suggested, therefore, the development of another research, involving variables that can better explain the use of these strategies by accounting sciences students as well as expanding the sample.

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HUMAN CAPITAL AND ITS RELATIONSHIP WITH THE ORGANIZATIONAL PERFORMANCE IN ACCOUNTING SERVICES PROVIDERS

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ABSTRACT

Currently the value of companies cannot only be estimated by their tangible assets. The generation and acquisition of knowledge are key for obtaining competitive advantages, reason for which the importance of the intellectual capital of the organization grows. In this context the research aims to analyze whether the human capital (CH) held by companies providing accounting services are positively related to their organizational performance (DO). Methodologically, the research is characterized as quantitative and of an applied nature, with the empirical data obtained from a questionnaire in intentional sample. Data were collected from both constructs and respondents and their companies. Statistical methods were t test and the analysis of variance for averages comparisons. We have also used exploratory and confirmatory factor analysis and modeling in structural equations to evaluate the conjectured relationship. The results have showed that the respondents have statistically equal perceptions for both constructs when considering gender and the type of management the firm has, but there were differences for the perception of performance according to the size. Larger companies report higher performance. The hypothesis that CH is positively and significantly related to OD is, therefore, confirmed.

Keywords: Human Capital. Performance. Accounting.

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1 INTRODUCTION

The concept of intellectual capital is often used as a synonym for intangible assets. However, some definitions, for example the Society of Management Accountants of Canada, do not include the competence of employees, the company's image and reputation, organization and culture, customer loyalty, among other components (Lopes Costa, 2012), which relate to the multidimensional concept of intellectual capital. For the construct, three dimensions are recognized: human capital, structural capital and relational capital (Edvinsson & Malone, 1997).

The component of highest value in the dimensions of intellectual capital, according to Rahman (2012), is the human capital and organizations with great efficiency in this type of capital tend to show better financial performance.

In the case of companies providing accounting services, both structural and relational capital can be considered relatively constant. The organization of work, the relations between bosses and subordinates, and organizational learning as examples of structural aspects, fluctuate little over time. On the other hand, information technology, which is the most changeable among the structural components, usually related to standardized obligations, ends up affecting equally all offices and, therefore, the effect is diluted. Accordingly, the customer portfolio, its satisfaction, the indexes of complaints, such as some of the items from the relations with the users of the services, also remain almost stable.

However, a common fact is the high turnover perceived in these companies. The turnover of the employees under this research is reflected in the relation existing between the time in the profession and the time in the company where they currently work. Therefore, it is justified to study the dimension that measures human capital, conceived as the knowledge, skills and capacities of individuals (Coleman, 1988).

Taking into account this assertion it can be supported that every organization has its human capital, but the business success also undergoes other conditions. The ability of a company to recognize the value of new, external information; to assimilate it, and apply it for commercial purposes is key to its innovative capabilities." (Cohen & Levinthal, 1990, p. 128), is one of the success pillars.

Based on the foregoing, this paper aims to analyze if the human capital (CH) that the companies providing accounting services have is positively related to its organizational performance (DO).

With the present study, we sought to obtain new empirical evidence regarding the relationships between the constructs under analysis. Its performance, in addition to the original for research focus organizations, has practical relevance for improving the functioning of offices. On the other hand, the propositions of theoretical articulations, still little addressed in empirical studies within the Brazilian reality, ground the academic interest.

Following this introduction, the theoretical framework defined is presented. The following section details the material and methods used followed by the description and analysis of the data. Finally, the final considerations are made and the bibliographic references cited in the text.

2 THEORETICAL REFERENCE

In this section, we present the theoretical framework defined as necessary to understand the adopted approach. After the treatment of the human capital construct, the hypothesis of its relation with the organizational performance in companies providing accounting services is drawn-up.

2.1 intellectual Capital

The value of an organization is directly influenced by knowledge and the application thereof, thus ensuring benefits. In general, they have been denominated as intangible assets and as intellectual capital. Wernke, Lembeck and Bornia (2003, 24) state "despite the difficulty of understanding and perceiving the intellectual capital in the face of its subjectivity, it remains evident that it is representative and relevant today, affecting the market value of companies."

Cassol, Zapalai and Cintra (2017, p. 13), in turn, emphasize, "Organizations began to look for possibilities to register and manage their intangible assets so as to develop competitive differentials towards their competitors, intensifying, therefore, the value of knowledge management".

The concept of such capital is related to the role knowledge plays in economic growth (Huang & Liu, 2005). Thus, it has been pointed out that intellectual capital is a vital asset to organizational success (Bontis, Keow, & Richardson, 2000; De Castro, Sáez, 2008, Kamukam, Ahiauzu, & Ntayi, 2010). Stewart (1998, p.8) affirms "intellectual capital is the intellectual matter - knowledge, information, intellectual property, experience, which can be used to generate wealth. It consists of the collective mental capacity."

It can be seen that intellectual capital can be considered as the sum of knowledge, whether individual or collective, as well as tacit or explicit (Bontis, 2001), used by companies to gain competitive advantage. Because of this sum, the intangibles that compose it are drivers of organizational performance (Sainaghi & Baggio, 2013).

In the view of Perez and Famá (2006), intellectual capital is generated by innovation, organizational practices and human resources. According to Gracioli, Godoy, Lorenzett and Godoy (2012), it is responsible for an increasing percentage in the development of organizations, creating the greater part of the value of its products and services. In general terms, the authors express that all intangible resources and their interconnections are considered intellectual capital. Brooking (1996), Stewart (1998), Sveiby (1998) and Edvinsson and Malone (1997, 1998) understand that intellectual capital consists of a set of components, according to Figure 1.

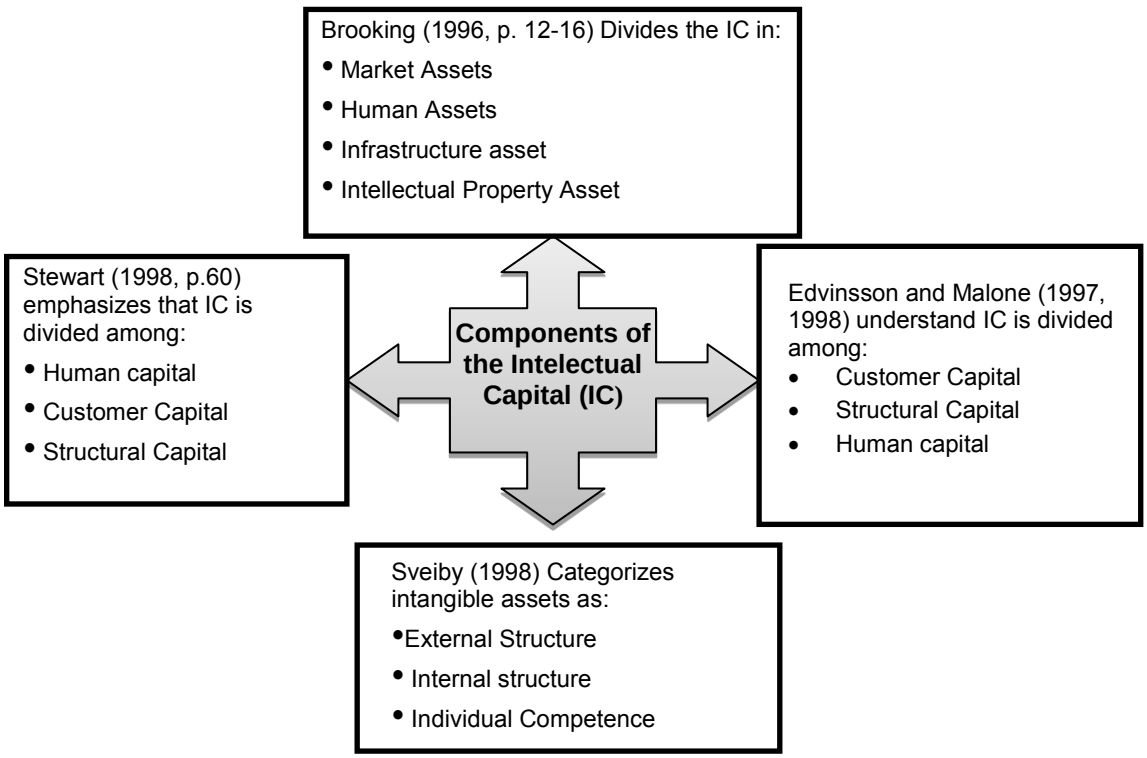


Figure 1. IC Components according to Brooking (1996), Stewart (1998), Sveiby (1998) and Edvinsson and Malone (1997, 1998)

Source: (Edvinsson & Malone, 1997, 1998).

Regarding Figure 1, this research is theoretically related to the categorization of intellectual capital proposed by Edvinsson and Malone (1997, 1998), who understand that IC is composed of human, structural and relational capital. Below, human capital is more deeply investigated, a it is the component analyzed in this study.

2.2 Human Capital

The value of an organization has been directly influenced by knowledge and its application, thus ensuring benefits. They have been generally denominated as intangible assets and as intellectual capital. The concept of this capital relates to the role knowledge plays in economic growth (Huang & Liu, 2005). Thus, it has been pointed out that intellectual capital is a vital asset for organizational success (Bontis, Keow, & Richardson, 2000, De Castro & Sáez, 2008). Accounting science's challenge is to measure it so as to evidence the return that these intangible assets may provide to the company (Oliveira & Beuren, 2003, Sena & Petri, 2011).

In this sense, Stewart (1998, p.8) argues "intellectual capital is the intellectual matter - knowledge, information, intellectual property, experience, which can be used to generate wealth. It consists of the collective mental capacity. "Thus, intellectual capital can be considered as the sum of knowledge, whether individual or collective, as well as tacit or explicit (Bontis, 2001), used by companies to obtain competitive advantage when converted into value (Silva, Bilich, & Gomes, 2002).

In the view of Perez and Famá (2006), intellectual capital is generated by innovation, organizational practices and human resources. In general terms, the authors state that all intangible resources and their interconnections are considered intellectual capital, which is formed, according to Edvinsson and Malone (1997), by the following components: structural, relational and human capital. The latter being the central focus of this study.

Human capital is an intangible asset that can be used to generate value for the organization. Thus, Florin (2005) argues that human capital refers both to the capacity, skill and experience as to the formal knowledge that people hold and that adds value to the company. That is, as conceived by Coleman (1988), he comprises knowledge, skills, and abilities of individuals. Gil and Arnosti (2007) emphasize that human capital involves the knowledge and learning capacity of the employees that make up the organization. Therefore, investments in human capital, according to Unger, Rauch, Frese and Rosenbusch (2009), become important as they enable companies to improve the qualification of their employees, increasing their satisfaction, commitment and, consequently, their performance. Therefore, it is possible to establish the following hypothesis:

H1: Human capital is positively related to organizational performance.

2.3 Organizational Performance

The performance evaluation serves to control a strategy defined by the organization, confronting its result with the established objectives. In this perspective, Neely, Gregory and Platts (2005) see it as a process of quantifying the efficiency and effectiveness of business actions. For Igarashi, Ensslin, Ensslin and Paladini (2008), it is through the performance analysis that organizations can measure their ability to survive and continue, given the demands of the internal and external environment within which they are. The growth of interest in organizational performance measures is a result of important changes both in the business environment and the strategies adopted (McAdam & Bailie, 2002).

Regarding the measurement thereof, Gunasekaran and Kobu (2007) consider it a great challenge for managers to develop appropriate measures to make decisions that are able to contribute to the achievement of competitiveness. Backes, Silva, Adão and Corso (2009) argue that measuring performance is complex and the various methodological forms and approaches used in its evaluation should take into account. Performance can be measured from two perspectives: first, as a subjective concept, which is related to the organizations' performance according to their own expectations or to competition (Pelham & Wilson, 1996); and second to

analyze it by the objective method, based on absolute measures of performance (Chakravarthy, 1996).

In support to the strategic decision of the organization, its measurement, according to Bortoluzzi, Ensslin and Ensslin (2010), shall take into account some important elements, namely: taking into account the particularities of each organization; considering financial and non-financial indicators, that is, the tangible and intangible aspects; connecting strategic and operational targets; and building a communication process that allows all organizational levels to identify in a clear and easy way the objectives idealized by the organization. In this sense, for Dani, Santos and Kaveski (2017: 35) "... business performance indicators are designed to provide the necessary support to decision makers and the survival of the organization."

However, the validity of the use of subjective performance indicators has been demonstrated as a viable alternative in the event of absence of reliable secondary data (Perin & Sampaio, 1999) or impossibility of obtaining them. According to Hoque (2005), the reason why subjective measures are usually chosen is because a significant number of small firms do not have those data or because they have insufficient objective information, making it almost impossible to accurately measure them. In this study, we have chosen to use subjective performance measurements, working in collaboration with the managers of the accounting offices. This decision is based on the fact that this construct constitutes the dependent variable in the model and its measurement, as a value in relation to the closest competitors, being appropriate to estimate the relations the human capital (CH) has therewith.

3 MATERIAL AND METHODS

In view of the adopted criteria, the approach to the problem was quantitative. The quantitative evaluation comprises organizing, summarizing, characterizing and interpreting numerical data (Martins & Theóphilo, 2007). The characteristics of this study, given the perspective of its objectives, place it as descriptive. For Vergara (1998), the objectives of the descriptive research refer to the obtaining of information about a phenomenon or about a certain population and the description of its characteristics. With regards to technical procedures, it was a survey-type, which aims to contribute to the knowledge of a particular area of interest through the collection of data about individuals or their environment.

The material for the study was obtained by means of a non-random sample using a self-filling questionnaire. It was applied in March and April 2016 in person and also sent by e-mail to managers, coordinators and assistants of companies providing accounting services located in the municipalities of Itajaí, Balneário Camboriú and Itapema, in the State of Santa Catarina. The instrument for data collection consisted of 33 assertions, to be answered with a 7-point Likert agreement scale, ranging from totally disagree (1) to fully agree (7). There were also 6 questions for obtaining data from respondents and offices.

The two main sections of the questionnaire comprised the constructs: human capital (CH) and organizational performance (OD). The first section contained 26 assumptions for CH, measured by values (4), attitudes (5), knowledge (6), abilities (6) and leadership (5). In the last section, intended to measure perception about OD, 7 items were presented to be evaluated in relation to the closest competitor. The indicators were: net profit, total sales, achievement of financial goals, employment and personnel targets, customer satisfaction, customer retention and overall performance.

All data obtained were typed in Excel® spreadsheet, which was pre-processed and performed according to the indications of Hair, Black, Babin, Anderson and Tatham (2009). It was observed that there were 17 data missing in the 202 questionnaires received, but on the grounds that the occurrence of any pattern was not recognized, they were filled with the average value of the item considered. Then, the outliers were evaluated using the Box-Plot graphical function of the Statistica software, with which 32 were recognized. Likewise missing data, it was verified that they did not follow certain pattern and it was chosen to maintain them. No typos were found. As a result of the procedures described, the initial database consisted of 202 respondents and 39 variables.

The statistical methods used to compare averages were the t-test and variance analysis.

Anova carried out was univariate and therefore very robust against violations of normality and homoscedasticity (Harris, 1975). The multivariate methods used in evaluating the relations between the constructs were exploratory factorial analysis (AFE), confirmatory factorial analysis (AFC) and structural equation modeling (MEE). The software used was Statistica®, SPSS® and AMOS®.

Before carrying out the factorial analyzes, the Cronbach's alpha coefficient was calculated for each construct considered as well as the correlation of the item with the total, according to the procedure suggested by Churchill (1979). The mean inter-item correlation was calculated and Kaiser, Olkin and Meyer (KMO) and Bartlett's tests were used to confirm the feasibility of factorial analysis. The extraction by principal components was used in AFE, which does not require multi-normality. Factors were extracted according to Kaiser criterion for correlation matrix.

Further restrictions imposed imply that factor loads must be greater than or equal to 0.70 in module and the commonality greater than or equal to 0.5. The variance extracted by the factor in the case of unidimensionality should be greater than or equal to 50%. After these procedures the base was left with 35 variables. These include the 6 variables referred to individual and corporate information along with the 23 variables measuring the human capital and 6 variables measuring performance. In order to evaluate the normality of the distribution of these selected variables and to take into account the data came from Likert scales, calculations of asymmetry and kurtosis were performed (Hair et al., 2009). Finney and Distefano (2006) state that data with coefficients of up to 2 asymmetry and up to 7 skewness, in module, can be considered almost within normality.

Once confirmed that each factor extracted had been with more than three items a confirmatory factorial analysis (AFC) was developed using the AMOS® software. It was posed as a restriction that, between the indicator and the dimension or construct evaluated, the standardized coefficient should have minimum value of 0.50. The AFC corrects possible shortcomings of the exploratory model and leads to a greater certainty of the hypotheses that must be contrasted by means of models that explain the interrelationships existing in the structure of a questionnaire. In this study AFC was used to validate the measurement model individually, for each dimension of the construct, and then for the construct considering all its dimensions. Finally, the general measurement model between human capital and performance was validated.

The analysis of the predictable relation was carried out through the modeling of structural equations, also with AMOS® software. The main function of MEE and the specification and estimation of linear relations models between variables. This technique offers the possibility to investigate how well the predictor variables explain the dependent variable, being also possible to identify which of the predictable variables are the most important (Kline, 2011).

4 RESULTS

With the data from the obtained sample, consisting of 202 valid questionnaires and 35 variables, the procedures described in the previous section were performed prior to conducting the factorial analyzes. Thus, following Churchill (1979) guidelines, in order to confirm the adequacy of data the reliability was evaluated through Cronbach's alpha and the correlations of the item with the total, besides the average value of the inter-item correlation. The results obtained are presented in Table 1, which also shows the value of the test performed by Kaiser, Olkin and Meyer (KMO), which also serves to confirm the feasibility of performing a factorial analysis. Values above 0.7 are expected for KMO. The results of the Bartlett test are not presented in the Table since they were all significant ($p < 0.001$).

Table 1
Indicators of feasibility in performing factorial analysis with the considered constructs

Construct	Dimension	Number of items	Cronbach α	Correlation		K-M-O
				Item-total	Inter-items	
CH	Values	4	0,8428	> 0,6	0,576	0,781
	Attitudes	5	0,9196	> 0,7	0,703	0,884
	Knowledge	5 *	0,8622	> 0,4	0,527	0,819
	Skills	5 *	0,8181	> 0,45	0,484	0,758
	Leadership	5	0,9049	> 0,65	0,682	0,787
DO	Performance	6 *	0,9420	> 0,55	0,729	0,876

Note. Source: Research Data (2016).
* Means the number of items were adjusted to obtain satisfactory data.

Exploratory factorial analysis made it possible to make other adjustments in the database, resulting in the final number of items per dimension and each construct considered (Table 1). Calculation of asymmetry and skewness has showed that none of the values exceeded the limits suggested by Finney and Distefano (2006), as shown in Table 2. This indicates that the distribution can be considered almost within normality.

Once defined the variables used in the data analysis, a comparison of average was made for each construct. For such, dependent variables were the sum of the scores attributed to the selected indicators of each construct. In the comparison between respondents, the gender was used as categorical variable; while to contrast the companies were used the type of administration presented by them: family or professional. In the first t-test there were no differences related to the subject's gender for any of the constructs. For the type of management there was a difference in the averages of three dimensions of human capital, with higher values in family management companies. These differences were verified for the attitudes, capacities and leadership; however, equality was observed for the total sum of the five dimensions.

When considering the size of the office, which are categorized as small (up to 49), medium (from 50 to 99) and large (with 100 or more employees), the contrast of the averages was created using the variance analysis. There were differences for performance and for human capital in simultaneous comparisons, being both constructs measured by the total sum of the selected indicators (Table 2).

Table 2
Calculation of descriptive measures of selected items in the exploratory factorial analysis

Dimension	Item	Average	d.p.	Ass.	Skewness		Dimension	Item	Average	d.p.	Ass.	Skewness
PERFORMANCE	DO 1	5,38	1,201	-0,08	-1,317	CAPITAL HUMANO	Knowledge	CN 1	5,34	1,076	-0,41	0,025
	DO 2	5,57	1,085	-0,06	-1,279			CN 3	5,22	1,178	0,03	-0,751
	DO 4	5,73	1,131	-0,31	-1,305			CN 4	5,52	1,217	-0,24	-0,849
	DO 5	5,80	1,157	-0,46	-1,253			CN 5	5,77	1,023	-0,51	-0,540
	DO 6	5,80	1,215	-0,46	-1,384			CN 6	5,30	1,087	-0,19	-0,777
	DO 7	5,77	1,150	-0,40	-1,286		Attitudes	AT1	5,83	1,293	-0,91	-0,130
Dimension	Item	Average	d.p.	Ass.	Skewness			AT2	5,77	1,144	-0,70	-0,070

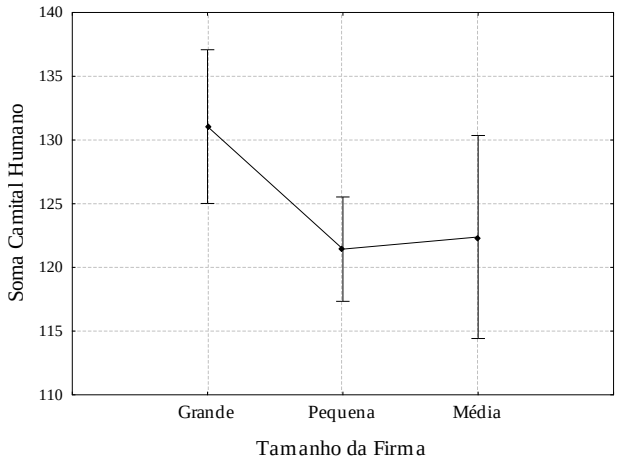
Continue

Table 2 (continuation)

Dimension		Item	Average	d.p.	Ass.	Skewness		Dimension	Item	Average	d.p.	Ass.	Skewness
HUMAN CAPITAL	Values	VL1	5,80	1,010	-0,57	0,769	HUMAN CAPITAL	Attitude-	AT3	5,88	1,208	-1,10	0,512
		VL2	5,57	1,200	-0,21	-1,429			AT4	5,47	1,406	-1,40	1,341
		VL3	5,13	1,343	-0,69	0,239			AT5	5,57	1,536	-1,05	0,203
		VL4	5,99	1,182	-0,79	-0,707		Leadership	LD1	5,35	1,530	-0,61	-0,748
	Capacities	CP1	5,45	1,034	-0,38	0,399			LD2	5,14	1,536	-0,34	-0,995
		CP2	5,72	1,134	-0,28	-1,144			LD3	4,86	2,008	-0,71	-0,915
		CP5	4,58	2,027	-0,48	-1,144			LD4	5,40	1,517	-0,42	-1,251
		CP6	5,61	1,348	-0,63	-0,922			LD5	4,67	2,121	-0,78	-0,800

Note. Source: Research Data (2016).

In Anova for human capital, the simultaneous comparison have showed that there are differences between averages, as shown in Figure 2, and confirms the result of test [F(2, 199) = 3.4968, p = 0.03217]. However, when comparing the comparisons paired with the Tukey test for unequal number of observations, it can be observed that large companies have higher average scores compared to small companies, but their significance is only verified at 10% (p = 0.067) . Medium-size companies, in turn, are no different from large or small companies.

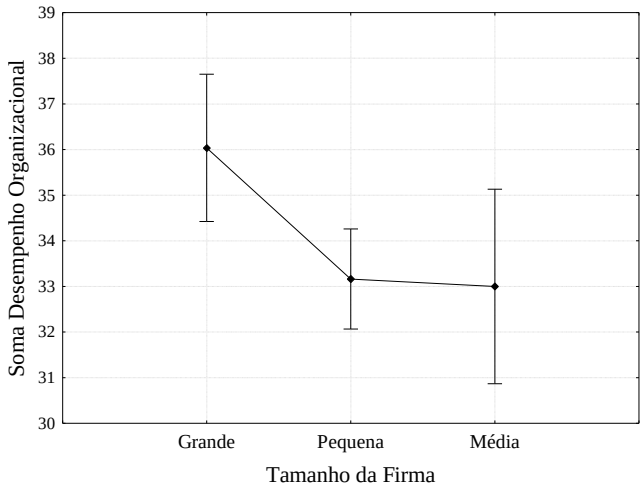


Key: vertical = Human Capital Sum | horizontal = Big Small Medium | Company Size

Figure 2. Simultaneous comparison in Anova of the sum of the score of selected human capital items according to the size of the accounting services office.

Source: Research Data (2016).

In performance Anova with the same predictors, in turn, it is also confirmed that there are differences in the simultaneous comparison [F (2, 199) = 4.6322, p = 0.01081]. Likewise, the larger offices are those that declare better performance (Figure 3).



Key: vertical = Organizational Performance Sum | horizontal = Big Small Medium | Company Size

Figure 3 – Simultaneous comparison in Anova of the sum of the score of selected human capital items according to the size of the accounting services office.

Source: Research data (2016)

And, in the comparisons paired with the Tukey test for unequal number the difference is confirmed to be significant at 5%, as shown in Table 3, between the averages of the performance score for large offices contrasted with small ones. The medium-size offices are not different from big or small offices.

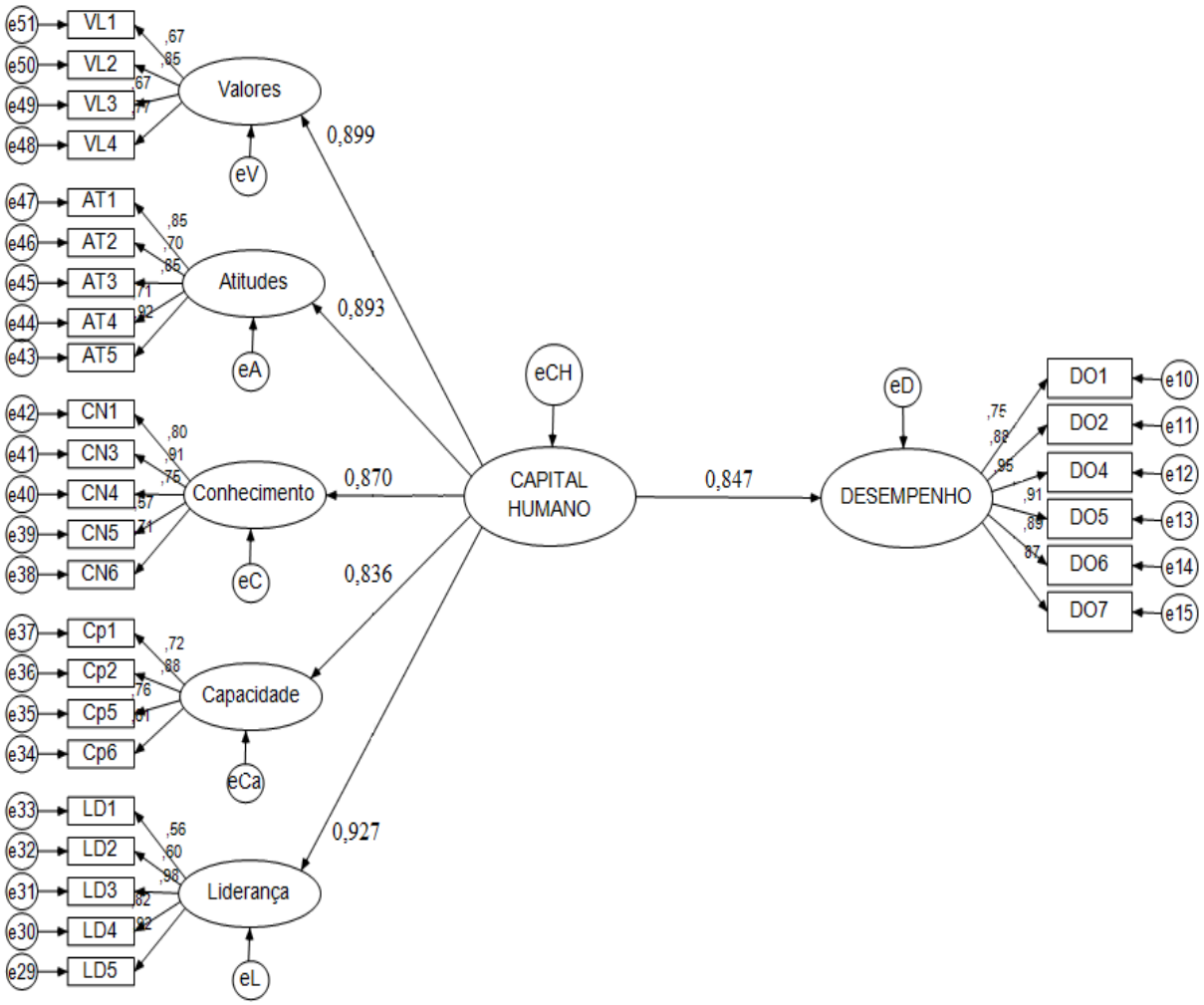
Table 3
Values of average scores and of significance of performance comparisons with Tukey test for unequal number of elements

Size	**Big**	**Small**	**Medium**
Medium	36,037	33,162	33,000
Big		0,034837	0,115324
Small	0,034837		0,993798
Medium	0,115324	0,993798	

Note. Source: Research Data (2016).

In order to evaluate the first hypothesis proposed, the structural model was organized considering the 5 dimensions of human capital (CH), with 23 items influencing the organizational performance (OD) measured by 6 indicators. Figure 4 shows the model with the values of standardized covariance (or correlations) of the relations.

The adjustment of relations by means of the covariance coefficients was obtained in 11 interactions. The results obtained are presented in Table 4, which presents the standardized coefficients and their significance.



Key: Column 1 = Values / Attitudes / Knowledge / Capacity / Leadership | Column 2 = Human Capital | Column 3 = Performance

Figure 4. Structural model of the relationship between the human capital and the organizational performance

Source: Research Data (2016).

Observing the tabulated values, we confirm that all associations involving the human capital with their dimensions and performance were significant.

Table 4

Coefficients calculated in the modeling of structural equations and the significance thereof

Relation			Coefficient	Significance
Knowledge		HUMAN CAPITAL	0,87	***
Attitudes		HUMAN CAPITAL	0,893	***
Capacities		HUMAN CAPITAL	0,836	***
Values		HUMAN CAPITAL	0,899	***
Leadership		HUMAN CAPITAL	0,927	***
PERFORMANCE		HUMAN CAPITAL	0,847	***

Note. Source: Research data (2016).
***: p <0.001.

It is, therefore, confirmed the hypothesis that provided the positive relationship between CH and DO. These same findings were obtained in the researches with several types of companies, such as companies from the software sector (Seleim et al., 2007) and the pharmaceutical sector (Sharabati, 2013).

To evaluate the adjustment of the model, the following indices were used: chi-square divided by degrees of freedom (χ^2/g.l.); Root Mean Square Error of Approximation (RMSEA); Non-Normed Fit Index (NNFI); Comparative Fit Index (CFI); And, Root Mean Residual (SRMR). The reference values suggested as appropriate are: χ^2/g.l. < 5; RMSEA < 0.08; NNFI > 0.90; CFI > 0.90; RMR < 0.10.

In this list data processing the adjustment values obtained were: χ^2/g.l. = 5.5251; RMSEA = 0.086; NNFI = 0.852; CFI = 0.890; and RMR = 0.126. Therefore, the adjustment can be considered satisfactory.

5 CONCLUSIONS

In line with the general objective of the research, it focused on the analysis of the associations between the human capital (CH) and the organizational performance (OD) of accounting offices. Based on the theoretical reference, the hypothesis that postulated such relation was proposed as positive. Initially, some analyzes were carried out to determine whether the gender or type of company management influence the respondents' perception of constructs.

Average comparisons tests failed to show significant differences for any of these predictors. However, according to the size of the companies, differences are observed in performance. The largest are those declaring better performance and still have a higher average in the human capital score, with significance at 10%, if compared to small companies.

As a conclusive remark of this study, we emphasize that in the offices integrating the sample, the available human capital is positively related to the declared performance if compared to competitors. It has also been observed that the aspect that most influences the relations with the human capital is leadership.

We suggested that further researches are done on this type of organization, considering the other components of the intellectual capital, namely structural and relational components. Moreover, we recommend that the database is expanded in new researches, thus including other important constructs, such as the absorptive capacity of knowledge, and conducting a probabilistic sampling so as to generalize the results.

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THE IMPACTS OF THE "PAYROLL TAX RELIEF" ON AN INFORMATION TECHNOLOGY COMPANY

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ABSTRACT

In order to accelerate the growth of productive investment, the technological effort and the innovation in domestic companies, as well as the increase the competitiveness of national goods and services, the program "Brasil Maior" was established, in 2011. One of the measures imposed by this plan is the replacement, for some sectors of the economy, of Social Security Employer tax (taxes on labor) to Social Security tax on revenue, or "Payroll tax relief". In this sense, the objective of this paper is to investigate the impact of this substitution on labor charges expenditures incurred by an Information Technology company located in Florianópolis. An exploratory research was carried out through a case study with qualitative and quantitative approaches. The results indicate that after the implementation of the Social Security tax on revenue, the company achieved savings in social security tax expenditures. Finally, it was found that as of the period when the company could opt for the payment of one or another social security contribution, it has been more interesting to opt for the social security contribution on total revenue.

Keywords: Payroll tax relief. Social Security Employer tax. Social Security tax on revenue.

1 INTRODUCTION

With the slogan "Innovate to compete. Compete to Grow" *Brasil Maior* Plan was established in 2011, aiming to accelerate the growth of productive investment, the technological effort, the innovation of national companies, as well as to increase competitiveness of national goods and services (Plano Brasil Maior, 2011).

According to the provisions of Brasil Maior Primer, *Brasil Maior* Plan integrates instruments from various ministries and bodies of the Federal Government whose initiatives and

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programs are combined in an integrated and comprehensive effort to generate employment and income for the benefit of Brazilian people." Among the measures instituted by *Brasil Maior* Plan is the replacement of the Pension Fund Contribution (CPP) for the Social Security Contribution on Gross Revenue (CPRB), or the "payroll exemption", for some sectors of the economy. The CPRB was established by Provisional Measure No. 540, of August 2, 2011, which was subsequently converted into Law 12,546 of December 14, 2011.

Among other rules, this provisional measure has established the replacement of CPP, whose incidence consists in the application of the 20% rate on the payroll, by CPRB, which consists of applying a rate determined by law, on the gross revenue calculated by the companies. The measure have failed to cover all sectors of the economy, being initially restricted to only a few, including Information Technology (IT) and Information and Communication Technology (ICT) companies, which, according to Dallava (2014), were the most benefited from the payroll tax relief in 2012, in terms of tax exemption.

Moreover, in 2012, these sectors showed a greater positive variation in the number of employees compared to 2011 (Dallava, 2014). Under the new rule, the sectors of companies defined by law were forced to collect this substitute contribution, regardless of whether they were exempt or not. Since the introduction of payroll tax reliefs, there have been several changes in legislation, which, in addition to including new sectors, have changed the rates levied on gross revenue. The most recent amendment, which came into force by December 1, 2015, besides the increase in tax rates, have allowed companies to opt for the payment of one contribution over another, namely: CPP or CPRB. Therefore, they will no longer be required to collect the Social Security Contribution on gross revenue, provided that they collect the 20% on the payroll again.

Considering the foregoing, a case study is carried out on the impacts of "payroll tax reliefs" on labor expenses incurred by an information technology company located in Florianópolis. Based on information provided by the company regarding gross revenue and payrolls settled within the period from 2011 to 2016, comparing the company's expenses with social security contributions from three periods: the period in which the social security contribution should be collected on the payroll (until November, 2011); the period in which the collection on gross revenue became mandatory (December, 2011 to November, 2015); and the beginning of the period in which the company may choose to pay one or the other (as of December, 2015). For the latter period, it was calculated how much the company disbursed by contributing to the CPRB and how much it would spend if it resumed CPP collection, a relevant assessment aimed to tax savings. Eckert, Mecca, Biasio and Silveira (2013), Oliveira, Petri, Casagrande and Rosa (2014) and Echevarrieta, Magalhães, Casagrande and Rosa (2015), in a metallurgical auto parts manufacturer, in Furniture industries and in a hotel, respectively, the authors have found that the replacement of the social security employer contribution to social security tax on gross revenue represents, in fact, a reduction in the tax burden of the companies analyzed.

2 THEORETICAL REFERENCE

2.1 Social security charges on a payrolls and on revenue

According to Martins (2009: 24), expenditures refer to the "purchase of any product or service that generates financial sacrifice for the entity (disbursement), such sacrifice being represented by delivery or promise to deliver assets (usually cash)". Among the various expenses incurred by organizations are those related to the workforce, which represent a high percentage of billing for many companies, especially those focused on providing services.

In information technology companies, according to Kimura, Pereira and Antunes (2012), labor costs represent a large share of the total expenditures, as these services require the intensive use of intellectual capital. Workmanship costs comprise labor charges and social charges. The amounts paid directly to the worker, such as salary, vacation, vacation premium, 13th salary, remunerated weekly day-off, among others, are considered labor charges. Recalls made by the employer for the benefit of employee are considered social charges. Are

considered social charges the Government Severance Indemnity Fund for Employees (FGTS) established by art. 15 of Law no. 8,336/90, the Social Security Employer tax and the Occupational Accident Insurance (SAT) (items I and II of article 22 of Law 81,212/91) and contributions to other entities and funds, including the education-wage and contributions to INCRA, SENAI, SESI, SENAC, SESC, SEBRAE, DPC, AEROVIÁRIO FUND, SENAR, SEST, SENAT, SESCOOP, as established in Attachment I of Normative Instruction no. 971/2009. As a CPP, employers must collect 20% on salaries paid to employees. Regarding SAT, the legislation has established that employers collect from 1% to 3%, according to the degree of risk of their activity. And 5.8% for other entities and funds, so called third parties. With regards to FGTS to be deposited for the employee, the company shall collect 8%.

According to Martins (2009, p. 135), social charges in Brazil "are totally dependent on the payment made, making them a variable cost in relation to the workforce itself and directly proportional thereto", while, according to Author, in other countries these charges assume a fixed cost nature, once they relate more to the number of people than to the amount paid. Thus, considering the volume of these expenses, as well as their variation in relation to the amounts spent on labor, adequate measurement is key for companies to obtain an effective control over the costs related to each employee. In addition, the measurement and control of these expenditures become essential for the economic sectors that obtain more intensive labor expenditures, such as the service sectors.

The Social Security Contribution collected by the companies is intended to finance Social Security and, according to the Federal Constitution of 1988, may incur on payrolls, revenue / income or profit.

> Art. 195. Social security shall be financed by society as a whole, both directly and indirectly, pursuant law, through resources from the budgets of the Federal Government, the States, the Federal District and the Municipalities, and from the following social contributions:
> I – of the employer, the company and the entity assimilated thereto in accordance with the law, incurred on:
> a) the payroll and other income from work paid or credited, in any capacity, to the individual who provides services, even without employment relationship;
> b) the revenue or earnings;
> c) the profit;
> [...]
> § 12. The law shall define the sectors of economic activity on which contributions in the form of subsections I, b; and IV of the caput, shall incur non-cumulatively.
> § 13. The provisions of § 12 apply even in the event of gradual, total or partial replacement of the contribution incurred in the form of item I, a, by that incurring on revenue or income (Federal Constitution 1988, 1988).

The Social Security Contribution payable by companies is provided for in art. 22 of Law no. 8,212/1991, which, among other measures, establishes the Social Security Costing Plan. Employers shall collect, as Social Security Employer tax, 20% of the total remuneration paid to employees, self-employed and independent workers providing services to them. According to Ansiliero et al. (2010) and Kertzman (2012), the increase in the employer's rate in the last decades - which at the origin of the pension was only 3% (Law Eloy Chaves of 1923) having changed to the current 20%, has had a major impact on labor-demanding companies and sectors, thus discouraging the generation or formalization of employment links. Thus, according to Ansiliero et al. (2010, p.10), "the replacement (whether total or partial) of 20% tax rate for the contribution on revenue or income would produce some relief for firms and labor-demanding sectors" (...). In this sense, Silva, Paes and Ospina (2014, p. 518) suggest that such replacement is "made in sectors of the economy considered labor intensive."

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In this context, in 2011, through Provisional Measure no. 540 (later converted into Law 12,546, of December 14, 2011), the CPRB was established. This "new" contribution, popularly called payroll tax reliefs, replaced the CPP payment with a new social security contribution, whose tax rate and calculation basis are different. This, established by law, should focus on the gross revenues of companies. Ferrari, Kremer and Silva (2014, p.5) point out that payroll tax reliefs consist of two complementary measures:

> First, the government has eliminated the current social security contribution on the payroll and adopted a new model on corporate gross revenues (excluding export earnings), in line with the provisions of the Federal Constitution guidelines. And, secondly, this change in the base of the contribution also comprises a reduction in the tax burden of benefited sectors, because the rate on gross revenue was set at a lower level than that rate - the so-called neutral rate.

Kertzman (2012, p. 168), on the other hand, argues that payroll tax reliefs do not necessarily represent a reduction in total tax costs. According to the author, the intention is "to find a source of financing that is less aggressive to society, without loss of resources intended to social security."

Silva et al. (2014, p. 518), when analyzing the macroeconomic effects of the substitution of the employer to income contribution, have stated that "when the 1% or 2% income rate is replaced by the employer's rate, the great effects are due to the reduction of the tax burden, but without significant impact in reducing the distortions of the Brazilian tax system."

According to Kertzman (2012), the replacement of CPP by CPRB reflects the worsening of the social risk of involuntary unemployment. For Cavalcanti (2008, p.258) one of the goals of the replacement in taxation from payroll to the billing "is to stimulate the increase of formal employment relations". In this aspect, Silva et al. (2014, p.544) found that "labor-demanding companies show an increasing behavior towards labor demand, but that slows down as the rate on the sector's revenue increases."

When created, the measure was limited only to call centers, Information Technology (IT), Information and Communication Technology (ICT), clothing, leather and footwear sectors. Subsequently, it was expanded to 56 economy sectors. Since its institution, companies listed by legislation are now forced to replace the CPP collection with CPRB collection. After the enforcement of Law no. 12,546/2011, the companies listed would stop making the 20% contribution on the total payroll payable during the month to insured employees and individual employees, as well as to individual taxpayers who has provided services, as provided for in subsections I and III, of Art. 22 of Law no. 8,212 of July 24, 1991. They would proceed to establish the social security contribution with the application of the rate, as defined by law, on gross revenue, excluding canceled sales, unconditional discounts granted, revenues from exports, Tax on Industrialized Products - IPI (if included in gross revenue) and State Value Added Sales Tax (ICMS), when charged by the seller of the goods or the service provider as a tax replacement.

For information technology companies, the rate initially set by legislation was 2.5%. As of August 1, 2012, after some changes in the legislation, the rate went down to 2%. The most recent amendment, which came into force on 12/01/2015, has increased the tax rates to 4.5% on gross revenue (article 7 of Law 12,546 of 2011, as amended).

Besides the increase in tax rate, a recent change brought by Law no. 13,161/ 2015, allowed for the option of collecting the CPP. As of December 1, 2015 companies included in payroll tax reliefs may choose either to collect the CPP or the CPRB. Unlike CPP, which shall

be collected through the Social Security Guide (GPS), the CPRB, in turn, shall be collected through the Federal Income Collection Document (DARF), both by the 20th day of the month following the month in which they become due.

Pursuant the new rules, the option for substitute taxation shall be expressed by the payment of the tax levied on the gross revenue related to January of each year, or to the first subsequent jurisdiction for which there is gross revenue, being irreversible for all calendar year. According to the new Law, exceptionally for 2015, the option shall be expressed by the payment of the tax levied on the gross revenue related to November (article 9, §13 and §14 of Law 12,546/2011). This wording has resulted in divergent understandings among taxpayers that were only clarified by the publication of the Normative Instruction n. 1,597 of December 1, 2015, which established that the collection with increased tax rate shall only be effective as of December, whose CPRB collection shall occur in January 2016. The same shall apply for taxpayers who, in December 2015, opt for the return to CPP taxation. Figure 1 presents a summary of the main differences between the two collection modalities.

CPP	CPRB
Applicable to all sectors	Applicable to specific sectors
Collection on salaries paid to employees	Collection on adjusted revenue (adjusted gross revenue) of companies
Collected through Social Security Form (GPS)	Collected through Federal Income Collection Document (DARF)
In terms of the final amount, it tends to be higher when the use of labor is high and revenue is low	In terms of the final amount, it tends to be higher in activities where the revenue is high and the use of labor is low

Figure 1. Summary of main differences between the collection modalities
Source: Research data (2016).

According to the differences presented in Figure 1, in economy the sectors where CPRB is applicable, the impacts on companies' expenses with labor charges may be representative. In this sense, managers should consider the adjusted billing and the proceeds paid to employees for simulation purposes. In order to illustrate these analysis in an information technology company, previous studies were used for exploring procedures employed and results achieved.

2.2 Previous studies

A survey of previous studies was made on this matter in an attempt to identify procedures used and results obtained. Therefore, Figure 2 shows the objective, the procedures used and the main results achieved.

Authors	Objectives	Procedures	Results
Eckert *et al.* (2013)	To analyze the impacts of payroll tax relief in an auto parts manufacturer	Exploratory research, through a case study, with qualitative approach	Significant reduction in the amount of labor charges after the payroll tax reliefs
Oliveira *et al.*(2014)	To verify the impact of the change in the form of calculation of social security contribution in companies within the furniture sector	Descriptive research in a case study, with a quantitative approach	Regardless of the divergence, both in revenue figures and with regards to the number of employees, in the two companies analyzed, both were exempted in their contributions, reaching 70% of savings in the two years under analysis.
Bertini & Wunsch (2014)	To evidence the impact of payroll tax relief on footwear industries	Assessment survey with qualitative and quantitative approach	Cost reduction and positive financial impact on companies analyzed
Echevarrieta *et al.* (2015)	To verify the influence of the social security contribution before and after the payroll tax relief of a Hotel in Florianópolis metropolitan area	Descriptive study, with case study and qualitative approach	Reduction of labor costs based on the reduction of the social security contribution, pointing to a payroll tax relief
Ludwig *et al.* (2016)	To verify if there was a costs reduction in two companies analyzed within	Case study with quantitative approach	The company that uses proprietary labor has benefited from changes in legislation, including the reduction in

	the civil construction sector		figures paid to social security, while the company that uses outsourced labor did not observe benefits, not even indirectly

Figure 2. Objectives, procedures and results of previous studies
Source: Prepared from the identified studies (2016).

Studies identified in Figure 2, although addressing different empirical objects in terms of size and economic segment, present similarities in the objectives, procedures and results achieved. The analysis of the impacts of payroll tax reliefs on the labor charges incurred is common to the objectives of the studies. Except for Bertini and Wunsch (2014), all other researches used a case study as research procedure. Regarding the results, the positive aspects of payroll tax reliefs, including the reduction of labor costs incurred, were also demonstrated in all studies.

3 METHODOLOGICAL PROCEDURES

With regards to its objective, which is to compare the company's expenditures with social security contributions between 2011 and 2016, this research can be classified as descriptive, which, according to Triviños (1987), demands from the researcher a precise delimitation of techniques, methods, models and theories that guide the data collection and analysis, whose objective is to provide scientific validity to the work.

As to technical procedures, it is classified as a case study, which, according to Yin (2001, 32), "is an empirical research that investigates a contemporary phenomenon within its real-life context, especially when the limits between phenomena and context are not clearly defined." For Gil (2008, p. 57), "the case study is characterized by the deep and exhaustive study of one or a few objects, in order to allow its ample and detailed knowledge".

The case, an Information Technology company, is chosen based on three main reasons: the first concerns the fact that the company belongs to a sector covered by payroll tax reliefs, therefore, subject to study; the second reason is that we sought a case whose type of company had not yet been investigated in many studies, as seen in Figure 2; The third reason, which links to the second, refers to a case with intense use of labor, which makes it interesting to compare the collection on the income and on the earnings.

Regarding the approach to the problem, the research is classified as quali-quantitative, which, according to Koche (2006), is concerned with the understanding and interpretation of the phenomenon. Its main objective is to understand, explore and specify the existing scenario.

This research was carried out based on data from gross revenues and payrolls related to the period from January 2011 to December 2016. Data collection was performed using payroll reports made available by the company and the Profit and Loss Statement for the year provided by the Accountant, both issued monthly. Moreover, semi-structured interviews with managers and the Accountant of the company were also used to solve doubts about the reports received.

The data made available through semi-structured reports and interviews were analyzed and analyzed under the descriptive technique, which was implemented using electronic spreadsheets to calculate expenses with social security contributions: a) from employers (from January to November 2011); and b) on gross revenue (from December 2011 to 2016). Considering that as of December 2015 the companies could choose to pay one or another social security contribution, an analysis was made to identify which would be less costly for the company from that month on.

4 RESULTS

4.1 Company presentation

The company under study is a private equity company located in Florianópolis, which provides services to clients located in various regions of Brazil and started its activities in 2004.

According to the classification proposed by the National Bank for Economic and Social Development (BNDES), through Circulars 11/2010 and 34/2011, considering its income, it is a small company. It is currently made up of a team of 61 employees and taxes company income tax on actual profit.

Since the institution of the substitutive social security contribution, the company has obtained a growing revenue (gross revenue). The company's gross revenue, shown in Table 1, comprises the services provided in the years of 2011, 2012, 2013, 2014, 2015 and 2016. There have been no sales canceled, unconditional discounts granted, revenues from direct exports, Tax on Industrialized Products (IPI) and State Value Added Sales Tax arising from tax replacement (ICMS).

Table 1
Gross revenue reported – 2011 to 2016

Year	2011	2012	2013	2014	2015	2016
Gross Revenue	2.355.596,44	3.365.296,32	5.529.615,28	5.842.143,20	7.425.649,50	9.879.373,40

Note. Source: Research Data (2016).

Within the same period, the company obtained payroll expenses related to salaries, directors’ fees, 13th salary, vacations, FGTS, SAT, outsourcing, food tickets, transportation vouchers, health plans and dental plans. Payroll expenses (remuneration, directors' fees, 13th salary and vacations) included in the Social Security Employer tax calculation basis, for the period from 2011 to 2016, are shown in Table 2.

Table 2
Proceeds from 2011 to 2016

Year	2011	2012	2013	2014	2015	2016
Proceeds	987.649,81	1.307.116,09	1.833.493,00	2.380.139,63	2.864.422,40	3.444.398,50

Note. Source: Research Data (2016).

In 2011, year in which payroll tax reliefs were established, the company had a team of 24 professionals. This team has continued until 2013, jumping to 38 in 2014, 50 in 2015 and 61 in 2016. With this information it is possible to show, through Table 3, the growth in gross revenue, earnings and number of employees within the period from 2011 to 2016. There has been a 43% increase in revenue in 2012 compared to 2011. The same occurred in 2013, when the increase was 64%, compared to that obtained by the company in 2012. In 2014 the growth of Revenues were lower (6%), presenting stronger growth in 2015 (27%) and 2016 (33%).

Table 3
Annual growth of gross revenue, proceeds and number of employees

Year	2011	2012	2013	2014	2015	2016
Gross revenue (R$)	2.355.596,44	3.365.296,32	5.529.615,28	5.842.143,20	7.425.649,50	9.879.373,40
GR Annual Growth (%)	0,00	43%	64%	6%	27%	33%
Proceeds (R$)	987.649,81	1.307.116,09	1.833.493,00	2.380.139,63	2.864.422,40	3.444.398,50
Proceeds Annual Growth (%)	0,00	32%	40%	30%	20%	20%
No. of employees	24	24	24	38	50	61
No. of employees Annual Growth (%)	0,00	0%	0%	58%	32%	22%

Note. Source: Research Data (2016).

The expenses with proceeds were in line with the expansion of the company's revenue, but more timidly. They reached the highest percentage in 2013, when they showed an increase

of 40% compared to the previous year. In 2015, still growing, expenses with proceeds were 20% higher than in the previous year. Concerning the number of employees, the company maintained the team from 2011 to 2013. It increased its position by 58% in 2014 (compared to 2013) and by 32% in 2015 (compared to 2014).

In 2011, 2012 and 2013 there has been growth in both gross and salary expenditures, directors' fees, 13th salary and vacations, while the number of employees remained unchanged. While in 2014, the number of employees increased over 50% and revenues grew by less than 10%, while expenses with revenues grew 30%. Based on these observations, the analysis of expenditures obtained by the company with CPP and CPRB in the period from 2011 to 2016 is proceeded with.

4.2 Analysis of results

For better evidence of research results, we first analyze the variations occurred in disbursements related to social security contributions payable within the period from January, 2011 to November, 2015. Then, the social security contribution payable as of December 2015 is presented, considering the possibility the company opts for the collection of the CPP or CPRB. In this case, the two options are compared in order to identify the most austere for the company. Finally, we present how much the company disbursed with social security contribution within the period from 2011 to 2016.

4.2.1 Social security contribution payable from January 2011 to November 2015

As already pointed out, up to November 30, 2011, the company was bond to the payment of CPP, that is, until that date 20% collection incurred on the salaries of employees and directors. In 2011, R$ 175,938.20 was collected as CPP, as shown in Table 4.

Table 4
Social security contribution payable from 2011 to 11/30/2015

Year	2011	2012	2013	2014	2015
CPP	175.938,20	-	-	-	-
CPRB	8.614,83	75.903,22	110.592,31	116.842,86	136.136,91
Total for the year	184.553,03	75.903,22	110.592,31	116.842,86	136.136,91

Note. Source: Research data (2016).

As of December 2011, the company was forced to pay the social security contribution at the rate of 2.5% on gross revenue. Table 4 shows the amounts disbursed by the company within that period. For the period beginning in August 2012 and ending on November 30, 2015, the law was changed and the CPRB collection rate went down to 2%. This fact has again reduced the value of the social security contribution to be collected by the company. With the payroll tax reliefs, the company began to disburse less with social security contribution. Regarding costs obtained in 2011, in 2012 related to this tax, the company perceived saving of almost 60%. Solely due to the increase in revenue, as of December 2011, a reflection was perceived on the payment of social security contributions, which gradually increased over the following years. In 2015, expenses with social security contributions still did not reach the level of expenses obtained by the company in 2011, when it has contributed with CPP most of the year.

It is worth emphasizing that, in 2015, the social security contribution for December was not considered, since CPRB started being calculated as of this months taking into account the increase of the rate to 4.5%. Once incurred directly on the gross revenue, expenses with social security contributions for the period between December 1, 2011 to November 30, 2015 were directly proportional, i.e., 2.5% on the gross revenue from 12/01/2011 to 07/31/2012, and 2% from 01/08/2012 to 11/30/2015.

4.2.2 Social security contribution payable as of December, 2015

As of December 1st, 2015, the company could choose to continue collecting CPRB or to resume CPP collection. However, the rate on gross revenue was 4.5% thereafter. Taking this

fact and the data on gross revenue and earnings into consideration, Table 5 breaks down the disbursements made by the company as CPRB as well as those the company would have made if opted for CPP. We point out however, that the comparison between the collection methods was done only for the period showed in Table 5, since in previous periods the company was not able to choose one over another collection modality.

Table 5
Collection of CPP and CPRB social security contribution

Social Security Contribution	December, 2015	2016
CPP	47,740.37	688,879.70
CPRB	27,846.19	444,571.80

Note. Source: Research Data (2016).

The expenses with CPRB are lower than the expenses with CPP, that is, for the contributions payable, concerning 2015 and 2016, the option to continue the CPRB collecting has resulted in smaller social security burden to the company. Thus, Table 5 shows that it was more cost-efficient to the company to continue collecting the social security contribution based on gross revenue.

Considering that the tax rate on gross revenue is 4.5% and that the rate on payrolls is 20%, it is possible to affirm that if the value of payrolls is lower than 22.5% of company's revenues, it is more advantageous for the company to collect CPP. Accordingly, if payroll expenses exceed 22.5% of revenues, it is more advantageous to collect CPRB. The company under this study, has a history of payrolls expenses above 30% of the gross revenues, therefore, the best option is to collect CPRB.

4.2.3 Evolution in social security contributions payable from 2011 to 2016

With the introduction of payroll tax reliefs, as of 12/01/2011, the company reduced the collection of social security contributions, corroborating with the findings of the authors Ansiliero et al. (2010), Ferrari et al. (2014) and Silva et al. (2014), which argue that the change in the social security contribution calculation basis would result in a reduction in the tax burden of the beneficiated sectors. Compared with collections of 2011, the company has obtained savings in subsequent years until 2015. In 2012, the social security contributions paid by the company were less than 50% compared to what was paid in 2011. In the years 2013 and 2014, the payments reached an average of 60% above the amounts the company paid in 2011.

This study, therefore, have demonstrated that the replacement of CPP by CPRB represented a reduction in the tax burden of the company under analysis, as well as the results achieved by Eckert et al. (2013), Oliveira et al. (2014), Bertini and Wunsch (2014), Echevarrieta et al. (2015), Ludwig, Borgert and Kremer (2016), who found reduction in the collection of social security contributions in several other sectors, confirming positive aspects of payroll tax reliefs.

In 2016, due to the increase, from 2% to 4.5% (125%), in CPRB rate, the company has considerably increased the expenses with social security contributions. It is important to note that, although the rate has increased, the company actually observed a reduction in payroll expenses. This exemption has started at the end of 2011 and continues to be relevant to the company, so that in 2016 it was more interesting for the company to continue collecting CPRB.

5 CONCLUSION

the growth in corporate spending, along with the granting of benefits, concerning certain taxes, have strengthened the need for planning and preparing projections aimed at savings to organizations. In this sense, the objective of this research focused on investigating the impact of "payroll tax reliefs" on labor expenses incurred by an information technology company located in Florianópolis.

The findings of the study show that since established, payroll tax reliefs have been beneficial to the company, representing a significant saving in terms of labor charges, more specifically, of social security contributions. We, therefore, conclude that, with regards to social security contributions expenses, the company was, in fact, exempted. As of December 2011,

the company has started to collect CPRB, which means its social security contribution payments initially decreased by over 50%.

Only in 2015, when it reached earnings almost 3 times higher than in 2011, the company collected as social security contribution amounts close to those it used to spent back then. For the company, as of December, 2015, expenses with social security contributions have increased, due to the 125% increase in the CPRB rate. It was also identified that, only if the value of the payrolls is lower than 22.5% of company's revenues, it is more advantageous to collect the Social Security Employer tax. Considering that if payroll expenses exceed 22.5% of revenues it is more advantageous to collect the social security contribution on gross revenue.

It should be noted that the company currently spends a little more than 30% of its earnings with payrolls. Therefore, the best option has been to collect CPRB since the establishment of payroll tax reliefs. As a natural consequence of the methodological procedures adopted, the results herein achieved refer only to the case studied, which belongs to a sector whose labor cost is the largest portion of the cost for revenue generation. Therefore, in sectors with lower labor demands the same results may not be repeated; which is the perfect scenario for future studies aimed at assessing this issue.

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INDEX OF ENVIRONMENTAL DISCLOSURE (IDA): ANALYSIS OF THE APPLICATION OF INDICATOR DEVELOPED FROM THE EXPERT PERSPECTIVE IN BRAZIL*

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ABSTRACT

Companies are concerned with disclosing environmental information in order to convey to stakeholders an environmentally sound "image". The study aims to apply the Environmental Disclosure Index (IDA) to Sustainability Reports in the paper and pulp sector in Brazil. This indicator was developed by Bachmann, Carneiro and Espejo (2013), with Brazilian researchers in the area of sustainability, using the Delphi technique. Characterized as descriptive and exploratory, the content analysis was performed using the Atlas.ti software from the IDA categorization. The results show that Sustainability Reports include both the categories and the items that make up IDA, except for Cia. Melhoramentos de São Paulo, which failed to show excerpts from the environmental financial information. The findings indicate that Celulose Irani was the organization whose environmental disclosure was more aligned with the indicator proposed by Bachmann et al. (64%), followed by Fibria Celulose (64%), Klabin (50%) and Cia. Melhoramentos de São Paulo (36%). It is concluded that the results of this research strengthen the IDA, favoring the theoretical and empirical consolidation of the aspects of environmental disclosure, while proposing a wider range of international discussion on the validity of this indicator aimed at sustainability. Therefore, it is observed the relevance of organizations to develop projects, indicators and initiatives aimed at the disclosure of environmental information, considering that investments related to the reduction of environmental impacts are beneficial to the entity and all information stakeholders.

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1 INTRODUCTION

Environmental accounting is a part of accounting that addresses the activities, methods, systems, reports of financial and ecological impacts within an economic system (Schaltegger & Burrit, 2000). From the perspective of the reports, the disclosure of environmental information in Brazil does not have a defined regulatory framework. However, the pressure imposed by stakeholders, especially in companies that have activities of high environmental impact, induces voluntary disclosure (Nossa, 2002).

Given the voluntary nature of environmental disclosure, it is important to understand the motivations for disclosure of environmental information (Yamamoto & Salotti, 2006), since this evidence contributes to the generation of added value increasing the trust towards and commitment with stakeholders (Borges, Rosa, & Ensslin, 2010). Additionaly, disclosure of environmental information and economic performance has an intrinsic correlation; the institutional arrangements of the environmental information disclosure system necessarily promote the economic performance (Zhongfu, Jianhui, & Pinglin, 2011). In this scenario, Bovespa has developed the Corporate Sustainability Index (ISE), which includes companies concerned with the sustainable development of society (BM&FBovespa, 2014).

It should be noted that the implementation of sustainable processes is one of the greatest challenges of organizations. They aim at reducing pollution and minimizing the use of scarce natural resources (Souza, Rásia, & Jacques, 2010). Dalmoro, Venturini and Pereira (2009) report that the unruled quest by some companies for short -term economic results has caused great ecological impacts reflecting on related parties. In this sense, social and environmental issues at corporate level have influenced the increase of research in the field of environmental accounting, especially in those aspects related to disclosure (Nascimento, Santos, Salotti, & Murcia, 2009). The socially responsible action of entities has already surpassed the stage of mere trend, and sustainability has become a strategic vision of long-term business that incorporates the economic, social and environmental dimensions (Kassai, Ha, & Carvalho, 2011).

Costa and Marion (2007) have analyzed the environmental disclosure and observed that the absence of uniformity of information jeopardize the analysis of the reports. Souza et al. (2010) have investigated the environmental information of the companies that make up ISE in the segments of chemical, electric power and steel making and metallurgy. The results suggest that in the Corporate Balance there are greater environmental evidences compared to the Management Report and the Explanatory Notes; still, we observe that the use of environmental indicators is little explored in these business segments.

Roumeliotis and Alperstedt (2014) have analyzed the environmental principles and indicators of electric power generation companies in Santa Catarina (SC) in the Sustainability Reports, so as to meet GRI requirements. For such, they used content analysis. The results have demonstrated that the structure of the Report needs evolution, so that there is greater adherence to factors related to the principles and degrees of environmental indicators.

Bachmann et al. (2013) have listed environmental attributes, according to the degree of importance of disclosure for the composition of a Brazilian indicator that evaluated the quality of disclosure of environmental information. In this sense, the scientific contribution of the present investigation is the application of the Brazilian indicator, refereed to as Environmental Disclosure Index (IDA), to the pulp and paper segment.

Therefore, the question that guides this study is: **what is the application of the IDA in Sustainability Reports?** The purpose of the research is to present the results of the application of IDA to companies belonging to the paper and pulp sector. Thus, this research expects to check whether companies in pulp and paper segment consider the categories of analysis defined by IDA, as well as what content is being evidenced by these companies in their Sustainability Reports.

The relevance of this study is grounded on the fact that sustainability represents a new scope of research in the "business universe", and its performance optimizes the use of natural resources while contributing to the integrity of the planet (BM & FBovespa, 2014). Still, this research aims to collaborate to scientific knowledge, given the exclusivity of the applied indicator, as well as to disseminate it nationally in order to enable the broadening of the critical mass on the sustainability matter.

Research related to environmental sustainability in the pulp and paper sector is relevant, considering that this segment depends on nature, which has limited resources. In addition, if companies are not aware of the impacts generated in the industrial process, the continuity of the industry may be compromised (Gasparino & Ribeiro, 2007). Therefore, we have observed the need for a socially correct attitude by the entities.

Nossa (2002) have analyzed the content in environmental reports of the pulp and paper sector at international level. The findings of the study revealed that the environmental disclosure in pulp and paper companies is distinguished by size, country of location and type of financial or specific report. Following the same line of thinking, this research seeks to contribute to the progress of studies related to sustainability.

2 IDA AND ENVIRONMENTAL *DISCLOSURE*

Environmental issues are often discussed (Zeng, Xu, Dong, & Tam, 2010; Zhongfu et al., 2011, Ashcroft, 2012, Momin, 2013, Lu & Abeysekera, 2014). Central aspects refer to the commitment of organizations to the environmental impacts arising from the business activities (Lu & Abeysekera, 2014). Nossa (2002) clarifies that environmental disclosure, also refereed to as environmental disclosure, may be either mandatory or voluntary; The first refers to legal and normative impositions; while the volunteer, on the other hand, is the result of managers' choices.

In Brazil, there is no regulation on environmental disclosure. Therefore, disclosure by entities is voluntary. The Laws n. 6,404/76 and n. 11,638/07 is not specific in the disclosure of these aspects. However, Guideline of Brazilian Securities and Exchange Commission (CVM) Opinion no. 15/87, Auditing Standard and Procedure no. 11 from the Institute of Independent Auditors of Brazil (IBRACON) and Resolution no. 1,003/04 of the Federal Accounting Council (CFC), present the guidelines for dissemination of environmental information (Beuren, Santos, & Gubiani, 2013).

Bovespa, in December 2005, has created the Corporate Sustainability Index (ISE), which seeks to evaluate in an integrated manner different sustainability scopes, whose focus is to induce entities to good environmental practices. It should be noted that in the ISE composition, one of the aspects refers to the Tripple Bottom Line that considers three perspectives of analysis: i) economic; (Ii) social; And iii) environmental. The economic aspect analyzes the efficiency of the allocation of production resources; the social aspect considers the human development, specifically those related to the remuneration of employees, safe environment; and the environmental aspect focuses on matters related to the ecosystem and natural resources (BM&FBovespa, 2014).

In this sense, greater disclosure of environmental aspects contributes to creating an environmentally correct image, reducing capital cost and increasing of liquidity of shares. It is a differential for organizations to adopt this attitude (Rover, Murcia, Borba, & Vicente, 2008). Furthermore, the dissemination of environmental information favors the development of the corporate image (Gray & Bebbington, 2001) and contributes to competitive advantage (Porter 1993, Aaker 2001, Tachizawa 2002).

With regard to environment-oriented researches in Brazil, Ribeiro (1992) marks the beginning thereof, when investigating the profile of the dissemination of environmental information by accounting in the national and international scope. Nossa (2002) have analyzed environmental disclosure in Brazilian and foreign companies within the pulp and paper sector. The findings are in line with the theory, considering that the variation of environmental disclosure occurs according to the size and the country of the company.

Borba, Rover and Múrcia (2006) have compared Brazilian and U.S. environmental information evidence. The results have shown discrepancies in the volume of information released by these countries. Rover et al. (2008) have analyzed the voluntary environmental information disclosed by companies belonging to high-impact sectors. For this purpose, categories of analysis were established. Their results corroborate the Voluntary Disclosure Theory that refers to the disclosure beyond the regulation recommendations representing a free choice by managers to communicate additional information to the decision making process of internal and external users (Murcia & Santos, 2009).

"Accounting, Auditing and Accountability Journal" made special editions on issues concerning the environment (Rover et al., 2008). Table 1, below, presents studies from the perspective of environmental disclosure as of 2010.

Table 1
International Studies

International Studies	Author(s)
Corporate Environmental Information (FDI) refers to information related to the natural environment, environmental protection and use of resources. Such information was analyzed in 871 industries listed on the Chinese stock exchange. In the discussions the relations between the FDI are presented compared to the industrial sector, size of the company and ownership of the entity. The results reveal the negative relationship between FDI and the level of commercialization.	Zeng, Xu, Dong and Tam (2010)
This research finds that the dissemination of environmental information has a positive effect on economic performance. Therefore, companies that sufficiently disclose their environmental information perform better.	Zhongfu, Jianhui and Pinglin (2011)
This study was carried out in companies from the United States and Canada, with the purpose of discussing the influences for the elaboration of the environmental disclosure. The content of the environmental disclosure of the annual reports was evaluated based on the environmental reporting guidelines published by the American Institute of Chartered Accountants and the Canadian Institute of Chartered Accountants. The results indicate that US companies have a higher level of environmental disclosure compared to Canadian companies.	Ashcroft (2012)
This article explores the perceptions of Corporate Social Disclosure (CSD) in non-governmental organizations in the context of a developing country: Bangladesh. Semi-structured interviews were conducted in selected social and environmental NGOs. The results suggest that companies need to engage in social development to improve their social performance in order to meet their social and environmental responsibilities for the people of Bangladesh.	Momin (2013)
The influence of stakeholders and the social and environmental characteristics of Chinese companies listed as socially responsible were analyzed. The results have indicated that the disclosures related to social and environmental aspects have a positive and significant association with company size, profitability and industry classification.	Lu and Abeysekera (2014)

Note. Source: the authors, based on works refereed to (2017).

The scope of international studies on environmental issues are observed (Zeng *et al.*, 2010; Zhongfu *et al.*, 2011; Ashcroft, 2012; Momin, 2013; Lu & Abeysekera, 2014). In order to contribute to the scientific progress of the Brazilian researches related to environmental disclosure, the following is the composition of the Environmental Disclosure Index, named IDA, which has been developed by Brazilian researchers.

The study by Bachmann et al. (2013), published in the Journal of Accounting and Organizations, led to this research. From the perception of accounting and sustainability specialists, the authors, through Delphi rounds, have created IDA, an indicator composed of ten aspects of environmental characteristics. According to experts, these attributes, in ascending order, reflect on the practicity and representativeness of the quality of environmental information.

Table 2
Composition of the Environmental Disclosure Indicator (IDA)

IDA Composition
1 - Environmental impacts of products and processes (air, water, noise, visual pollution)
2 - Debris and waste information
3 - Establishment of environmental goals and objectives
4 - Environmental management program (long term)
5 - Declaration of environmental business policies
6 - Water efficient use / reuse
7 - Environmental auditing
8 - Accounting practices of environmental items
9 - Environmental protection reserve
10 - Environmental costs and / or expenses

Note. Source: Bachmann, R. K., Carneiro, L. M., & Espejo, M. M. dos S. B. (2013). Evidence of environmental information: proposal of an indicator based on the perception of experts. *Revista de Contabilidade e Organizações, 7*(17), 36-47.

For the authors, the study makes it possible to understand the environmental aspects that must be disclosed. It also reveals that qualitative aspects, such as "environmental impacts of products and processes" and "waste information", were of high importance. As a perspective of further studies, the authors suggest that the IDA can be validated in a number of companies. This suggestion is aligned with the purpose of the present study.

3 RESEARCH METHODOLOGY

This research is characterized as descriptive and exploratory, as it seeks to identify the application of the IDA to sustainability reports. Only companies within the paper and pulp sector listed on BM&FBovespa were evaluated, as shown in Table 3.

Table 3
Bovespa Pulp and Paper Portfolio

Celulose Irani	Santher Fab. de Papel Sta. Therezinha
Cia. Melhoramentos de São Paulo	Suzano Holding
Fibria Celulose	Suzano Papel e Celulose
Klabin	

Note. Source: BM&FBovespa. (2014). *Business Sustainability Index (ISE).*

After selecting the companies, and in order to operationalize this study, the data were collected in the Sustainability Report for the year of 2013. These reports were obtained in October 2014 on the companies' websites. The Sustainability Report, also known as Integrated, reports the information and results related to social, environmental and corporate governance aspects. Its differential consists in being a quick mean for accessing information (BM&FBovespa, 2014).

At that moment, it was found that the company Santher Fab. De Papel Sta. Therezinha has failed to publish this report and on Suzano's website, therefore, only the Sustainability Reports were available up to the year 2012. Based on the foregoing contact with Suzano Papel e Celulose was made via e-mail. However, no return was obtained. As a result, four companies were obtained as final sample: i) Celulose Irani; ii) Cia. Melhoramentos de São Paulo; iii) Fibria Celulose; and iv) Klabin.

In order to analyze the application the IDA to the Sustainability Reports, we have used the content analysis technique, which seeks to reveal the description of messages contents

based on systematic and objective procedures (Bardin, 2004). Fauzi (2009) and Nossa (2002) have also used this methodology in their studies, when discussing matters concerning the environment.

Thus, as proposed by Bachmann et al. (2013), the 10 components of IDA were distributed in four environmental categories: i) impact of products and processes; (ii) environmental policies; iii) environmental management systems and; iv) environmental financial information, as shown in Table 4.

Table 4
Conceptual structure for environmental disclosure

Environmental Categories	IDA Composition
Impact of Products and Processes	1 - Environmental impacts of products and processes (air, water, noise, visual pollution)
	2 - Debris and waste information
	6 - Water efficient use / reuse
Environmental Policies	3 - Establishment of environmental goals and objectives
	5 - Declaration of environmental business policies
Environmental Management Systems	4 - Environmental management program (long term)
	7 – Environmental auditing
Environmental Management Systems	8 - Accounting practices of environmental items
	9 - Environmental protection reserve
	10 - Environmental costs and / or expenses

Note. Source: Adapted from Múrcia, F. D. R., Rover, S., Lima, I., Fávero, L. P. L., & Lima, G. A. S. F. de. (2008). 'Green Disclosure' in financial statements: Characteristics of environmental information and possible explanations for voluntary disclosure. Accountancy, *Revista UnB Contábil, 11*, 260-278; Bachmann, R. K., Carneiro, L. M., & Espejo, M. M. dos S. B. (2013). environmental information Evidence: proposal of an indicator based on the perception of experts. Revista de Contabilidade e Organizações, 7(17), 36-47. (2013)

Atlas.Ti software version 7.5.2 was used for associating environmental disclosure with IDA indicators and their categories to companies within the pulp and paper sector. This software made it possible to categorize and interconnect the environmental information presented in Sustainability Reports, through the creation of a project in the so-called hermeneutics unit that composes primary documents (P-Docs), quotations (Quotes) and Codes. Based on these elements, Atlas.Ti enables the illustration of relations observed by the researcher through the construction of relationship networking. Therefore, to obtain these results, the Sustainability Reports were read and the excerpts of the text classified as to the ten aspects that make up IDA. It is worth mentioning that some categories were segregated as they addressed different approaches. Table 5 shows the composition of ADI (segregated) used for content analysis.

Table 5
IDA Segregation for content analysis

IDA Composition	Segregated IDA Composition
1 - Environmental impacts of products and processes (air, water, noise, visual pollution)	1.1 - Air pollution
	1.2 - Water Pollution
	1.3 - Noise Pollution
	1.4 - Visual pollution
2 - Debris and waste information	2.1 - Debris
	2.2 - Waste
3 - Setting of environmental goals and objectives	3.1 - Environmental goals

Continue

Table 5 (continuation)

IDA Composition	Segregated IDA Composition
4 - Environmental management program (long term)	4.1 - Environmental program
5 - Declaration of environmental business policies	5.1 - Environmental policies
6 - Water Efficient use / Reuse	6.1 - Reuse of water
7 - Environmental auditing	7.1 - Environmental audit
8 - Accounting practices concerning environmental items	8.1 - Environmental accounting practices
9 - Environmental protection Reserve	9.1 - Environmental reserve
10 - Environmental costs and / or expenses	10.1 - Costs and expenses

Note. Source: Adapted from Bachmann, R. K., Carneiro, L. M., & Espejo, M. M. dos S.B. (2013). Evidence of environmental information: proposal of an indicator based on the expert perspective. *Revista de Contabilidade e Organizações, 7*(17), 36-47.

To the light of the aforementioned methodological path, the final purpose of this study has been met, as described below.

4 ANALYSIS OF SUSTAINABILITY REPORTS

4.1 Celulose Irani

Celulose Irani has gone public in 1977. Its activities are focused on the production of paper for packaging, boxes and corrugated cardboard sheets, all biodegradable and 100% recyclable, as well as resins. Its industrial units are located in the cities of Vargem Bonita (SC), Balneário Pinhal (RS), Indaiatuba (SP) and Santa Luzia (MG). While the administrative offices are located in Joaçaba (SC) and São Paulo (SP), and the headquarter in Porto Alegre (RS) (Celulose Irani Sustainability Report, 2013).

Regarding the environmental categories that make up IDA, it was verified that all were highlighted in the Sustainability Report, according to Figure 1. However, some items were not mentioned, such as noise pollution, visual pollution, environmental reserve and environmental accounting practices.

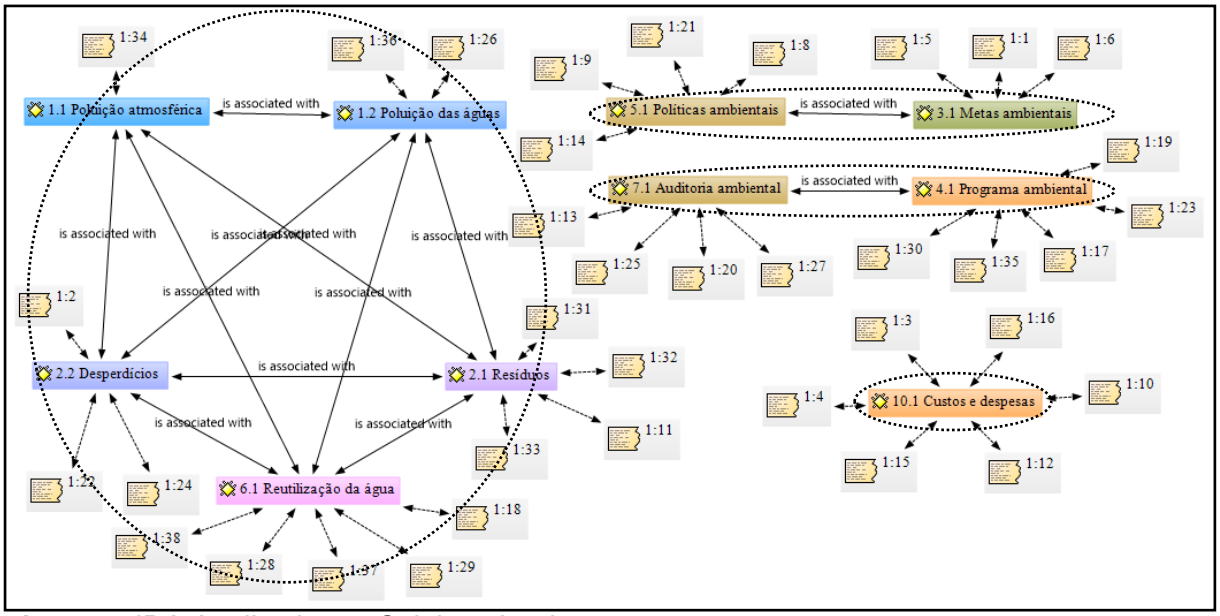

Figure 1. IDA Application to Celulose Irani

Key: 1.1 - Air pollution; 1.2 - Water Pollution; 1.3 - Noise Pollution; 1.4 - Visual pollution; 2.1 - Debris; 2.2 - Waste; 3.1 - Environmental goals; 4.1 - Environmental program; 5.1 - Environmental policies; 6.1 - Reuse of water; 7.1 - Environmental audit; 8.1 - Environmental accounting practices; 9.1 - Environmental reserve; 10.1 - Costs and expenses.
Source: The authors (2017).

With regards to the category of impact of products and processes, it was found that in the disclosure related to atmospheric pollution the company removes more carbon from the atmosphere than its emissions, so its activities are carbon neutral. With regards to water pollution, in 2013 the Resins Unit presented problems at the Effluent Treatment Station (ETE). It is verified that the company adopts specific procedures for the collection, storage and proper destination of the waste generated throughout the processes, by hiring specialized services for this purpose.

From the waste perspective, Celulose Irani seeks the continuous improvement of the products' Life Cycle Analysis (LCA) indicators, in order to avoid waste and identify new opportunities for cost reduction. There are excerpts that show the practice of reusing water, in which Celulose Irani states that water consumption has been reducing over the years; In addition, the new technologies implemented allowed the reuse of water in some processes making use of closed circuits.

In the environmental policies category, Celulose Irani demonstrated that one of its environmental goals is to maintain a balance between the environment and society. In parallel, the company seeks creativity and commitment to continue making progress in reducing environmental impacts, especially with a focus on recycling products and by-products. From the perspective of environmental policies, the company ensures commitment to sustainability in its actions, as well as believing that sustainability is a conditional factor for innovation.

Regarding the category of environmental management systems, the company has defended aspects related to environmental auditing and environmental programs. Concerning the audit, the company shows adequacy of procedures to international standards of sustainability. Internal and external audits are also carried out. Specifically in ETE, the monitoring comprises the analysis of several parameters and constant actions that are developed aiming at reducing the effluent volume.

The development of some programs such as: i) Family Garden Program: grow health at home", (stimulates the grow of organic foods and quality of life for residents); ii) Solid Waste Management Program (prioritizes the reduction, recycling and reuse of waste); iii) Fixed-Source Emissions Program (aim at periodically monitoring the points of emission of its industrial units).

The environmental financial information category features disclosure aspects regarding the costs / expenses. The company states that it seeks gains from productivity and cost reduction in processes. In 2013, the devaluation of Real has boosted the productive chain to face new challenges from the cost perspective. In the same year, the company saved R$ 3,500.00 reais by reusing substrates from the production of Pine and eucalyptus seedlings for producing native seedlings.

4.2 Cia. Melhoramentos de São Paulo

Cia. Melhoramentos de São Paulo prepares, since 2011, the Sustainability Report. The company operates in the editorial segment, of forest management, pulp and cellulose fiber, distributed in 3 units. In addition to the administrative headquarters in São Paulo, in the region of Lapa, the management is carried out at Fazenda Florestal, in Caieiras (SP) - with 5 thousand hectares; at Fazenda Santa Marina, in Bragança Paulista (SP) - with 650 hectares; and at Fazenda Levantina, in Camanducaia (MG) - with approximately 12 thousand hectares. In the latter, besides the forest management practiced in only 50% of the total area, the remaining 50% is preserved as native forest (São Paulo Improvements Report, 2013).

Data analysis has revealed that three environmental categories - impact of products and processes, environmental policies and environmental management systems - are included in the Sustainability Report of Cia. Improvements of São Paulo, 2013. As to the category of impact of products and processes, the company issued a note on actions addressing the reuse of

water, noting that after water is used it is treated in ETE. Moreover, it made evident that investments were made in ETE, thus increasing its treatment capacity from 10m³/h to 20m³/h.

In the environmental policies category, Cia. Melhoramentos de São Paulo has presented in its Sustainability Report the excerpts of goals and environmental policies. It is observed that with regards to the goals, the company seeks to become a benchmark in socio-environmental responsibility, positioning itself as the largest high-yield fiber producer for the world market by 2025, in addition to seeking to neutralize the environmental impacts in its operations, always concerned with the preservation and monitoring of the biodiversity present in its management areas.

With regards to environmental policies, it is noted that the organization is based on the ideal of respect for the environment and protection to ecosystems. Therefore, according to the reports, the entity is involved in socio-environmental practices. From customers' perspective, its policy focuses on creating value in the sustainable packaging chain.

Another approach identified in Cia. Melhoramentos de São Paulo corresponds to the environmental management system. In this category, the entity has demonstrated aspects of environmental auditing and participation in environmental management programs. As part of the audit, the company follows strict rules established by the Forest Stewardship Council (FSC), and conducts audits regularly. Another remark, verified in 2013 by the annual audit, refers to the maintenance of the Green Seal at Fazendas de Camanducaia, which guarantees the traceability of the wood from raw material to final consumer.

To the light of environmental programs, the content of information disclosed states that the organization has a genetic improvement program, whose purpose is to select and obtain clones adapted to weather conditions, which contributes to the production of high-yield fibers. Additionally, it can be seen that Cia. Melhoramentos de São Paulo participates in cooperative programs linked to the Institute of Research and Forestry Studies, whose focus is to improve the embedding of its clones.

Regarding the environmental categories of IDA, Cia. Melhoramentos de São Paulo was the one that presented the smallest amount among the entities under study. Through the analysis in the Sustainability Report, some items, such as air pollution, water pollution, noise pollution, visual pollution, debris, waste, environmental accounting practices, environmental reserve and costs and expenses, were not mentioned.

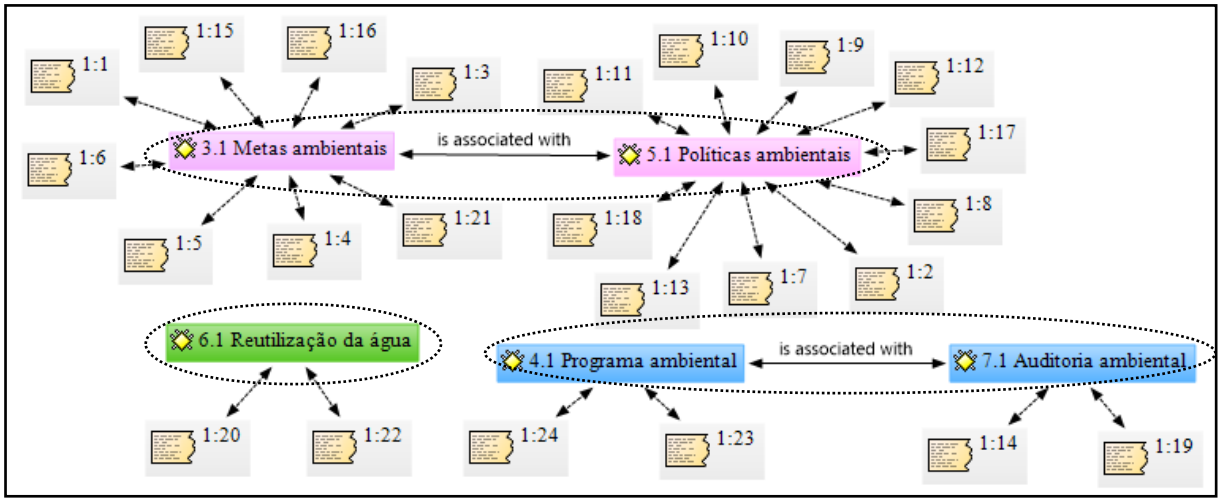

Figure 2. Application of IDA to Cia. Melhoramentos de São Paulo
Key: 3.1 - Environmental goals; 4.1 - Environmental program; 5.1 - Environmental policies; 6.1 - Reuse of water; 7.1 - Environmental audit.
Source: The authors (2017).

Figure 2 represents the categories identified in the analysis of Cia. Melhoramentos de São Paulo.

4.3 Fibria Celulose

Fibria Celulose was created in 2009, from the acquisition of Aracruz Celulose SA by Votorantim Celulose e Papel S.A. It is the world's largest producer of short-fiber eucalyptus pulp - raw material for the manufacture of papers for printing, writing, personal hygiene and special uses. The wood is processed in the company's factories in Aracruz (ES), Três Lagoas (MS) and Jacareí (SP). Fibria is present in 242 municipalities, in 7 Brazilian states, namely: Rio Grande do Sul, São Paulo, Rio de Janeiro, Espírito Santo, Mato Grosso do Sul, Minas Gerais and Bahia. The company also maintains a fourth Industrial Unit, Veracel, in partnership with the Swedish-Finnish group Stora Enso (Fibria Celulose Sustainability Report, 2013).

Based on Figure 3, we observe that all environmental categories comprising the IDA were identified in Fibria's Sustainability Report. It should be noted that some items of these categories were not identified in the analysis performed, namely: i) water pollution; (ii) noise pollution; (iii) visual pollution; (iv) waste; and v) environmental reserve.

With regards to the category of impacts of products and processes, the entity has showed aspects of air pollution, debris and water reuse. Some sections emphasize that the total area affected by fires was 7,950 hectares, of which 4,445.1 hectares of burned forests were in preservation areas. With regards to waste, the company emphasizes that one of its priorities in industrial processing is to make the most efficient use of solid waste and, by 2025, to seek a reduction of 91% in the volume of waste intended for industrial landfills. Jacareí Unit, for example, reuses waste (fiber), which used to be disposed of, thus increasing the productivity of the plant and providing annual savings of around R$ 500,000. Additionally, the company uses the soil corrective from the use of industrial waste, which results in economy to the company.

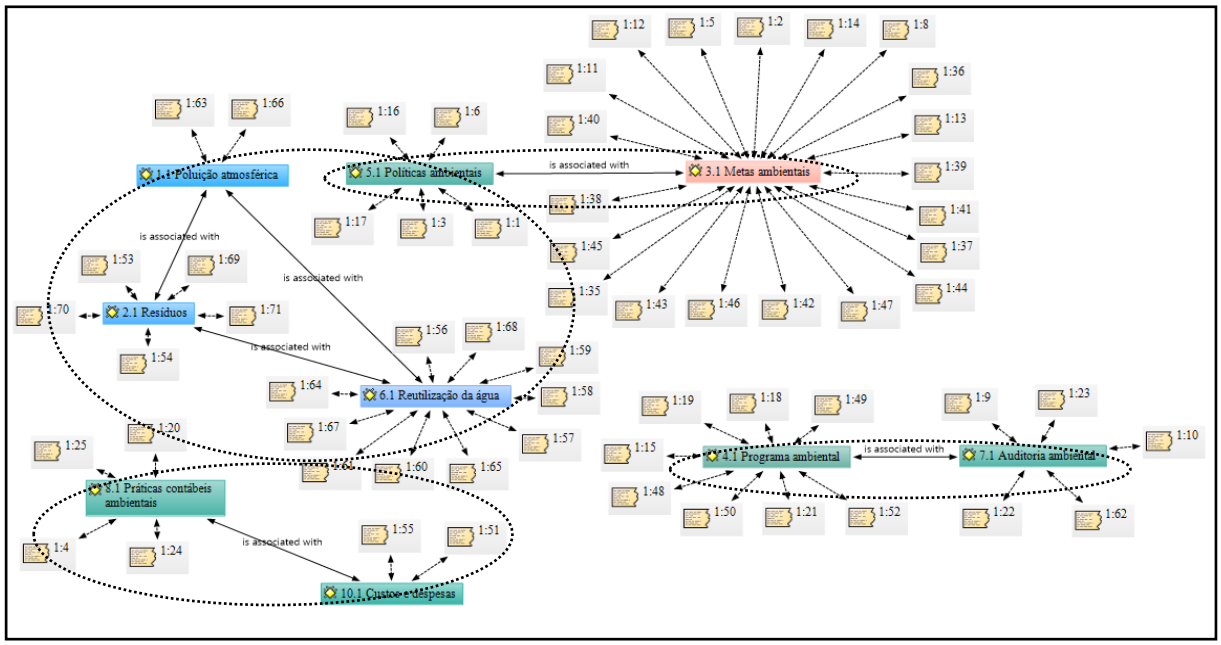

Figure 3. Application of IDA to Fibria Celulose
Key: 1.1 - Air pollution; 1.2 - Water Pollution; 1.3 - Noise Pollution; 1.4 - Visual pollution; 2.1 - Debris; 2.2 - Waste; 3.1 - Environmental goals; 4.1 - Environmental program; 5.1 - Environmental policies; 6.1 - Reuse of water; 7.1 - Environmental audit; 8.1 - Environmental accounting practices; 10.1 - Costs and expenses.
Source: Authors (2017).

The concern of Fibria Celulose regarding the efficient use of water is observed. In the sections of the Sustainability Report, it is perceived that the entity seeks to guarantee the quantity and quality of water necessary for its forestry and industrial activities, always ensuring the supply to the communities. In 2013, Fibria has expanded the monitoring of water resources in order to identify bottlenecks that could interfere with the water supply to communities. It is noteworthy that in 2013, an innovative project was developed, reducing by half the water consumption in Aracruz seedlings nursery, for which rainwater harvesting and effluent treatment

were used. Fibria is part of the Water Footprint Network (WFN) and monitors the use of water at all stages of production to identify optimization opportunities.

Another category identified refers to environmental policies. Based on the analysis, it was verified that Fibria's goals are environmental, with emphasis added to the large number of excerpts that refer to this aspect of IDA. In addition, the entity have also presented some environmental policies, such as the identification and monitoring of environmental impacts throughout the entire value chain, so as to act in harmony with society. Once again, the text makes it clear that Fibria's policy focuses on prioritizing local communities, since they are the most affected by the organization's operations. Finally, from the suppliers' perspective, Fibria requires them to comply with environmental policies.

With regards to environmental goals, these were found to be aligned with the environmental policy defined by the company. Some of the goals identified in the analysis of the Sustainability Report include: reducing by one third the amount of land required for the production of pulp by 2025; consolidating the forest business as a renewable and sustainable source of life; strengthening the work of the Internal Sustainability Commission (CIS), which has as one of its objectives the function of monitoring the execution of commitments assumed by the company; prioritizing the implementation of a solid supplier management policy, conduct on-site audits with a focus on sustainability, and develop a Code of Conduct for suppliers.

The environmental management systems category, comprised of environmental programs and audits, have demonstrated that the company has some environmental programs, such as: i) Territorial Rural Development Program (PDRT) (focus: community empowerment to manage sustainable agroforestry projects); ii) Beehives Program (aim to contribute to the improvement of the life quality of beekeepers); iii) Environmental Education Program (PEA) (actions for residents, schools, leaderships, community groups and companies from Barra do Riacho); iv) Forest Restoration Program; V) Forestry Learning Program (qualifies labor for forest harvesting area in partnership with Senai and Kolping Institute); Vi) Forest Savings Program (offers financing in exchange for guarantee of timber supply); (vii) Odor-Perception Network Program (aims to reduce the emission of odor during the industrial process based on reports of the residents surrounding the plants.

It was observed that Fibria has issued in its Sustainability Report excerpts on costs / expenses and environmental accounting practices, items that integrate the environmental category named environmental financial information. With regards to costs and expenses, the evidence focuses on the search for new alternatives to reduce the volume of inputs in the processes of cooking and bleaching, whose purpose is to lower pulp production costs.

In turn, the company's discourse, in line with accounting practices, refers to the sales of 207 thousand hectares of land to a Brazilian investment fund, generating revenue of R$ 1.65 billion. Fibria was involved in two actions related to losses from Aracruz Celulose derivatives, which occurred in 2008. These actions resulted in agreements, which were settled in the first quarter of 2013.

4.4 Klabin

Klabin has three business units, forestry, paper (letter, Kraft and recycled papers) and conversion (corrugated cardboard boxes and industrial bags). Klabin currently has 15 units distributed in 8 Brazilian states, and 1 unit in Argentina (Klabin Sustainability Report, 2013). Figure 4 demonstrates that Klabin presented all the environmental categories integrating the IDA in 2013 Sustainability Report. The category impacts of products and processes presented sections on the efficient use of water, not mentioning aspects related to air pollution, water pollution noise pollution, visual pollution, debris and waste.

As to the reuse of water, we verify that ETE ensures the removal of more than 80% of biochemical oxygen demand, ensuring compliance with legal requirements and emissions below the limits established for the discharge of its effluents, which are monitored in all units Of Klabin. This procedure is managed through reports and analysis. The rivers that receive the effluents have monitored water quality. Klabin also declared that seeks to reduce consumption and promote the rational use of water in all its industrial and forestry operations.

With regards to environmental procedures, the company has presented excerpts of

environmental goals and policies. With regards to environmental goals, the discourse directs management towards sustainable development. In addition, the activities carried out by the organization follow guidelines for climate change, whereas the goal for 2014 is to reduce greenhouse gas emissions.

With regards to environmental policies, Klabin undertakes to adhere to the best practices adopted in the market, using environmentally and socially responsible processes throughout the production chain. Its code of conduct gathers together principles of business sustainability in economic, environmental and social spheres. In this sense, the sustainability policy guide the conduct of business and investments, taking into consideration the sustainable growth and value generation for all stakeholders.

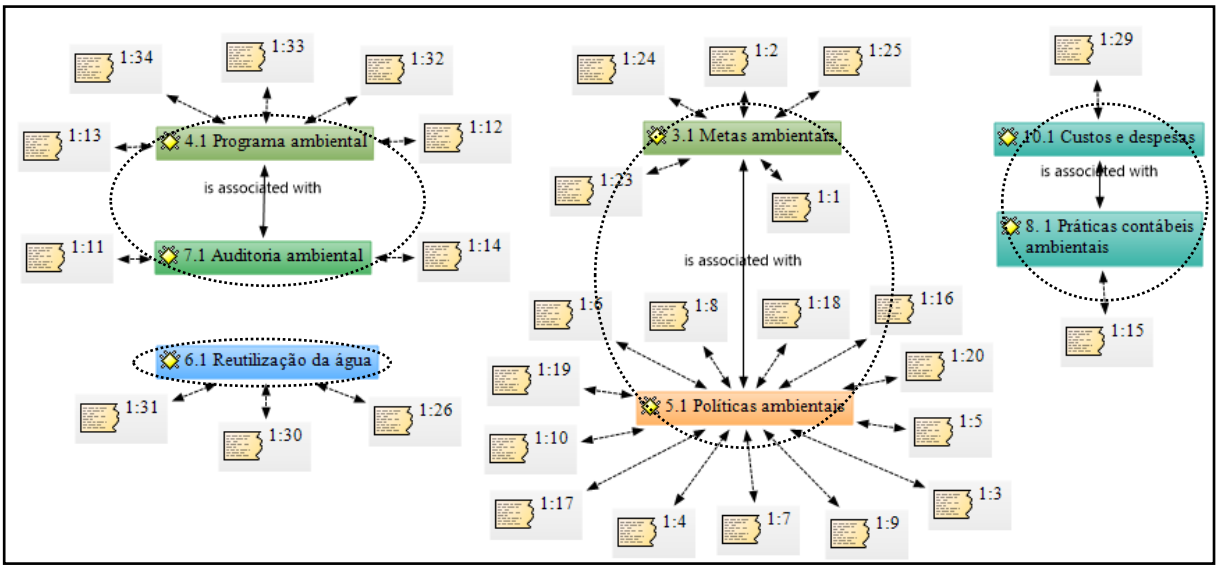

Figure 4. Application of IDA to Klabin
Key: 3.1 - Environmental goals; 4.1 - Environmental program; 5.1 - Environmental policies; 6.1 - Reuse of water; 7.1 - Environmental audit; 8.1 - Environmental accounting practices; 10.1 - Costs and expenses.
Source: The authors (2017).

In the environmental management systems category, Klabin presented evidence of environmental auditing and adoption of environmental management programs. From the audit perspective, a contracted risk management company is monitored and audited at Klabin's units. In December 2013, the company monitored 1992 requirements in all of its units. Performing periodic internal and external audits ensures correctness of data and system evidences. As a result, in the last three years the company has not suffered any lawsuit, whether of civil or criminal nature concerning the environment.

As to the environmental programs, Klabin has a program for research and conservation of fauna and flora, monitoring biodiversity and identification of species considered rare or extinct. Superar Program has been contributing to the company's continuous improvement through the involvement and appreciation of people, developed at Monte Alegre (PR) unit. O Superar is present in 14 units, with expressive results in the excellence of processes and products.

With regards to the environmental financial information, the analysis evidences costs / expenses and accounting practices of environmental items. In terms of costs and expenses, Klabin was fined R$ 2,784.52 for having produced the acidity corrector (lime sludge) with magnesium oxide content beyond the tolerance limit set.

With regards to the accounting practices of environmental items, Klabin has an agreement signed with the Government of the state of Paraná that provides for the division of ICMS from operations of the new plant among 12 municipalities. With Ortigueira bearing 50% and the remaining 50% being divided among the 12 municipalities.

4.5 Joint Analysis

Table 6 was prepared based on the individual analysis of the Sustainability Reports of companies Celulose Irani, Cia. Melhoramentos de São Paulo, Fibria Celulose and Klabin, presenting the environmental categories proposed by IDA, the composition of the segregated IDA and the objects companies analyzed hereunder.

Among the analyzed companies, only in Cia. Melhoramentos de São Paulo excerpts referring to the environmental financial information category were not observed. In other organizations at least one item of each IDA category was mentioned.

Table 6
Comparison of IDA application

Environmental Categories	Composition of the Segregated IDA	Celulose Irani	Cia. Melhoramentos de SP	Fibria Celulose	Klabin
Impact of Products and Processes	1.1 - Air pollution	X		X	
	1.2 - Water Pollution	X			
	1.3 - Noise Pollution				
	1.4 - Visual pollution				
	2.1 - Debris	X		X	
	2.2 - Waste	X			
	3.1 - Environmental goals	X	X	X	X
Environmental Policies	4.1 - Environmental program	X	X	X	X
	5.1 - Environmental policies	X	X	X	X
Environmental Management Systems	6.1 - Reuse of water	X	X	X	X
	7.1 - Environmental audit	X	X	X	X
Environmental Management Systems	8.1 - Environmental accounting practices			X	X
	9.1 - Environmental reserve				
	10.1 - Costs and expenses	X		X	X

Note. Source: The authors (2017).

Comparing the composition of the segregated IDA (fourteen indicators) with the environmental disclosure, we find that: i) Celulose Irani is the company that most evidenced IDA categories, that is, ten categories or 71% disclosure; ii) Cia Melhoramentos de São Paulo presented five categories or 36% disclosure; iii) Fibria Celulose presented 9 categories of segregated IDA or 64% disclosure and; iv) Klabin presented seven categories or 50% disclosure.

Thus, considering the joint analysis of the companies integrating this study, we verify that IDA composition have integrated the Sustainability Report of companies within the paper and pulp sector. However, the degree of environmental disclosure is unstable. Some companies disclose information more often than others. It was also found that environmental policy categories and environmental management systems are those presenting the highest level of disclosure. These are recurrent in all reports analyzed.

5 CONCLUSIONS

The article aimed to present the results of the application of IDA in companies comprising to the pulp and paper sector in Brazil. In this sense, the work sought to be an empirical contribution to the validation of the indicator proposed by Bachmann et al. (2013), based on content analysis of the Sustainability Reports of four companies: Celulose Irani; Cia Improvements of São Paulo; Fibria Celulose and Klabin. Moreover, aspects focused on the sustainability of organizations were discussed.

To the light of the analysis it was found that all companies examined evidence environmental information. The environmental policies and environmental management systems are the most publicized categories. On the other hand, the volume of excerpts and the robustness of the Sustainability Report vary among organizations; Differences were found in the volume of information and further in the categories explained by companies.

It is concluded that the findings of this study contribute to: i) evidencing how companies from the pulp and paper segment report their environmental information to stakeholders; ii) demonstrating the application of ADI to a specific segment; iii) validating IDA, an indicator that until now was restricted to the theoretical field, as it was not applied empirically; iv) strengthen theoretical and empirical environmental studies.

However, when analyzing the results it is necessary to take into consideration that the findings are limited to the Sustainability Reports analyzed as well as to the pulp and paper segment. Therefore, these should not be understood generally. Moreover, it is noted as a further limitation, that the study refers to the year of 2013. Thus, it is possible that analyzed companies presented other aspects of environmental disclosure in previous years.

We suggest that future researches are carried out in other segments or that the window under analysis comprises a greater number of years, in order to consolidate the validation of the theoretical construction proposed by Bachmann et al. (2013). Finally, it is recommended to replicate this study so that comparisons can be made.

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INFLUENCE OF ENVIRONMENTAL INVESTMENTS AND FINANCIAL PERFORMANCE INDICATORS TO COMPOSE THE CORPORATE SUSTAINABILITY INDEX (ISE)*

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ABSTRACT

This study aims to investigate the influence of environmental investments and financial performance indicators in 2014's Corporate Sustainability Index (ISE). This research is classified as descriptive, with a quantitative and qualitative approach. It is a documentary research, based on procedures and sourced by secondary data. The research sample comprises 178 companies eligible to ISE in 2015, base year 2014. The 2014 Sustainability Reports are referenced in order to identify environmental investments. Of the 178 companies, 95 published sustainability reports, of which 93 reported environmental investments qualitatively and 49, quantitative. On average, environmental investments totaled R$ 158,028,447,36. The statistical technique used to determine which variables influenced entry to ISE was regression. Total assets, asset profitability, current liquidity, indebtedness, *Novo Mercado*, qualitative and quantitative environmental investments were used as independent variables. In conclusion, asset profitability, indebtedness and quantitative environmental investments influence companies for selection to compose ISE. The company size was calculated to have 1% level of significance, indebtedness and quantitative environmental investments 5% and, profitability 10%.

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INTRODUCTION

Society has been reflecting more and more on the environment, since it is essential to life quality. Due to this concern, consumers value environmentally correct postures adopted by some companies, since this way it is possible to minimize the environmental impacts generated by them.

Sustainable development softens aggression towards the environment. The definition of sustainable development emerged in the Brundtland report as "one that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1991, p. 46).

Therefore, given the pressures of society towards companies, the disclosure process has become more efficient. Environmental disclosure is understood as the act of disclosing or evidencing practices related to the environment, an adequate transparency mechanism of the companies.

ISE was created in 2005 by the São Paulo Stock Exchange (BOVESPA). It is the first sustainability indicator in Latin America and the fourth of its kind in the world (Favaro & Rover, 2014), "with the purpose of showing the market performance of a portfolio formed by companies that adopt the principles of sustainable management" (Marcondes & Bacarji, 2010, p.18). To participate in ISE, the company must own one of the 200 most liquid shares of BMF&Bovespa. The Index consists of up to 40 of these companies. The aim is to aggregate companies focused on sustainability, based on principles of economic efficiency, social-environmental balance and corporate governance (BMF&Bovespa, 2015).

According to Dalmácio and Paulo (2004, p.7), "companies have a social commitment to society, and should no longer aim only at profit". They emphasize that it is necessary to preserve the environment, as companies are relevant to the economic and social development of the country. Developing sustainable products can average better financial and economic returns for companies, strengthening the brand and its image (Pereira, Silva, & Carbonari, 2011). But according to Barbieri (2011), for most companies, this concern is not yet effective, because if it really were, the accumulation of environmental issues would not be so huge.

Due to the importance of sustainable development, social responsibility, transparency and corporate governance, it is crucial that companies make environmental investments. Based on the above, we ask: What is the influence of environmental investments and economic and financial indicators in the selection of companies to compose ISE? To answer this question, the objective of the study is to verify the influence of environmental investments and economic and financial indicators in the selection of companies to compose ISE.

Thus, this research is justified due to the importance of investigating whether larger, more profitable companies with high liquidity, lower indebtedness, members of the new market and with environmental investments are more likely to belong to ISE.

2 LITERATURE REVIEW

Companies highlight environmental issues through social report or management report, as well as disclosure in environmental reports (Tinoco & Kraemer, 2011). According to Barbieri (2011, p. 279), "the social balance sheet is an instrument to make the company's social responsibility transparent", and according to Tinoco and Kraemer (2011, p. 235), "they are the averages that companies adopt to describe and disclosure their environmental performance".

Dias (2012, p.144) explains that the reports "constitute a form of accountability, based on the triple bottom line concept" and that the elaboration covers the measurement, disclosure and accountability, based on a social responsibility information, allowing the socio-environmental repercussion of the company's performance.

Communication of socio-environmental performance is important. It contributes to accountability and transparency (Dias, 2012). Vellani (2011, p. 39) states that "transparency, in the context of business, averages that the company allows access to reality through accounting

reports". For Tachizawa (2015), the implementation of social balance is focused on the public accountability and transparency of companies.

The Global Reporting Initiative (GRI) is an independent international organization created in the late 1990s to help companies, governments and other organizations understand and communicate their impact on sustainability issues such as climate change, human rights, corruption and others (GRI, 2016).

The GRI operates in a transparent and responsible way, with the objective of achieving a sustainable economy, in which companies can measure social, economic and environmental performance (GRI, 2012). The GRI guidelines provide adequate and up-to-date information, helping make the sustainable issue disclosure a business-to-business practice (GRI, 2013). GRI arises to "make sustainability reports as common as financial reports" (GRI, 2012, p. 16). Bronstein (2015) states that the scenario has changed since 2006 with the launch of G3 in Portuguese. G4 is the current GRI model, but some companies still use G3.

In 1999, the first index that considers sustainable aspects was created in New York – the Dow Jones Sustainability Indexes, and then (2001), the FTSE4Good, from London. The third is from Johannesburg, JSE of 2003 and, in 2005, ISE is born in Brazil (Favaro & Rover, 2014).

According to Barbieri and Cajazeira (2009), ISE integrates companies that stand out in the three dimensions of sustainability and governance, forming a stock portfolio that represents the Brazilian benchmark. These initiatives seek to create references based on the definition of sustainable company, through a management system related to the policy of social responsibility. Teixeira, Nossa e Funchal (2011) and Pereira *et al*. (2011) corroborate the earlier concept by defining the index's objective of being a benchmark of organizations that deliver sustainable good practices by committing to corporate social responsibility and corporate sustainability.

Marcondes and Bacarji (2010) argue that ISE makes the market more attractive to investors, especially those committed to socially responsible investments, as it encourages companies to introduce social, environmental and governance issues into investment decision-making. Therefore, ISE's mission is to get companies to adopt environmental practices, helping investors to make sustainable investment decisions (ISE, 2015).

The environmental indicators, according to França (2004), present the results regarding environmental performance and are important measurement instruments that allow improvements in the scope of sustainability, through the implementation of actions. Azevedo (2006) emphasizes that the indicators must be adequate so that it is possible to evaluate the company's practices with respect to sustainable development. Vellani (2011) defines physical and monetary environmental indicators as being the main instrument of companies to evaluate sustainability. They promote information relevant to decision makers.

ISE is essential in the sustainable scope. It identifies companies that care about governance through an environmental management system related to social responsibility. It causes researchers to begin to focus their studies on the area (Table 1).

Table 1
Previous studies

Author(s) / Year	Study
Bertagnolli, Ott and Damacena (2006)	The authors determined the influence of socio-environmental investments on the economic performance of companies. They used social statements of 176 companies (IBASE) and internal and external social indicators and environmental indicators (independent variables), as well as net revenue and operating income (dependent variables), and found that the investments explain changes in the dependent variables.
Macedo, Souza, Souza and Cipola, (2007)	The researchers evaluated the performance of the ISE companies through indicators of liquidity, indebtedness and profitability between companies of Melhores e Maiores Magazine and compared those that belong to ISE with the others. The authors concluded that there are no significant advantages of socially responsible firms in the market.
Ott, Alves and Flores (2009)	The authors replicated the methodology of Bertagnolli *et al.* (2006) and analyzed environmental investments and economic performance of companies with a sample of 353 companies, and presented results similar to the 2006 survey.

Continue

Table 1 (continuation)

Author(s) / Year	Study
Nunes (2010)	The variables (size, sector of activity, share concentration, location of share control, being ADR issuer and state-owned) were analyzed from 124 companies that led to ISE membership. They concluded that the size of the company and the sector of activity interfered with the entrance to ISE.
Guimarães (2010)	The author assessed whether the company's change over ISE influences the company's long-term value. The results did not confirm the increase in the value of the companies.
Machado, Macedo, Machado e Siqueira (2012)	They investigated the relationship between social-environmental investments and the inclusion of a company to ISE through logistic regression, and concluded that there was a positive relationship between them, demonstrating the company's commitment to sustainability.
Garcia e Orsato (2013)	They researched 15 academic papers with various methods of economic and financial evaluation between 2006 and 2011, verifying the creation of value for the companies that composed ISE. The authors found no significant differences between the company's adherence to the index and the impact on the value of its shares.

Note. Source: Prepared by the authors (2015).

In the study by Bertagnolli *et al*. (2006) and Ott *et al.* (2009), environmental investments interfered in the economic performance of companies. For Machado *et al*. (2012) there was a positive relation between the investments and the adhesion of the companies to ISE. According to Nunes, Teixeira, Nossa and Galdi (2010), some factors interfered in the entry of companies to ISE. According to Macedo *et al.* (2007), Nunes (2010), Guimarães (2010), Garcia and Orsato (2013), there were no significant differences of socially responsible companies over the others. Therefore, through the previous studies, it was noticed that depending on the analysis, the environmental investments may influence or not the adhesion of the companies.

3 METHODOLOGY

This work is classified as descriptive and explanatory, since the results indicate which variables explain the selection of companies to compose ISE. Regarding the methodological approach, the research is predominantly quantitative, since statistical tests were carried out through logistic regression, and also qualitative, when the disclosure of environmental investments was verified.

The collection source occurred by averages of secondary data. According to Loesch (2012, p. 3), they are "published or communicated by another researcher or organization", and the content analysis is used. The search for environmental investment values consisted of "a method of data analysis that can be applied to both qualitative and quantitative studies" (Beuren, 2006, p. 137). For data collection, environmental aspects were verified in the sustainability reports of the companies that compose the most liquid stocks in 2014, according to the BMF&Bovespa website. By averages of these reports, the aim was to have in the GRI remissive index model, item EN31 (G4) or EN30 (G3), "total investments and expenses with environmental protection". With regard to companies that did not present this topic, the value was obtained by the social balance, IBASE model. When the company portrayed the quantitative value in the GRI – table, texts and social balance sheet – the table was prioritized when presenting the total investment.

If the company did not show the social balance and the GRI, environmental data was collected on topics such as: Environmental performance, Socio-environmental management, Environmental and Natural capital. In addition, to search for quantitative information, it was searched by R$ and "invest".

For the sample, the 200 most liquid stocks of the 2014 BMF&Bovespa were selected. ISE consists of up to 40 of these companies. Some companies presented two types of actions, such as common and preferred ones, so there were 182 companies remaining. Table 2 shows the number of companies eligible for ISE and for exclusions made.

Table 2
Number of eligible companies reviewed

Total number of companies eligible for ISE	182
(-) Anhanguera (merger with Kroton)	1
(-) Auto Metal (information not available)	1
(-) BHG (process of capital closure)	1
(-) Sierra Brasil (has no report in Portuguese)	1
Total of companies surveyed	**178**

Note. Source: Research Data (2015).

Auto Metal was excluded because it was not listed on BMF&Bovespa, BHG, which is in the process of capital closure, and Anhanguera, as it merged with Kroton. Some companies changed their name, others merged or were incorporated. As an example, IMC Holdings is considered as BMI S.A. as was incorporated. And LLX LOG is now called Plumo Logística S.A.

In relation to companies with or without a report, Ideiasnet, despite having an annual report, was disregarded because it was not suited, as it did not present social and/or environmental aspects. In the same way, Cetip, despite presenting social issues, mentioned no environmental issue, therefore, it was considered that the company did not have a sustainability report.

Cosan, despite having no specific topic on the environment in its report, data was found through keywords, which made it possible to assert that the company has qualitative environmental investments, such as: projects related to the identification of social and environmental risks in business, ecoefficient process of final destination of the leftover materials used and investment in efficient and responsible land management. Tupy also did not present a topic related to the environmental aspect, but when searching for the keywords, only quantitative information was found.

Contact was made via email with Sulamerica, Sierrabrasil and Lojas Americanas. With regard to Sulamerica, information was requested for a written report, since it had only been made available on video. In response, the company stated that it only has the video version, therefore, only the aspect related to sustainability was analyzed. Sierrabrasil was excluded because it did not present the complete report in Portuguese, and no answer was obtained. From the email requesting the full report sent to Lojas Americanas, no response was obtained either. Only the summary on the Companhia Verde website was used, since the link for the full report was broken.

The indices were collected in the Economática Software database, using the companies' consolidated information for the calculations of 2014, and we chose to use: total assets (TAM), asset return (ROA), current liquidity (LIQC) and indebtedness (GEND). For the analysis of the influence of the environmental investments, a list presenting the companies that make up the portfolio of 2015 was presented, and it was compared with the eligible companies of 2015, in the base year 2014, which are informed on the website of BMF&Bovespa, and the technique of statistical analysis of logistic regression was used (Fávero, Belfiore, Silva, & Chan, 2009) to verify if factors such as: total assets, asset profitability, current liquidity, indebtedness, new market and environmental investments explain the companies selection to compose ISE.

4 RESULTS

The ISE companies stand out in the Public Utilities sector, representing 27.5%, specifically the Electric Energy segment with 11 companies. For the non-ISE companies, the two most representative sectors are: Construction and Transport, and Cyclical Consumption, corresponding to 18.84% each. The Construction and Engineering segment represents 69.23% of the total of the sector; it is the one that has more companies. The Public Utility sector is not very representative. It is equivalent to 7.97% of the non-ISE companies (Table 3).

Table 3
Number of eligible companies by sector and segment

Sector	Segment	ISE	% ISE per sector	Non-ISE	% non-ISE per sector
Industrial goods	Machinery and Equipment	1	5,00%	4	8,70%
	Transportation Material	1		5	
	Services	0		3	
Construction and transportation	Construction and engineering	1	10,00%	18	18,84%
	Transportation	3		8	
Cyclical consumption	Business	3	7,50%	6	18,84%
	Miscellaneous	0		8	
	Hotels and Restaurants	0		1	
	Media	0		2	
	Fabric, Apparel and Shoes	0		5	
	Houseware	0		2	
	Trips and Leisure	0		2	
Non-cyclical consumption	Farming	0	7,50%	2	15,22%
	Processed food	1		8	
	Beverages	0		1	
	Trade and Delivery	0		4	
	Miscellaneous	0		1	
	Tobacco	0		1	
	Personal Use and Cleaning Products	1		0	
	Health	1		4	
Financial and others	Properties exploration	0	20,00%	9	16,67%
	Diversified Holding	0		2	
	Financial Intermediary	6		6	
	Pension and Insurance	1		3	
	Several Financial Services	1		3	
Basic materials	Wood and Paper	3	17,50%	2	7,25%
	Several Materials	0		2	
	Mining	1		1	
	Chemical	1		1	
	Steel Industry and Metallurgy	2		4	
Oil, gas and biofuels	Oil, Gas and Biofuels	0	0%	2	1,45%
Information Technology	Computers and equipment	0	0%	2	4,35%
	Programs and services	0		4	
Telecommunications	Fixed Telephony	1	5,00%	1	0,72%
	Mobile Telephony	1		0	
Public utility	Water and sanitation	1	27,50%	2	7,97%
	Electric power	10		8	
	Gas	0		1	
Total		**40**	**100,00%**	**138**	**100,00%**

Note. Source: Research Data (2015).

The categorization of the eligible companies by segment was carried out according to BMF&Bovespa's governance levels: Level 1, Level 2 and *Novo Mercado*, and those of the traditional market were included to encompass companies that trade in the stock market, but are not listed in the levels of corporate governance. It can be seen that, in the same way as the ISE companies, the non-ISE companies represent a greater number than those belonging to the *Novo Mercado* and have a higher percentage, representing 68.84%, compared with 52.5% of those belonging to ISE (Table 4).

Table 4
Quantity of companies eligible by type of market

Type of Market	ISE	NON-ISE	Total companies
Level 1	11	15	26
Level 2	3	14	17
Novo Mercado	21	95	116
Traditional	5	14	19
Total	**40**	**138**	**178**

Note. Source: Research Data (2015).

Table 5 shows the number of companies eligible for ISE that had a sustainability report in 2014, 53.37% of which published such documents. All ISE companies issued the reports in 2014, with non-ISE accounting for approximately 40%, which allows us to identify that all ISE companies and 40% of non-ISE companies mentioned environmental information in their sustainability reports.

Table 5
Number of eligible companies that issued sustainability report in 2014

Eligible companies	Total companies	Total reports 2014	% of companies that have reported
ISE	40	40	100,00%
NON-ISE	138	55	39,86%
Total	**178**	**95**	**53,37%**

Note. Source: Research Data (2015).

As all ISE companies issued reports and as the Public Utility sector is predominant, consequently it is the one that presented most amount of documents. The sectors that contain most non-ISE companies are: Construction and Transportation and Cyclical Consumption, representing 18.84%. Third is Financial and Others, with 16.67%. The sector that issued most reports is the Non-Cyclic Consumption sector, followed by Construction and Transportation, and Financial and Others. It can be seen that non-ISE companies, despite being the largest, are not the ones that presented the most reports, as is the case of the Cyclical Consumption sector (Table 6).

Table 6
Number of eligible companies reporting by sector

Sector	Number of reports - ISE	Number of reports – non-ISE
Industrial goods	2	5
Construction and transportation	4	9
Cyclical consumption	3	7
Non-cyclical consumption	3	10
Financial and others	8	9
Basic materials	7	3
Oil, gas and biofuels	0	2
Information Technology	0	2
Telecommunications	2	1
Public utility	11	7
Total	**40**	**55**

Note. Source: Research Data (2015)

The data presented in Table 7 shows that a large part of the companies issued the annual report, followed by the sustainability report. Non-ISE companies presented less standardized reports when compared to ISE, as they used other nomenclatures, such as: performance, socio-environmental balance, social report, socio-environmental report and annual social and environmental responsibility report.

Table 7
Report type

Report type 2014	ISE	NON-ISE	Total companies
Annual report	14	23	37
Sustainability report	11	18	29
Annual and sustainability report	9	6	15
Annual sustainability report	3	2	5
Annual Integrated Report	2	-	2
Annual Integrated Report	1	-	1
Performance	-	2	2
Socio-environmental balance	-	1	1
Social balance	-	1	1
Annual report on socio-environmental responsibility	-	1	1
Social and environmental report	-	1	1
Total	**40**	**55**	**95**

Note. Source: Research Data (2015).

According to Table 8, of the 40 ISE companies that reported in 2014, 36 presented the GRI index. 6 mentioned G3, and 30, G4. Four companies used the G3, and 20, G4, to mention the companies' quantitative value based on the information "total investments and expenses with environmental protection".

Table 8
Number of eligible companies reporting GRI report

Eligible companies	Total reports 2014	Total companies with GRI	GRI G3	GRI G4
ISE	40	36	6	30
NON-ISE	55	30	6	24
Total	**95**	**66**	**12**	**54**

Note. Source: Research Data (2015).

Of the 55 non-ISE companies that reported in 2014, 30 issued the GRI. 6 have G3 and 24, G4. Only 4 companies issued G3, and 12, G4, reporting the quantitative value on the topic "total investments and expenditures on environmental protection".

For companies that did not have the GRI, the information was sought in the social report. Ultrapar was the only one to mention quantitative values in the social balance sheet. For the rest, it was searched in the topic related to the environment, seeking any monetary value. It was verified that 90% of the ISE companies presented some GRI model, and 54.54% of non-ISE companies disclosed the G3 or G4 model, which apparently demonstrates that ISE companies seek to provide greater accessibility to information. Of the eligible companies, approximately 70% reported some GRI model, 81.82% through GRI G4.

Table 9 shows the number of eligible companies that have disclosed qualitative and/or quantitative environmental investments.

Table 9
Eligible companies that have disclosed qualitative and/or quantitative environmental investments

Eligible companies	Total reports 2014	Environmental investments	
		Qualitative	Quantitative
ISE	40	40	27
NON-ISE	55	53	22
Total	**95**	**93**	**49**

Note. Source: Research Data (2015).

All ISE companies have disclosed environmental investments in a qualitative way. 67.5% also reported quantitative values. However, of the non-ISE companies, only Multiplus and Tupy did not mention the investments in a qualitative way in their annual and sustainability report, and 40% of the companies disclosed quantitative values. Of the total eligible companies that reported reports, 97.89% mentioned environmental investments qualitatively, and only 51.58% reported quantitative environmental investments.

By averages of the data shown in Table 10, it can be seen that from the ISE companies, the Public Utility sector publicized most environmental investments in a qualitative way. From the non-ISE companies, the Non-Cyclic Consumption sector did so, represented by 10 companies. The sector of eligible companies that most mentioned environmental investments in a qualitative way was Public Utilities, followed by Finance and Others.

Table 10
Eligible companies that have disclosed qualitatively environmental investments by industry

Sector	Environmental investments in a qualitative way - ISE	% environmental investments in a qualitative way - ISE	Environmental investments in a qualitative way – Non-ISE	% environmental investments in a qualitative way – Non-ISE	Total environmental investments in a qualitative way
Industrial goods	2	5,00	3	5,66	5
Construction and transportation	4	10,00	9	16,98	13
Cyclical consumption	3	7,50	7	13,21	10
Non-cyclical consumption	3	7,50	10	18,87	13
Financial and others	8	20,00	9	16,98	17
Basic materials	7	17,50	3	5,66	10
Oil, gas and biofuels	0	0,00	2	3,77	2
Information technology	0	0,00	2	3,77	2
Telecommunications	2	5,00	1	1,89	3
Public utility	11	27,50	7	13,21	18
Total	**40**	**100,00**	**53**	**100,00**	**93**

Note. Source: Research Data (2015)

All ISE companies that belong to the Public Utility sector have mentioned environmental investments in a qualitative way. This is the sector with the highest representation, corresponding to 40.74%.

Of the non-ISE companies, the Construction and Transportation and Public Utility sectors stood out the most, corresponding to 22.73% each. This analysis indicates that although the Non-Cyclic Consumption sector has more companies with disclosure of environmental investments in a qualitative way, it is not the sector with the largest number of companies with disclosure of quantitative investments. Only 3 out of the 10 companies mentioned the investments in a qualitative way, according to Table 11. The Construction and Transportation and Public Utility sectors indicated in Table 10, with 9 and 7 companies, respectively, have 5 companies that have disclosed quantitative investments.

Table 11
Eligible companies that have disclosed quantitative environmental investments by sector

Sector	Quantitative environment investments - ISE	% Quantitative environment investments - ISE	Quantitative environment investments – Non-ISE	% Quantitative environment investments – Non-ISE	Total Quantitative environment investments
Industrial goods	1	3,70	3	13,64	4
Construction and transportation	3	11,11	5	22,73	8
Cyclical consumption	1	3,70	0	0,00	1
Non-cyclical consumption	1	3,70	3	13,64	4
Financial and others	2	7,41	1	4,55	3
Basic materials	6	22,22	2	9,09	8
Oil, gas and biofuels	0	0,00	2	9,09	2
Information technology	0	0,00	0	0,00	0
Telecommunications	2	7,41	1	4,55	3
Public utility	11	40,74	5	22,73	16
Total	**27**	**100,00**	**22**	**100,00**	**49**

Note. Source: Research Data (2015)

The sector reporting the highest average of quantitative environmental investments of the ISE companies is the Basic Materials sector, with R$ 276,419,159.18, and it was the second sector reporting most quantitative investments (Table 12). Of the non-ISE companies, the sector with the highest average is Oil, Gas and Biofuels, since Petrobras alone comprises R$ 3,276,900,000.00 of environmental investments, which averages that the average of the companies that belong to this sector is high.

Table 12
Average of eligible companies that have disclosed quantitative environmental investments by sector

Sector	Average of quantitative environment investments - ISE	Average of quantitative environment investments - Non-ISE
Industrial goods	R$ 11.122.000,00	R$ 9.462.166,40
Construction and transportation	R$ 9.370.968,85	R$ 7.061.896,80
Cyclic consumption	R$ 647.664,00	R$ 0,00
Non-cyclical consumption	R$ 208.410.000,00	R$ 15.070.613,33
Financial and other	R$ 165.548.500,00	R$ 44.689.000,00
Basic materials	R$ 276.419.159,18	R$ 238.439.525,00
Oil, gas and biofuels	R$ 0,00	R$ 1.641.339.681,82
Information Technology	R$ 0,00	R$ 0,00
Telecommunications	R$ 8.730.670,50	R$ 8.094.690,53
Public utility	R$ 96.117.252,73	R$ 101.897.669,32
Total	**R$ 122.690.949,88**	**R$ 201.397.194,27**

Note. Source: Research Data (2015)

In Table 13, it is possible to verify the descriptive statistics of the quantitative investments of the eligible companies, considering R$ 0.00 as the minimum value. The only company that has reports but has no quantitative investment that considers R$ 0.00 as the minimum value is Multiplus, since Tupy, despite being excluded from Table 9 (due to having not mentioned investments in a qualitative way), has disclosed the quantitative values.

Regarding quantitative investments, the ISE companies, when considering the R$ 0.00 minimum value, presented a better average, although the highest value belongs to Petrobras, a non-ISE company. The smaller standard deviation indicates that the values should be close to the average, unlike non-ISE companies whose data is more dispersed than the average.

Table 13
Quantitative investments considering R$ 0.00 as the minimum value (R$)

Eligible companies	Quantity of companies	Average	Max	Min	Standard deviation
ISE	40	R$ 82.816.391,17	R$ 864.800.000,00	R$ 0,00	R$ 162.624.927,11
Non-ISE	54	R$ 82.050.708,78	R$ 3.276.900.000,00	R$ 0,00	R$ 451.114.856,05
Total	**94**	**R$ 82.376.531,07**	**R$ 3.276.900.000,00**	**R$ 0,00**	**R$ 356.463.902,61**

Note. Source: Research Data (2015).

Table 14 shows the quantitative investments disregarding R$ 0.00 as the minimum value, since R$ 0.00 corresponds to companies that only mentioned environmental investments in a qualitative way without mentioning the quantitative ones. When disregarding the value of R$ 0.00, the average of non-ISE companies becomes larger, despite having a high standard deviation, indicating that some companies have environmental investments that are distant from the average. Excluding Petrobras, the company with the largest investment of non-ISE companies, the average corresponds to R$ 54,944,679.71. It can be seen that the average of non-ISE companies is higher, since Petrobras has a very significant investment.

Table 14
Quantitative investments disregarding R$ 0.00 as the minimum value (R$)

Eligible companies	Quantity of companies	Average	Max	Min	Standard deviation
ISE	27	R$ 122.690.949,88	R$ 864.800.000,00	R$ 548.800,00	R$ 185.983.573,28
NON-ISE	22	R$ 201.397.194,27	R$ 3.276.900.000,00	R$ 523.600,00	R$ 698.874.996,19
Total	**49**	**R$ 158.028.447,36**	**R$ 3.276.900.000,00**	**R$ 523.600,00**	**R$ 483.722.182,67**

Note. Source: Research Data (2015)

The profitability of the asset indicates how much the company has made of profit in relation to its total assets. Table 15 shows the analysis of this indicator in % and indicates better averages for the ISE companies with less dispersion, since the standard deviation is lower.

Table 15
Analysis of Asset Profitability of eligible companies (in %)

Eligible companies	Quantity of companies	Average	Max	Min	Standard deviation
ISE	40	4,47	17,29	-3,81	4,61
NON-ISE	138	2,97	33,29	-27,85	8,82
Total	**178**	**3,31**	**33,29**	**-27,85**	**8,08**

Note. Source: Research Data (2015)

Table 16 shows the analysis of the indebtedness in %, and although the maximum value comes from non-ISE companies, ISE companies have a higher indebtedness than those. By analyzing this indicator, it can be seen that non-ISE companies are less indebted. Even excluding the company with the maximum value (IBG S.A.), the average corresponds to 58.96%, below the ISE companies.

Table 16
Analysis of the indebtedness of eligible companies (in %)

Eligible companies	Quantity of companies	Average	Max	Min	Standard deviation
ISE	40	65,29	94,40	13,10	17,96
NON-ISE	138	57,96	173,80	12,50	23,88
Total	**178**	**59,61**	**173,80**	**12,50**	**22,84**

Note. Source: Research Data (2015).

The analysis of the current liquidity index of the eligible companies is shown in Table 17, in which the non-ISE portfolio companies presented a better average if compared to the others, despite having a higher standard deviation. BBseguridade was the only company that did not mention the value of the current liquidity indicator.

Table 17
Analysis of the current liquidity of eligible companies

Eligible companies	Quantity of companies	Average	Max	Min	Standard deviation
ISE	40	1,53	3,80	0,60	0,74
NON-ISE	137	1,82	12,10	0,00	1,31
Total	**177**	**1,75**	**12,10**	**0,00**	**1,21**

Note. Source: Research Data (2015).

The Qgep Part of the sample was excluded to test again the averages and to analyze if only this company was distant, since it represented 12,1. However, although the average fell to 1.75, it was not enough for the ISE companies to perform better.

We also analyzed the total assets, and we observed that the average of the ISE companies is higher in relation to non-ISE, however the standard deviation is also higher, showing a greater dispersion of data. By the averages of the analysis, it can be seen that the ISE companies are larger, since they are well above the average of the total eligible companies (Table 18).

Table 18
Total Asset Analysis of eligible companies (in thousands of reais)

Eligible companies	Quantity of companies	Average	Max	Min	Standard deviation
ISE	40	137.481.045,48	1.437.485.512,00	3.209.768,00	333.213.263,38
NON-ISE	138	14.692.070,10	793.375.000,00	70.155,00	68.406.424,95
Total	**178**	**42.285.098,28**	**1.437.485.512,00**	**70.155,00**	**175.294.034,32**

Note. Source: Research Data (2015).

Through the logistic regression analysis, we verified factors that interfere in the selection of companies to compose ISE. The sample consisted of 177 eligible companies. BBseguridade was excluded because it did not present the liquidity indicator. The following options were considered: Classification diagrams; Hosmer-Lemeshow adjustment quality; CI for exp(B): 95%; Probability Per step: Input: 0.05 and Removal: 0.10; Rating Limit: 0.5; Maximum interactions: 20; Include constant in the model. We analyzed the probabilities and group association as predicted values, including the covariance matrix. The considered method was insertion, "which executes the model with all the variables selected by the researcher" (Fávero *et al.*, 2009, p. 447).

The dependent variable was ISE, which considered 1 for member companies and 0 for non-member companies. The analyzed covariables were the following: Natural Total Asset Logarithm (TAM), Asset Profitability (ROA), Current Liquidity (LIQC), Indebtedness (GEND), *Novo Mercado* (NM), Qualitative Environmental Investments (INVQUALI) and Quantitative Environmental Investments (INVQUANT).

For the variables INVQUALI, INVQUANT and NM, as well as for ISE dependent variable, we used dummy variables that indicate the presence or absence of a given attribute, assuming only the value 1 or 0 (Corrar, Paulo, & Dias, 2007). That is, for INVQUANT, we considered if the company showed monetary quantitative environmental investment, assuming the value 1, or not, represented by 0.

The model was tested by eliminating INVQUALI and INVQUANTI including quantitative environmental investment (VALORINV), but the analysis was not significant for any variable. No high correlation was identified, allowing to conclude that the explanatory variables are not influencing the others. Table 19 shows by means of Chi-Square that the joint coefficients are significant. We tested if at least one of the coefficients is different from 0. By Sig = 0.000, at least one of the variables has coefficient different from 0, rejecting the hypothesis that the parameters are null. The model is valid at the significance level of 5%.

Table 19
Omnibus Test of Model Coefficients

		Chi-square	df	Sig.
Step 1	**Step**	92,000	7	,000
	Block	92,000	7	,000
	Model	92,000	7	,000

Note. Source: Research Data (2015).

The proposed model presents 61.7% of explanatory power (Nagelkerke R Square), that is, the variables explain 61.7% of the companies' acceptance of ISE. The Hosmer-Lemeshow test verifies the null hypothesis that there are no significant differences between the expected and observed frequencies. The result indicates that there are no significant differences between the expected and observed frequencies at the level of significance, considering that the Sig value was 0.711, not rejecting the null hypothesis.

Table 20 shows if the model correctly classifies the events, based on the initially established c cut-off point (Fávero *et al.*, 2009). Due to BBseguridade having being excluded for not mentioning the current liquidity, 177 companies were actually observed. It can be concluded that there is 88.7% of company success, whether or not it belongs to ISE. Non-ISE companies are correctly classified in 94.9% (130/(130+7)) and non-ISE in 67.5% (27/(27+13)).

Table 20
Rating table

Observed			*Predicted*		
			ISE		*Percentage Correct*
			0	1	
***Step* 1**	**ISE**	0	130	7	94,9
		1	13	27	67,5
	Overall Percentage				88,7

Note. Source: Research Data (2015).

Table 21 indicates the variables, presenting the results that are significant in the selection of companies to compose ISE. It was possible to conclude that the significant variables were: TAM, ROA, GEND and INVQUANT (size, profitability of the asset, indebtedness and quantitative environmental investment), which interfere in the selection of companies to compose ISE. As to current liquidity, qualitative environmental investment and the fact of belonging to the *Novo Mercado* did not show any significance in relation to the company being part of ISE. The TAM variable was significant at 1% level, the GEND and INVQUANT at 5% level and the ROA at 10% level.

Table 21
Variables in the equation

		B	**S.E.**	**Wald**	**df**	**Sig.**	**Exp(B)**	**95% C.I.for EXP(B)**	
								Lower	***Upper***
Step 1	**TAM**	0,758	0,243	9,745	1	0,002	2,135	1,326	3,437
	ROA	0,1	0,052	3,658	1	0,056	1,105	0,998	1,224
	LIQC	-0,012	0,254	0,002	1	0,961	0,988	0,601	1,624
	GEND	0,032	0,016	3,853	1	0,05	1,032	1	1,065
	NM(1)	-0,47	0,53	0,786	1	0,375	0,625	0,221	1,766
	INVQUALI(1)	-19,629	4048,87	0	1	0,996	0	0	.
	INVQUANT(1)	-1,062	0,506	4,405	1	0,036	0,346	0,128	0,932
	Constant	-14,375	4,375	10,795	1	0,001	0		

Note. Source: Research Data (2015).

The study found that the analysis of the indices is in line with the logistic regression analysis when identifying that the size, the profitability of the asset, the indebtedness and the quantitative environmental investment were the factors that influenced the selection of companies to compose ISE, making it possible to come to the same conclusion.

5 CONCLUSIONS

In order to achieve the objective of the research, it was initially identified whether companies have disclosed environmental investments in their sustainability reports. Of the 178 eligible companies surveyed, 95 submitted reports. 93 companies report that they have invested in environmental aspects, and 49 mention monetary amounts.

In addition, we compared if the ISE companies have greater environmental investments than the non-ISE companies. For the companies that issued reports, 100% of the ISE companies presented qualitative environmental investments and 67.5% quantitative ones, corresponding to a greater proportion of investments to ISE, since from the non-ISE companies, only 40% reported quantitative values and 96.36% qualitatively.

When calculating the economic-financial indicators and when analyzing the descriptive statistics, we concluded that the total assets, the profitability of the asset and the indebtedness presented the highest averages for the ISE companies. And, through the logistic regression, we evaluated if some factors influenced the selection of the companies to compose ISE. It was found that TAM, ROA, GEND and INVQUANT interfered in the selection of the companies to ISE. The analysis of the indices is in agreement with the logistic regression obtaining the same conclusion. The TAM, ROA, GEND and INVQUANT variables influenced the selection of companies to compose ISE, but LIQC, INVQUALI and NM did not show significant results. The TAM variable was significant at 1% level, the GEND and INVQUANT at 5% level and the ROA

at 10% level.

Due to the criteria used, the result cannot be generalized, since, if other parameters are considered, different conclusions can be obtained. Another limitation of the research is that it refers to a single period (2014). It has not been applied to other periods. In addition, not all companies have released sustainability reports. Thus, for future work, we recommend the verification of more time periods, as well as the analysis of the social aspect involving social and environmental investments. We also propose to consider the savings of resources resulting from social and environmental investments and to make new selections, such as the most profitable companies.

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FIVE RISK FACTORS MODEL: PRICING SECTORAL PORTFOLIOS IN THE BRAZILIAN STOCK MARKET

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ABSTRACT

The assets risk premium is the central variable of the finance models that seek to estimate the cost of capital of the companies, the cost of this employee, for example, in the evaluation of the stock price. There are several models used to calculate the risk premium, with Fama and French models being widely known and widely disseminated. In 2015, Fama and French introduced a new model with the introduction of two new risk premiums. Due to the relevance of the theme and the possibility of obtaining new information from this new model, the objective of this paper is to conduct a study in the Brazilian stock market from a sample composed of companies listed on the São Paulo Stock Exchange (BMF&Bovespa), testing the ability of sectoral pricing in the risk factors present in the recent 5-factor model, proposed by Fama and French (2015a). In order to carry out the research, the companies listed on the Bovespa were used between January 2008 and December 2015. The results point to a greater importance of the investment risk premium, being statistically significant in three of the five sectors of the economy studied.

Keywords: Pricing Model. 5-Risk Factors. Brazilian Stock Market. Sector Portfolios. SUR Regression.

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1 INTRODUCTION

"Wall Street: money never sleeps". This jargon is not just a movie name, but a reflection of the constant fluctuations in which stock market prices daily pass. In order to understand the factors that give rise to returns, investors and academics seek to achieve for decades the key elements that drive the stock market.

The technical and fundamentalist analyzes are the tools used daily by traders, assets management, institutional funds, and agents who are at the forefront of the negotiations, in an attempt to interpret the oscillations and to beat the market.

On the other hand, academics strive to understand the factors that explain the return of shares. In this way, we seek to formulate a pricing model, capable of reflecting the key factors that explain the market return with the highest possible precision.

In the literature, after CAPM, the most widespread model was the multifactorial model of Fama and French (1993) that selects the risk factors as elements of the pricing model. Risk factors can be defined as risk exposures reflected in the returns of a particular asset class.

In this context, risk factor models have been used not only in the academic field, but also by quantitative funds that try to capture excess returns from risk factors present in the business and macroeconomic environment. The risk-based investment strategy seeks to identify drivers of returns. In the macroeconomic field one, can cite as relevant factors: economic growth, real interest rate, inflation, default rate, country risk. Already in the business environment, liquidity, market value, leverage, in addition to several indices obtained from accounting data.

The four-factor model developed by Carhart (1997) succeeded the Fama and French 3-factor model and originates from the moment strategy of Jegadeesh and Titman (1993). Such strategy arises from the finding of the existence of abnormal returns positive for a strategy based on the selection of roles, having as parameter the past performance. The strategy establishes a sold position for papers with recent low performance and purchased from those coming from a recent high rally or accumulation of earnings in the last 12 months.

Following this line of studies, Fama and French (2006) derive from the dividend model, discounting the influence of book to market (B/M - relation between the book value and the market value) on the capturing of returns. The main premise of the 5-factor model proposed by Fama and French (2015a) is that the present value of a given stock is calculated from the dividends expected in future financial years, testing the robustness of this model in later works (Fama & French, 2014, 2015b).

The objective of the study is to conduct a study in the Brazilian stock market based on a sample composed of companies listed on the São Paulo Stock Exchange (BMF&Bovespa), testing the ability of sectoral pricing of risk factors present in the recent 5-factor model, proposed by Fama and French (2015a).

It is important to emphasize that the idea of the present study is not to replicate the original 5-factor model of Fama and French (2015a), but to use the five risk factors proposed by the authors in the composition of a pricing model, through a methodology adapted to the conditions of the Brazilian capital market.

From the selection of the sample and calculation of the risk factors, we obtained the pricing models to be applied to sectoral portfolios assembled year by year. The idea is to show the model's capacity to price the average weekly returns of the main sectors of activity of the companies listed on Bovespa (basic materials, cyclical consumption, non-cyclical consumption, industrial and public utility).

2 LITERATURE REVIEW

Markowitz's portfolio selection theory (1952) was the initial step in the development of various asset pricing models that seek to determine the expected return. The central hypothesis is that investors make their decisions backed by two parameters present in the probability distributions of assets: the mean and the variance. These metrics refer to the classic risk-return relationship, always inherent to the process of choosing an investment. For this reason, Markowitz's framework is also known in the literature as a mean-variance model.

Considering the assumptions of this theory, to compose an optimal investment portfolio, the economic agent should allocate its resources to the portfolio that presents the smallest variance among an infinite set of portfolios that bring a certain expected return (Caldeira, Moura, & Santos, 2013).

In this context, the return on an investment portfolio can be measured by means of the individual expected returns of the component assets, weighted by their respective portfolio weights (Investment Science p.166). The variance of the portfolio can be obtained from the individual variances of the assets.

Diversification is a basic principle of this theory. It is considered capable of mitigating non-systematic risk (of the companies themselves), whenever the assets do not have a perfect correlation with each other (other than ρ = 1).

Systematic (market) risk, in turn, cannot be eliminated, but can be optimized through the portfolio of minimum variance, which generates the lowest risk level for the investor.

In the stock valuation models, the asset risk premium is the central variable in explaining the return of these assets. In this context, two lines of research stand out in the improvement of the study of the CAPM model. One of these lines of research focused on the dynamic treatment of the model, in which risk factors vary over time. These models are called conditional CAPM. In these models, it is not assumed that the relationship between the return of the asset and the risk factor is static. It seeks to reflect the changes that occur in the market over time.

The other line of research sought to study multiple risk factors capable of explaining the return of the target asset. The focus was on what organizational factors would be able to explain the company's performance. It is in this line that the present research fits and seeks to apply the most recent model of Fama and French, the 5-factor model. In sections 2.1 to 2.3, the evolution of the uni factor model (CAPM model) to the current multi-factor model (5-factors) will be explored.

2.1 Capital Asset Pricing Model

The portfolio theory was the basis for the works of Sharpe (1964), Lintner (1965) and Mossin (1966), who formulated the CAPM (Capital Asset Pricing Model). The Sharpe-Lintner version is the most widespread in the literature, establishing that the expected return of the asset $E(R_i)$ is equal to the sum of the risk-free rate, R_f, with the risk premium of the asset, $\beta_{im}[E(R_m) - R_f]$. $E(R_m)$ is the expected return on the market portfolio (systematic risk).

The CAPM parameter β_{im} is the core of the model and seeks to capture the sensitivity of the asset to market portfolio oscillations. It is calculated by the quotient between the active-market covariance and the variance of the market return.

Therefore, insofar as the systematic risk cannot be mitigated, investors would theoretically be compensated for by higher returns by carrying higher risk embedded portfolios, in turn captured by the beta sensitivity of the market.

Another well-known version is Black, known as Zero Beta CAPM. The difference in relation to the previous strand is the substitution of the risk-free rate for the return of a portfolio Z, with no correlation with the market portfolio.

The result of the Zero Beta model is interesting. It strengthens the CAPM insofar as it shows that the efficient market portfolio, in terms of mean-variance, can be achieved not only from risk-free loans (CAPM Sharpe-Lintner's premise), but also from the sale to Risk-bearing assets (Fama & French, 2004).

CAPM, in its various versions, is built on the so-called efficient market hypothesis, encompassing, as premises, the elimination of diversifiable risk (through the construction of a portfolio with minimal variance), inexistence of transaction costs, symmetric information, rational investors averse to risk, and market equilibrium, among others.

Despite the inability of the premises to reflect the natural conditions of the market, CAPM served (and still serves) as a theoretical analytical-base model for the construction of more complex models.

The CAPM postulates that the return of an action can only be explained by the beta parameter. However, since the 1980s, empirical evidences contrary to the explanatory capacity

of the market beta appear in the literature, such as the work of Stambaugh (1982) and Fama and French (1992). Such studies show that the beta-return relationship is less pronounced (or more horizontal) than the predicted by the Sharpe-Lintner model.

It is important to highlight Roll's critique (1977) of the impossibility of testing the CAPM model, insofar as the true market portfolio, with all the marketable assets present in the economy, cannot be replicated.

2.2 The 3-factor model of Fama and French

In the search for a pricing model with greater scope and ability to explain the return of papers listed on NYSE, AMEX and NASDAQ, Fama and French (1992) elaborated a 3-factor model: market risk, size and B/M ratio.

The sample consists of shares of the three Stock Exchanges between 1963 and 1991. To calculate the model factors, Fama and French (1992) constructed portfolios to replicate the Small Minus Big (SMB) factor, defined by the market capitalization of the companies, as well as the book market (High minus Low - HML) factor. The excess market return, $R_{m,t} - R_{lr,t}$, present in the single factor model, will also compose the model:

$$R_{i,t} - R_{lr,t} = a_i + b_i(R_{m,t} - R_{lr,t}) + s_i(SMB_t) + h_i(HML_t) + e_{it} \quad (1)$$

Wherein $R_{i,t}$ is the return of portfolio i in month t; $R_{lr,t}$ is the return of the asset with risk free rate in month t; $R_{m,t}$ is the return of the market portfolio in month t; SMB_t is the premium for the size factor in month t; HML is the premium for the B/M factor in month t; e_{it} is the error term of the model.

The authors find evidence of positive premiums for the three risk factors; the regression of the model portfolios presents an intercept statistically equal to zero, which validates the risk factors such as proxies for the pricing model. The model was able to neutralize problems of multicollinearity between the factors, besides showing superior explanatory capacity to the CAPM for the returns of shares in the American financial market.

Another interesting result, B/M has explanatory power for the average returns greater than the size effect. Dividing the sample into 12 portfolios, based on B/M, companies with lower B/M obtained an average return of 0.3%, while those with the highest index reached 1.83% of return in the period analyzed. The explanation for this phenomenon is based on the fact that shares with high B/M are considered riskier than those with reduced B/M. According to Fama and French (1992), the highest return would be a way to compensate for the greater risk borne by high B/M papers.

2.3 The 5-factor model of Fama and French

Fama and French (2006) derive from the dividend model, discounting the influence of B/M on the capture of returns. The main premise of this model is that the present value of a certain share is calculated from the dividends expected in future financial years.

M_t is the sum of the dividends discounted by i, the internal rate of return (IRR) of the expected dividends, supplying the share price in period t. By means of an accounting derivative, they arrive at the value of the share as: the return per share, RPA, less the change in the net book value per share, ΔB_t.

$$M_t = \sum \frac{E(RPA_{t+1} - \Delta B_{t+1})}{(1+i)^t} \quad (2)$$

$$\Delta B_t = B_t - B_{t-1} \quad (3)$$

Dividing the present value of the dividends (which in theory must correspond to the market price of the share, M_t) by the value of the net worth account is the inverse of the B/M metric:

$$\frac{M_t}{B_t} = \frac{\sum \frac{E(RPA_{t+1} - \Delta B_{t+1})}{(1+i)^t}}{B_t} \quad (4)$$

The derivation from this cash flow allows the following inferences: *ceteris paribus,* a lower value of M_t (higher B/M) implies higher expected return; maintaining fixed B_t, M_t and the expected profit, the increase in the balance sheet growth (investment, asset expansion) generates lower expected returns.

The importance of this valuation model is to provide factors that, included in the pricing model, can efficiently capture the expected returns. In this context, motivated by the works of Novy-Marx (2012) and Aharoni, Grudy and Zeng (2013), who find favorable evidence for the average returns and profitability ratio, and for the average returns and investment ratio, respectively, Fama and French (2015a) added two new parameters to the original three-factor model:

$$R_{i,t} - R_{lr,t} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + e_{it} \quad (5)$$

The RMW factor is calculated from the operational profitability measured by the company. The financial index that makes this calculation possible is the operating profit/PL ratio. Therefore, the factor measures the return difference obtained by stocks with robust and weak operating performance.

The CMA risk factor is calculated using the total assets variation from year to year as a parameter. The factor idea is to measure the difference in return between companies that expanded their total assets with more intensity (more aggressively) and companies that had more moderate asset expansion, or even had a contraction in their (conservative) asset position.

In a later study, Fama and French (2015b) tested the robustness of this 5-factor model based on anomalies, suggested by the market beta literature, stock repurchases, volatility, accruals and timing. The results show that returns from profitable firms and conservative investment (positive RMW and CMA) capture high average returns associated with low beta market, share repurchases and low volatility.

Testing the 5-factor model in international capital markets, Fama and French (2015c) confirm the existence of a positive relationship of B/M and profitability, and a negative relationship of the investment, with the average returns of the stock markets of North America, Europe and Pacific Asia. The model is also tested for the Japanese market by providing favorable evidence for the explanatory power of the B/M, which does not occur with profitability and investment factors.

3 METHODOLOGY

The present research seeks to investigate if the adapted 5-factor model is able to accurately price the variations of the returns of sectoral portfolios.

The method used to construct the portfolios (used to calculate the risk factors) is the 2x2x2x2 model. This method produces 8 portfolios, segmented by the median of the metrics of the four risk factors (SMB, HLM, RMW, CMA).

Some differences from the Fama and French (2015a) method should be highlighted. Firstly, the authors build their portfolios from monthly value weighted returns. In this work, equally weighted weekly returns are used. The metrics of the risk factors undergo an adaptation, related to the RMW factor, as explained in section 3.1.

The criteria for inclusion in the sample were those adopted by Leite, Pinto and Klotzle (2016), who seek to adapt the sample to the conditions of the Brazilian stock market. The theoretical justifications of the adopted methodology are detailed in section 3.2.

3.1 Sample and Data Collection

The sample was assembled from stocks listed on BMF&Bovespa from January 2008 to December 2015. The choice of period is justified by the large number of initial public offerings (IPOs) that occur between 2006 and 2008. In this sense, the collection of data from 2008 provides the possibility of working with a wider and more robust sample for the pricing model. Between February 2006 and June 2008, the domestic stock market experienced a boom in terms of public listing. During this period, 94 IPOs were authorized by the Securities and Exchange Commission, reflecting the favorable macroeconomic scenario that the Brazilian economy was undergoing.

In the study, weekly return series obtained from the closing prices of the companies included in the sample were used. All data was collected from the Bloomberg terminal, except the 30-day SWAP-DI rates, obtained from the BMF&Bovespa information retrieval system.

The initial selection of the assets to compose the portfolios is carried out year by year, prospectively, at the end of December of each year. In other words, the position of listed companies with active trading at the end of December of each year is used in the initial gross sampling, which will go through the subtracted exclusion criteria. The net sample, obtained after applying the exclusionary criteria, will provide the papers that will compose the portfolios of the subsequent year.

In this context, the sample is redefined from an annual periodicity, based on the following criteria:

- The share must be traded in at least 50% of the trading sessions of the year, liquidity criterion;
- Excluding shares with negative Shareholders' Equity (PL), companies with PL<0 characterize insolvency, being able to bias the HML and RMW factors, which directly use the book value of the PL in its calculation;
- Excluding banks and insurance companies, the composition of the balance sheet and the income statement of the companies of these segments have particular characteristics, requiring a methodology of own evaluation for the sectors. Its inclusion may bias the model.

By applying the aforementioned criteria, the following amounts of assets were obtained year by year: 88 in 2008, 111 in 2009, 197 in 2010, 194 in 2011, 193 in 2012, 175 in 2013, 188 in 2014, and 178 in 2015. By obtaining the filtered assets, these were segmented into portfolios, whose selection criterion was sectorial. The calculation of the risk factors was carried out from the portfolios assembled.

The series of weekly returns from 2008 to 2015 provided the total of 417 observations (weeks) that, through calculations of weekly risk factors, produced 417 data for the estimation of the pricing model.

3.2 Base variables

The adjusted weekly return on shares is used to include dividends. The Bloomberg terminal has a configuration feature that allows embedding mandatory dividends, additional dividends and interest on equity in the return of the shares, as well as to adjust historical stock prices for splits, inplits, increases and capital reductions. Adjustments to distribute dividends and corporate events carried out by the terminal avoid distortions in weekly returns, in addition to embodying the global return measured by the shareholder.

Applied to the nominal return with dividends is the Neperian logarithm for transforming the discrete returns into continuous ones.

$$R_{i,t} = \ln\left(\frac{Div_{i,t} + P_{i,t}}{P_{i,t-7}} - 1\right) \quad (6)$$

Wherein $P_{i,t}$ is the closing price of the trading day of t and $P_{i,t-7}$ the closing price of the day of the previous week, t-7. The quotient of the two variables provides the weekly variation of the stock price.

We adopt the hypothesis of equally weighted weights to calculate the average weekly return of the market portfolio, measured from the shares that met the eligibility criteria.

$$R_{c,t} = \frac{1}{N}\left(\sum_{i=1}^{n} R_{i,t}\right) \quad (7)$$

Wherein $R_{c,t}$ is the weekly return of the portfolio is at week t, $R_{i,t}$ is the stock return *i* in week *t* and *N* is the number of shares in the portfolio. The choice of adopting equally weighted returns avoids an inherent problem in the Brazilian stock market: the high concentration of trading in a small number of stocks. The low dispersion among stocks in relation to the volume traded is a common feature of capital markets in emerging markets.

The B/M index, calculated on the basis of shareholders' equity, is taken from the balance sheet as of December 31 from *t-1*, and the market value at the same date, December 31 from *t-1*.

$$\frac{B}{M_{i,t}} = \frac{VC_{PL,dezembro(t-1)}}{VM_{dezembro(t-1)}} \quad (8)$$

The market value of a share (VM) is a reflection of the market's expectation for the ability to generate cash flow and to make profits of a company. The net equity ($VC_{PL,}$) is the difference between the book value of the assets and liabilities, it is the residual value between the debt (assets) and the credit (liabilities) of the balance sheet of a company.

Unlike the current strategy of Jegadeesh and Titman (1993), which uses stock performance in the capital market to calculate the WML (Winning Minus Losers) risk factor, the RMW (Robust Minus Weakers) factor seeks to reflect the operational performance of a company, that is, its ability to generate cash flow to the shareholder.

In the work of Fama and French (2015a), the metric used is the operating profit divided by the net equity. Operating income is obtained from net revenue less general and administrative sale expenses. Due to the difficulty in accessing the Brazilian data of these specific accounts of the income statement, an adjustment was made. Operating profit has been replaced by EBIT. The factor is calculated from the financial index EBIT/PL.

$$RMW = \frac{EBIT_{dez(t-1)}}{VC_{PL,dez(t-1)}} \quad (9)$$

This index is similar to ROIC (return on invested capital), a measure that measures the operational capacity of a company to remunerate the capital invested by the shareholder. The ROIC is calculated by the EBIAT/Invested Capital Index. The measure of the denominator is Earnings Before Interest After Taxes (EBIAT) and the divisor is the invested capital (or the paid-up capital stock), an integral part of Net Equity.

This measure reflects the basic productivity of the capital invested in the business (it is the return obtained by each monetary unit applied in the business). The higher the ROIC, the more attractive it is to invest in the company.

At this point, it is interesting to note that two of the risk factors use PL in its composition (HML and RMW). The use of this balance sheet component as an evaluation tool has pros and cons.

Based on the premise that accounting information carries the fundamental qualitative characteristics - relevance and reliable representation - it can be considered that PL is a stable measure, capable of reflecting the generation of value by the organization. On the other hand, it can be influenced by accounting decisions, regarding the measurement of assets and liabilities. As examples, we can cite the procedures adopted to reduce the recoverable value of fixed assets (impairment tests), and the method adopted in the control and evaluation of inventories, among other decisions capable of affecting the accounting result and, consequently, the position of the PL (Damodaran, 2012).

Based on a measure of profitability, the RMW factor is determined by the same fundamentals of the discounted cash flow model: expected growth, business risk (determinant of discount rate) and cash flow generated (measured result). In this sense, firms with higher expected growth, reduced specific risk and greater dividend distribution, *ceteris paribus*, have higher EBIT/PL.

The fourth factor - CMA (Conservative minus Aggressive), also called INV (investment rate) – in turn is calculated based on the change in corporate assets. The calculation of this risk factor is done by the difference in the position of the total assets between the end of year t-1 and the end of year t-2. The idea of the factor is to measure the rate or variation of investment of the companies, reflected in the expansion of assets in the balance sheet.

$$CMA = \frac{A_{\text{dez}(t-1)} - A_{\text{dez}(t-2)}}{A_{\text{dez}(t-2)}} \tag{10}$$

There are two ways for a company to carry out the aforementioned expansion: CAPEX (capital expenditure) – amount of capital expenditure that exceeds depreciation – and the need for capital turnover.

The risk factors mentioned in this section can be interpreted as diversified portfolios, capable of providing different combinations of exposure to the metrics: market capitalization (SMB), B/M index (HML), EBIT/PL index (RMW) and changes in assets (CMA).

3.3 Sectoral portfolios

The sectorial portfolios used in this study are formed from the companies that met the inclusion criteria to calculate the risk factors. The sectors listed were: basic materials, cyclical consumption, non-cyclical consumption, industrial and public utility, defined from the Bloomberg terminal sector filter, following a similar structure to the sector indexes prepared by BM&FBovespa:

- Basic Materials Portfolio - covers segments such as the chemical, pulp and paper, metallurgy, mining and steel industries. It can be considered the pillar of the productive chain, insofar as it supplies the raw materials and inputs for the various fields of productive activity;

- Cyclical Consumption Portfolio - comprised of wholesale, retail, clothing, textile, auto parts and equipment, travel and leisure, hotels and restaurants, real estate developers. This is a sector closely followed by analysts and economists who work with economic conjuncture, considered one of the main thermometers of the level of economic activity;

- Non-Cyclical Consumption Portfolio - includes the food and beverage industry, farming, commerce and distribution, pharmaceutical, tobacco, various services (educational, laboratorial, highways, operational leasing). In contrast to the volatility and seasonality characteristics of the cyclical consumption sector, non-cyclical consumption is characterized by greater homogeneity in terms of revenues;

- Industrial Portfolio - composed of companies that operate in the capital goods industry (machinery and equipment), logistics (services and transportation material) and electrical equipment;

- Public Utility Portfolio - brings together the subsectors for water supply, electricity, gas and sanitation. They are services rendered by means of delegation of the public power that seek to attend to the satisfaction of collective well-being.

Table 1
Spearman correlation between Sectorial Portfolios

	Basic Material	Cyclical consumption	Non-cyclical consumption	Industrial	Public Utility
Basic Material	1				
Cyclical consumption	0,6084	1			
Non-cyclical consumption	0,4255	0,4468	1		
Industrial	0,7836	0,7260	0,7260	1	
Public Utility	0,4252	0,4464	0,9999	0,6633	1

Note. Source: Prepared by the authors.

Table 1 shows the correlation between the weekly returns of the sector portfolios. The highest correlations occur between the industrial and basic materials sectors (ρ=0.7836) and between the public utility and non-cyclical consumption sectors (ρ = 0.9999). All sectors present medium or high correlation.

The presence of lower correlations by the public utility sector with the returns of the other segments (last line of the table) is justified because it belongs to a particular market structure, as will be explained in section 4.2. Its higher correlation with the non-cyclical consumption sector (ρ=0.9999) shows a common characteristic among the sectors: the lower dependence of the level of economic activity insofar as both provide essential services to society, characterized by low elasticity of demand.

The sector premiums are calculated from industry portfolios assembled on the basis of equally weighted returns. The junction of these parameters gives rise to the following regression model:

$$R_{\text{CarteiraSetorial},t} - R_{lr,t} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + e_{it} \quad (11)$$

Section 4 details the results obtained from these regression, estimated by the OLS (Ordinary Least Squares) and SUR (Seemingly Unrelated Regression) methods.

3.4 Construction of portfolios for calculation of risk factors

The base order month is the end of December of each year *t*, coinciding with the end of the Brazilian fiscal year. In the first stage, the shares are ordered according to their market value at the end of December of year *t*. This ordering, done in a decreasing sequence, allows the segmentation of the companies listed in two portfolios: B (Big) and S (Small).

The second order uses the B/M index as a parameter, allowing the formation of two new H (High) and L (Low) portfolios. In the third order, the shares are classified according to the EBIT/PL index, segmenting the portfolios in R (Robust) and W (Weak). Finally, in the fourth order, the metric becomes the total change in assets, or the investment rate, leading to the unfolding of the portfolios in C (Conservative) and A (Aggressive). This procedure is repeated eight times at the end of each year of the study period (2008 to 2015).

In all four orders, the parameter used to separate portfolios is the median of the base variables (market value, B/M, EBIT/PL, change in total assets). The median therefore serves as a dividing line for portfolio segmentation. This way of building the portfolios produced eight sets of diversified assets (portfolios) that allowed, each year, the calculation of risk factors, described in the following section.

3.5 Calculation of Risk Factors

The main pricing studies with risk factors, such as Fama and French (1993), use monthly returns to calculate them. On the other hand, they analyze an extended period of time. In the case of this study from 1963 to 1991.

In the present study, given the shorter extension of the investigated period, we opted to work with weekly returns, in order to increase the number of observations and, thus, to measure more accurately the calculation of the risk factors.

The market factor is calculated from the difference between the weekly evenly weighted returns and the weekly risk free rate, R_{lr}, computed from linear interpolation performed from the 30-day SWAP-DI rate. The difference between the two metrics provides the excess return $R_{c,t}$ of the portfolio c at day t::

$$R_{c,t} = \frac{1}{N}\left(\sum_{i=1}^{n} R_{i,t}\right) - R_{lr} \tag{12}$$

Calculated weekly, from a long position in the portfolio with shares of companies with low market capitalization (Small) and sold in shares of companies of great market value (Big). The difference in the weekly return between the portfolios provides the SMB risk factor.

Calculated weekly, from a long position in the portfolio with shares of companies with a high B/M ratio and sold in shares of companies with a low ratio. The difference in return between the two positions provides the HML risk factor.

Calculated weekly, from a position bought in the portfolio with stocks of companies that obtained robust operating performance (Robust) and sold in shares of companies with weak operating performance (Weak). These performance measures were computed based on the operating profit/PL obtained at the end of each year t-1. The difference in return between the two positions provides the RMW risk factor.

Calculated weekly, from a long position in the portfolio with shares of companies that had reduced investment rates between the financial years (Conservative) and sold in shares of companies that expanded their assets with greater intensity (Aggressive). The difference in return between the two positions provides the CMA risk factor.

Table 2 shows the presence of a low correlation between the risk factors, a positive attribute for the pricing model, insofar as it reduces possible muticolourarity problems among the model variables.

Table 2
Spearman correlation between Sectorial Portfolios

	Rm-Rf	SMB	HML	RMW	CMA
Rm-Rf	1				
SMB	-0,2449	1			
HML	0,2097	-0,0426	1		
RMW	-0,2423	-0,0402	-0,0303	1	
CMA	-0,0884	0,0447	0,0029	0,0473	1

Note. Source: Prepared by the authors.

We highlight the inverse correlation between the market premium and the SMB factor (ρ=-0.2449) and the RMW factor (ρ=-0.22423), the most intense of the correlation matrix.

4 RESULTS

This section presents the search results. The methods are applied to the returns of the five proposed sectoral portfolios, each one based on the five calculated risk factors. From the sector portfolio premiums used as explained variable and risk factors as explanatory variables, five linear regression are formed, which seek to explain the relationship between sector portfolio returns and risk factors.

The SUR methodology is processed in two stages. In the first step, OLS regression residuals are used to estimate the covariance matrix of the errors of the equations. In a second moment, the coefficients of the regression were estimated via GLS, when the previously estimated covariances were applied (Duarte, Lamounier, & Takamatsu, 2007).

If the error covariance matrix obtained in the first step is zero, the OLS and SUR methods are equivalent. As a non-zero covariance matrix, the SUR method performs the correction of residues, generating greater accuracy in the estimation process (Neves, 1996).

The results obtained by the study corroborate the presence of a non-zero covariance matrix for the pricing model, reflected in the superiority of the R^2 adjusted from regression estimated by the SUR method in comparison to those estimated by OLS, as demonstrated in section 4.2.

The option by the SUR method follows the Costa and Neves (2000) approach, which, applied to the 5-factor model, makes it possible to test the statistical significance of the four risk factors that expand the CAPM model at the same time, as it reflects the capacity of the Adjustments in the market premium of sector portfolios.

4.1 Statistical Analysis

Initially, a preliminary analysis of the data was made from the correlation matrix and graphical visualization of the series of risk factors. The first step was to understand in a preliminary way the interrelationship of variables. In a second moment, the OLS and SUR methods were evaluated (section 4.2).

Table 3
Stationary Testing

Returns	Augmented Dickey-Fuller	p-value
Rm-Rf	-5,3744	<0,01
SMB	-4,9524	<0,01
HML	-6,7011	<0,01
RMW	-6,8917	<0,01
CMA	-6,0431	<0,01

Note. Source: Prepared by the authors.

The Augmented Dickey-Fuller (ADF) test is performed for the five risk factors of the model in order to verify whether the returns are stationary or not. The importance of the test is due to the fact that non-stationary series have a temporal tendency; they may present high explanatory power even if the variables are not correlated (Brooks, 2014).

The results of the stationarity tests are shown in Table 3 for the returns of the risk factors and in Table 6 for those of the sector portfolios. No tested return series presented unit root. They are stationary.

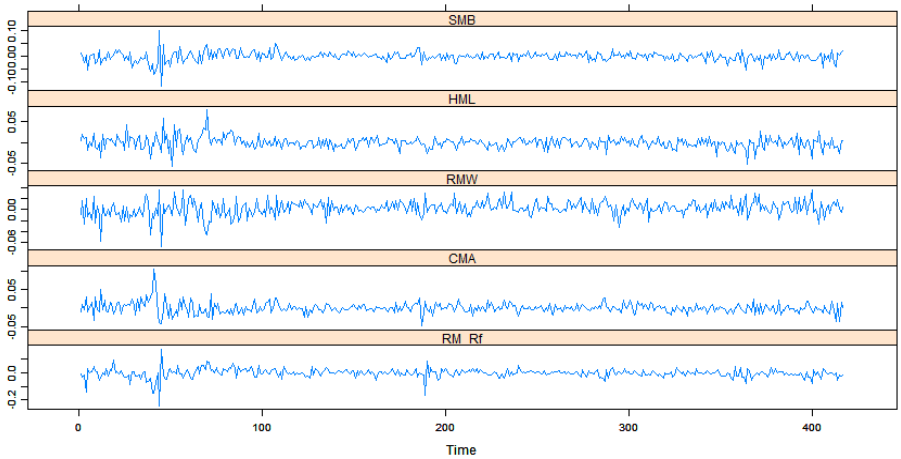

Figure 1. Series of weekly returns of risk factors: Jan-2008 to Dec-2015

Source: Prepared by the authors.

Analyzing the graphs of the behavior of the risk factors, one can observe certain behaviors for the period of analysis. The first of these is the strong acceleration of spreads

volatility caused by the subprime crisis, from the fourth quarter of 2008, remaining until the middle of 2009.

During this period, there is a particular behavior on the part of the CMA factor, when the investors direct their resources to conservative companies, to the detriment of the bold ones. This movement that reflects a process of risk aversion is translated into the positive spread of the CMA factor.

Another interesting scenario, a new acceleration of spreads (less intense than that occurred at the end of 2008) occurs from the end of 2010, notably in the market premium (Rm-Rf) and in the CMA factor, this time drawn by the European debt crisis, promoted by strong budget deficits linked to the rise in public debt in European countries. The factor, however, that effectively triggered the new cycle of volatility was the onset of global market fears with the possibility of default on Greek debt from the second half of 2010. This fear was confirmed years later, more precisely on June 30 2015, with the expiration of the deadline and non-payment of the taxiing of the debt contracted with the IMF (International Monetary Fund).

The third and final widening of the spreads of the series occurs from the last quarter of 2014, starting from the presidential elections in Brazil. The increase in variation is clearly seen in the HML and RMW factors, persisting during the year 2015, as a result of President Dilma's continued presence in power, linked to the macroeconomic scenario of stagflation in the Brazilian economy.

Table 4
Descriptive Statistics of Risk Factors

Statistic	Rm-Rf	SMB	HML	RMW	CMA
Maximum	0,1700	0,1010	0,0763	0,0357	0,1046
Minimum	-0,3422	-0,1206	-0,0565	-0,0665	-0,0499
Average	-0,0086	-0,0025	-0,0009	0,0019	0,00004
Medium	-0,0029	-0,0016	-0,0005	0,0028	-0,0009
Standard deviation	0,0489	0,0183	0,0058	0,0135	0,0145
Asymmetry	-3,72	-0,49	0,29	-0,69	1,15
Kurtosis	24,12	9,78	6,94	5,59	10,40
Jarque-Bera	<0,01	<0,01	<0,01	<0,01	<0,01
	-5,69	-7,32	-6,44	7,10	362,5

Note. Source: Prepared by the authors.

Descriptive statistics of risk factors (Table 4) show the presence of right asymmetry for the Rm-Rf, SMB and RMW factors, and left asymmetry for the CMA. The HML factor, on the other hand, presents more symmetrical returns. Asymmetry to the right of the market premium is expected, given the combination of low performance of the Brazilian stock exchange, tied to high interest rates; for the RMW factor, the opposite was expected. In relation to the CMA, what is expected is that the low profitability of the capital market in a macroeconomic context that is unfavorable to leveraged companies generates a superior performance on the part of the conservative organizations.

The market factor is the most volatile (σ=0.0489), the other factors have lower volatilities, all below 2%. The coefficient of variation (CV) was also presented, embodied in the ratio between standard deviation and the average, as a way of measuring volatility. The Jarque-Bera test rejects the null hypothesis of normality for the risk factors.

The ADF test is also performed for the variables explained. The sectoral portfolio premiums do not have a unit root, as shown in Table 5. The analysis of unit root existence is important to verify the possibility of modeling through regression. The existence of a unit root would make this methodology impossible.

Table 5
Stationary Testing

Returns	Augmented Dickey-Fuller	p-value
Basic Mat.	-6,1297	<0,01
Cyclic Cons.	-5,2204	<0,01
Non-Cyclic Cons.	-5,7654	<0,01
Industrial	-5,7271	<0,01
Public Utility	-6,3722	<0,01

Note. Source: Prepared by the authors.

Figure 2 shows the return series of sectoral premiums. Interestingly, the behavior of the cyclical consumer sector premiums during the second shock (2011) is more intense than that of the other sectors. This phenomenon can be explained by the withdrawal of the countercyclical fiscal stimulus granted after the 2008 crisis coupled with a contractionary monetary policy in an attempt to contain the acceleration of the inflation rate and appreciation of the real after a year of robust economic growth (in 2010 the Brazilian GDP grew 7.5%).

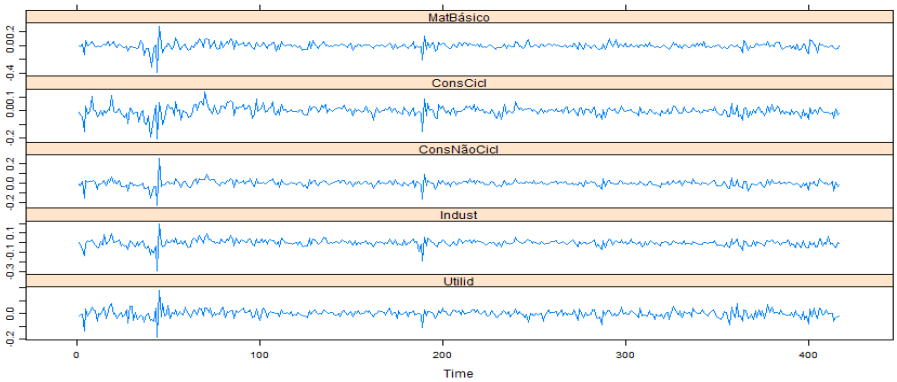

Figure 2. Weekly returns series of sector portfolios: Jan-2008 to Dec-2015
Source: prepared by the authors.

Figure 2 also reflects the volatility of sector premiums brought by the presidential race. China's macroeconomic deceleration scenario, domestic inflationary pressures, rising interest rates, strong depreciation of the real coupled with the beginning of a fiscal adjustment process by the government affected the purchasing power of Brazilians and, consequently, the level of consumption. The sectors of cyclical consumption and basic materials clearly reflected the effects of this adverse scenario.

Table 6
Descriptive Statistics of Sectoral Portfolio Premiums

Statistic	Mb	Cc	Cnc	Ind	UtP
Maximum	0,2816	0,1381	0,2582	0,1927	0,1791
Minimum	-0,3903	-0,2061	-0,2235	-0,2971	-0,1832
Average	-0,0034	-0,0023	-0,0016	-0,0032	-0,0009
Medium	-0,0027	-0,0007	-0,0002	-0,0007	0,0005
Standard deviation	0,0487	0,0358	0,0329	0,0348	0,0304
Asymmetry	-1,48	-1,08	-0,39	-1,61	-0,45
Kurtosis	18,68	9,57	19,60	19,28	9,55
Jarque-Bera	<0,01	<0,01	<0,01	<0,01	<0,01
	-14,32	-15,56	-20,56	-10,87	-33,78

Note. Source: Prepared by the authors.

The descriptive statistics of sector portfolios (Table 6) demonstrates the presence of higher volatility of weekly returns by the portfolio of commercial materials (σ=0.0487) followed by cyclical (σ=0.0358) and industrial (σ=0.0348) consumption, which makes sense insofar as they are more sensitive to fluctuations in the level of economic activity (sectors with higher price

elasticities and demand income). We also highlight the right asymmetry of returns of all sectors (common characteristic in the stock market), more accentuated in non-cyclical consumption and public utility. The Jarque-Bera test rejects the null hypothesis of normality of the weekly premiums for all sector portfolios.

4.2 Regression

In this section, the parameters obtained from regression estimated by the SUR method will be presented. The economic package used for the estimation process was R Studio. For correlation of the regression estimates, the Newey-West covariance matrix (HAC matrix) was applied.

The results obtained by the OLS method were not presented to save space and not to interfere with the reader (and can be sent to interested parties). The comparison between the results of the two methods of estimation demonstrated the reduction of the standard errors obtained by the SUR method, also reflected in the R^2 empirically adjusted superior to that obtained by means of the OLS method.

The return of the first sectoral portfolio, of commercial materials (Table 7), points to the market price and RMW as statistically significant factors at the 1% significance level. It is interesting to note the relevance of profitability (RMW) in the portfolio price of commercial materials, a volatile sector in terms of results (a negative variation of 1% in the RMW causes a positive oscillation of 0.44% in the return of the portfolio of commercial materials). Its activity is basically concentrated in the circulation of commodities, with low value added, dependent on the international prices of these raw materials and inputs, a factor that impacts the profitability of these organizations. Hedge operations in future markets are usually carried out by the treasuries of these companies, an attempt to mitigate this volatility. The significant 5% intercept provides a caveat for the application of the model in this sector.

Table 7
Basic Materials SUR Regression

$$R_{\mathrm{MB},t} - R_{lr,t} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + e_{it}$$

Variables	Coefficient	Standard-Error	Statistic t	p-value
Intercept	0,00286	0,00123	2,57	0,0104**
Rm-Rf	1,23896	0,04321	14,82	0,0000***
SMB	-0,09243	0,07001	-0,68	0,4938
HML	0,08706	0,09562	0,74	0,4567
RMW	-0,44131	0,09671	-2,87	0,0043***
CMA	0,22540	0,09008	1,27	0,2063

Note: R^2 adjusted = 0.7492. Significance: ***, ** and * correspond to 0.01, 0.05 e 0.1, respectively.
Note. Source: Prepared by the authors.

In the second sectoral portfolio, the cyclical consumption (Table 8), the statistically significant factors were market premium, RMW and CMA. It should be noted that for this portfolio, as well as for non-cyclical consumption, the intercept was statistically significant at 1%, with a caveat for the model applied in these sectors, which is contrasted by the high R^2 adjusted from the respective models, 86.29% and 87.94%, respectively.

Table 8
Cyclic Consumption SUR Regression

$$R_{CC,t} - R_{lr,t} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + e_{it}$$

Variables	Coefficient	Standard-Error	Statistic t	p-value
Intercept	0,00241	0,00066	3,40	0,0007***
Rm-Rf	1,02146	0,02344	31,44	0,0000***
SMB	0,14476	0,03798	1,64	0,1026
HML	0,08921	0,05187	1,15	0,2514
RMW	0,20092	0,05246	2,18	0,0298**
CMA	-0,14537	0,04886	-2,32	0,0207**

Note: R^2 adjusted = 0.8629. Significance: ***, ** and * correspond to 0,01, 0,05 e 0,1, respectively.
Note. Source: Prepared by the authors.

In the third sectoral portfolio, of non-cyclical consumption (Table 9), the significant factors were market premium, SMB and HML. The SMB and HML coefficients show that a small negative variation in the returns of these factors (-0.12% and -0.18%) causes a positive change in the non-cyclical consumption portfolio (+ 1%).

Table 9
Non-Cyclic Consumption SUR Regression

$$R_{CNC,t} - R_{lr,t} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + e_{it}$$

Variables	Coefficient	Standard-Error	Statistic t	p-value
Intercept	0,00236	0,00057	4,17	0,0000***
Rm-Rf	0,93951	0,02020	48,18	0,0000***
SMB	-0,11829	0,03272	-2,00	0,0466**
HML	-0,18154	0,04469	-3,44	0,0006***
RMW	0,08087	0,04520	-1,04	0,2957
CMA	0,07363	0,04210	1,27	0,2036

Note: R^2 adjusted = 0.8794. Significance: ***, ** and * correspond to 0,01, 0,05 e 0,1, respectively.
Note. Source: Prepared by the authors.

In the fourth sectorial portfolio, the industrial one (Table 10), the relevant factors were market premium and CMA. The significant CMA factor points out a positive influence of the investment rate on the returns of the industrial sector (a variation of 0.24% in the CMA causes a 1% oscillation in the return of the industrial portfolio). This relationship makes sense insofar as the sector is formed by companies with a high asset position, capital intensive, whose main activity is the circulation of capital goods, justifying the intense sensitivity of the premiums of the industrial portfolio in relation to the variation of assets (CMA).

Table 10
Industrial SUR Regression

$$R_{IND,t} - R_{lr,t} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + e_{it}$$

Variables	Coefficient	Standard-Error	Statistic t	p-value
Intercept	0,00138	0,00076	2,19	0,0287**
Rm-Rf	1,01778	0,02667	17,80	0,0000***
SMB	0,07131	0,04321	0,90	0,3685
HML	-0,03829	0,05902	-0,59	0,5558
RMW	0,09663	0,05970	1,08	0,2797
CMA	0,23623	0,05560	2,26	0,0242**

Note: R^2 adjusted = 0.8135. Significance: ***, ** and * correspond to 0,01, 0,05 e 0,1, respectively.
Note. Source: Prepared by the authors.

In the fifth sectoral portfolio, of public utility (Table 11), the significant factors were market premium, SMB and CMA. The SMB factor, significant at 1%, has an inverse ratio of 0.42% with the return of the public utility portfolio. This behavior has an intuitive explanation, which stems from the market structure of the public utility sector based on the presence of

barriers to entry due to legal regulation (inherent in the concession process for the exploitation of public utility services) and the production process of economies of scale), making it close to a monopoly structure. This feature reflects the influence of the size factor (SMB) on the utilities sector pricing.

Table 11
Public Utility SUR Regression

$$R_{\mathrm{UP},t} - R_{lr,t} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + e_{it}$$

Variables	Coefficient	Standard-Error	Statistic t	p-value
Intercept	0,00132	0,0008	1,57	0,0922*
Rm-Rf	0,76510	0,0297	15,63	0,0000***
SMB	-0,42006	0,0482	-7,03	0,0000***
HML	0,09723	0,0658	1,37	0,1720
RMW	0,10862	0,0665	1,43	0,1531
CMA	0,25778	0,0620	2,57	0,0106**

Note: R^2 adjusted = 0.6951. Significance: ***, ** and * correspond to 0,01, 0,05 e 0,1, respectively.
Note. Source: Prepared by the authors.

The market premium is statistically relevant in all estimated regression, which corroborates its contribution to the explanatory capacity of the 5-factor model, strengthening the market beta as the most relevant component of the pricing model.

5 CONCLUSIONS

The present work used the components of the 5-factor risk model proposed by Fama and French (2015a) to verify their respective influences on Brazilian stock market returns. The investigated asset class was the weekly returns of sector portfolios.

In order to obtain the components of the pricing model, the 2x2x2x2 portfolio method was used, which produced eight portfolios, based on the variables inherent to the risk factors (market value, B/M, EBIT/PL and asset variation). The ordering was carried out in four steps, producing at each step two portfolios, obtained by a cutting methodology that uses the median of the four factors mentioned above. Having the weekly returns equally weighted from these portfolios, the risk factors are obtained by means of a simple difference of averages.

In the last step, the model was tested. The chosen estimation process was the multiple linear regression of the SUR type. The results point out the importance of the statistically significant market premium for all five sectors tested. In addition to the expected significance of this premium, the risk premium tied to investments was significant in three of the five sectors of the economy studied. This shows the ability to explain the amount of investment in relation to the return of the companies. This fact in particular shows managers how important it is to reflect on the organization's investment policy due to its impact on results.

It is interesting to note in the results that an increase in investments does not always have a positive impact on the performance of the company at that time, a fact verified in the negative coefficient of the cyclical consumption sector, unlike the Industrial and Public Utility sectors, which had positive coefficients.

The presence of significant intercepts, at a significance level of 1% for the consumption sectors (cyclical and non-cyclical) and 5% for those of basic and industrial materials, and of 10% for public utility shows the existence of influences in the returns of sector portfolio premiums not captured by the 5-factor model.

It contrasts with this result, as favorable points to the pricing model, the low correlation between the risk factors (avoiding possible problems of muticollectarity) and the high explanatory power of the factor model reflected in the R^2 adjusted from the respective regression.

One of the limitations of the study is the size of the Brazilian stock market, which makes it difficult to construct diversified portfolios for periods prior to 2008, before the IPO boom

mentioned in section 3.1. The number of listed companies and the low volume of trading in the stock market are also reflected in the difficulty of implementing other methodologies for portfolio construction. In their study, Fama and French (2015a) set up 2x4x4 (32 portfolios), 5x5 (25 portfolios) portfolios, segmenting portfolios from quartiles and quintiles to control variables, for example, difficult replication techniques for the Brazilian market. Therefore, the relevance of adapting the pricing models to the conditions of the capital market investigated is emphasized.

The estimation process is also a limitation. It is recommended that future research uses data in panels, based on the use of time series conjugated with cross-section. The use of the GRS statistical test, adopted in the study by Fama and French (2015a), may be an econometric technique used to validate pricing models that adopt panel data as the estimation method.

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CONTROLLER'S MOTIVATIONS, SKILLS AND COMPETENCIES IN THE PERCEPTION OF STUDENTS WHO COURSE POST-GRADUATE IN CONTROLLING

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ABSTRACT

This study aimed to analyze the motivations, abilities and competences of the controller in the perception of students who study post-graduation in controller. A descriptive survey and a quantitative approach were carried out. The population of this study was defined by accessibility and comprised the Higher Education Institutions of Santa Catarina that have a post-graduate degree in Controllership, that is, 278 students. The sample of the study was composed of 58 students who answered the questionnaire duly. To analyze the data, the statistical method of canonical correlation was used by statistical software StatGraphics®. The results of the study indicated that the greater the prospect of a salary increase, the greater the broad and critical view of operations and the ability to implement new ideas and projects, and the lower the responsibility for knowledge of finance, general accounting, costs, skills Leadership and teamwork, and proactivity. However, the lower the prospect of career advancement and job satisfaction, the greater the critical and broad vision of operations and the ability to implement new ideas and projects, and the smaller the responsibilities for financial literacy, general accounting, cost, Leadership skills and teamwork and proactivity.

Keywords: Controllership, Motivations. Skills and Competencies, Controller.

1 INTRODUCTION

The demand for controllers increased considerably from the 1960s onwards. This increase is due to the importance of the industrialization process that Brazil experienced during

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this decade (Siqueira & Soltelinho, 2001). However, the emergence of contemporary controllership began in the 20th century with the proliferation of multinational corporations. From then on, it plays a fundamental role in organizations. Supports managers in the planning, execution and control phases. The support that the controller gives to the management process implies an information system that allows to integrate several levels. In Brazil, the professional who performs the functions of controller is called controller. However, over the years and in several countries, there were several attributions given to this professional (Oro, Beuren, & Carpes, 2013). In this way, several functions have been assigned to the controller profession. It is relevant to the evolution of organizations and their organizational structure (operational, managerial and strategic), the diversity and complexity of the competencies assigned to these professionals (Araújo, Souto, & Azevedo, 2016).

On the other hand, it should be taken into account that companies increasingly lack planning, control and management of their activities, tasks, and functions, due to the competitiveness that, in general, is conferred on the controlling and Even to the professional controller. This is because the controller is assigned to enter and coordinate various areas of the company. Thus, the valorization of this profession results from the need for organizations to prepare strategic planning and control the development of activities (Gomes, Souza, & Lunkes, 2014). In this sense, the need for control in modern companies and the provision of management accounting information is one of the main tasks of controllers. In addition, most companies use accounting information for decision-making and control purposes (Weissenberger & Angelkort, 2011).

For Oro et al. (2013), the controller profession demands skills and managerial skills that are necessary for business management. Regardless of the organizational, ie operational, managerial or strategic level, its role will be managerial. With regard to managerial skills, these are related to behavior and skills are essential for the execution of a certain position.

Several factors may influence the performance of the controller. Duque (2011) cites the size and origin of capital. For the author, this controller should adapt both his skills and his competencies to the goal of the organization. This is also due to the dynamics of the economy that is under a new scenario, demonstrating that companies are increasingly competitive. They need a professional that best helps the management.

According to Oro et al. (2013), the controller stands out as the person in charge of information management, regardless of the stage of the management process. To do this, you must be prepared to understand and direct your own actions and the organization. In addition, the authors emphasize that the formation of a professional, regardless of the area, is marked by solid academic and continuing education.

Even though over the years the relevance of the controllers has consolidated, there is little literature that assists in understanding and clarifying the functions and competences attributed to these professionals (Araújo et al., 2016). In addition, there is the gap for the development of this research, because there are some divergences in the practice of professionals who are trained in the area of controller, with what students actually learn in theory in Higher Education Institutions. These students are studying postgraduate in order to seek a specific professionalization, in this case the controller, to improve, in this way, their skills and competences to the theme and, above all, increase their motivation to work in this area of accounting.

Several studies have sought to analyze the thematic analyzed in the present research, such as, Siqueira and Soltelinho (2001), Martin (2002), Calijuri, Santos and Santos (2005), Santos, Castellano, Bonacim e Silva (2005), Amaral and Rodrigues 2006), Lunkes, Schnorrenberger, Gasparetto and Vicente (2009), Machado, Lunkes, Petri and Rosa (2010), Duque (2011), Lunkes, Schnorrenberger and Rosa (2013), Oro et al. (2013), Ferrari, Cunha, Lunkes and Borgert (2013), Araújo et al. (2014), Gomes et al. (2014), Dal Vesco, Daniel and Tarifa (2014), and Pletsch, Silva and Lavarda (2016), which allow the support of the research problem. However, no studies were found with the purpose of analyzing the context of this research in post-graduation in the area of Controllership. This presents the differential and an opportunity for the investigation of this relevant topic in the accounting context.

It is understood that the skills and abilities necessary to perform a task must be understood and taken into account, especially when it comes to this profession that is still

developing (Duque, 2011). In addition, considering the importance of this professional to the accounting area and the scarcity of research, with regard to postgraduate students in Controlling, the study seeks to answer the following question: what are the motives, skills and competencies of the controller In the perception of students who study post-graduation in controllership? Thus, the objective of this research is to analyze the motivations, abilities and competences of the controller in the perception of students who study post-graduation in Controlling.

It is important to note the motivations as well as the skills and competencies of the controllers, as controllability is growing and, as soon as this information is taken into account, professionals will bring better results to the organization. It is worth mentioning that, according to Duque (2011), when institutions know what motivates their academics, they can prepare professionals not only to meet the technical requirements, but also to have more and more skills and management. By the way, the organization will only be able to hire the professional they are looking for, if they know the profile that meets their needs.

Even though the professions related to the accounting area have undergone significant progress in Brazil, the functions of the controller are still not well defined within the organizations. However, in order to be recognized, this professional must have an influence in the organization to lead managers along the best path. Therefore, it is essential that the controller has its functions well defined (Dal Vesco et al., 2014). It is also justified, according to Oro et al. (2013), which suggests analyzing students' perceptions of the skills and competencies required by the labor market, in view of the findings of these professionals who work in the controller.

It is also justified by Baruch and Lemming (2001), since a postgraduate course adds value to its participants, provides them with skills and competences important for the development of their professional career. The reasons for this course are to improve the career prospects, by obtaining management knowledge and, above all, for success in working life. In addition, teaching in postgraduate courses has evolved dramatically, bringing benefits to students and businesses. The bulk of the demand is concentrated in the Master of Business Administration (MBA), which was relevant a North American creation from the beginning of the last century and has expanded to practically all over the world (Frezatti & Kassai, 2003)

By identifying the skills and competences required by the current market, it is possible to work to develop them, aiming at the professional improvement of the controllers, as well as the continuous learning, essential in the contemporary days. In relation to institutions that offer postgraduate courses, they can use the results to adjust their courses to the demands of the market.

This study contributes to a better professional training in the area, based on the analysis of the motivations, skills and competences mentioned by the students, compared to the profile expected by the job market. In addition, the contributions can be theoretical and practical, both for the academy and for the company, taking into account the students' perception of the postgraduate in control.

2 THEORETICAL REFERENCE

In the theoretical reference, the controller, concepts and functions are presented initially. Following is a description of the controller functions. In addition, the previous studies are evidenced, which make it possible to base the present research.

2.1 Controllership

The importance of controlling companies has been growing in recent years. The market stopped searching for and hired professionals who only transcribed information and began to look for more dynamic professionals, capable of generating useful and relevant information to extend the support to the business decision making (Santos et al., 2005). Similarly, the area of controllability has undergone several changes in recent years. It evolved from cost accounting to managerial accounting and, finally, to strategic cost management. In this way, the

controllability allows the administration to adapt the companies to the changes of the environment, through the planning process (Bencová & Kalavská, 2009).

In the modern business environment, management accounting, which is based on an exclusively financial model, does not provide adequate support to the company's management in decision-making. To do this, the financial model needs to incorporate new dimensions from control, since, when they work together, they form a general framework for performance evaluation, which does not only give explanations regarding the current state of the company, but allows projections as well as Simulations of future scenarios (Martin, 2002). In this sense, Oro et al. (2013) point out that from the moment that accounting adapts to this new environment, it evolves to the concept called Controlling.

According to Borinelli (2006, p.105), "Controlling is a set of knowledge that constitute theoretical and conceptual bases of operational, economic, financial and patrimonial orders, related to the control of the organizational management process." It should also be noted that the controlling company is responsible for controlling the process of management, generation and even the provision of operational, economic, financial and equity information for decision making.

As a mission, the controller seeks to support the management of companies, with a view to ensuring that it achieves the objectives, ie, seeks to optimize economic results, interacting with other areas. In this way, the controllership aims to: promote organizational effectiveness, enable economic management and promote the integration of business areas (Borges, Parisi, & Gil, 2005).

In this sense, the controller holds information at a global level of companies and contributes to the identification and monitoring of risks. In addition, it aims to provide managers with tools that allow an overview of resource applications, with the purpose of verifying how goals will be achieved and thus making decisions (Guimarães, Parisi, Pereira, & Weffort, 2009).

However, controllership is an area of study that lacks clear definitions as well as conceptualisations, which include a basic set of functions. In this sense, the development of control was based on the precepts of accounting, aiming at a broad function of international support, internal control, tax planning, participation in budgeting. In this way, it also acts in the formulation of strategies. It ceases to be just the controller a professional data compiler, to be an information manager focused on the strategic alignment of companies (Lunkes, Gasparetto, & Schnorrenberger, 2010; Lunkes, Machada, Rosa, & Telles, 2011).

Per Oro et al. (2013), the controller is an administrative unit that has the mission to support the company's management process. In order to fulfill its attributions it is used of diverse areas of the human knowledge. In this way, the company must have a professional with skills and competences to manage the information in order to respond to the challenges of the organization.

Controlling is responsible for establishing the theoretical and conceptual basis necessary for the construction, as well as for the maintenance of the information systems and economic management model, that adequately meets the information needs of the company managers and also that it assists in the process Of decision making (Amaral & Rodrigues, 2006).

In the face of constant changes in the world economy, the market has a greater influence, with consequences for companies, which need to go through adaptation processes in their information systems with a view to maintaining competitiveness. Faced with this, the controller seeks to coordinate management systems and act on the vital points of the companies (Richartz, Krüger, Lunkes, & Borgert, 2012). However, the rise of controllership has resulted in the search for qualified professionals that meet the profile demanded by the labor market.

Faced with this, postgraduate courses have become more sought after, with the aim of developing skills and competences necessary for the performance of the controller role, which is based on diversified areas of knowledge.

2.2 Controller Functions, Skills, and Competencies

The definition of functions is considered as one of the fundamental points in the studies related to control. In this sense, the functions aim to guide the performance of a certain area of

knowledge. However, there are difficulties in this regard, due to the concepts related to the theme, which are sometimes confusing and contradictory in the literature (Lunkes et al., 2011; Lunkes et al., 2013). According to Granlund and Taipaleenmaki (2005), management expects controllers to actively develop the finance, control and information systems processes of companies.

In this sense, the functions of the controller can vary according to the size of the company and the number of managers in the same function. The less managers, the more functions the same will have (Duque, 2011). In the same way, Guimarães et al. (2009) and Oro et al. (2013) emphasize that one must take into account that the role of the controller can change from one company to another, according to the size of the company and its organizational structure.

Therefore, controllers who wish to adapt to the profile that companies expect, in order to increase their potential and performance, should focus on multidisciplinarity. The controller must perform the functions of planning, control, budget, costs, financial and accounting analysis, know how to work in a team, have leadership and global vision, be proactive, have business vision and good communication to improve the controller's own performance. Duque, 2011).

Controllers are responsible for a wide range of functions and their growing experience can extend the tasks assigned to them. To do so, the nature of the controller's tasks makes it clear that his interactions with the managerial area play an important role in company analysis (Weber, 2011).

Likewise, Dal Vesco et al. (2014) emphasize that, among other functions, this professional is responsible for coordinating people to reach the goals, that is, for leadership. For this, it is the controller that must motivate other employees and guide them to the best path, so that they feel satisfied, monitor and supervise the sectors, perform technical, operational and managerial functions. In addition, the authors emphasize that it is not enough just to plan and execute, it is necessary to control the processes subtly, so that the objectives are achieved. Thus, it is the role of controllers to guide managers towards decision making (Dal Vesco et al., 2014).

Lunkes et al. (2009) emphasize that control plays a central role in the management process and a broad function for information support, tax planning, internal control, budgeting, strategy formulation. In this way, the controller becomes responsible for this process. There are three approaches to the basic functions of controllership: operational management that involves planning, reporting and interpretation, evaluation and deliberation, tax administration, reporting and regulatory and public agencies, equity protection, and economic valuations policy.

The second approach concerns economic management. Its function is to subsidize the management process, to support the performance evaluation and the evaluation of results, to manage the information system, to assist the market agents. In addition, the controllers that act in strategic management have the function of planning, information system, control, people management and organizational (Lunkes et al., 2009).

With regard to the empirical functions of the controller, the most important are accounting, control, tax administration, interpretation and reporting, planning and internal control. In relation to consolidated functions, the controller is responsible for planning, controlling, accounting and reporting, and their interpretation. Finally, the functions covered in the literature cover the control, planning, accounting information system, and report design and interpretation (Lunkes et al., 2013). In view of the aforementioned functions, it should be noted that there are several skills, competencies and motivations of the controllers towards the companies. Thus, in relation to skills, it is pointed out that, as people move up in one organization, the needs also turn out to be others, and consequently the skills change. For this, it takes a great technical skill, especially in the early career of controllers (Duque, 2011).

In this sense, contemporary companies have experienced competitive pressures. They are forced to create mechanisms to differentiate themselves and increase competitiveness. Faced with this, the controllership plays a fundamental role in this management process, since it has as functions to provide information support, internal control, tax planning, budgeting, participation in the formulation of strategies. Thus, in order for the controller to meet its demands, it needs to have a set of technical and personal skills (Machado et al., 2010).

The competencies of the controller are considered one of the fundamental points for any study in the area of controller. However, it has been difficult to identify a basic set of personal and professional skills in the literature (Machado et al., 2010). Regarding competence, Duque (2011) emphasizes that the word originates from the Latin competentia and refers to the individual who is capable of analyzing and solving a certain subject, with ability, ability, aptitude and even suitability. It is required a set of skills of the professional that acts in the controller, so that it can meet the demands (Oro et al., 2013).

According to Simãozinho (2012), controllership professionals have an essential role in the management of the companies' business, since this area requires innovations in their practices. This is in order to better develop their ability to manage strategic and operational information, thereby contributing to the competitiveness of enterprises and supporting stakeholder decision-making. The author also emphasizes that controllers are responsible for providing information that supports decision making, planning, as well as evaluating economic-financial and operational performance and also serves as a basis for the evaluation and compensation of managers.

In addition, the controller must know the activities of the companies in a broad way, so that he can see the performance and make future forecasts. It is pointed out that the controller is not responsible for an area, but rather has the function of verifying the information of the companies for the managers to make the best decisions (Richartz et al., 2012).

2.3 Previous studies

The concern in verifying the perception of students of Post-Graduation in Controllership on the abilities and competences developed with respect to the functions of the controller was object of some studies of different environments and authors. However, among the studies evidenced, few verified this subject in graduate courses.

In the study by Siqueira and Soltelinho (2001) the authors aimed to evaluate the evolution of the controller in Brazil based on the ads published in the classified section. They selected several years based on the announcements published in the Domingo do Jornal do Brasil notebook. They considered a broad definition of the term controllership, not selecting only ads that searched for controllers. The results pointed out that economic evaluation is a necessary function for the role of controller. In addition, the interest was greater by professionals with a background in accounting sciences, economics and, to a lesser degree, in management. The market is looking for professionals with experience, proficient in computer science, who have mastery of one or more foreign languages, are able to work under pressure and in team, are communicative and have the capacity to lead.

The study by Martin (2002) aimed at analyzing the evolution of accounting to control, through a qualitative and descriptive study. After analyzing this evolution, he concluded that the controller needs to be a generalist par excellence, with the ability to deeply understand his company as well as his branch of business. In addition, it needs to understand, manage and critique methods, research tools, analysis and forms of action of a large number of functional specialists working in the organization.

Calijuri et al. (2005) aimed to show the role of the controller through an exploratory research. In this way, they applied questionnaires to the professionals who occupied the functions of controller. The results indicate that the controllers indicated that the most important skills for the performance of their work are: leadership, flexibility for change, ease of interpersonal relationship, ability to implement new ideas and projects, initiative, knowledge of finances, and proactivity. Among the courses most sought by these professionals are those of Accounting and Business Administration. In addition, the majority, that is to say, 19 students undertook a post-graduate MBA degree and 14 undertook a specialization in Controllership.

Santos et al. (2005) developed a study based on the 500 largest companies in Brazil, in order to outline the main functions, attributions, responsibilities, skills and attitudes of the controller profile. The results indicated that the Brazilian companies analyzed seek a controller profile with experience between 3 and 10 years, with MBA or specialization, training in accounting sciences, administration and economics, initiative, economic vision, leadership and ethics. The main functions are: implementation and supervision of the accounting plan,

compilation of production and distribution costs, preparation, presentation and supervision of tax matters, preparation and interpretation of statistics and reports for administrative decision, focus on the company's overall budget and Knowledge in tax, tax and accounting.

The study developed by Amaral and Rodrigues (2006) aimed to demonstrate the functions performed by the controllers and the teaching of the controller discipline in graduate programs at the level of specialization in Accounting Sciences, as well as the professional working in the labor market. They elaborated a questionnaire and sent to the coordinators and / or teachers that minister the discipline of controller and carried out interviews with professionals who are exercising the function of controller in the companies. In relation to the role of the controller in the view of teachers, first is the function of budget, financial control, accounting and costs. For professionals, the main functions of the controller would be information, motivation, coordination, evaluation, planning and follow-up, as well as that of a strategic employee in providing critical vision. Thus, the results point out that the Accounting Sciences course can make the controller very technical and with no business vision.

The research of Lunkes et al. (2009) aimed to identify a set of control functions in manuals and reference works in the United States, Germany and Brazil. The research results, common to the three countries, were: planning (87%); Control (83%); Prepare and interpret reports (47%); And feed the information system (43%). The results showed that the most cited functions are planning (87%) and control (83%), that the role of the controller has a proactive character in the organization. It also shows that, in its development, the controller has incorporated broader and more systemic functions. This result reveals that a large part of the controller's concerns must be more focused on the future of the organization, that is, the controller is expected to have a proactive attitude towards the organization, and not just informative.

Machado et al. (2010) aimed to identify the controller's competencies in the 100 largest companies in the State of Santa Catarina. The findings revealed that controllers' personal competencies are more related to characteristics such as working on pressure, ethics, flexibility for change, honesty and integrity, initiative and leadership, among others. The professional competences are related to characteristics such as strategic and process vision, logical reasoning, planning and organization.

In view of the objective of analyzing the current professional profile of skills and abilities required by the contracting companies for the role of controller and to investigate whether the profile has an association with the size of the company, the origin of capital, the hierarchy of the position, academic training and salary offered by the company. Current work market, Duque (2011) found results that showed an association between the behavioral profile and the size of the company and the origin of capital, between the technical profile and the hierarchy of the position and also between the benefits offered and the size of the company.

The research developed by Lunkes et al. (2013) aimed to identify and analyze the main functions of control in empirical studies and reference works and manuals. Among the functions consolidated in terms of works and manuals and empirical studies stands out the planning, control, accounting and reporting as well as interpretation.

The study by Oro et al. (2013) analyzed the adherence between the skills and abilities required by the national market in the hiring of the controller and the proposal for their academic training in the perception of teachers of the discipline of controller. The results relate the skills and abilities required by the national market in the hiring of the controller and the proposal for their academic training in the perception of teachers of the discipline of control. The authors concluded that there is a certain degree of adherence between the profile desired by the labor market and the proposition for the academic training of the controller.

Based on the objective of identifying the functions and duties of the controller requested by Brazilian companies in the recruitment process in the national labor market, Ferrari et al. (2013) revealed that the requested functions that stand out most are accounting management, tax and fiscal control, strategic planning and management reports. Regarding the competences, the most outstanding are: global vision of the market, dynamism, leadership, proactivity and knowledge in IFRS / ERP. In addition, the demand for professionals with an academic background in accounting has declined, and it has become necessary to master a second language. One can conclude that the market is demanding controllers capable of managing the

information of the organizations and that stand out by the technical and interpersonal knowledge.

The study by Araújo et al. (2014) aimed to identify the skills and competences developed in graduate courses (lato senso) with an emphasis on controller, related to the profile contemplated in the literature for the controller. The data were collected through a questionnaire applied to students of the postgraduate course in Controlling at HEIs in the city of João Pessoa - PB. The results of the study reveal that in relation to the most developed competences, the following stand out: controller specific skills, ie, financial, economic evaluation, accounting skills, audit procedures, organizational risk measurement, accounting information systems, Internal control procedures, and also strategic planning. They further affirm that a postgraduate course can add value to students, making them more prepared to face the labor market.

The research of Gomes et al. (2014) aimed to identify the professional profile of the controlling company requested by Brazilian companies. The authors concluded that the profile requested for controllers is changing over the years. It is no longer an essentially accounting function, to be a strategic professional, participant in management in a systematic way, with leadership, proactivity and analytical capacity.

Dal Vesco et al. (2014) developed the study in the segment of Farming Cooperatives of the State of Paraná, with a view to identifying the profile of the controllers with regard to the functions. The results showed that 85.7% of the controllers had higher education in the accounting sciences, the others in administration and other courses. 88.9% of the sample had undergraduate MBA (88.9%), 42.9% hold the management position, 23.8% of the board and 19% of supervision. 95% of controllers perform the function of cost management, 90% of planning and budget control, 90% of management reports and 86% coordination of monthly accounting closings. Regarding skills, the results demonstrated that 100% of controllers have leadership and cooperation skills, 86% initiative and flexibility skills for change, forward thinking, persistence and persuasion, and interpersonal skills and implementation of new ideas / projects , 81% have knowledge in finance and foreign language mastery and 76% have ethical standards.

The study developed by Pletsch et al. (2016) sought to identify how the contents of the controller discipline and the functions of the controller in the labor market are approached in the accounting sciences courses of southern Brazilian universities. The results showed that the requirements of the labor market for the exercise of the accounting profession are located in the accounting and financial process of the companies and that the discipline of controllability meets all the requirements of the market, in addition to being the most comprehensive. The control functions: information system, planning and control, stood out in the present study and related studies.

3 METHODOLOGICAL PROCEDURES

In order to meet the proposed objective, to analyze the relationship between the motivations and the skills and competences of the controller in the perception of graduate students in controllership, a descriptive, survey and quantitative approach was carried out.

The questionnaire was elaborated from the literature evidenced in the theoretical reference and the instrument used by Araújo et al. (2014) with closed questions on a Likert scale of 1 to 5 and is divided into four parts: Part I: Respondents' Profile, Part II: Motivations to pursue a postgraduate course in Controlling, Part III: Skills and competencies Developed in the post-graduate course and Part IV: Contribution of the postgraduate in the relation between theoretical knowledge and practice. It should be emphasized that this questionnaire was submitted to a reliability test carried out by three professors from the Accounting Sciences course, who verified the content of the questions. After the verification, the questionnaire was adjusted according to the considerations.

Before sending the questionnaire, contact was made with those responsible for the post-graduate courses in Controlling HEI of the sample, emphasizing the importance of this study and justifying the need for the questionnaires to be returned. Thus, the link of the questionnaires

that were elaborated in Google Docs was sent in the months of September and October of 2015, requesting that they send to the respective students.

The population of this study was selected for accessibility and comprised the Institutions of Higher Education of Santa Catarina that have postgraduate course in Controlling. It is noteworthy that, there are several nomenclatures for postgraduate in the management area, such as, strategic management of companies, cost accounting, among others. However, it was decided to analyze postgraduates that presented the nomenclature of "Controllership", which allows greater comparability. However, it should be noted that even if there is an identical nomenclature, there may be differences in curriculum matrix, teacher education, among other factors, which are considered limitations for the development of this study.

Table 1 shows the Institutions of Higher Education, their respective city, as well as the number of students to whom the questionnaire was sent, constituting the population of the present research.

Table 1
Research Population

Institution of Higher Education	City	Students
Centro Universitário Barriga Verde - UNIBAVI	Orleans	23
Centro Universitário para o Desenvolvimento do Alto Vale do Itajaí - UNIDAVI	Rio do Sul	35
Faculdade Empresarial de Chapecó - UCEFF	Chapecó	35
Universidade Comunitária Regional de Chapecó - UNOCHAPECÓ	Chapecó	31
Universidade da Região de Joinville - UNIVILLE	São Bento do Sul	24
Universidade do Oeste de Santa Catarina - UNOESC	Chapecó	45
Universidade do Oeste de Santa Catarina - UNOESC	Joaçaba	21
SEI FAI Faculdades/ Pólo UCEFF	Itapiranga	54
Serviço Nacional de Aprendizagem Comercial - SENAC	Concórdia	10

Note. Source: Research Data(2014).

It can be seen, from Table 1, that the population comprised 278 postgraduate students in Controllership of the State of Santa Catarina. The sample of the study was composed of 58 students who answered the questionnaire duly.

Table 2 presents the codification of the motivations and skills and competences used in the research instrument, to facilitate understanding in the analysis of the results.

Table 2
Coding of motivations and skills and competencies of the research instrument

Groups	Code	Questions/Variables
Motivations to take a postgraduate course in Controlling	M1	Improvement of managerial skills
	M2	Career improvement outlook
	M3	Perspective of wage increase
	M4	Professional satisfaction
	M5	Personal satisfaction
	M6	Professional update (qualification)
	M7	Acquisition of new skills
	M8	Improved self-esteem
	M9	Career Change
Developing Skills and Competences that while attending a postgraduate degree, regarding the functions of the controller	HC1	Responsible for finance knowledge
	HC2	Responsible for knowledge of budgets and economic evaluation
	HC3	Responsible for general accounting knowledge
	HC4	Responsible for tax and fiscal expertise
	HC5	Responsible for knowledge of costs
	HC6	Knowledge of accounting principles and corporate law
	HC7	Leadership Skills and Teamwork
	HC8	Ability to influence managers to make decisions
	HC9	Strategic planning
	HC10	Measurement of organizational risks

Continue

Table 2 (continuation)

Groups	Code	Questions/Variables
Developing Skills and Competences while attending a postgraduate degree, regarding the functions of the controller	HC11	Responsible for information systems management
	HC12	Knowledge of audit procedures
	HC13	Consulting
	HC14	Broad and critical view of operations
	HC15	Proactivity
	HC16	Development and implementation of internal controls, integrated systems, among others
	HC17	Ability to solve problems and flexibility for change
	HC18	Command of foreign language (s)
	HC19	Ability to work under pressure
	HC20	Initiative
	HC21	Ability to implement new ideas and projects

Note. Source: Research Data (2014).

After the data collection process, the answers of the questionnaires were tabulated and analyzed in a quantitative way, through descriptive analysis of frequencies and descriptive statistics, reliability test of the research instrument used (Cronbach's alpha), t test of means and THE NEW. Finally, in order to relate motivations to the skills and competences of postgraduate students in Controllership, the statistical method of canonical correlation was used by statistical software StatGraphics®

4 DESCRIPTION AND ANALYSIS OF RESULTS

This section presents the description and analysis of the study results. The profile of respondents is initially presented through a descriptive analysis of frequencies and descriptive statistics. Following, the reliability test of independent samples (Cronbach's alpha). After that, the means test was performed from the t-test and ANOVA and, finally, canonical correlation to analyze the relationship between the motivations and the students' abilities and competences. Table 3 presents the gender of the respondents.

Table 3
Gender

Gender	Absolute frequence	Relative frequence (%)
Female	29	50%
Male	29	50%
Total	**58**	**100%**

Note. Source: Research Data(2014).

It can be seen from Table 3 that the gender of the respondents presented the same proportion, that is, half are men and the other half are women. Table 4 shows the age of the postgraduate students in Controllership who answered the questionnaire.

Table 4
Age

Age interval (years)	Absolute frequence	Relative frequence (%)
21 – 24	28	49%
25 – 27	11	19%
28 – 30	3	5%
31 – 34	10	17%
35 – 37	3	5%
38 – 40	2	3%
41 – 44	1	2%
Total	**58**	**100%**

Nota. Source: Research Data(2014).

From Table 4 it was verified that the majority of the respondents are between 21 and 24 years old, representing 49% of the sample. In addition, a significant number of students are between 25 and 27 years and 31 and 34 years, which is 19% and 17%, respectively. Only one respondent is between 41 and 44 years of age. In the sequence, Table 5 is presented, referring to the educational area.

Table 5
Educational Area (graduation)

Área	Absolute frequence	Relative frequence (%)
Administration	7	12%
Accounting	48	82%
Others	3	6%
Total	**58**	**100%**

Nota. Source: Research Data (2014).

Table 5 shows that the area of educational (undergraduate) that prevailed among the respondents was Accounting Sciences, with 48 respondents, that is, 82% of the sample, followed by Administration with 12% and, finally, Other areas with 6%. The other areas are related to the Economics, Logistics and Information Systems courses. Table 6 shows how long the student has been graduated.

Table 6
Graduated time on graduation

Time interval (years)	Absolute Frequence	Relative Frequence (%)
0,5 – 3	40	69%
4 – 5	3	5%
6 – 7	3	5%
8 – 9	6	10%
10 – 12	3	5%
13 – 14	1	2%
15 – 17	2	4%
Total	**58**	**100%**

Note. Source: Research Data (2014).

The time of educational of the respondent students, according to Table 6, was mostly the period of 6 months (0.5 years) to 3 years, since it presented an absolute frequency of 40 respondents, which represents 69% of the sample. The other respondents are graduated from 4 to 17 years of age. Table 7 shows the professional performance of the respondents.

Table 7
Area of professional activity

Área	Quantity
Administrative	9
Auditing	2
Accounting	25
Controllership	6
Financial	12
Public	2
Others	2

Note. Source: Research Data (2014).

According to the data presented in Table 7, the majority of respondents work in the accounting area, that is, 25 students. In addition, 12 students work in the financial area, 9 in the

area administered and the other in the areas of auditing, controlling, public and others. Table 8 shows the level of the postgraduate level of the respondents.

Table 8
Post graduation Level

Genre	Absolute Frequence	Relative frequence (%)
Specialization	43	74%
MBA	15	26%
Total	**58**	**100%**

Note. Source: Research Data (2014).

It can be seen from Table 8 that the majority of respondents attend post-graduate level of specialization, that is, 74%. Of the 58 students, only 15 have an MBA. This result differs from that found by Calijuri et al. (2005), since the majority of the respondents carried out the post-graduate in MBA, that is, 19 controllers, and 14 undertook a specialization in Controllership.

Table 9 shows the descriptive statistics, with minimum, maximum, mean and standard deviation for the variables of the respondents' profile on Gender, Age, Educational area, Educational time, Area And Level of the academic post-graduation.

Table 9
Descriptive statistics

Variables	Minimum	Maximum	Average	Standard Deviation
Genre	1	2	1,50	0,50
Age	21	44	**26,83**	**5,36**
Educational Area	1	3	1,22	0,53
Educational time	0,5	17	3,82	4,15
Occupation area	1	8	**4,26**	**1,78**
Post Level	1	2	1,26	0,44

Nota. Research Data (2014).

To verify the reliability of the research instrument used for the development of this study, the Cronbach alpha test was performed, which presented a value of 0.725, that is, a reliability of 72% regarding the motivations of the respondents to seek a post- Degree in Controllership and 0.851 on skills and competencies, ie 85% of data reliability. According to Corrar, Paulo and Dias Filho (2009), the closer to 1 is the Cronbach's alpha, the better the reliability of the data. Hair (1998) presents 0.7 as the ideal value, however, one can accept 0.6 in exploratory research.

After that, the t-test of means and ANOVA was carried out in order to verify if there is a difference between the profile of the 58 respondents and the motivations to seek a postgraduate in control, skills and competences that they develop through the post-graduation, With regard to the functions of the controller, and also the contributions of the graduate taking into account theory and practice. Therefore, for the variables Gender and Postgraduate Level, the t-test of averages was applied, since they are Dummy variables and for the other variables, that is, Age, Educational area, Time graduated and Area Of professional performance, the ANOVA test was applied.

In addition, the variables Age and Area of professional performance presented values among the students of the sample, dispersed in relation to their mean, that is, the values are distant from the mean, which can be noticed from the standard deviation of 5.36 And 1.78, respectively. The other variables (Gender, Educational Area, Educational Time and Postgraduate Level) had a standard deviation with low values, between 0.44 and 4.15, which means that they are close to the mean, without dispersion.

From these statistical tests, it was been verified that there is no difference of averages between the profile of the respondents with the motivations, abilities and competences, as well

as, of contributions of the post-graduation in controller. In this way, the profile of the respondents does not alter the response of the students. The following is the canonical correlation of the motivations group with the skills and competences group in Table 10.

Table 10
Canonical correlation of the group of motivations with the group of skills and competences

Number	Autovalue	Canonical Correlation	Lambda *Wilks*	Square-Chi	D.F	*P-Value*
1	0,710956	0,843182	0,00335748	236,407	189	0,0109
2	0,654893	0,809255	0,0116158	184,899	160	0,0865
3	0,574864	0,758198	0,0336586	140,747	133	0,3061
4	0,553073	0,743689	0,0791714	105,25	108	0,5570
5	0,464146	0,681282	0,177146	71,8273	85	0,8452
6	0,33155	0,575804	0,330587	45,9358	64	0,9570
7	0,293768	0,542004	0,494557	29,2198	45	0,9670
8	0,234536	0,484289	0,700276	14,7856	28	0,9806
9	0,0851611	0,291824	0,914839	3,6938	13	0,9940

Note. Source: Research Data (2014).

As verified in the first column of Table 10, nine different linear combinations could be calculated by means of canonical correlation, since this is the number of the set of variables in the group of motivations to seek a postgraduate in Controllership, smaller than the set of Variables of the group skills and competencies that they develop through the postgraduate, in what refers to the functions of the controller.

In addition, it can be seen from Table 8 that the first linear combination between the motivations group and the skills and competences group had a correlation coefficient of 0.843182 and a significant P-Value at the 5% level, which was 0.0109. As one of the values of P-Value is less than 0.05 this set of variables presented a statistically significant correlation at the 95% confidence level. According to Hair, Babin, Money and Samuel (2005), it represents a high association strength, since it was between +0.71 and + 0.90. It is also worth noting that none of the other linear combinations had a significant P-Value at the 5% level. Table 11 presents the coefficients for the canonical variables of the group of motivations with the group of skills and competences.

Table 11
Coefficients for the canonical variables of the group of motivations with the group of skills and competences

Number	Variables	Linear combinations								
		1	2	3	4	5	6	7	8	9
Motivations to pursue a post-graduate degree in Controlling	M1	-0,3534	0,2286	0,04639	-0,1980	0,7436	0,08745	0,4750	0,1779	0,26529
	M2	-0,7427	0,04420	-0,08891	-0,00788	-0,4799	-0,2400	0,3869	-0,9262	0,07443
	M3	**0,85090**	0,45389	-0,3932	-0,56158	0,07773	-0,46728	0,27589	0,50403	-0,5486
	M4	-0,97768	-1,08809	-0,39020	-0,08263	0,18453	0,51768	-0,42186	0,42842	-0,0131
	M5	0,29724	1,1399	0,07269	0,05440	0,25808	-0,93668	-0,34058	0,17363	0,32669
	M6	0,24266	0,54856	-0,11525	0,46951	-0,30194	0,88175	0,08466	0,23771	-0,4013
	M7	-0,42853	-0,26020	0,84034	0,18891	0,14345	-0,40662	-0,14421	0,09907	-0,3994
	M8	-0,04676	-0,37964	0,35196	-0,36685	-0,62112	0,31767	0,14322	0,32469	0,63974
	M9	0,23855	0,31643	0,15088	-0,54648	0,12222	0,34002	-0,46130	-0,52483	-0,2234
Skills and competences developed through post-graduation	HC1	-0,53485	0,03655	0,23819	-0,20604	0,50726	0,38599	0,13722	-0,21960	0,38244
	HC2	0,12233	1,09162	0,09699	0,08466	-0,05043	0,12513	0,17790	-0,00521	-0,2036
	HC3	-0,44939	-0,49402	0,30481	0,13528	0,50084	0,1623	-0,84300	-0,55839	-0,3284
	HC4	0,13236	-0,47355	-0,11561	-0,78786	-0,23231	-0,69142	0,58915	0,05470	-0,1180
	HC5	-0,69883	0,21405	0,01687	0,79321	-0,28474	0,64334	-0,35863	0,05664	0,14125
	HC6	0,06505	0,08855	0,28972	-0,11836	-0,88036	-0,50895	0,26646	0,51725	0,00371
	HC7	-0,44189	-0,38671	0,10624	0,08875	-0,16974	-0,29761	-0,31085	-0,47135	0,23353
	HC8	0,38345	0,67326	0,37042	0,21020	0,01008	1,10791	0,31831	-0,43436	-0,4397
	HC9	0,33659	-0,15974	0,88738	-0,61372	0,79061	-0,02092	-0,17860	0,58611	0,28283
	HC10	-0,03065	0,11235	-0,80140	0,49697	0,34899	-0,45968	-0,24923	0,33462	-0,1816
	HC11	0,00461	-0,32815	-0,52308	-0,40148	-0,48141	-0,42019	-0,27843	-0,20392	0,30612

Continue

Table 11 (continuation)

Number	Variables	Linear combinations								
		1	2	3	4	5	6	7	8	9
Skills and competences developed through post-graduation	HC12	-0,07203	-0,07445	0,33346	0,56218	0,15735	-0,12585	0,02705	-0,29402	0,29535
	HC13	0,21445	-0,31876	-0,31129	-0,10471	0,50746	0,48078	0,25056	-0,20291	0,02468
	HC14	**0,42004**	-0,32981	-0,06615	0,01072	0,48116	-0,29272	0,50622	0,01612	-0,3348
	HC15	-1,31573	-0,30200	-0,21841	-0,10451	0,04298	-0,40888	-0,03986	0,24504	0,27096
	HC16	-0,34396	0,61572	0,68681	0,38759	-0,13178	0,33450	0,18264	-0,31780	-0,0225
	HC17	0,34169	0,22594	-0,28223	0,27431	-0,42221	0,02001	-0,31745	0,24404	0,38564
	HC18	0,16145	-0,52635	-0,11429	-0,27947	0,18779	0,47915	-0,1651	0,56490	0,29540
	HC19	0,35533	0,21288	0,02641	-0,20148	0,14430	-0,39590	-0,31980	-0,32539	-0,0704
	HC20	-0,08159	-0,39952	-0,01784	0,25754	-0,22205	-0,26192	0,41782	-0,37560	-0,0798
	HC21	**0,65077**	0,08433	-0,44299	-0,84032	-0,28633	-0,00029	0,09173	0,39927	-0,6235

Note. Source: Research Data (2014).

From Table 11 we obtained the results on the relationship between motivations and skills and competences. We analyzed only the variables that showed above-moderate strength of association, according to Hair et al. (2005), that is, above +0.41.

The only variable of the motivation group that presented with strength of association above moderate was the perspective variable of salary increase (M3). It had a value of 0.85090 and the strength of high association, since the high association strength for Hair et al. (2005) ranges from +0.71 to +0.90. This variable presents a linear combination with two skills and competences variables, that is, a broad and critical view of operations (HC14) and capacity to implement new ideas and projects (HC21).

This combination indicates that the greater the prospect of a salary increase, the greater the broad and critical view of operations and the ability to implement new ideas and projects. In this sense, the study developed by Martin (2002) revealed that the controller needs to be able to deeply understand the company and the branch of business in which it operates.

However, according to the result obtained, presented in Table 8, the higher the salary increase perspective, the lower will be the responsibility for knowledge of finance (HC1), knowledge of general accounting (HC3), knowledge of costs (HC5), Leadership skills and teamwork (HC7) and pro activity (HC15).

These results demonstrated that the motivation perspective of salary increase is related to some of the abilities and competences developed by means of the postgraduate, in what concerns the functions of the controller.

In addition, it has been observed from Table 8 that the lower the motivations: career improvement (M2) and career satisfaction (M4), the greater the skills and competences: a broad and critical view of the operations (HC14) and capacity to implement new ideas and projects (HC21). However, the lower the motivation: career advancement and job satisfaction, the shorter the responsibilities for financial literacy (HC1), general accounting skills (HC3), responsibilities for knowledge of costs (HC5), skills Leadership and teamwork (HC7), proactivity (HC15), ie these five skills and competencies.

From these results found in this study, it is noticed that the results of the study by Siqueira and Soltelinho (2001) pointed out that the market seeks professionals who are qualified to work under pressure and in a team. In the present research, this ability and competence presented a negative association strength, however, different from the results found by these authors.

In addition, Siqueira and Soltelinho (2001) emphasize that the controller is a strategic professional to provide a critical vision for the company's management.

However, the result of the present study is similar to that of Calijuri et al. (2005) and Dal Vesco et al. (2014), who also verified that the most important skill for a controller's work performance is the ability to implement new ideas and projects (Dal Vesco et al., 2014). However, it is in agreement with other skills and competences, since they pointed out the leadership (Calijuri et al., 2005, Santos et al., 2005, Machado et al., 2010, Ferrari et al., 2013, Gomes et al. 2014 and Dal Vesco et al., 2014), finance knowledge (Dal Vesco et al., 2014) and proactivity (Gomes et al., 2014, Ferrari et al., 2013) as being important. In this research, they had a negative association with the motivations of the postgraduate students in Controlling.

In addition, the results contradict some of those found by Amaral and Rodrigues (2006). In the view of the teachers, the controller has the function of financial control, general accounting and costs (Santos et al., 2005, Dal Vesco et al., 2014). However, in relation to the professionals' view, the results go to their encounter, since they emphasize that one of the main functions of the controller is that the employee must provide a critical view of the operations (Ferrari et al., 2013, Dal Vesco et al ., 2014).

Moreover, the results of the study by Araújo et al. (2014) differ from the present research, since these authors revealed that in relation to the most developed skills and competences, those related to finance and general accounting knowledge stand out.

All the skills and competences that these authors highlighted as important for the controller presented a negative association with the motivations analyzed in the present study, according to the students' responses. Regarding the motivations of the students, no study has been found that matched the relation of motivations that presented strength of association both positive and negative with such skills and competences

5 CONCLUSIONS

This study analyzed the relationship between the motivations and the skills and competences of the controller in the perception of postgraduate students in controllership from a descriptive, survey and quantitative research. The study sample comprised the 58 students enrolled in a postgraduate course in control in the State of Santa Catarina and who answered the questionnaire. Data descriptive analysis and descriptive statistics, reliability test of the research instrument used (Cronbach's alpha), t-test of means and ANOVA, and canonical correlation were used to analyze the relationship between Motivations and skills and competencies.

Regarding the profile of the respondents, the results of this study revealed that half the respondents were men and the other half were women. Most respondents are between 21 and 24 years old. The time of educational of the students respondents was mostly the period from six months to three years. The area of educational (undergraduate) that prevailed was that of Accounting Sciences. Most of the respondents work in the accounting area and attend post-graduate level of specialization.

Given the results, it can be concluded that the higher the perspective of salary increases, the greater the critical and critical view of the operations and the capacity to implement new ideas and projects, and the lower the responsibility for knowledge of finance, General accounting, knowledge of costs, leadership skills and teamwork and proactivity.

However, the smaller the motivations: career prospects and job satisfaction, the greater the skills and competencies, the broad and critical view of operations and the ability to implement new ideas and projects, and the smaller the responsibilities for financial, Responsibilities for general accounting knowledge, responsibilities for knowledge of costs, leadership skills and teamwork and proactivity.

This study contributes to the fact that the HEIs analyzed verify the motivations of the students to pursue a postgraduate course in Controlling and, through these, adjust their courses, because the motivation related to the salary increase perspective was the only one that presented high positive association strength With the skills and abilities broad and critical view of the operations and ability to implement new ideas and projects, regarding the functions of the controller.

Araújo et al. (2014) emphasize that a postgraduate course can add value to students, making them more prepared to face the labor market. However, it is worth emphasizing that one must be attentive to the motivations and skills and competences of the students.

The limitations of this study are the impossibility of generalization of the results, since the population was intentional and not probabilistic, chosen due to the ease of access to the respondents. Thus, the questionnaires were not sent to all HEIs in Santa Catarina. In addition, another limitation is to obtain all the questionnaires properly answered since our of 278 questionnaires sent, only 58 returned answered. It is suggested, for future work, the expansion

of the population for all HEIs in Santa Catarina and / or Brazil, since a new sample will make it possible to use this study for comparative results.

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