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Leandro Pinheiro CRB-14/1340
Danielly da Cunha CRB-14/793

Journalist in Charge
Sara Caprario (Mtb0625JP)

Address for exchange and correspondence:
Revista Catarinense da Ciência Contábil
Regional Accountancy Council of Santa Catarina
Av. Osvaldo Rodrigues Cabral, 1900 – Centro
88.015-710 Florianópolis/SC

Phone: 48 3027-7006
Email: revista@crcsc.org.br
@crcscoficial
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Summary

Editorial

In a profession that continuously keeps track of changes in law and the dynamics of the economic and social world, academic studies become increasingly essential for the evolution of Accounting.

In this edition that debuts the planned news for 2017, like the translation into English of all articles, Revista Catarinense da Ciência Contábil brings seven significant researches in several work fields

The first addresses the evaluation of intangible assets and which approaches are mostly used, at a moment when technology rules business and subjectivity rules the business environment.

Subsequently, another study brings an analysis of the most relevant indicators for the performance evaluation of banking institutions, involving more than 118 with activities in Brazil.

Moving to the public sphere, the third article compares the investment in education with the performance of students in the small municipalities of Santa Catarina, revealing a great disparity between the volume of resources and the conclusion that there is no relation between the indicators.

In a conceptual sphere, another study evaluates the judgment and decision-making capacity of Accounting Scientists in solving issues involving international standards.

One of the articles further reports a case study to measure the performance of the company analyzed thereunder, through four accounting indicators, which demonstrates the relevance of this area in the strategy of organizations.

Long-term indebtedness is addressed by the last paper presented, which demonstrates the impacts on the performance of Companies in Brazil and Latin America.

Finally, the Magazine brings a study that analyzes the approaches and methodologies used in international researches. The results evidence that the New Institutional Sociology approach took over the scenario of the study regarding the changes in managerial accounting.

We wish you a good reading,

Accountant **Marcello Alexandre Seemann**
CRCSC President

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INTANGIBLE ASSET EVALUATION APPROACHES: A LITERATURE REVIEW

STEPHANIE KALYNKA ROCHA SILVEIRA
Master's Degree Candidate in Accounting by the Federal University of Santa Catarina. Currently acting as Accounting Coordinator in the Educational Foundation for the Municipality of São José, Chief Audit Executive in Estácio's University Center, in Santa Catarina. ***Address:*** *Municipal Educational Foundation, Avenida Acioni Souza Filho | Praia Comprida | 88103790 | São José/SC | Brazil.*
Email: *stephaniekrocha@gmail.com*

DARCI SCHNORRENBERGER
Doctor of Business Management by the Federal University of Santa Catarina. Current Associate Professor for the course of Accounting Sciences and the Graduate Program in Accounting, in the Federal University of Santa Catarina. ***Address:*** *Federal University of Santa Catarina, Departament of Accounting Sciences, Campus-Trindade-CSE/CCN, Trindade | 88040-970 | Florianópolis/SC | Brazil.*
Email: *darcisc@gmail.com*

VALDIRENE GASPARETTO
Doctor of Production Engineer by the Federal University of Santa Catarina. Professor in the Federal University of Santa Catarina, acting in undergraduate course and graduate programs. ***Address:*** *Federal University of Santa Catarina, Departament of Accounting Sciences, Campus-Trindade-CSE/CCN, Trindade | 88040-970 | Florianópolis/SC | Brazil.*
Email: *valdirenegasparetto@gmail.com*

ROGÉRIO JOÃO LUNKES
Doctor of Production Engineer by the Federal University of Santa Catarina. Professor in the Federal University of Santa Catarina. ***Address:*** *Federal University of Santa Catarina, Departament of Accounting Sciences, Campus-Trindade-CSE/CCN, Trindade | 88040-970 | Florianópolis/SC | Brazil.*
Email: *rogeriolunkes@hotmail.com*

ABSTRACT

The aim of this study is to analyze the evaluation approaches of intangible assets presented in national and international literature. Therefore, a constructivist philosophical basis and the Knowledge Development Process - Constructivist (ProKnow-C) were used as intervention tools for literature review. This survey was carried out on the databases (i) *EBSCO; (ii) ProQuest; (iii) Scopus; (iv) Science Direct and (v) Spell, where 1,672 articles were found in total* using the terms: *Intellectual Capital* or *Intangible Asset* and *Organization,* whether in their (i) titles, (ii) abstracts or (iii) keywords. By fine-tuning the research with the criteria (i) exclusion of duplicate / redundant articles; (ii) alignment of the articles to the topic as to; (iii) scientific recognition of articles; (iv) alignment of the articles to the topic as to abstracts and (v) availability of the articles in full, a bibliographic portfolio (PB) comprising 28 articles was met. By analyzing this PB, a total of 41 intangible asset evaluation approaches were identified. Skandia Navigator was the mostly cited approach, totaling 13% of citations. The categories and the framing of each approach were found, identifying some gaps in research involving the evaluation approaches.

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1 INTRODUCTION

One of the changes to the performance scenario of companies in the information era is the relevance of the intangible assets as a source of competitive advantage, and the effective management and application of these assets to support their conversion into results (FRANCINI, 2002).

The intangible assets are highlighted in the current scenario as allies in the pursuit of organizational competitiveness; however, companies need to identify them in order to make a strategical use of such. In view of this fact, the organizations need to resort to systematic approaches for the management of intangibles (Roos & Roos, 1997).

Researches have been conducted aimed at defining a reliable and practical way to evaluate a company's intangible assets. Despite there are still problems to be solved, several evaluation models have been developed (Joia, 2001).

Several attempts to develop approaches capable of evaluating intangibles have been found in the literature. Therefore, the study aims to identify the mostly cited approaches in the literature and to classify them as to their categories and framework. Within this context, the following question occurs: what are the frameworks categories of the evaluation approaches of the most-cited intangibles in the literature?

Thus, the aim of this study is to analyze the evaluation approaches of intangible assets presented in national and international literature.

The premise for conducting this research is grounded on the expected contribution to the scientific community and to managers, in the sense of highlighting the evaluation approaches that are mostly cited in the literature, which are useful in the measurement and management of intangibles, raising their categories and framework.

This article is structured in five sections, starting with the introduction as the first. Subsequently, the literature review is presented, and the third section addresses the research methodology. In the fourth section, the results are presented and, finally, the final considerations are addressed in the fifth section, followed by the references used.

2 THEORETICAL REFERENCE

The structure of investments made by companies has changed over the last decades, representing the transition from a industrial economy to a knowledge-based economy (Zéghal & Maalouol, 2011). With the change in the economy, not only the investments in tangible capital, such as materials, machinery and equipment, but also the investments in intangible capital, such as brands, customers, relations with suppliers, know-how, networks and patents, have become increasingly important (Zéghal & Maalouol, 2011; Santos, 2002; Santos & Schmidt, 2003; Wernke & Bornia, 2003; Kayo, Kimura, Basso & Krauter, 2008).

Note that said relevance of the investments in intangibles was caused by (i) globalization of trade and deregulation of key sectors of the economy and (ii) the advent of information technologies, which started to consider intangible components as value drivers for business (Lev, 2001, Santos, 2002, Santos & Schmidt, 2003, Wernke & Bornia, 2003, Kayo *et al*., 2008, García-Meca & Martínez, 2007).

The term '*intangible*' covers many additional concepts, which are not different in form or content, such as intangible investiments, intangible assets and intangible capital (Zéghal & Maalouol, 2011). Furthermore, the literature review highlights many other concepts as may be considered synonyms for intangible resources, namely: intangible capital, intellectual capital, immaterial capital, knowledge capital, intangible assets, as seen in Table 1, below.

Table 1
Terms used for intangibles

Authors	Year	Term
Vergauwen; Alem	2005	Intellectual Capital
Oliveira; Rodrigues; Craig	2006	Intangible / Intellectual Capital
Martínez; García-Meca	2007	Intellectual Capital / Intangibles / Intangible assets
Macagnan	2009	Intangible resources
Oliveira; Rodrigues; Craig	2010	Intellectual Capital
Zéghal; Maaloul	2011	Intangible Investment; intellectual capital, immaterial capital, knowledge capital
Hidalgo; García-Meca; Martínez	2011	Intellectual Capital
Kang; Gray	2011	Intangible assets
Kumar	2013	Intangible assets
Fontana; Macagnan	2013	Intangible assets

Note. Source: Vergauwen & Alem (2005); Oliveira, Rodrigues & Craig (2006); García-Meca & Martínez (2007); Macagnan (2009); Oliveira, Rodrigues & Craig (2010); Zéghal & Maaloul (2011); Hidalgo, García-Meca & Martínez (2011); Kang; Gray (2011); Kumar (2013); Fontana & Macagnan (2013).

The users acknowledge the relevance of intangibles regardless of the used term. These users argue that market failure or inefficiency is a result of improper disclosure of information regarding the company's intangibles (Lev & Radhakrishnan, 2003, Moura, Varela & Beuren, 2014).

The prominence of these resources has forced many managers to use new planning approaches. These approaches help measuring the success of business operations over time (Usoff, Thibodeau & Burnaby, 2002).

2.1 Intangible Asset Evaluation Approaches

The literature provides different intangible asset evaluation approaches and levels of detail, which change according to the purposes of each proposed approach. Table 2 brings some intangible asset evaluation approaches cited in the literature.

Table 2
Intangible Asset Evaluation Approaches

Intangible Asset Evaluation Approaches	Author	Context
Skandia Navigator	Edvinsson & Malone (1997)	Designed to provide a balanced picture of the financial situation and the intellectual capital. Intangible assets must be analyzed from several perspectives in order to see the big picture.
Balanced Scorecard (BSC)	Kaplan & Norton (1992,1993,1996)	Tool aimed to create an integrated view of the management measurement system, including both financial and non-financial elements (market, internal processes and learning) that impact on the organizational performance.
Intangible Assets Monitor	Sveiby (1998, 1997)	Aims to guide managers on the use of intangible assets, the identification and renewal of these flows and stocks, avoiding the loss thereof. This tool is focused in three types of intangible assets: external structure assets, internal structure assets and competence of assets used.

Continue

Table 2 (continuation)

Intangible Asset Evaluation Approaches	Author	Context
Tobin's Q	Stewart (1997) & Bontis (1999)	One of the first approaches for measuring corporate intellectual capital. This tool developed by the Nobel laureate, James Tobin, measures the ratio between market value and replacement value of organizational physical assets.
Technology Broker	Brooking (1996)	The author argues that the intellectual capital can be obtained based on the diagnosis and analysis of the answers to a questionnaire containing twenty questions. This questionnaire must cover the four components of intangible assets: market, human resources, intellectual capacity and infrastructure.
Difference between the Market Value and the Book Value	Stewart (1997) & Luthy (1998)	The central idea revolves around the assertion that the value of the intangible assets of a certain company corresponds to the difference between the market value and the value recorded in financial statements.
Skandia's Intellectual Capital Formula	Edvinsson & Malone (1998)	The value of the Intellectual Capital is the product of the monetary value invested in the Intellectual Capital elements and the efficiency ratio related to the investment carried out.
Intangibles-Driven-Earnings	Lev (2004)	In general terms, it absorbs the perception of the market on intangible elements of the organization by comparing its market value with the projected value of the Intellectual Capital, generated from the Gross Operating Revenue and the Profitability of the Asset.

Note. Source: adapted from Pablos, P. O. de. (2003). Intellectual capital reporting in Spain: a comparative view. *Journal of Intellectual Capital*, *4*(1); Antunes, M. T. P., & Martins, E. (2007). Intellectual Capital: its understanding and its impacts on the performance of large Brazilian companies. BASE - *Revista de Administração e Contabilidade of* UNISINOS, 4 (1); Schnorrenberger, D. (2005). Identifying and evaluating the intangible assets of an organization aimed at its management: an illustration in the economic-financial area. Doctoral thesis, Federal University of Santa Catarina, Florianópolis, SC, Brazil.

Based on the presentation of the approaches, it can be noted that these were developed within the same decade, except for the *Intangibles-Drives-Earnings*, which was developed in 2004. All others were created in the 1990's.

2.2 Categories of intangible asset evaluation approach

Sveiby (2001) proposed to categorize the approaches in four categories, according to the focus and the level of unfolding: (i) Direct Intellectual Capital Methods (DIC); (ii) Market Capitalization Methods (MCM); (iii) Evaluation of Return of Assets (ROA); and (iv) Scorecards Methods (SC), as shown in Table 3, below.

Table 3
Categories of intangible asset evaluation approach

Categories of intangible asset evaluation approach	Concept
Direct Intellectual Capital Methods	Calculates the monetary value of the intangible assets by identifying their several components that, when estimated, can be directly evaluated as an aggregate ratio.
Market Capitalization Methods	Calculates the difference between the market capitalization of a company and the assets of shareholders, such as the value of their relevant resources or intangible assets.
Evaluation of Return of Assets	The average revenue before taxes of a company in a certain period is divided by the average value of its tangible assets. The result is the ROA, which is compared to the average of the segment. The difference is multiplied by the average of the tangible assets to calculate the annual average intangible revenues. An estimate of the value of the intangible assets or intellectual capital can be obtained by dividing the upper average by the average cost of capital or the interest rate.

Continue

Table 3 (continuation)

Categories of intangible asset evaluation approach	Concept
Scorecards Methods	The several components of intangible assets or intellectual capital are identified and the predefined displacements are generated and reported in *scorecards* or in charts.

Note. Source: Adapted from Sveiby, K. E. (2001). *Methods for Measuring Intangible Assets*. Retrieved on July 1, 2016, from http://www.sveiby.com/articles/IntangibleMethods.htm.

Throughout his work, Schnorrenberger (2005) has developed a brief analysis on the evaluation approaches of intangible assets most frequently found in the literature - in total, 21 were analyzed. Therefore, given that each one has its peculiarities, they were divided according to the methods and the four categories previously presented. The respective approaches were listed within each category, as shown in Figure 1.

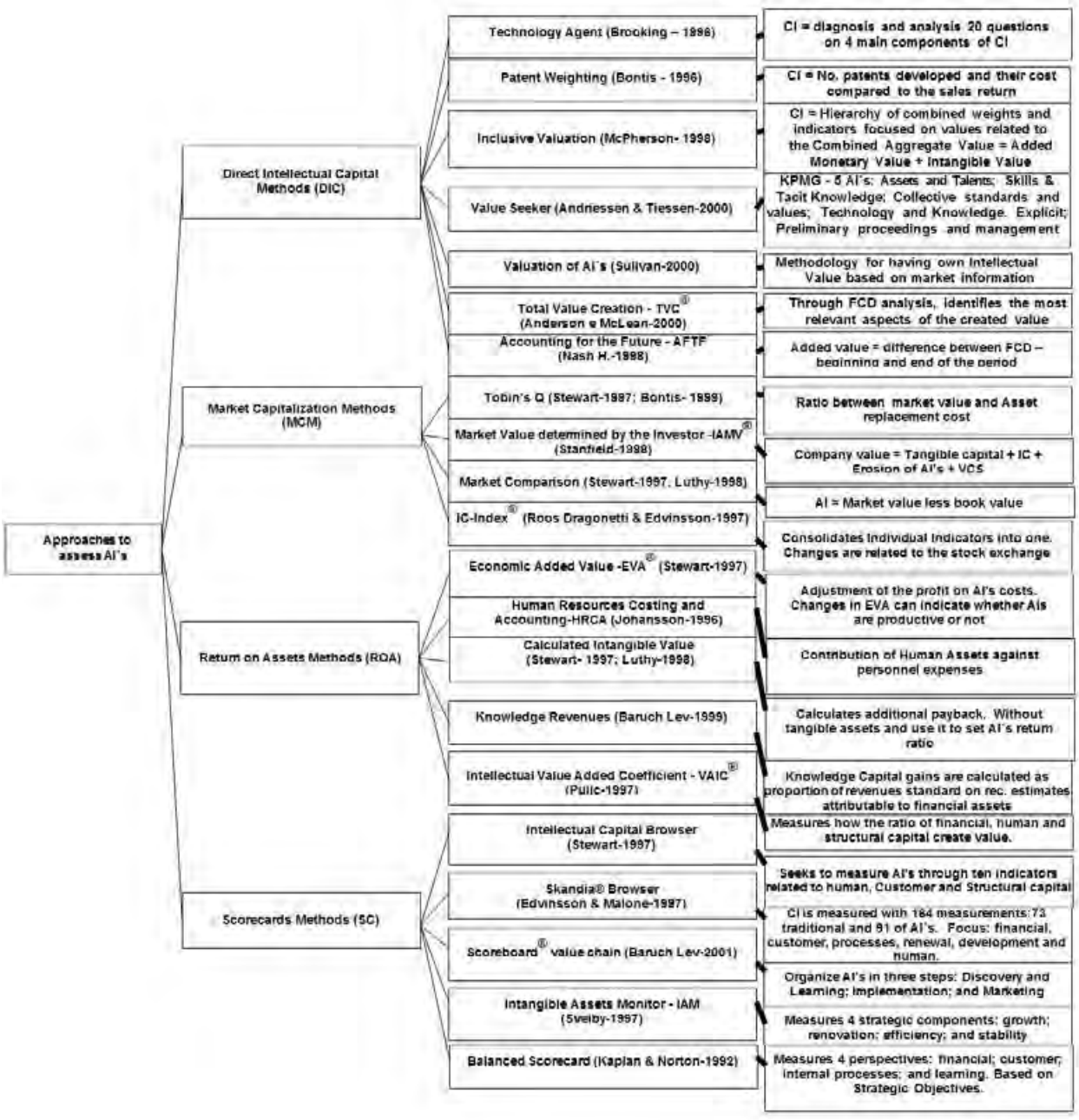

Figure 1. Categories and the corresponding Intangible Asset Evaluation Approach
Source: Schnorrenberger, D. (2005). Identifying and evaluating the intangible assets of an organization aimed at its management: an illustration in the economic-financial area. Doctoral thesis, Federal University of Santa Catarina, Florianópolis, SC, Brazil.

Based on Figure 1 and through the development of the present study, it was possible to classify the most-cited evaluation approaches of intangibles in the literature regarding categories and framework.

2.3 Framework of Intangible Asset Evaluation Approaches

Schnorrenberger (2005) has classified as evaluation approaches, according to the level of customization, detailing and integration of results: (i) Standard; (ii) mixed; (iii) customized; (iv) measures globally; (vi) identifies and measures – locally and (vii) identifies, evaluates – locally and globally – and manages, as presented in Table 4.

Table 4
Framework of intangible asset evaluation approaches

Framing	Concept
Standard	Approaches with structure deemed valid for all situations and companies.
Mixed	Approaches seeking to establish some standards and also acknowledge that there should be adaptations to each situation.
Customized	Approaches based on the assumption that, in the case of intangible assets, each situation is unique.
Measures globally	Approaches seeking to identify a global value for the intangible assets, without identifying the items comprised in it.
Identifies and asses Locally	Approaches seeking to know the intangible assets of an organization, in addition to knowing its local performance.
Identifies, Evaluates – Locally and globally – and Manages	Approaches seeking to cover the entire process, from the identification of intangible assets, going through the local and global evaluation, and ending with the management thereof.

Note. Source: Schnorrenberger, D. (2005). Identifying and evaluating the intangible assets of an organization aimed at its management: an illustration in the economic-financial area. Doctoral thesis, Federal University of Santa Catarina, Florianópolis, SC, Brazil.

Therefore, it is noted, in Table 4, that the Intangible Asset Evaluation Approach may be classified in 6 categories, starting with the *Standard*, representing a valid structure for all companies in all situations, and ending with category *Identifies, evaluates – locally and globally – and manages*, which represents a complete approach, identifies the intangible assets, evaluates globally and manages them.

3 METHODOLOGICAL PROCEDURES

This section addresses the aspects related to the methodological framework of the research, as well as the intervention tool used in the study.

3.1 Methodological Framework

With regards to the methodological framework as to the objectives, the study is characterized as exploratory-descriptive, as it is intended to select a PB for familiarization with the intangible asset topic, and it is classified as descriptive because it describes the characteristics found in the relevant PB within the area of interest (Markoni & Lakatos, 2003).

With regards to the approach to the problem, the study is considered qualitative. For the qualitative analysis of the data, the three steps presented by Miles & Huberman (1994, as cited in Gil 2008) were applied: reduction, display and conclusion / verification. The reduction step is the PB selection process for future data simplification. The display step consists of organizing, presenting and analyzing the data. Finally, in the conclusion / verification step, a review of the data is made to verify the framework of the publications on the intangible topic.

The bibliographic research procedure reported by Proknow-C was used for data collection, given that works that have been already performed, and of a critical relevance regarding intangible assets, were searched in the databases made available by CAPES, for the preparation of the article (Markoni & Lakatos, 2003).

3.2 Intervention Tool

ProKnow-C was used for the conduction of this work that consists of four steps: (i) selection of a portfolio of articles regarding the research topic; (ii) bibliometric portfolio analysis; (iii) systemic analysis and (iv) definition of the question and objective of the research (Ensslin, Ensslin, Kremer, Chaves & Borgert, 2014). However, in this research, the first two steps are fulfilled, which comprise the necessary literature review.

3.2.13.2.1 Procedures for data collection

In order to meet the objective of this study, the bibliographic portfolio was selected, step on which researchers are allowed to gather a database of articles related to the topic, in line with the perception and limitations of each researcher. In this step, three phases are executed: (i) the selection of articles in databases comprising the gross scientific articles; (ii) the filtering of selected articles based on the line of research and (iii) the representativity test of the bibliographic portfolio. At the end of the step, the bibliographic portfolio (PB) is constituted, which corresponds to a set of articles considered relevant to the topic (Ensslin et al., 2014).

3.2.1.1 Selection of gross scientific articles

The research pillars are defined in order to start the process. Therefore, to get to know the scientific researches that represent the literature excerpt related to the topic of intangible assets, the following research pillar was defined: Intangible.

After the definition of the pillar, we proceed with the formation step of the gross scientific articles, composed of four steps: (i) definition of the keywords; (ii) definition of the database; (iii) search for the articles in the databases with keywords and (iv) conduction of a test for assessing the adherence of keywords (Ensslin et al., 2014).

(i) Definition of keywords

The following keywords were defined for the pillar: ("Intellectual Capital " or "Intangible asset*") and ("Organization*"). The use of asterisk after the terms was necessary for the researches to cover the grammatical variations of the terms.

(ii) Definition of databases

After deliberation of the pillars and the definition of keywords, we proceed with the definition of databases in order to perform the search for articles. The following bases aligned to the area of knowledge of applied social sciences that are made available in CAPES; EBSCO; ProQuest; Scopus & Science Direct were defined, aimed at the search for international articles in English and the Spell basis for national review.

With the definition of keywords and databases, the process of searching for such words starts. The present research determined that the representativity of databases would be 100%, which means that the return of at least 1 article would be enough to stay in the process. For the search, the command was applied, observing the specific parameters and the structure in each database. As delimitations of the search process, we can highlight: (i) articles published in scientific journals and (ii) research containing the keywords in its title, abstract or keywords.

(iii) Search for the articles in the databases using the keywords

1,367 international and 305 national articles making up the gross scientific articles were found in the search, conducted within the abovementioned limitations. These publications were exported to the *software EndNote® X7* in order to proceed with the analysis.

(iv) Conduction of test for assessing the adherence of keywords

In this step, the articles considered in line with the topic were selected in order to verify the need to include new keywords. In this sense, 5 articles were selected from the gross scientific articles and the keywords were checked with those used for the search. Therefore, it was found that it would not be necessary to include new keywords, since the existing ones were already in line with the topic.

3.2.1.2Filtering of gross scientific articles

After the PB selection process, the filtering takes place; and is carried out under the following considerations: (i) exclusion of duplicate / redundant articles; (ii) alignment of articles to the subject as the title; (iii) scientific recognition of articles; (iv) alignment of articles to the subject as the abstracts and (v) availability of full articles.

The first step, exclusion of duplicate / redundant articles, was conducted using EndNote® X7 software. 977 international and 195 national publications that were duplicated in the gross scientific articles were deleted, resulting in a total of 390 international and 110 national articles for the analysis of alignment of articles as to the title. At that step, the titles of the 500 articles were read, eliminating a total of 40 international and 20 national articles. Therefore, the remainder was 350 international and 90 national non-duplicated articles aligned to the title.

Then, the number of citations in each of the 440 articles was verified, using *Google* Scholar, and all articles that had 10 or more citations were selected for further reading of abstracts, totaling of 188 articles.

At the fourth step, alignment of articles to the subject as the abstracts, 188 abstracts composing the non-duplicated scientific articles with aligned titles and scientific recognition were read. In this phase, 112 articles were eliminated. Therefore, the non-duplicated scientific articles with aligned title and abstract remained a total of 76 articles.

It was further verified, among these 76 articles, those that were fully available for free, resulting in 57 files and in the elimination of 19 articles that were not available. In order to verify the alignment of the articles in full, the 57 available articles were entirely read, among which 15 international and 13 national articles were selected, forming the PB scientific articles. Table 5 shows the articles composing the PB.

Table 5
Articles selected to compose the PB

Article	Title	Year	Citations	Authors	Magazine
International	Measuring your company's intellectual performance	1997	1103	Roos, G.; Roos, J.	Long Range Planning
	The Intangible Assets Monitor	1997	607	Sveiby, Karl Erik	Journal of Human Resource Costing & Accounting
	The importance of intellectual capital and its effect on performance measurement systems	2002	74	Usoff, Catherine A.; Thibodeau, Jay C.; Burnaby, Priscilla	Managerial Auditing Journal
	Intellectual capital reporting in Spain: a comparative view	2003	228	Pablos, Patricia Ordonez de	Journal of Intellectual Capital
	Intellectual capital: Measurement effectiveness	2004	191	Kannan, Gopika; Aulbur, Wilfried G.	Journal of Intellectual Capital
	The dominance of intangible assets: consequences for enterprise management and corporate reporting	2004	134	Lev, Baruch; Daum, Juergen H.	Measuring Business Excellence
	Managing and reporting knowledge-based resources and processes in research organizations: specifics, lessons learned and perspectives	2004	122	Leitner, Karl-Heinz; Warden, Campbell	Management Accounting Research
	Comparative justification on intellectual capital	2004	98	Seetharaman, A.; Low, Kevin Teng; Saravanan, A. S.	Journal of Intellectual Capital
	Managing and reporting intangible assets in research technology organizations	2005	87	Leitner, K. H.	R and D Management
	An integrated framework for visualizing intellectual capital	2005	76	Boedker, C.; Guthrie, J.; Cuganesan, S.	Journal of Intellectual Capital

Continue

Table 5 (continuation)

Article	Title	Year	Citations	Authors	Magazine
International	The IC Rating™ model by Intellectual Capital Sweden	2005	70	Jacobsen, K.; Hofman-Bang, P.; Nordby Jr, R.	Journal of Intellectual Capital
	The German guideline for intellectual capital reporting: method and experiences	2007	34	Manfred, Bornemann; Kay, Alwert	Journal of Intellectual Capital
	A framework for prioritization of intellectual capital indicators in R&D	2009	49	Kim, Dong-Young; Kumar, Vinod	Journal of Intellectual Capital
	Analysis and Valuation of Intellectual Capital According to Its Context	2009	18	Ortiz, Miguel Angel Axtle	Journal of Intellectual Capital
	Intellectual capital models in Spanish public sector	2010	56	Ramirez, Yolanda	Journal of Intellectual Capital
National	Measuring the intellectual capital	2001	76	Joia	Revista de Administração de Empresas
	Knowledge management: connecting strategy and value for the company	2002	36	Francini	e-RAE
	An exploratory study on the management control of assets and intangible resources in Brazilian companies	2002	40	Barbosa; Gomes	Revista de Administração Contemporânea
	Intellectual Capital: myths and facts	2002	95	Antunes; Martins	Revista Contabilidade & Finanças - USP
	The accounting treatment of the intellectual capital in companies with market value higher than the book value	2003	34	Oliveira; Beuren	Revista Contabilidade & Finanças - USP
	An empirical study on Controllership and Intellectual Capital management	2006	49	Antunes	Revista Contabilidade & Finanças - USP
	Intangible assets and business performance	2006	135	Perez; Famá	Revista Contabilidade & Finanças - USP
	Intellectual Capital Management: a proposal based on the controllership of large Brazilian companies	2007	17	Antunes, Martins	REAd. Revista Eletrônica de Administração
	Intellectual Capital: concepts and impacts on the performance of large Brazilian companies	2007	26	Antunes, Martins	BASE - Revista de Administração e Contabilidade da UNISINOS
	A study on scientific production in intellectual capital	2008	14	Gallon; Souza; Rover; Ensslin	Revista de Administração Mackenzie
	Brands, patents and value creation	2008	27	Teh; Kayo; Kimura	Revista de Administração Mackenzie
	Determinants of the formation of Intellectual Capital in the companies producing Communication and Information Technology	2011	10	Lima; Carmona	Revista de Administração Mackenzie

Note. Source: research data.

The 28 articles formed part in the PB and were used in this research to investigate the intangibles' evaluation approaches, raising the categories and framework of the mostly cited approaches.

3.2.2 Procedure for data analysis

The analysis of articles was carried out after the selection of the PB. At first, the Intangible Asset Evaluation Approach cited by PB articles were raised; then, its framework and categories were verified, according to search protocol shown in Figure 2.

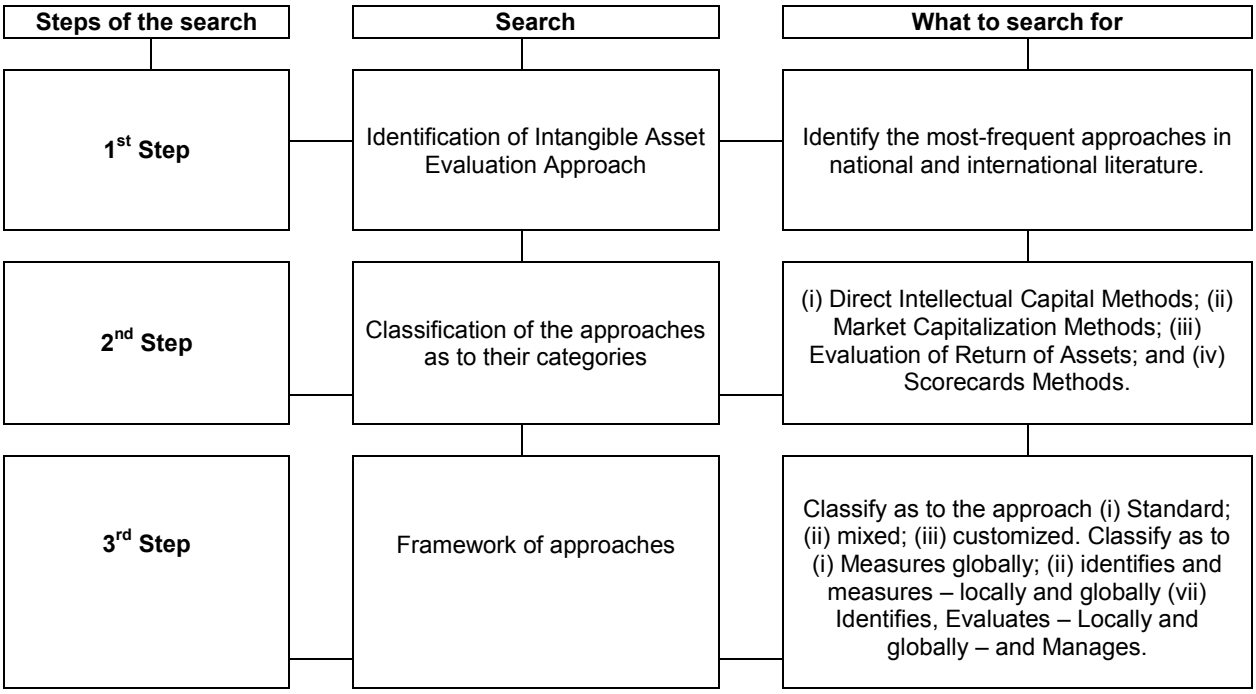

Figure 2. PB's search protocol
Source: research data.

The analysis of data collected in July, 2015 was carried out after the search conducted under the established protocol.

4 ANALYSIS OF RESULTS

The analysis of data was carried out after the selection of the PB. This analysis was divided into three steps: (i) identification of the intangible asset evaluation approaches; (ii) assimilation of approaching categories and (iii) framework of the Intangible Asset Evaluation Approach.

4.1 Intangible Asset Evaluation Approaches

With regards to the Intangible Asset Evaluation Approach, a total of 28 were cited by international and 18 by national articles. The approaches were put together after the individual identification of national and international publications, which resulted in a total of 41 Intangible Asset Evaluation Approach, as presented in Table 6, below.

Table 6
Intangible Asset Evaluation Approaches cited on PB

No.	Intangible Asset Evaluation Approach	International recurrence	National recurrence	Total recurrence
1	*Skandia Navigator*	5	6	11
2	*Balanced Scorecard (BSC)*	5	3	8
3	*Intangible Assets Monitor*	5	3	8
4	*Tobin's Q*	4	2	6
5	*Technology Broker*	2	3	5
6	Difference between the Market Value and the Book Value	0	5	5
7	Skandia's Intellectual Capital Formula	0	3	3
8	Intangibles-Driven-Earnings	0	3	3

Continue

Table 6 (continuation)

No.	Intangible Asset Evaluation Approach	International recurrence	National recurrence	Total recurrence
9	*Competence Strategic Management Model*	1	0	1
10	*Knowledge production function*	1	0	1
11	*Knowledge capital scorecard*	1	0	1
12	*The intellectual capital accounts*	1	0	1
13	*Market to book ratio (p/b)*	1	0	1
14	*Calculate intangible value (CIV)*	1	0	1
15	*Knowledge capital earnings (KCE)*	1	0	1
16	*Pricewaterhouse Coopers LLP overall value*	1	0	1
17	*IC Rating*	1	0	1
18	*Intellectual Capital Value Creation (ICVC)*	1	0	1
19	*Contextual intellectual capital components valuation (CONICCVALTM)*	1	0	1
20	*Framework for prioritizing intellectual capital (IC)*	1	0	1
21	*The SICAP Project*	1	0	1
22	*The intellectual capital model proposed by Caba and Sierra*	1	0	1
23	*The intellectual capital model proposed by Garcı´a*	1	0	1
24	*The intellectual capital model proposed by Bossi*	1	0	1
25	*The model for Gamma Company*	1	0	1
26	*The model for Epsilon Company*	1	0	1
27	*The intellectual capital report*	1	0	1
28	*Framework addresses IC valuation*	1	0	1
29	*A basic model for IC management and reporting for research organizations*	1	0	1
30	*A model for measuring and valuing intangible assets in RTOs*	1	0	1
31	*Intellectual capital reporting framework*	1	0	1
32	Method for evaluating the Intellectual Capital (CI) linking the Business strategy to the CI	0	1	1
33	*CI-Index*	0	1	1
34	Conceptual model for measuring returns on investments in intellectual capital (CI)	0	1	1
35	*Framework of Intangible Valuation Areas (FIVA)*	0	1	1
36	Heuristic Model	0	1	1
37	Holistic Statements	0	1	1
38	Value, Cost and Adjustment Matrix	0	1	1
39	Barret Model	0	1	1
40	Multidimensional System	0	1	1
41	*Value Explorer*	0	1	1
	Total recurrence	**44**	**38**	**82**

Note. Source: research data.

From the analysis of Table 1 it is found that *Balanced Scorecard* (Kaplan & Norton, 1992, 1993, 1996), *Skandia Navigator (*Edvinsson & Malone, 1997) and *Intangible Assets Monitor (*Sveiby, 1998, 1997) are the approaches mostly cited by the articles of international PB,

mentioned in 5 of 15 articles. *Tobin's Q* (Stewart 1997 e Bontis 1999), with 4 citation, and the *Technology Broker* (Brooking, 1996), with 2, are presented below.

On the other hand, a total of 18 Intangible Asset Evaluation Approach was found in the national scenario. *Skandia Navigator (*Edvinsson & Malone, 1997) was the mostly cited approach, with 6 citations, followed by the difference between the market value and the book value (Stewart, 1997), mentioned 5 times. The approaches (i) *Balanced Scorecard* (Kaplan & Norton, 1992,1993,1996), (ii) *Intangible Assets Monitor* (Sveiby, 1998, 1997), (iii) *Technology Broker* (Brooking, 1996), (iv) Skandia's Intellectual Capital Formula (Edvinsson & Malone, 1998), (v) *Intangibles-Driven-Earnings* (Lev, 2004), are mentioned by 3 national articles, and Tobin's Q (Stewart, 1997 e Bontis, 1999) is mentioned in 2 articles.

The cross-referencing of evaluation approaches frequencies in national and international articles was carried out using the information available, as shown in Figure 3.

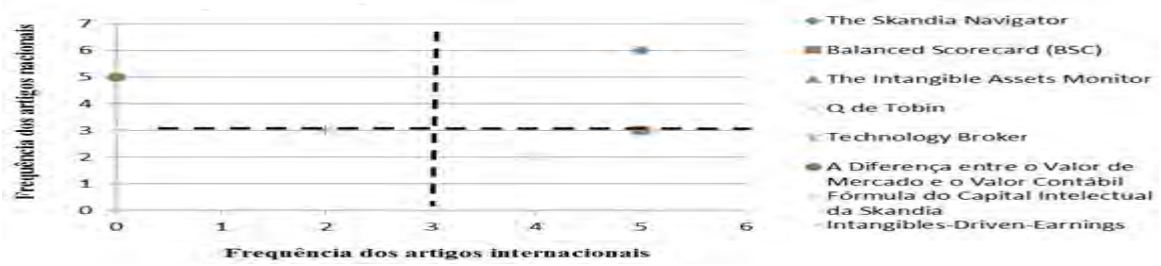

Figure 3. cross-referencing of evaluation approaches of intangible assets in national and international researches
Source: research data.

In this sense, the intangible asset evaluation approaches mostly cited in the literature were: (i) *Skandia Navigator*; (ii) *Balanced Scorecard* (BSC); (iii) *Intangible Assets Monitor*; (iv) *Tobin's Q*; (v) *Technology Broker*; (vi) Difference between the Market Value and the Book Value; (vii) Skandia's Intellectual Capital Formula and (viii) *Intangibles-Driven-Earnings.*

The approaches mostly cited in international and national articles were created in the 1990's, confirming a concern of the time in developing approaches to evaluate the intangible assets, highlighting the relevance of these assets in an organization.

4.2 Categories of Intangible Asset Evaluation Approach

The approaches were classified based on the survey of the intangible asset evaluation approaches, which were more than once in the researches, according to their categories. The classification is shown in Table 7.

Table 7
Categories of intangible evaluation approaches highlighted in national and international research

Intangible Evaluation Approaches	Categories
The Skandia Navigator	Balanced Scorecard Evaluation Method
Balanced Scorecard (BSC)	Balanced Scorecard Evaluation Method
The Intangible Assets Monitor	Balanced Scorecard Evaluation Method
Tobin's Q	Evaluation by market value
Technology Broker	Direct Intellectual Capital Methods
Difference between the Market Value and the Book Value	Evaluation by market value
Skandia's Intellectual Capital Formula	Balanced Scorecard Evaluation Method
Intangibles-Driven-Earnings	Evaluation by market value

Note. Source: research data.

Therefore, the most prominent approaches are mostly classified in the category of balanced scorecards evaluation method, i.e., they seek to identify the types of intangible assets and to generate indexes and indicators with the purpose of representing them in maps and panels.

It was verified, however, that no approach was included in the category of Evaluation of Return of Assets, which offers, as a competitive advantage, the capacity of being easily obtained and the understanding among technicians of the economic-financial area, since they are based on traditional accounting statements. Therefore, the approaches mostly cited in the literature are not based on the financial statements.

4.3 Framework of Intangible Asset Evaluation Approach

Subsequently, we sought to identify the framework of approaches raised in the studies, as shown in Figure 4.

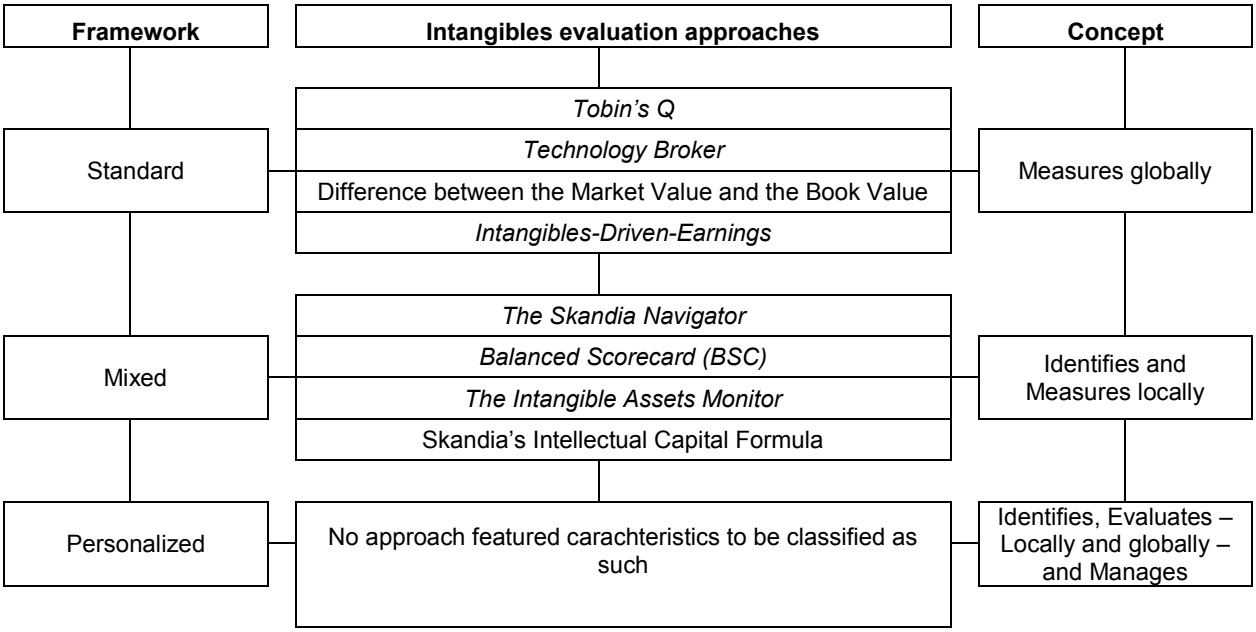

Figure 4. Framework of intangibles evaluation approaches
Source: research data.

Therefore, 4 approaches are classified as standard approaches that *Measures globally*, presenting a structure considered valid in all situations and companies, and seek to identify a global value for intangible assets, without identifying the items comprising it.

While another, included in these 4 approaches, was classified as mixed, *which Identifies and Measures locally*. These approaches seek to establish standards and also acknowledge that are necessary adaptations to each situation and to know what the intangibles of an organization are, besides knowing the local performance thereof.

However, none of the approaches often used in national and international literature have been classified as personalized, neither that they identify, evaluate - locally and globally - and manage. Approaches classified in this framework seek to cover the entire process, since the identification of intangible assets, going through local and global evaluation, until its management.

Finally, the approaches cited in the literature fail to cover the entire process, i.e., to identify the intangible assets, to evaluate locally and globally, for the later management thereof.

In light of this finding, it is our suggestion that new researches work are carried out in the development of intangibles evaluation approaches able to meet the need for personalized framework. We further suggest a survey of intangible evaluation approaches used by the companies, identifying categories and framework.

5 FINAL CONSIDERATIONS

In the information era, the intangible assets stand out as a source of competitive advantage in companies, however, an effective management and application of these assets is

necessary on their conversion into results. This work aimed to analyze the Intangible Asset Evaluation Approach contained in national and international literature.

The most-cited intangible asset evaluation approaches were identified based on a PB, which were classified as to their categories and framework. Therefore, we found that Skandia Navigator is the most outstanding approach in national and international research. Followed by (i) Balanced Scorecard; (ii) Intangible Asset Monitor; (iii) Tobin's Q; (iv) Tecnology Broker; (v) difference between the Market Value and the Book Value; (vi) Skandia's Intellectual Capital Formula and (vii) Intangibles-Driven-Earnings, which were also highlighted. The mostly cited approaches were created in the 1990's, reinforcing a concern of the time in developing approaches that help the effective management of these assets.

However, the approaches mostly cited in the literature are not based on the financial statements. No approach fell within the category of Evaluation of Return of Assets, which has, as a competitive advantage, the capacity of being easily obtained and the understanding among technicians of the economic-financial area, since they are based on traditional accounting statements.

Furthermore, the approaches mostly cited fail to cover the whole process, i.e., they can't expound from the identification of the intangible assets, going through local and global evaluation, and ending with the management thereof. Therefore, they are not useful in the effective management and application of intangible assets, and neither support their conversion into results.

As a limitation of this work, the bibliographic research was developed only with articles published in journals freely available in certain national and international databases.

Based on this analysis, it is our suggestion for further researches, the practical findings on the use of Intangible Asset Evaluation Approach, identifying if such approaches are being used according to their respective categories and framework. We further suggest the conduction of analysis focused both on assets and intangible liabilities, and the development of intangibles evaluation approaches that can meet the personalized framework.

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APPLICATION OF FACTOR ANALYSIS TO IDENTIFY THE ECONOMIC AND FINANCIAL KEY PERFORMANCE INDICATORS IN BANKING INSTITUTIONS*

JÚLIA ALVES E SOUZA
Doctoral Candidate in Business Management (with major in Controllership and Finance) by The University of Lavras (UFLA). Master of Accountancy by The Federal University of Espírito Santo (UFES). ***Address:*** *Department of Administration and Economics, Block III, UFLA University Campus | 37200-000 | Lavras / MG | Brazil.*
E-mail: *julia.jasouza@gmail.com*

DOUGLAS JOSÉ MENDONÇA
Master's Degree Candidate in Business Administration (with major in Controllership and Finance) by The University of Lavras (UFLA). ***Address:*** *Department of Administration and Economics, Block III, UFLA University Campus | 37200-000 | Lavras / MG | Brazil.*
E-mail: *mendonca_douglas@yahoo.com.br*

GIDEON CARVALHO DE BENEDICTO
Doctor of Controllership and Accounting by the University of São Paulo (USP). Associate Professor for The University of Lavras (UFLA). ***Address:*** *P.O. Box 122 | 37200-000 | Lavras/MG | Brazil.*
E-mail: *gideon.benedicto@gmail.com*

FRANCISVAL DE MELO CARVALHO
Doctor of Business Management by the Mackenzie Presbyterian University (UPM). Associate Professor for The University of Lavras (UFLA). ***Address:*** *Department of Administration and Economics, Block III, UFLA University Campus | 37200-000 | Lavras / MG | Brazil.*
E-mail: *francarv@dae.ufla.br*

ABSTRACT

This study aims at identifying the most relevant economic and financial indicators for evaluating the performance of banking institutions by using the factor analysis. A total of 118 banking institutions with activities in Brazil over the years of 2011 to 2014 are covered. Quantitative and Descriptive study is carried out in this research. Statistical technique of factor analysis was used for data analysis. In the application process of that technique, the overall appropriateness of the model and of each variable were verified, in order to identify key indicators that will compose the analysis of banks. The study is developed from an initial set of 17 indicators employed to analyze the economic and financial performance of such institutions. Following the criteria of factor analysis techniques, the indicators that explain the maximum variance from the smallest possible number of variables were selected. The results show that the most relevant indicators for evaluating the performance of such institutions are: Return on Total Investment, Net Margin, Return on Equity, Ratio of Capital to Deposits, Loans/Deposits Ratio, Immediate Liquidity, Voluntary Fit and Interest Rate Sensitivity. These 8 indicators can also be replaced by 3 factors, which explain about 89,23% of the overall data range. The factors "Cost Effectiveness and Profitability", "Capital and Liquidity" and "Fitting and Interest Sensitivity" allow us to classify and compare the performance of banking institutions.

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Keywords: *Economic and financial indicators. Analysis of the financial statements. Bank Accounting. Factor analysis.*

1 INTRODUCTION

Financial banking institutions play an important role in a country's economy and are the main channel of financial mediation (Zha, Liang & Bian, 2016). Due to the specific characteristics of this mediation, the economic and financial management of such institutions have some peculiarities. The development of models that contribute to the performance analysis and allow the comparison between different financial institutions is important for the decision-making process both for internal agents and for those external to these institutions.

A methodology widely used to analyze the economic and financial performance of organizations is the creation of indicators through the analysis of financial statements. The main purpose of the financial statements analysis is to obtain information favoring the decision-making. Using the indicators, the analyst is able to extract trends and to compare the indexes with pre-established patterns (Matarazzo, 2010). According to Brigham and Ehrhardt (2016), to make a standardized comparison of companies is possible by analyzing the indicators, since the financial indicators are developed to extract information that may not be obvious when reviewing the financial statements.

The performance evaluation of companies in the banking sector can also be carried out by analyzing the financial statements. Some authors propose specific indicators for financial institutions, considering the specificities of this type of organization. In this context, Assaf (2012) presents a set of 17 indicators adapted to this type of institution, divided into three groups: "solvency and liquidity", "capital and risk" and "cost effectiveness and profitability". According to Matarazzo (2010), after the individual assessment of each index, it is also possible to carry out a joint verification of the indicators, by analyzing their relations so as to generate a general framework of the company's performance and management.

Although the indicators are widely used, some limitations are present. According to Silva (2016), the amount of indicators to be used in the analysis of a company is an important point: a great number of indicators may even confuse the user, while a very small amount may not be enough to draw conclusions about the financial health of the business. Callado, Callado and Mendes (2015) argue that the definition of the indicators to be used is part of a logical sequence of procedures for the implementation of a performance evaluation system.

The evaluation of the indicators shall be done jointly, as well as the definition of which are the ones that most impact the result of the company, in addition to establishing weights for such indicators. Bezerra and Corrar (2006) state that this definition usually involves a great degree of subjectivity, while through the statistical technique of factor analysis it is possible to determine more objectively the relevance of each indicator in the results of the company.

The factor analysis aims to reduce the complexity of a large number of variables in a smaller arrangement, considering the correlations between the original variables (Mendez & Rondon, 2012). The application of this technique to economic and financial indicators is exemplified by Bezerra and Corrar (2006), who address the indicators of insurance companies, as well as by Carvalho and Bialoskorski (2007), who include agricultural and livestock cooperatives. The study conducted by Borges, Benedicto and Carvalho (2014) also uses a similar approach, but applies the factor analysis to evaluate the performance of rural credit cooperatives. In this sense, as highlighted by Louzada, Oliveira, Silva and Gonçalves (2016), it is observed that the use of statistical techniques is important in the construction of a set of indicators that allow to evaluate the performance of an entity.

Given the above, this article aims to identify, through statistical factor analysis, the most relevant economic and financial indicators for the evaluation of the performance of the banking institutions.

Therefore, the question that this research aims to answer can be summarized as follows: what are the most relevant economic and financial indicators for evaluating the performance of Brazilian banking institutions?

When analyzing financial indicators, we notice that it is possible to group these indicators into factors that allow the understanding of the behavior of the original data. According to Pereira (1999), instead of subjectively proposing the creation of an indicator, it is possible to subject the data to a factor analysis, and the results shall objectively point to such measure aggregation

Thus, the research contributes to increase the capacity of interpretation of the economic and financial indicators that is used to assess the performance of the banking institutions, allowing the use of the less subjective criteria and identification and consideration of the most important variables.

2 THEORETICAL REFERENCE

In this section, we find the theoretical framework that supported the study. Initially, we address the financial banking institutions and discuss the analysis of economic and financial indicators. Subsequently, the analysis of indicators for banking institutions and the application of the factor analysis in studies evaluating financial indicators are discussed.

2.1 Financial Banking Institutions

The financial banking institutions are responsible for the financial mediation, focusing mainly on seeking the satisfaction of the various economic agents. According to Assaf (2012), on the one hand are the lessees, who seek to increase their amount of real assets, and on the other side are the lessors, which aim to keep the equity in assets that value in a stable way and with a minimum risk. Therefore, the basic functions of these institutions relay in the collection and application of resources. Further, according to the same author, the banks seek their results by fundraising at a certain rate and applying the same at higher rates. The difference between such rates is called the *spread*.

These institutions are important to the economy. They help in the transformation of the risk and the creation of liquidity. For Cleary and Hebb (2016), whenever these institutions obtain demand deposits, the resources are raised with high liquidity and low risk; but, when returning with these funds to the market in the form of loans, the institutions invest in assets with low liquidity and high risk. This way, according to the authors, the risk and the liquidity of the financial mediation operation are taken in by the banking business (Cleary & Hebb, 2016).

According to Saunders (2000), this type of institution shall have special regulations, once any deviation in its functions or services may have negative effects on the economy. Other entities providing public utility services are also subject to specific surveillance, such as electricity, telephone and water companies. Accordingly, banking institutions shall operate within the guidelines regulated by public surveillance agencies, given their specific functions and the important services they offer to society.

The Central Bank of Brazil (BCB) is one of the bodies responsible for such regulation. Among other duties, it is the responsibility of the Central Bank to institute and disclose the specific accounting and statistical standards to be observed by the banking sector. In 1987, BCB established the Accounting Plan for Institutions in the National Financial System - COSIF (BCB Memorandum No. 1,273, 1987). The creation of this plan aimed at unifying the several accounting plans existing at the time, as well as standardizing the procedures for recording and preparing financial statements, which eased the monitoring, the analysis, the performance evaluation and the control of the institutions that make up the National Financial System (Central Bank of Brazil [BCB], 2015). Accordingly, COSIF sets forth the criteria and accounting procedures to be observed by the banking institutions and the structure of accounts and models of documents.

According to Jayaraman, Srinivasan and Arunachalam (2014), the banking sector faced significant changes around the world since the beginning of the 1980s, due to the impact of technological evolution and globalization. Still according to the authors, an important aspect of this process is the consolidation of the banking institutions through mergers, acquisitions or restructurings. In emerging countries, this change was driven by the restructuring of banking system proposed by governments, aimed at greater regulation and competitiveness.

Lee, Hsieh and Yang (2014) argue that the competitiveness in the banking sector has encouraged financial institutions to develop new products in order to meet market demands, increasing competitiveness and expanding the volume of services offered. Given this scenario, in which the banking institutions are inserted, the analysis of the financial statements awakes the interest both for managers (internal to the company) and for the various segments of external analysts. According to Assaf (2012), this type of analysis is considered one of the most important in the financial management, because its main objective is to evaluate the economic and financial performance of organizations.

2.2 Analysis of economic and financial indicators

The modern management of organizations has as fundamental characteristic the creation of managerial models that allow the analysis of the performance of the company. Such models are vital in the context of globalization and competitiveness of the current markets (Borges et al., 2014). Castro (2015) argues that performance evaluation allows for the identification of the strengths and weaknesses of an organization

According to Matarazzo (2010), the analysis of the financial statements aims to study the economic and financial performance of a company in a certain period, in order to determine its current position and to produce results that serve as basis for forecasting future trends.

In order to analyze the economic and financial performance, a widely used methodology is the creation of indexes through the analysis of the financial statements. These indicators relate two accounts (or two combinations of accounts) of the Balance Sheet and / or Income Statement (Herrera, Gomez & Granadillo, 2012). Matarazzo (2010) highlights that this evaluation of the company can be greatly simplified when you work with the main indicators, obtained from the access to accounting information.

Such accounting information can be characterized as the primary source for the performance evaluation of a company. By calculating the indicators, we can further define which of them shall be used as a management tool. For this analysis to be efficient, there is no need for highly complex indicators or a large number thereof, but rather a selection of an efficient number of indicators for the company under analysis. Comparisons with benchmarking can also be carried out when individually evaluating financial indicators over time, creating parameters to improve the management system (Miranda, 2008).

The analysis of the financial statements can be developed for multiple purposes, such as credit, investment and merger & acquisition decisions, in addition to competition analysis (Silva, 2016). Matarazzo (2010) further emphasizes that the individual study of the balance sheets provides useful and critical information to formulate the organizational strategy, which can be done by comparing the balance sheets with the budgets. This causes the analysis of financial statements to become a complementary tool for decision-making. After the individual diagnosis of each indicator, a joint analysis of the indicators can be performed aimed to identify the relationships between them, in order to identify a general framework of the performance of the relevant entity.

2.3 Analysis of Indicators for Banking Institutions

The financial and economic performance evaluation of the banking institutions operating in Brazil can be carried out through analysis of the financial statements. The bank accounting has some specifics, which result in differences between the statements presented by financial institutions and those presented by industrial and commercial companies or other companies in the service sector of the economy (Naves, 2007).

The management of the liquidity of financial institutions is not an easy task, given the specific characteristics of the financial mediation. Assaf (2012) highlights that the mediation business performed via deposit (fundraising for the bank) represents an obligation towards third parties and is recorded as a liability. The application of these resources is classified as Assets. For example, it can be in the form of cash or in the form of loans granted. I.e., financial banking institutions "Trade" an obligation (demand deposit) for a right (loans receivable). This creates the difficulty in equalizing receipt and payment periods, as well as a great difficulty in the structure of assets (Assaf, 2012).

The creation of economic and financial indicators has been used to facilitate the management of the financial institutions. These indicators aim at evaluating the performance of the company in terms of generation o financial results (Miranda, 2008). The cost effectiveness provided by a company is the result of decisions made related to the capital structure policies, methods for the market and administration of resources available to the administrators. Trying to choose some indicators that are important for the analysis of the financial statements is necessary to carry out the economic and financial evaluation of banks.

However, according to Miranda (2008), studies on the analysis of financial statements of banking institutions using indicators are still scarce in Brazil. According to the author, national publications on the subject are rare and mainly based on specific methodologies, such as CAMELS (Capital, Quality of Assets, Quality of Management, Results and Liquidity) - developed by banking surveillance agencies.

Some authors suggest the use of different indicators that adequately represent the reality of entities in the banking sector. In this context, the approach proposed by Assaf (2012), suggesting 3 main blocks of indicators – which shall be used for the economic and financial analysis of banking institutions. The author provides the calculation of 17 indicators, classified in 3 groups. Table 1 shows the calculation formulas and the concepts related to them.

Table 1
Formulas and Concepts of Economic and Financial Performance Indicators

Solvency and Liquidity Indicators
Voluntary Fit (EV) = Availability / Demand Deposits *Identifies the immediate financial capacity to cover withdrawals against deposits.*
Immediate Liquidity (LI) = (Availability + Interfinantial application) / Demand Deposit *Identifies the institution's capacity to cover demand deposits and part of time deposits.*
Loans on Deposits (ESD) = Credit Operations / Deposits *Discloses, for every R$ 1,00 of borrowed capital, the amount raised in the form of deposits.*
Interest in Loans (PDE) = Credit Operations / Total Assets *Identifies the percentage of asset applied in Credit operations.*
Risk and Capital Indicators
Financial Independence (IF) = Credit Operations / Total Assets *Identifies the level of financial independence with respect to the use of third-party resources.*
***Leverage* (LEV)** = Total Asset / Equity *Identifies the level of leverage of the institution in the use of assets.*
Ratio Capital / Depositor (RCD) = Equity / Deposits *Identifies the relation between the use of own resources and the fundraising in the form of deposits.*
Own Capital Fixed Assets (ICP) = Permanent Asset / Equity *Identifies the level of fixed assets related to own resources.*
Interest Rate Sensitivity (ISJ) = Sensitive Assets / Sensitive Liabilities *Identifies how interest on sensitive assets and liabilities correlates with the market.*
Cost Effectiveness and Profitability Indicators
Return on Equity (RPL) = Net profit / Equity *Provides the percentage recorded as a consequence of profit margins related to the equity*.
Return on total Investment (RIT) = Net Profit / Total Assets *Shows the results of business opportunities activated by the institution.*
Net Margin (ML) = Net Profit / Income from Financial Mediation *Allows to evaluate the basic function of financial mediation of the institution.*
Financial Margin (MF) = Gross Income from Financial Mediation / Total Assets Allows to evaluate the gross income from the financial mediation before credit risk.
Asset Profitability (LA) = Income from Financial Mediation / Total Asset Allows to evaluate the income from the financial mediation resulting from investments in the total assets.
Average Fundraising Cost (CMC) = Fundraising Financial Expenses / Time Deposits Allows to evaluate the *relation between financial expenses and time deposits.*
Interest Payable (JP) = Mediation expenses / Total Liabilities *Refers to capital expenses incurred in the several types of investment.*
Efficiency (EF) = Operating Expenses / Income from Financial Intermediation Allows to evaluate the *need for an operational structure to maintain the operation.*

Note. Source: Adapted from Assaf, A., Neto. (2012). *Structure and analysis of balance sheets: an economic and financial approach*.

The first group is the Solvency and Liquidity, which aims to highlight the organization's own resources in relation to its obligations, and tries to reflect the competence to meet the

demands for cash resources in order to cover financial liabilities. The second group is the Capital and Risk, whose structure is composed of indicators that evaluate the institutions' own capital volume, or the minimum capital that shall be preserved by them (although it is important to highlight that such indicators do not evaluate the risk of assets).

Finally, the third group is the Cost Effectiveness and Profitability, whose composition is structured by indicators that evaluate the wealth maximization of the organization through the risk-return ratio (Assaf, 2012). All indicators mentioned hereunder are calculated based on the financial accounts used by the banking institutions, including those set forth in COSIF. Therefore, they reflect the particularities of the economic and financial characteristics of this sector.

2.4 Application of Factor Analysis in Studies Evaluating Financial Indicators

During the analysis, the financial indicators can be grouped into factors allowing the understanding of the behavior of the original data. Pereira (1999) argues that the researcher can assume that several of their measures shall compose a factor, but instead of subjectively proposing the creation of an indicator, they may prefer to subject the data to a factor analysis. And the results of this analysis shall objectively point to such grouping of measures.

The factor analysis aims to reduce the complexity of a large number of variables in a smaller arrangement, in order to explain the phenomenon in more detail. This type of multivariate technique addresses the problem of analyzing the structure of correlations between a large numbers of variables, determining a set of common underlying dimensions called factors (Mendez & Rondon, 2012).

Thus, the application of such technique allows to identify the main indicators that should be considered for the analysis of the economic and financial performance of the organizations. According to Castro (2015), this methodology is used with the purpose of summarizing and validating the relations observed. Such goal is achieved by identifying a minimum number of factors that explain a maximum variance portion of all indicators.

The use of factor analysis in models related to economic and financial performance is observed in some scientific studies, such as Borges et al. (2014). The authors proposed a cautious model of economic and financial analysis composed of the main indicators arising from the analysis of the financial statements for the years 2010 and 2011, through factor analysis in a group of 44 rural credit cooperatives in the state of Minas Gerais.

The study by Bezerra and Corrar (2006) further proposes a methodology that could reduce the level of subjectivity in the choice of indicators to evaluate companies, as well as be done simultaneously with several indicators. The factor analysis is used in the ion of indicators that analyzed 132 insurance companies of the Private Insurance Surveillance Body (SUSEP), in 2001.

While the research by Carvalho and Bialoskorski (2007) aimed to identify, through factor analysis, which are the most relevant accounting indicators for evaluating the performance of agricultural cooperatives belonging to a certain Cooperatives Development program in the state of São Paulo, in 2000. Fifteen financial performance indicators were covered for the 91 cooperatives analyzed.

With regards to the financial banking institutions, no scientific studies that applied the factor analysis in order to favor the measurement of the economic and financial performance were identified. Which evidences, therefore, an opportunity to apply such technique, which sees to be relevant for the identification of the main indicators and which may bring significant contributions to improve the performance analysis of such institutions.

3 METHODOLOGICAL PROCEDURES

This section includes the methodological aspects related to the development of the study, describing the research sample and characterization, and the procedures for data analysis and application of factor analysis.

3.1 Research Sample and Characterization

This work uses a quantitative approach, according to the classification of Martins and Theóphilo (2007). According to the authors, in this type of research the data are quantified, and analysis and interpretations use statistical techniques.

The study has a descriptive nature and, as main objective, the description of the characteristics of a certain population or phenomenon and the establishment of relations between the variables (Gil, 2010). In this case, we sought to observe, analyze, classify and interpret the information regarding the economic and financial performance of financial institutions in the period covered by the research.

With regards to the data collection for the study, secondary data were used referring to the financial statements of the banking institutions operating in Brazil. Such data were obtained through the website of the Central Bank of Brazil. The spreadsheets referring to the years of 2011, 2012, 2013 and 2014 were collected, with data of such institutions' financial statements. The spreadsheets were obtained under section "50 largest banks and the consolidated National Financial System", available in specific link in said website (BCB, 2015).

The research sample consisted of all classified institutions, such as the Commercial Bank (Banco Comercial), Multiple Bank (Banco Múltiplo) and Caixa Econômica Federal, which operated in Brazil from 2011 to 2014 (those remaining active over the four years were selected). Accordingly, the final sample of the study includes 118 banking institutions. Worth mentioning that the sample included both Brazilian and foreign institutions with branches in Brazil. Based on data corresponding to each of these institutions, the economic and financial performance indicators were calculated.

3.2 Procedures for data analysis and application of factor analysis

Financial institutions had their performance numerically measured by the analysis of their financial statements. The model of statement used follows the COSIF standards (BCB Memorandum no. 1,273, 1987). 17 economic and financial performance indicators were calculated (as shown in Table 1, subitem 2.3), proposed by Assaf (2012).

Note that all financial accounts necessary for the calculations are directly presented by the financial statements under COSIF, except for those relating to the interest sensitivity indicator. To calculate this indicator, the classification of assets and liabilities sensitive to changes in the interest rate was made. According to Assaf (2012), the main balance sheet accounts classified as sensitive assets are those related to interbank investments, securities, and credit operations; and the main balance sheets classified as sensitive liabilities are those of interest-bearing deposits, open-market fundraising, obligations on loans and onlendings, and acceptances and issues of securities. The indicator was calculated considering these accounts for the composition of sensitive assets and liabilities.

The 17 indicators were calculated for each of the financial institutions in the years of 2011, 2012, 2013 and 2014. Such data were analyzed using the multivariate factor analysis statistical methodology. The factor analysis statistical technique was used to identify the most relevant economic and financial indicators for evaluating the performance of Brazilian banking institutions. Although the use to assess organizational performance is largely employed, some limitations are found. For Silva (2016), the amount of indicators to be used in the analysis is an important factor to be considered, since the use of many indicators can confuse the user, while a very small amount may not be enough for the financial evaluation of a company.

According to Januzzi, Coelho, Gonçalves and Vieira (2015), to define which variables shall be considered for determining the company's performance is a relevant aspect. It is important to evaluate all the indicators jointly and to define which ones influence on the company's results, in addition to establishing weights for such indicators. Bezerra and Corrar (2006) argue that this definition usually involves a great level of subjectivity. However, they also point out that it is possible to determine the impact of each indicator in the company's result through the statistical technique called factor analysis. According to Hair, Black, Babin, Anderson and Tatham (2009), the factor analysis change the original variables into new, uncorrelated variables, so called factors. Each factor is a linear combination of the original variables. One measurement of the amount of information transferred to each factor represents the variance. For this reason, the factors are arranged in decreasing variance order. Buesa, Heijs and Baumert (2010) point out that the factor analysis aims to define the underlying

structure in a data matrix, and its main purpose is to reduce a set composed of a large number of variables in a small number of factors that may be able to explain the summary of the original data.

Moreover, the model developed, when applying the factor analysis, shall be cautious. Meaning that it needs to explicit the maximum variance from the smallest possible number of variables, so that it leads to sound results and produces relevant information (Puente-Palacios & Laros, 2009). According to Viana (2005), a relationship between the variables is necessary in order to apply the factor analysis method, since it will allow for the identification of groups of correlated variables.

After verifying the correlation between variables, the model was initially developed with the 17 economic and financial performance indicators previously presented (Table 1). Subsequently, seeking for a better explanation of the factors, the variables with low power of relationship with others were excluded and the procedures referring to the factor analysis were repeated.

The adequacy of analysis was also demonstrated through the Kaiser-Meyer-Olkim (KMO) test and Bartlett's sphericity test. The number of factors was selected using the latent root method (based on the variance measure that the factor explains), defining the number of factors with a self-value greater than 1 (Hair et al., 2009).

The extraction method was the analysis of the main components. The purpose of this method is to produce a first factor with the maximum explained variance. Subsequently, with the definition of the first factor and its associated charge, the analysis proceeds with a second factor maximizing the variance explained thereof. The procedure continues until there are as many factors as there were variables, or until the analyst determined that the number of usable factors has been exhausted (Hair et al., 2009).

The adequacy of each variable was also individually analyzed, making use of the Measure of Sampling Adequacy (MSA) test, which was obtained by means of the anti-image matrix, and the communality table analysis.

The factor loads were calculated and presented. The adjustment of the model and its interpretation was later determined. The variance explained by the retained factors was analyzed using the Matrix of Explained Total Variance. The matrix was used after the factor rotation to facilitate the identification of the indicators comprising each of the factors. Varimax, with orthogonal rotation, was the method applied. Hair et al. (2009) state that the orthogonal rotation aims to simplify the rows and columns of the factorial matrix, facilitating the interpretation of the results. There is an attempt to load the weights from the maximization of the sum of the required load variances of the factorial matrix, so that each indicator is related to one of the factors generated.

The Statistical Package for Social Science (SPSS®), version 17.0, was the software used for data analysis.

4 RESULTS AND DISCUSSIONS

Initially the matrix of correlations between the variables covered were analyzed to verify the adequacy of the use of factor analysis. A significant number of statistically significant variables with Pearson correlation coefficient hiher than 30% (at significance level of 1%) were observed. This indicates the feasibility of using the factor analysis. Therefore, it is possible to continue the application of this technique.

4.1 Analysis with all indicators

At first, the factors were established using all indicators at the same time, seeking to aggregate all indicators into factors with high commonality and minimal loss of information. However, the fact that there are indicators that have inexpressive or no relationship with others causes that analysis to reach unsatisfactory results, once the factor analysis seeks to create factors simultaneously explaining all indicators. It was observed that it occurred, in this attempt to unite all the indicators in a single data analysis.

Bartlett's Sphericity Test rejected the void hypothesis that the data correlation matrix is the identity matrix, at the value of $p < 0.001$ (highly significant). While Kaiser-Meyer-Olkim test,

which measures the sample adequacy, presented a value of approximately 0.562. Hair et al. (2009) recommend a minimum of 0.500 for an appropriate analysis. Therefore, these tests indicated the adequacy of the exploratory factor analysis for the analysis and treatment of the data.

Subsequently, the factor analysis was applied for the seventeen indicators. Initially, seven factors were retained. The Matrix of Total Explained Variance allows to verify level degree of explanation reached by such factors. As shown in Table 2, with the extraction of the seven factors, the explanatory power is 76.33% of the total variations of the seventeen indicators initially used.

Table 2
Matrix of Total Explained Variance for analysis with 17 indicators

Compo-nents	Initial Own Amounts			Sum of square extracted loads			Sum of square rotated loads		
	Total	% Variance	% Cumu-lative	Total	% Variance	% Cumu-lative	Total	% Variance	% Cumu-lative
1	3,104	18,257	18,257	3,104	18,257	18,257	2,971	17,476	17,476
2	2,564	15,082	33,339	2,564	15,082	33,339	2,259	13,288	30,764
3	2,316	13,625	46,964	2,316	13,625	46,964	2,071	12,185	42,949
4	1,486	8,743	55,707	1,486	8,743	55,707	1,673	9,842	52,790
5	1,325	7,792	63,499	1,325	7,792	63,499	1,467	8,630	61,421
6	1,155	6,793	70,292	1,155	6,793	70,292	1,310	7,709	69,129
7	1,026	6,038	76,330	1,026	6,038	76,330	1,224	7,201	76,330
8	0,871	5,121	81,451						
9	0,805	4,735	86,186						
10	0,622	3,660	89,846						
11	0,490	2,883	92,729						
12	0,440	2,586	95,314						
13	0,324	1,907	97,222						
14	0,288	1,694	98,916						
15	0,152	0,896	99,812						
16	0,032	0,187	99,999						
17	0,000	0,001	100,000						

Note. Source: research data.

Although the tests indicated the possibility of applying the factor analysis to all variables (the seventeen indicators), it was decided to increase the explanatory power of the factors by analyzing each variable and, if necessary, removing some variables from the analysis. The choice for the indicators that would be excluded from the analysis was made based on two criteria: the analysis of the anti-image matrix and the analysis of the communalities table.

With regards to the first criterion, the anti-image matrix indicates the explanatory power of the factors in each of the variables analyzed. Hair et al. (2009) state that the KMO test evaluates the appropriateness of the application of the factor analysis in general, and also that it is possible to evaluate the individual variables, which should be analyzed through MSA - Measure of Sampling Adequacy indicator.

The diagonal of the bottom of the anti-image matrix indicates the MSA for each of the model variables. Values lower than 0.500 are considered insignificant for the analysis, indicating, in such cases, variables that can be excluded. According to this criterion, the following indicators were taken from the analysis: Interest Payable (JP), Average Fundraising Cost (CMC), Financial Margin (MF) and Asset Profitability (LA), which presented an MSA level of less than 0.500 in analysis carried out.

While in the second the commonality of each one of the indicators was analyzed, in order to evaluate the proportion of the common variance within each variable. According to Hair et al. (2009), the estimated values of commonalities, after extraction of factors, range between 0.0 and 1.0, meaning that if the value is 0.0 there is no partial variance, and if the value is 1.0

there is 100% common variance. Field (2009) argues that indicators with commonality values below 0.700 are disregarded. Following this criterion, the following indicators were taken from the analysis: Loan Interests (PDE), Efficiency (EF), Fixed Equity (ICP), Leverage (LEV) and Financial Independence (FI), which obtained values lower than 0.700 in the analysis carried out.

4.2 Final analysis with eight indicators

After extraction of the indicators indicated by the criteria of the anti-image matrix (MSA) and the communality table, a great improvement was observed in the explanatory power. The final model includes the following indicators: Voluntary Fit (EV), Immediate Liquidity (LI), Loans / Deposits Indexes (ESD), Ratio Capital/Depositors (RCD), Interest Sensitivity Index (ISJ), Return on Equity RPL), Return on Total Investment (RIT) and Net Margin (ML).

The KMO test was 0.588 (greater than 0.500) and the sphericity test continued to be less than 0.001, which validates the use of factor analysis. The Anti-Image Correlation Matrix presented all values of the individual MSA variables above 0.500, evidencing the sample adequacy. In addition, all the indicators of the commonality matrix presented values higher than 0.700 (as can be seen in Table 3), which indicates a high proportion of common variance within the variables.

The KMO test was 0.588 (greater than 0.500) and the sphericity test remained lower than 0.001, which validates the use of factor analysis. The Anti-Image Correlation Matrix presented all values of the individual MSA variables over 0.500, demonstrating the sample adequacy. Moreover, all commonality matrix indicators presented values higher than 0.700 (as shown in Table 3), which indicates a high proportion of common variance within the variables

Table 3
Communality Table for Final Analysis with 8 Indicators

Variable	Initial	Extraction
EV	1,000	0,986
LI	1,000	0,706
ESD	1,000	0,899
RCD	1,000	0,946
ISJ	1,000	0,982
RPL	1,000	0,768
RSIT	1,000	0,959
ML	1,000	0,893

Note. Source: research data.

Three factors were retained with the application of factor analysis for these eight indicators. The extraction method used was the analysis of the main components. The Total Explained Variance had a explanation level significantly higher than that obtained in previous attempts. The variation percentage explained by the three factors was approximately 89.23%, as shown in Table 4.

Table 4
Matrix of Total Explained Variance for Final Analysis with 8 Indicators

Compo-nents	Initial Own Amounts			Sum of square extracted loads			Sum of square rotated loads		
	Total	% Variance	% Cumu-lative	Total	% Variance	% Cumu-lative	Total	% Variance	% Cumu-lative
1	2,806	35,070	35,070	2,806	35,070	35,070	2,581	32,259	32,259
2	2,541	31,766	66,837	2,541	31,766	66,837	2,552	31,897	64,156
3	1,791	22,391	89,227	1,791	22,391	89,227	2,006	25,072	89,227

Continue

Table 4 (continuation)

Compo-nents	Initial Own Amounts			Sum of square extracted loads	Sum of square rotated loads
4	0,414	5,177	94,404		
5	0,352	4,406	98,810		
6	0,037	0,465	99,276		
7	0,033	0,408	99,684		
8	0,025	0,316	100,000		

Note. Source: research data.

Note that the number of the "Initial Own Amounts", described in Table 4, is equivalent to the number of variables analyzed hereunder, which, in this case, is eight. However, only three among these components have total value higher than 1.0 and, therefore, the number of retained factors is only three. Component 1 presented a value of 2.806, component 2 a value of 2.541, and component 3 a value of 1.791.

These factors represent three dimensions underlying the data, which are useful for the banking institutions performance analysis, object of this study. Accordingly, instead of working with the eight financial performance indicators, only three factors are used, since those are responsible for explaining 89.227% of the total association between the data. The use of these factors is in line with Castro's (2015) approach, which emphasizes that the factor analysis is used to summarize and to validate the relationships observed between the financial indicators. So, we identify a minimum number of factors that explain a maximum portion of the variance of the indicators.

4.3 Consideration on indicators excluded from the analysis

A series of tests was performed to see if it was possible to create groups between the indicators excluded from the analysis. In this sense, we verified if these indicators could give rise to other factors that, isolated from those three initially identified, would make up the evaluation model of banking institutions. However, the tests demonstrated the impossibility of creating a factor for grouping the indicators excluded in the study. No tests presented a satisfactory adjustment to the model, the KMO was lower than 0.500 and / or the variables presented low MSA (lower than 0.500) or low commonality (lower than 0.700).

Hence, we determined the inadequacy of employing another factor for these variables, and we objectively chose the indicators that should be part of the evaluation, using the factor analysis criteria. The result obtained was then backed, leading to the use of eight economic and financial indicators for the performance analysis of the 118 financial banking institutions covered by the study.

4.4 Discussions on factors obtained

In order to identify the most significant financial indicators for evaluating banking institutions and establishing the composition of the three factors generated by the factor analysis, we shall observe the matrix of rotated components. Such matrix was generated by Varimax method and is presented in Table 5.

Table 5
Matrix of Rotated Components

	Components		
Variable	**1**	**2**	**3**
RIT	0,971		
ML	0,926		
RPL	0,874		
RCD		0,972	
ESD		0,948	
LI		0,840	
EV			0,989
ISJ			0,987

Note. Source: research data.

Hence, the indicators comprising each of the extracted factors were identified. According to Matarazzo (2010), a joint analysis of the indicators and identification of the relationships between them shall be carried out in order to analyze the general framework an the entity's performance. According to the results obtained (Table 5), the performance of banking institutions can be evaluated through three factors.

The first factor is called Cost Effectiveness and Profitability and is responsible for 35.07% of the variances (see Table 4). This factor is composed of the indicators: Return on Total Investment (RIT), Net Margin (ML) and Return on Equity (RPL), and allows to evaluate the profitability obtained by the banking institution mainly from the primary function of financial mediation.

The second factor is called Capital and Liquidity, and is responsible for 31.77% of the variances. It is composed of the Ratio Capital/Depositors (RCD), Index Loans/Deposits (ESD) and Immediate Liquidity (LI). This factor allows to evaluate the composition of capital against the deposits and the capacity to cover the deposits with current resources.

Finally, the third factor is called Fitting and Interest Sensitivity, and is responsible for 22.39% of variances. It is composed of the indicators Voluntary Fit (EV) and Interest Sensitivity Index (ISJ), This factor allows to assess the immediate financial capacity and the sensitivity to variations in market interest rates.

The indicators may be grouped in three different factors, representing each of the dimensions to be considered when analyzing the financial and economical situation of these entities. Such factors may be converted into new indicators (Cost Effectiveness and Profitability; Capital & Liquidity; and Fitting and Interest Sensitivity), thus allowing the ranking and comparison of institutions based on factor loads. Simply multiply the scores presented in the matrix "Component Score Coefficient" (shown in Table 6) by the initial indicators, and add them up, in each case, in order to calculate the values of these new indicators referring to one of the institutions.

Table 6
Matrix "*Component Score Coefficient*"

Variable	**Components**		
	1	**2**	**3**
RIT	0,379	0,002	0,018
ML	0,355	-0,004	-0,022
RPL	0,356	-0,015	0,104
RCD	-0,009	0,381	0,000
ESD	-0,004	0,372	-0,002
LI	-0,006	0,329	-0,005
EV	0,044	0,000	0,502
ISJ	0,045	-0,006	0,501

Note. Source: research data.

Accordingly, RIT, ML, RPL, RCD, ESD, LI, EV, and ISJ indicators shall make up the model to be considered for the performance analysis of the institutions included in the study. These results are similar to those obtained by Borges et al. (2014) for credit union. The authors identified ten economical and financial indicators that are most relevant to these cooperatives' performance evaluation, from which can be observed that six of them are common to those identified to the financial banking institutions in the research hereunder (RIT, ML, RPL, RCD, ESD and LI).

Worth mentioning that, through the modeling results, the performance of the banking institutions can be evaluated with regards to each of the three factors, setting rankings and comparing the different institutions, as well as their evolution over the years. Therefore, contribution is made to identify the strengths and weaknesses of the institution, as well as to diagnose its current position and to produce results that serve as a basis for forecasting future trends, as recommended by Matarazzo (2010) and Castro (2015).

These factors reflect the characteristics of the banking business, as explained by Assaf (2012). According to such author, the financial institutions develop their market strategies in aiming at maximizing their operating results, so as to operate in competitive environments. In this sense, the financial services offered by banks are managed in a way that minimizes their costs and increases the volume of their applications and, therefore, their revenues. These strategies mainly impact on the "Cost Effectiveness and Profitability" and the "Capital and Liquidity" factors, the most important ones when analyzing the performance of financial institutions (the two factors jointly represent 66.84% of the data variance, as shown in Table 4) .

5 CONCLUSION

Upon the use of the factor analysis, the indicators that explain the maximum variance from the smallest possible number of variables were identified. We conclude that the most relevant economic and financial indicators for the Brazilian banking institutions performance evaluation are: Return on Total Investment (RIT), Net Margin (ML), Return on Equity (RPL), Ratio Capital/Depositors (RCD), Index Loans/Deposits (ESD), Immediate Liquidity (LI), Voluntary Fitting (EV) and Interest Sensitivity Index (ISJ). Thus, we observe the need for monitoring a number of indicators much smaller than that originally presented.

Further, these eight indicators can be replaced by three factors, which explain approximately 89.23% of the total data variance. The factors "Cost effectiveness and Profitability", "Capital and Liquidity" and "Fitting and Interest Sensitivity " allow to classify and compare the performance of institutions, determining the main aspects that shall be considered by the analysis.

Accordingly, upon the use of these indicators and the application of the Factor analysis, the data was summarized to assist in the economic and financial evaluation of the banking institutions. Through the results obtained, financial decision-makers may focus primarily on the indicators and factors that are most relevant for the performance of such institutions, which foster the efficiency optimization of the economic and financial management.

With regards to the academic sphere, the study provides a methodological contribution to evaluate the performance of banking institutions and to increase the level of knowledge about the economic and financial indicators of these institutions. The originality of the research relies in the application of the factor analysis. The new indicators resulting from this application can be used in other studies, in order to complement the analyzes with traditional indicators.

Moreover, the research contributes to make managers, analysts and investors note that it is possible to consolidate financial indicators evaluating the performance of companies within a specific sector. Additionally, it support these agents in establishing a smaller number of indicators and simplifying the companies' analysis process, which allows a better understanding on the data.

Among the limitations of this study, we highlight that the analysis was carried out from the seventeen predetermined indicators. Therefore, other economic and financial indicators were not addressed hereunder. For future researches, we suggested that different indicators are used with the application of the factor analysis, and that comparisons are made with the results herein presented. Finally, we further recommended that the indicators identified

hereunder are used to verify and compare the performance of different banking institutions over the years.

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PUBLIC RESOURCES APPLICATION IN BASIC EDUCATION: DOES EXPENSE INTERFERE IN PERFORMANCE?*

VALKYRIE VIEIRA FABRE
Doctoral Candidate in Accounting (UFSC), with Master's degree in Accounting (UFSC), specialization in Public Auditing (UFSC), specialization in Public Law (UNIVALI), specialization in Public Accounting (UNIVALI). Full Professor for the Department of Accounting Sciences (UDESC). ***Address:*** *Rua Siegolf Radlouff, n. 76, Ponto Chic | Ibirama/SC | Brazil.*
E-mail: *valkyrie.fabre@udesc.br*

DAIANI SCHLUP
Master's degree candidate in Accounting Sciences (FURB), Bachelor of Accounting Sciences (UDESC). ***Address:*** *Rua Ascurra, n. 40, Nova Stettin | Ibirama/SC | Brazil.*
Email: *daianischlup@gmail.com*

JARDEL PANDINI
Bachelor of Accounting Sciences (UDESC). Accountant for the City Council of Ituporanga. ***Address:*** *Rua Arthur Vanselow, n. 45, Apto 02, Dalbérgia | Ibirama/SC | Brazil.*
E-mail: *jardelpandini@hotmail.com*

ABSTRACT

The overall purpose of this research was to compare the public expense and the performance of students in small municipalities in the state of Santa Catarina. This is a descriptive study, with a predominantly quantitative approach, based on survey and collection of documentary evidence. A sample of 25 municipalities with less than 50,000 inhabitants was analyzed in the period of 2011 to 2014, which identified the annual spending per student and its relation to the students' approval rate and their performance in IDEB. The average annual expenditure per student was R` 8,529.68. A great disparity was found in the amounts charged by municipalities (difference of up to 462%), which, compared to the divergent and high average approval rates (96.6%) and different performances in IDEB, led to the conclusion that there is no relation between the public expenditures on public schools and the students' performance.

Keywords: *Public Accounting. Public Administration. Elementary School. Performance. Efficiency.*

1 INTRODUCTION

According to the Education Development Plan .Plano de Desenvolvimento da Educação – PDE] (2007), education can be defined as the process established between socialization and individualization of a person, through which individuals construct their autonomy and have the possibility of assuming a critical and creative attitude towards the world. For the United Nations

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(UN) (1948) it is an internationally guaranteed right, which requires the State to apply resources and to ensure the free and mandatory access to education.

In Brazil, the Federal Constitution (CF) (1988) establishes in article 6 that education is a social right of all and an obligation of the State and the family; it further defines that the State is responsible to offer basic, mandatory and free education from 4 to 17 years old.

For Daniel Cara, general coordinator of the National Campaign for the Right to Education [Campanha Nacional pelo Direito à Educação – CNDE] (2016), Brazil is still a long way from fulfilling the provisions of the National Constitution with regards to education. There are still alarming differences between Brazilian regions and social groups. According to a study published in 2007, Brazil needs to invest at least 10 years of its Gross Domestic Product (GDP) in basic education in order to make of education an instrument for prosperity and equality of all (CNDE, 2016).

For Souza, Silva and Araújo (2012), the development of education as one of the factors responsible for the social and economic progress of the population is related to the allocation of public resources.

Santa Catarina is elected one of the best Brazilian states in basic education, according to the Basic Education Development Index [Índice de Desenvolvimento da Educação Básica - IDEB]. In 2011, it got the second position in the IDEB for the first grade of elementary school (4th year / 5th grade) and the third position in 2013. With regards to the final years of elementary education (8th grade / 9th year), it got the first position in 2011 and the fourth in 2013 (INEP, 2015).

Taking into consideration the importance of education for the social progress and the prerogative that the allocation of public resources impacts on the students' performance, the question that guided this research was: Will public resources applied in the municipal school network impact the performance of students from small municipalities of the state of Santa Catarina?

As specific objectives, the annual expenses with education and the number of students enrolled in elementary education were assessed. The annual spending per student was assessed, as well as its relation to the students' approval rate and to the performance in IDEB.

Faria, Jannuzzi and Silva (2008) argue that this type of analysis is important because it shows to society if the public resources are being well managed by the government, in addition to the necessary transparency on the management of the public educational service.

The structure of this article was divided into introduction, theoretical reference on expenditure and efficiency in education, methodological aspects, description and data analysis, and conclusions.

2 DEVELOPMENT

Each municipality has a different reality with regards to education, making it impossible to standardize national expenditures, however, Souza et al. (2012) argues that public management is considered efficient when less resources are spent to achieve the results determined in its goals and objectives, reflecting the optimal transformation of inputs into quality products and services to be provided to the population.

Searching for the keywords "expenses", "cost" and "student" in Capes publications, 22 occurrences were found in articles from the last 10 years, but only four of them were related to expenditures per student. Among these four, three were national, addressing the cost of higher education in Brazil and one was an international article addressing the cost of basic education in California. Worth noting that the meaning used for the word *costs* in these articles does not match the standard accounting nomenclature

In accounting, the expenditure is understood as the accounting registration of debt or reduction of assets by payment. Expenditures include costs, expenses and investment (Martins, 2010). In public accounting, the concept of expenditure is in line with the term budgetary expenditure, used in the standardization of the area, for structuring the chart of accounts and public financial statements. Thus, the public expenditure researches on financial statements are understood to be applied to the concepts of accounting expenditures.

The National Treasury Secretariat (STN) (2015) establishes the Brazilian accounting standards applied to the public sector, in which the public budgets are classified by agency and unit, programmatic functional, nature of expenditure, economic category, nature group, expenditure elements, source of funds and other unfolding that are optional to the consolidation of national accounts.

Ordinance 41, dated April 14, 1999, establishes the standardized classification of the programmatic function, consisting of Functions and Sub-functions of public expenditure. The function reflects the institutional competence of the body, while the sub-function establishes the purpose of governmental action. In the case of this research, the expenditure on the function Education was used, downgrading it to the sub-funciton level: Elementary Education.

The performance of students in elementary education refers to the concept of efficiency in the use of public resources. Silva, Souza and Araújo (2013) define as efficient a smaller use of public resources to obtain a greater or better volume of services provided. In this sense, the manager that can still achieve the best performance per student using the smallest amount of public resources shall be efficient

2.1 Previous Studies

In the event of allocation of public resources in education, the following studies in Brazil should be highlighted: Souza et al. (2013) analyzing the efficiency of public expenditures on education in the Municipalities of the state of Rio Grande do Norte; Silva et al. (2012) analyzing the efficiency of public expenditures on education in Brazilian capitals; Afonso (2012), which addresses public policies of responsibility, aimed at accountability in education, comparing Brazilian evaluation methods with experiences from other countries; Gomes (2010), who analyzed the efficiency of municipal education systems in the city of São Paulo; Delgado and Machado (2008) assessing the efficiency of state public schools in Minas Gerais; and Faria et al. (2008) investigating the efficiency levels in the use of health and education resources in the state of Rio de Janeiro.

In the main studies analyzed, the efficiency calculation was made using the ranking of the official indexes of basic and elementary education, disregarding the relation between the expenditure and the students' performance. Souza et al. (2012) was the only who compared the performance of schools and the public expenditures, however, the value presented was only the annual total expenditures incurred with education by the Entity. Assessment by student or sub-function was not carried out

For the authors Gomes (2010), Delgado & Machado (2008) and Faria et al. (2008), the results of the research demonstrated that the higher the public resources expenditures the better the quality of education provided. Silva et al. (2013) do not follow the same line of thinking of these authors, instead, they argue that the quality of education is not related to the efficiency in the expenditures with education. In these researches, the sample and the variables chosen interfere directly in obtaining different results.

With regards to the evaluation method, Afonso (2012) reports that in the USA and in other countries the same devices are used for more than four decades to evaluate education (external evaluation, fixed tests with publication of school rankings, private explanations for public school deficits, accountability of schools, teachers and managers, connected to the academic results of students). The author suggests breaking with these methods and proceeding with the comparison of the school results based on public investments and the teaching methods, for a better view of the citizen and lower culpability by managers.

Considering international studies, we highlight the researches made by Pinto (2005), Yuan & Zhang (2015), Birchler & Michaelowa (2015) and Fabrino, Valle & Gomes (2014). If compared the levels of education analyzed in the mentioned article, they are all equivalent to what we call in Brazil elementary education.

Pinto (2005), who conducted a study on the spending per student in basic education in California - USA, where was found a discrepancy in education according to the location, even though the same value per student is passed on by the government, concluded that the expenditure itself do not provide quality education. According to the author, governments assist

only students with 95% attendance. In 2005, it was equivalent to US$ 4,306/ student. The government of the Municipality bears only $ 1,700 / attending student.

China, Yuan and Zhang (2015) made a comparison between the public expenditures on education and the demand for complementary education (private classes) combined with costs with teaching materials. They found that, as the Chinese government expenditures increase, there is a decline in the demand for private lessons, but there is no statistical change on the expenditure on textbooks or other articles required for Chinese students.

For Birchler and Michaelowa (2015), who analyzed the effects of financial aid on primary education, as a complement to the government expenditures in 34 member countries of the Organization for Economic Co-operation and Development (OECD), the aid was more relevant as to the number of registrations (enrollments) in basic education than to an effective improvement in the performance (quality education). The authors found that 1% increase in education expenditures results in an average increase of 0.06% in the enrollment in basic education.

For Fabrino et al. (2014), which assessed the effects of public expenditures on the effectiveness of education in Brazil and in other countries abroad, the educational outcomes can be affected by a combination of the evolution of public education expenditures and the rate of economic growth, which, according to the authors, impacts the effectiveness of the education system.

2.2 Methodological Aspects

The research is based on official financial statements through which the results are calculated and analyzed. It is characterized as descriptive research with a quantitative approach, based on the research and collection of documentary data.

The State of Santa Catarina currently has 295 Municipalities, among which 91% have less than 50,000 inhabitants. However, previous researches prioritized larger Municipalities or Capitals. The micro-region of Alto Vale do Itajaí, located in the east-central area of the state, comprising 28 municipalities, was intentionally chosen for having 96% of the municipalities with less than 50,000 inhabitants. Overall, it was possible to collect data from 25 municipalities that make up the sample of this research.

The evaluation period was from 2011 to 2014. Elementary Education expenditures were gathered in Attachments I, II and XVIII of the Summary Report on Budget Execution (Relatório Resumido da Execução Orçamentária – RREO), available at the website of the National Treasury Secretariat (STN). In cases where the statement was not available, the Municipal Accountant was contacted for data request.

All budgetary costs (current and capital) are recorded as expenditures, totaling the functional classification 12.361 (Education - Elementary School). The official public financial statements, available at the STN (2016), fail to provide details on the classification as to the nature, linked to the functional classification, therefore, it becomes impossible to separate the expenditures in costs, expenses and accounting investments.

Further, to calculate the expenditures, the accounting records that did not undergo the budget accounts subsystem (such as depreciations) were disregarded, since these records were optional to the Municipalities until 2015 and do not make up the budgetary classification of public expenditure, disclosed in the financial statements used in this research.

The performance per student was measured using the quantitative data provided by the Ministry of Education, at INEP (2015) webpage, where the approval rate and the IDEB indicator (from the 4th grade / 5th year to the 8th grade / 9th year). Therefore, it was possible to relate the annual spending per student from the municipal public elementary school and the educational performance.

2.3 Data Analysis and Description

Initially, the expenses with education and the number of enrolled students were found, and, subsequently the educational performance was determined, using the relation between the spending per student and the approval rate of these students, as well as the performance in IDEB.

2.3.1 Spending per student

The calculation of the spending per student was made considering the expenditures on Elemental Education, distributed by the number of students enrolled in each year.

Table 1
Annual Spending per Elementary School student - 2011 to 2014

Municipality	2011 (R$)	2012 (R$)	2013 (R$)	2014 (R$)	Average (R$)
Dona Emma	13.546,34	14.823,98	17.945,14	19.588,55	16.476,00
Rio do Campo	9.170,94	11.509,79	9.990,59	14.770,20	11.360,38
Ituporanga	10.113,78	12.948,42	10.379,30	8.033,50	10.368,75
Atalanta	10.582,29	12.672,55	8.781,34	8.757,23	10.198,35
Presidente Nereu	10.461,10	10.289,62	8.396,91	9.960,63	9.777,07
Mirim Doce	8.466,00	10.647,95	9.094,54	10.343,39	9.637,97
Aurora	7.680,86	8.115,15	10.451,06	12.145,39	9.598,12
Lontras	8.900,88	8.956,34	9.582,42	10.524,84	9.491,12
Chapadão do Lageado	10.561,16	7.866,14	10.665,06	8.264,61	9.339,24
Witmarsum	7.269,76	9.012,92	9.250,95	10.831,48	9.091,28
José Boiteux	11.108,87	9.503,51	6.755,27	8.530,34	8.974,50
Pouso Redondo	6.324,08	8.570,03	8.335,94	12.355,17	8.896,31
Imbuia	6.293,71	6.673,81	6.467,54	15.468,26	8.725,83
Agronômica	7.532,22	11.046,69	6.345,80	7.978,79	8.225,88
Vidal Ramos	8.130,06	7.102,98	7.432,45	8.568,19	7.808,42
Petrolândia	8.019,08	8.075,37	6.557,12	7.601,09	7.563,17
Rio do Sul	5.467,48	7.185,83	7.306,39	8.842,55	7.200,56
Vitor Meireles	5.797,18	7.233,41	6.289,55	8.934,57	7.063,68
Agrolândia	10.393,78	5.783,05	4.901,40	6.780,46	6.964,67
Laurentino	5.207,94	6.527,43	6.134,28	9.848,71	6.929,59
Braço do Trombudo	6.403,85	6.043,59	7.266,08	7.321,88	6.758,85
Presidente Getúlio	5.342,36	5.642,25	6.632,75	7.935,72	6.388,27
Ibirama	4.528,58	6.181,27	5.575,81	6.360,70	5.661,59
Taió	4.888,88	5.216,00	6.091,24	5.678,95	5.468,77
Rio do Oeste	4.241,14	5.273,03	5.089,96	6.490,23	5.273,59

Note. Source: research data.

The average annual spending per student, for the municipalities covered by the research, is R$ 8,529.68. Rio do Oeste is the smallest among those surveyed (R$ 5,273.59), while the largest is Dona Emma (R $ 16,476.00), representing three times the spending of that municipality.

Considering the evolution in time (2011 to 2014), it can be observed that Ituporanga, Atalanta, Presidente Nereu, José Boiteux and Petrolândia were the only municipalities among those covered by the research that reduced their expenses in the period. Most had increased spending and few remained stable

2.3.2 Spending per student x approval rate of the Municipal Elementary Education

The performance was measured using the approval rate and the annual percentages of approval in the Elementary School (Year 1 up to 9th Year) for the Years of 2011 to 2014 were calculated, based on INEP (2015) data. The average percentage was calculated by municipality and compared with the average values spent in the same period (data in Table 1).

The approval rate is high among the municipalities covered by the research, totaling the total average of 96.6%, while the average annual spending per student is R$ 8,529.68. Figure 1 shows the annual average spending per student related to the average approval rate for the period from 2011 to 2014.

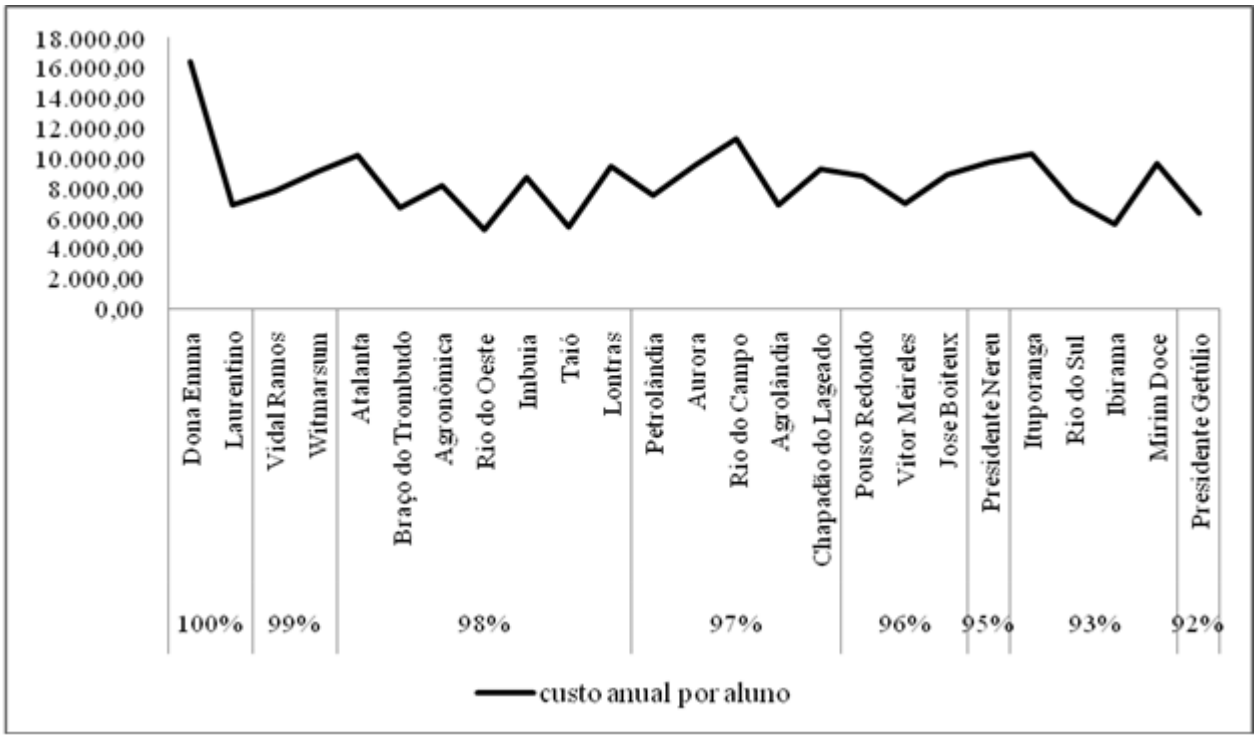

Figure 1: Average spending per student X Average approval rate
Source: research data.

Dona Emma had 100% approval and the highest average expenditure per student, of the sample researched, confirming the study by Fabrino et al. (2014), which concluded that the higher the expenditure, the better the student approval rate.

Rio do Oeste is the municipality with the lowest average annual spending per student, but its average approval rate is 98%, above the general average of the municipalities under analysis, supporting Silva et al. (2013), who argue that the quality of education has no relation with the efficiency in the education expenditure.

If the best approval results (100% and 99%) are compared, a variation of up to 238% of the average annual spending per student is found. (while Dona Emma spends an average of R$ 16,476.00, Laurentino spends only R$ 6,929,59). Likewise, if the worst sample approval results (93% and 92%) are compared, the variation found was equivalent to 183%. While Ituporanga spends an average of R$ 10,368.75, Ibirama spends only R$ 5,661.59.

2.3.3 Spending per student x Basic Education Development Index

INEP (2015) states that IDEB gather in a single indicator two key concepts for measuring the quality of education: the school flow and the average performance in evaluations. In this sense, spending per student was listed by IDEB, in order to identify the performance of elementary school students of the public system. Data from 2011 and 2013 were used, given that the indicator is only measured every two years, resulting in a limitation to the analysis hereof.

Table 2
Basic Education Development Index

Municipality	2011	2013
Taió	5.0*	4.9*
Ibirama	4.6*	4.7*
Aurora	5.3	4.9
Braço do Trombudo	-	4.8
Rio do Sul	4.3	4.6
Jose Boiteux	-	4.5
Ituporanga	4.8*	4.4
Agrolândia	5.3*	4.2
Pouso Redondo	-	3.5
Presidente Getúlio	4.2*	3.2

Note. Source: research data.
* Municipalities that reached the goal defined by INEP.

Among the 25 municipalities covered by the study, not all had data published on INEP website (2015). On Table 2, only two municipalities (Ibirama and Taió) reached the goal. Additionally, only Ibirama and Rio do Sul managed to increase the index over one evaluation to another.

Comparing spending per student and IDEB, we observe a better performance by Agrolândia and Aurora in 2011, which recorded the highest rate (5.3), despite the fact that none of the municipalities has the highest spending per student.

In the data of 2013, the best-evaluated municipalities in IDEB were Taió and Aurora, with a rate of 4.9, however, their average expenditures on education were not the highest observed. Ibirama, the only municipality that managed to stay above the goal established by MEC in the two years and increase the IDEB index, also presented the lowest spending per student in 2011 (R$ 4,528.58) and, in 2013, was the second lowest spending (R$ 5,575.81).

Thus, the analysis of the expenditure related to the student performance, using IDEB, provide evidence to the research of Souza, Silva and Araújo (2012), stating that the quality of education measured by IDEB has no relation to the application of public resources in the Area of education; However, it was negatively impacted by the calculation period of the indicator and the unavailability of data from all the municipalities at INEP (2015).

3 CONCLUSION

The growing popular demonstrations for better education in Brazil claim that the financial resources are insufficient to promote quality education, besides the common census to attribute the low performance of some students to the lack of public investments in education. However, previous studies demonstrated both possibilities: that the application of public resources can influence the performance of education and that financial resources do not interfere on quality education

The general objective of this research was to identify if the public resources, applied in the municipal education system, impact the performance of the students in small municipalities of the state of Santa Catarina. In spite of some limitations, all goals were achieved.

A sample of 25 small municipalities of Santa Catarina, located in the micro-region of Alto Vale do Itajaí, was investigated. The average annual spending per student in the municipal basic education system was R$ 8,529.68. Dona Emma spends an average of R$ 16,476 per enrolled student, while Rio do Oeste spends R$ 5,273.59 (difference of 462% in the same

micro-region). Therefore, it demonstrates a strong disparity in the application of municipal public resources in elementary School.

Students' performance, as measured by students' approval rate, ranges between 92% and 100; however, it shows no relation to the volume of public resources annually applied per student. The performance measured by IDEB was hampered by two reasons: not all municipalities had data available on INEP portal (2015) and IDEB was only measured every 2 years (in the research period, we used 2011 and 2013). The analysis was made anyway, and only the municipality of Ibirama was above the goal established by MEC, in the two years of IDEB evaluation. It had the lowest spending per student observed in 2011 (R$ 4,528.58) and the second lowest in 2013 (R$ 5,575.81).

Comparing this research with others mentioned in the article, we concluded that depending on the sample used the results may be different. In this research, which used as a sample municipalities with less than 50,000 inhabitants, the relation between the municipal public resources applied in the elementary school (per student) and the performance of students (measured by the approval and IDEB rate).

The research was limited to the data disclosed in official electronic website. Distinction was neither made between expenditures incurred (costs, investments or accounting expenses), nor determined the opinion of those involved (professors, managers, parents and students), as a matter of accessibility. In this sense, it is possible the extension of the research *in loco* concerning the perception of those involved and the justifications regarding the differences of expenditures between municipalities within the same micro-region.

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JUDGEMENT CAPACITY & DECISION-MAKING EVALUATION BASED ON INTERNATIONAL ACCOUNTING STANDARDS

IEDA MARGARETE ORO
Doctor of Accounting Sciences and Business Management by FURB. Professor for the Professional Master Business Administration of UNOESC. Address: Rua Nereu Ramos, 3777D | 89713-000 | Chapecó/SC | Brasil.
Email: *ieda.oro@unoesc.edu.br*

ROBERTO CARLOS KLANN
Doctor of Accounting Sciences and Business Management by FURB. Professor for the Post-Graduation Program in Accounting Sciences of FURB. Address: Rua Antonio da Veiga, 140, Victor Konder | 89012-900 | Blumenau/SC | Brasil.
Email: *rklann@furb.br*

ABSTRACT

The current international standards emphasize the need for judgment and decision making of accounting professionals on issues involving the recognition and measurement of financial facts. This study aims to evaluate the judgment and decision making of accountancy academic professionals in resolving issues involving international standards. Depending on the characteristics of the study we sought, throughout the development of the analysis, the association with the classic heuristic decision-making, such as representativeness, availability, anchoring and adjustment. The research is characterized as an exploratory study, a survey with a quantitative approach. The sample consisted of 97 undergraduate Accounting students from a University of Santa Catarina. The questionnaire selected 6 issues involving judgment and decision-making and integrates evidence from the Federal Accounting Council. In the heuristics analysis, which involves judgment and decision-making, an increasing use of heuristics of availability and anchoring and adjustment was found in the questions under analysis. The average percentage of correct answers in the six questions was considered low; however, it does not invalidate the results, but it draws attention to the degree of bounded rationality in decision-making. Thus, it must be emphasized that the cognitive biases may be caused by the use of heuristics. The survey findings reveal relevant points that reinforce the importance of judgment and decision-making as an accountant skill in the academic training.

Keywords: Judgment. Decision Making. Heuristics. International Accounting Standards.

1 INTRODUCTION

The current international standards have increased the degree of judgment and decision-making on the accounting facts involving the process of recognition, measurement and disclosure of accounting information, and, in this case, Ludícibus, Martins, Gelbcke and Santos (2010) warn that it requires the exercise of judgment by the accountant. For Dantas and Macedo (2013, p. 1), the "new way of doing accounting in Brazil raises concern about the

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preparation of accounting professionals to deal with this change and the cognitive elements that are present in the decision-making process for such professionals."

Accounting using accounting standardization has constantly evolved and "has been proved to be easily influenced, and influenced indeed, by culture, economics, legal thinking, power, interests, etc." (Martins et al., 2007 , P.2). The shift from rule-based accounting to principle-based accounting has increased the judgment required by those responsible for preparing the financial statements (Ernest Young & Fipecafi, 2010).

Judgment and decision-making studies rely on prescribing successful ways to make reliable decisions in game situations (Hastie, 2001). Like many of the cognitive functions, decision-making brings an internal difficulty to researchers in the behavioral area: it is a phenomenon that can only be known by the behavior in decision situations and by inferences made based on these behaviors (César, Akamine Jr. & Perez, 2011).

The two main reasons for the research in the behavioral sciences are the development of scientific theories and the resolution of problems occurring in everyday life. The behavioral research has been historically divided into two distinct streams: judgment and decision-making (Hastie, 2001).

The year of 2010 has been considered a divisor of accounting in Brazil, due to the full adoption by the companies of the IFRS standard, which is considered more complex than the old standards, requiring more judgment and decision-making by the Accountant. Laws 11,638/2007 and 11,941/09 and the international accounting standards issued by IASB and implemented in Brazil by CPC and regulatory bodies, such as the CVM and the CFC, among others, provides the use of principles rather than rules, furnishing higher judgment and analysis, and, therefore, higher quality and usability of the financial statements (Lemes & Carvalho, 2010; Iudícibus et al., 2010).

In this sense, the rational behavior becomes very important and causes individuals to treat information objectively without any tendencies, propensities or aversions. The decisions involve the psychological processes that constantly show that people make them in a little rational way (Pinto, 2012).

In this context, the question arising from this research is: What is the judgment and decision-making capacity of accounting sciences students in solving issues involving international standards? Judgment studies generally focus on how people interpret and decide in situations of multiple, conflicting suggestions about different situations. On the other hand, decision-making involves choosing between several options (Hastie, 2001; Eysenck & Keane, 2007).

The purpose of this research is to evaluate the judgment and decision-making capacity of accounting sciences students in solving international standards issues. To achieve the general objective, two specific objectives were outlined: a) verify if students attending the subject of international accounting notions present a better performance in solving issues involving judgment and decision-making; b) investigate whether students more experienced in accounting have a better performance in solving issues involving judgment and decision-making. Given the characteristics of the study, we sought, through the development of the analysis, the association with classical decision-making heuristics: representativeness, availability, anchoring and adjustment

International accounting standards are present in many curricular components within the professional and theoretical-practical core of the bachelor of accounting sciences, due to the need to update the contents of the Accountant's education. However, the suggestion for inclusion of a discipline addressing the international accounting standards took place through the national curricular guidelines in CNE / CES Opinion no. 10/2004, in Art. 5. These suggested the relevance of including contents that covered "knowledge of the economic and financial, whether national and international, scenario, in order to provide harmonization of international accounting standards and rulings."

Despite of the fact it is not mandatory to offer the subject of International Accounting, as per Resolution issued in 2004, several Accounting sciences courses in Brazil included it in the curricular matrix. Niyama, Botelho, Correa & Santana (2008, p.114) point out that of the 888 Brazilian institutions observed, "286 (32.20%) are in the capitals of Brazilian states and, of these, 183 (20.61%) published their curriculum on Internet. However, in only 44 (24.04%)

curricula was found the subject of International Accounting or similar". However, it has been found that there is a symmetry in the number of International Accounting or similar disciplines in the Brazilian regions.

This study brings as contribution a behavioral approach related to international accounting standards and behavioral aspects involving judgment and decision-making with accounting sciences students. The empirical application of research related to the evaluation of the decision-making capacity is useful in the sense of aligning theory with professional practice.

2 JUDGEMENT AND DECISION-MAKING IN ACCOUNTING

Judgment and decision-making are present in many accounting situations. They involve the need to estimate, measure, recognize and establish criteria, such as depreciation, economic shelf life, recoverable value, among others. The success in the judgment of accounting facts regarding the process of measurement and recognition of information by accounting professionals depends on the level of knowledge about the subject, or on reliable bases for estimating or defining clear and objective criteria.

The relationship between accounting and behavioral theories has been discussed in international literature for about 50 years (Birnberg, Luft & Shield, 2007). Accounting research focused on economic change and market mechanisms is among the types mostly researched in the behavioral area (Birnberg, 2011). In the 1970s, the researches in the accounting area started using cognitive psychology theory to study how individuals subjectively use accounting information to make decisions (Kahneman & Tversky, 1979; Birnberg et al., 2007).

The basis of behavioral literature indicates that there are differences between judgment and decision-making. The decision-making, according to Eysenck and Keane (2007: 460), "involves problem-solving as individuals try to make the best choice from a range of options." While judgment is evaluated by the level of accuracy and can have indirect consequence through decisions made (Havey 2001 as quoted in Eysenck & Keane, 2007). In this sense, decision-making refers to the whole process of choosing a course of action (Hastie, 2001).

In the case of research on judgment and decision-making, there are three theoretical frameworks that provide the motivation for current and future research, according to Hastie (2001): (a) the traditional theory of expected utility, most prominently represented by Von Neumann and Morgenstern (1947), and the prospect theory by Kahneman and Tversky (1972), which focuses on choice and behavior on the decision-making process; (b) algebraic cognitive theories that addresses judgment and estimation; and (c) computational cognitive theories that address mind perception, inferential and mnemonic functions.

Decisions in general have a higher or lower level of complexity. According to Kaufmann (1981, p.14), "one of the least obvious factors that makes decision in human actions difficult is the complexity of the modern world." That is, "living among this complexity we are more or less conditioned to it, but our constraints begin when circumstances generate decisions whose consequences we consider important."

The decision is the "process that leads directly or indirectly to the choice of, at least, one of several alternatives, all of which are candidates to solve a certain problem" (Gomes, 2007, p.1). In the decision-making process, people are looking for simplified features that are better known as heuristics. The most frequent heuristics are: representativeness, availability & anchoring and adjustment. Matlin (2003) argues that heuristics are strategies that generally produce a right solution. Often, the human being fails to distinguish the limitations of these heuristics and sometimes fails to make the most reasonable decision. It employs previous experiences or even beliefs, to make decisions.

People also use heuristics to cope with limited rationality, simplifying the decision-making process (Dorow, Macedo Júnior, Nunes, Reina & Maximiniano, 2010). The representative heuristic, according to Kahneman and Tversky (1979) is often used when judging a sample as representative, if this is similar to the population for which it was selected. Marin (2009) point out that the heuristic of representativeness occurs when during the performance of a judgment an individual or an event there is a tendency to look for characteristics that correspond to representations previously experienced.

Regarding the availability heuristics, Sternberg (2010) stresses that most of us employ,

at least eventually, through judgments made based on the level of ease with which we can bring to memory those things we perceive as relevant situations of a phenomenon. For Marin (2009), this type of heuristic may have a very useful decision-making management strategy, since higher frequency events are usually also the mostly remembered ones.

The "heuristic of anchoring and adjustment relates to the availability by which people adjust their assessments through certain reference points called anchors of purpose" (Sternberg, 2010, p.440). Matlin (2003) points out that this heuristic usually leads to a reasonable answer, however, it often depends on the availability heuristics, once information available serves as an anchor. According to this theory, the decision makers start from a point until the adjustments in the final decision. The values serve as anchors and can be historical data, in the way the problem is exposed or random information, thus generating greater difficulty for the decision-making success (Bazerman, 2004).

For Robbins (2004, p. 128) the "individual makes decisions aimed to obtain the best results, this process is carried out in a rational way, because the objective is the maximization of values". While Bazerman (2004, pp. 3-5) points out that judgment is part of the "cognitive aspects of the decision-making process." The author suggests that for a rational model of decision-making, it is required to: 1) clearly delimit the problem; 2) have defined criteria; 3) accurately weigh all the criteria; 4) know the relevant alternatives; 5) accurately assess each alternative based on the defined criteria; 6) evaluate the alternatives and choose the ones with the highest perceived value.

The adherence to international accounting standards is not only an operational process, since some cultural concepts shall be modified. It is known that in Brazil, before the change to international standards, the standards were mostly based on the doctrine of Roman law (code law), that is, in rules, unlike IFRS, whose main characteristic is to be based on principles. Considering the nature of a principle-based accounting system, where general precepts that serve as a benchmark for professional judgment are established, the best way to evidence the economic essence of operations, the model is more appropriate where there is a customary legal tradition (Direito Comum) (Dantas, Niyama, Rodrigues & Mendes, 2010).

When the standardization is rule-oriented, there are rules for everything: if this happens, do that, if alternative a takes place, ask question b, if it is positive, do this, etc." (Martins Et al., 2007, p.10). And it is likely that the solutions are found from the meticulous reading of the rules. It is not necessary to create, the judgment is reduced to classifications that fits the accounting fact (Martins et al., 2007).

In the current rules, the information on judgment indicates that the entity should disclose, in the summary of significant accounting practices or explanatory notes, the judgments that involve estimates used in the process of applying the accounting practices and that have a more significant effect on the amounts recorded in the financial statements. The Basic Conceptual Pronouncement of the Accounting Pronouncements Committee (Pronunciamento Conceitual Básico do Comitê de Pronunciamentos Contábeis - CPC (CPC 00, item 86, p.24)) states that "in many cases, the cost or value must be estimated, the use of reasonable estimates is an essential part of the preparation of financial statements, and does not affect its reliability".

Studies involving the academic accounting sciences education and dealing with the judgment and decision-making capacity are considered rare in the scientific literature (Maia, 2012). The proofs of sufficiency test and technical qualification by the Federal Counsel of Accounting are structured in knowledge and calculation, judgment and memorization. However, in the first exam of sufficiency of 2012 and in the second of 2011, only 4 questions were considered to be related to judgment and, therefore, integrated the list of questions of the test (Maia, 2012). Given the current accounting standards, this subject should be part of new studies. Subsequently, some behavioral studies carried out in Brazil focused on accounting decision-making processes.

2.2 Behavioral studies in accounting decision-making processes

Humans are endowed with skills and intelligence that allow them to decide between several options. Some decisions do not have established rules, while others require the need

for judgment of the facts. Behavioral research involving decision-making is the target of several studies in Brazil.

Lima (2007) observed the behavior of users of accounting information in the form of presentation and demonstration of accounting reports and their influence on the decisions made by their users. The study was carried out through experiments with students from public and private institutions. The results confirmed the formulation effect in five of the six situations presented.

Cardoso and Oyadomari (2010) investigated the existence of functional attachment in the accounting information environment. In the Brazilian accounting environment, with the change in the accounting regulation, we estimate that information users may have a hard time with this type of effect, once past experience may impact their decision. The research was based on two experiments based on accounting situations, changed by Law 11638/07. A sample of 120 questionnaires applied between market professionals and students with or without experience was used. The results of the research confirmed the existence of functional attachment, as well as the non-influence of the professional experience in the decision process when comparing the professionals that work in the market and the students.

Macedo and Sources (2009) analyzed the impact of limited rationality in the decision-making process, under an accounting-financial analysis environment. To this end, a questionnaire was applied to 91 analysts, who were invited to make a decision or to express an opinion on the aspects addressed in each of the questions. The results show that, in general, the use of judgment heuristics, as well as of prospect theory, lead to biases, which deviate the choice of a purely rational alternative.

Silva and Gonçalves (2011) verified whether the pro-forma statement influences the user of the accounting information in the decision process. The data were collected through two types of questionnaires applied to a total of 355 Accounting sciences students. In the first type, only the financial statements based on the Fundamental Principles were informed; in the second type, the Proforma Statement was also informed. The results showed that the immobilization of equity has an impact on the results. But that, in general, the pro-forma statement does not significantly change the decision-making process by the user of the accounting information.

The decision-making process in the accounting environment, based on the Prospects Theory, demonstrates that decisions are based mainly on judgment, contributing to the awareness of the imperfections of judgments and decisions (Pinto, 2012). The survey was applied to accounting professionals. In the results, it was found that the questions involving certainty in the field of gains are the mostly searched among the respondents. It is possible to identify the presence of the Framing Effect. Regarding gender, we identify a greater impact of the Framing Effect in men than in women.

The Judgment and Decision-making (J&DM) capacity is also subject of studies in the area of education. Maia (2012) studied how J&DM has been taught in the Accounting sciences undergraduate courses, when the training of skills and abilities of professionals starts. Despite the approach of the subject by some IESs, the teaching of J&TD, given its relevance in the application of international accounting standards, is still not satisfactory. Xavier Filho, Dias, França, Silva and Vasconcelos (2015) analyzed the importance given to the accounting area by students of the Administration course. The research addressed the analysis of the relevance attributed through Judgment Influencers (IJ). They represent socioeconomic characteristics that may impact the judgment. However, even considering those influencers, no statistical difference was observed after the students had attended the subject. Another study, conducted by Moreira, Firmino, Santos, Silva and Silva (2015), investigated the uniformity of the quality in services performed by Brazilian auditing firms on Brazilian public companies, based on the adoption of CVM Deliberation 564/08. The results showed a lack of uniformity of the quality in independent auditors' report based on the adoption of the adjustment to present value.

3 RESEARCH METHOD

This section presents the research design and sample, as well as the contents of the questionnaire applied to the students hereunder, besides a brief context of the International

Accounting discipline in Brazil.

3.1 research design and sample

This research is characterized as exploratory survey with a quantitative approach. Creswell (2007, p.161) defines survey research as "a quantitative or numerical description of a population's trends, attitudes or opinions by studying a sample thereof." The quantitative approach was used to identify the percentages of right and wrong answers of the two groups of students determined by the study. The relationship of the answers to the heuristics represents general strategies that usually produce a correct solution.

The research population comprised 170 Accounting sciences undergraduate students who composed 4 different groups, one on each campus of the University. The sample is characterized as non-probabilistic and intentional, since it takes place in restricted universe, given that the participants were selected at the convenience of the researchers, which resulted in 102 academics. Of which, 5 were excluded because their questionnaires presented inconsistencies (failed to answer some of the questions, or provided more than one answer to the same question). Participants were divided into two groups. The first one corresponding to 50 students who attended the subject of international accounting notions in August and September, 2012, with questionnaire application on September 27 and 28, 2012. While the second group, of 47 students, attended the discipline in October and November, 2012, with questionnaire application on October 01 and 02, 2012. The data collection document was applied by the course coordinators on the dates mentioned.

The participant students are in the fourth year and have already had, during the course, in other accounting-related subjects, contents involving the international standards. At the moment of the research, 85% of the contents of the specific accounting core have already been studied. The choice of the subject is justified by the purpose of this research.

3.2 Contents of the survey questionnaire

The research instrument initially required answers to 3 closed questions for purposes of profiling (gender, age group and experience in the accounting area). Subsequently, in order to meet the goal, it requested the resolution and response to 6 questions identified as judgment in the study of Maia (2012) that, therefore, requires decision-making. All questions are included in the Federal Accounting Council's Sufficiency Examination and Technical Qualification tests. In Table 1, the content, foundation, regulation and origin of the questions (Technical Qualification Test - TEQ and Sufficiency Examination - ES).

Table1
Questions involving judgment

No. of the question	Content	Foundations (IAS e CPC)	Regulation (CFC)	Source of the question
01	Consolidated Statements - determining when to consolidate	IAS 27; CPC 36 (R1) (2009)	1.240/09 alt.; .273/10 e 1.351/11- NBC TG 36	EQT, 2010
02	Revenue recognition	IAS 18 CPC30 (2009)	1.187/09; NBC TG 30	EQT, 2010
03	Non-current assets held for sale and discontinued operations	IFRS 5 CPC 31 (2009)	1.188/09; NBC TG 31	EQT, 2010
04	Construction contracts - measurement	IAS 11 CPC 17 (2009)	1.171/09; NBC TG 17	EQT, 2010
05	IFRS for PMEs business combination – identification of the purchaser	IFRS for SMES CPC PME (R1)	1.255/09; 1.285/10 1.319/10;1329/11 NBC TG 1000	EQT, 2011
06	Public grant – recognition	IAS 20 CPC 07 (R1) (2010)	1.305/10 NBC TG 07	ES, 2012

Note. Source: own preparation based on Maia, K. I. C. (2012). *The teaching of judgment and decision-making in under-graduating accounting sciences in Brazil*. Masters dissertation. Brazilian School of Public Administration and Business - EBAPE - FGV. São Paulo, Brazil. Recovered on July 29, 2012, from

http://bibliotecadigital.fgv.br/dspace/handle/10438/9909 and the Federal Accounting Council (2012). Technical Qualification Test and Sufficiency Examination. Recovered on August 10, 2012, from http://www.portalcfc.org.br/coordenadorias/desenvolvimento_profissional/exames/exame_de_qualificacao_tecnica/

3.3 International Accounting Discipline

The discipline of International Accounting was inserted in the curricular matrix based on the suggestion of 'CNE / CES 10 Opinion of 2004 and integrated in the curricular matrix of the IES accounting course, which conducted this study in 2009, based on the need to offer content related to Harmonization of international accounting standards and regulations. The course is offered with 30 classroom hour in the eighth term of the course.

The amendment of the discipline in the pedagogical project provides the supply of contents related to the form of recognition and measurement that involves the international standards of accounting. However, it is worth noting that in this research we did not observe if the program contents indicated in the teaching agenda of professors teaching the mentioned subjects were related to the specific items of Table 1.

4 DESCRIPTION AND ANALYSIS OF RESULTS

In order to respond to the research problem, a questionnaire was applied to two groups of students, following the results of the study. First, the profile of the respondents.

4.1 Profile of respondent students

Regarding the gender and age range of students covered by the analysis, Table 2 presents the results.

Table 2
Gender and time of experience in accounting

Gender	Experience up to 1 year	%	Experience more than 1 year	%	No experience	%	Total	%
Female	13	68	35	76	25	78	73	75
Male	6	32	11	24	7	22	24	25
Total	19	100	46	100	32	100	97	100

Note. Source: research data.

It was found that the research sample is represented by 75% of female respondents and 25% of male respondents. With regards to the experience in the accounting area, 19 answered they had less than a year. From which, the majority are female. At the experience time, more than a year, 76% are also female. There is also a significant percentage of inexperienced academics, 32 students do not work in the accounting area, and attend the senior year. Table 3 shows the relationship between the age group and the time of experience of the participating students

Table 3
Relation between the age and experience time of student

Age group	Up to 1 year experience	%	More than 1 year experience	%	No experience	%	Total	%
Up to 20 years	3	16	2	4	4	13	9	9
From 21 to 25 years	15	79	31	67	21	66	67	69
From 26 to 30 years	0	0	9	20	5	16	14	14
Over 31 years	1	5	4	9	2	6	7	7
Total	19	100	46	100	32	100	97	100

Note. Source: research data.

Most students participating in the research are between 21 and 25 years old, corresponding to 69% of the sample. Of these, 67% indicated that they had more than one-year experience in the accounting area. The age groups that presented less observations in the sample were up to 20 years old and over 31 years old.

4.2 Analysis of research results

This section presents the results of the research, comparing the indexes of correct answers to the questions between the two groups. A group that had already attended (50 students) and another that had not attended (47 students) the subject of notions of international accounting. Matlin (2003, p.261) points out that "in decision-making, the judgment and the choice between different alternatives are at stake." That is, when faced with situations of uncertainty, deductive reasoning is used to seek the solution.

a) Consolidated Statements

Table 4 presents the first question with the answers alternatives, and Table 5 shows the percentages of correct and wrong answers. The wording of the question is structured based on CPC 36 (R1) (2009), which addresses the consolidated financial statements. The answer is letter D.

Table 4
First Question

Question	Answer Alternatives
In May 2009, the publicly traded company Brasília SA acquired a minority interest of 48% of the voting capital (32% of the share capital) of Luisiânia S.A. In September 2009, by virtue of a shareholders agreement execution, for the first time, in the invested company, Brasília SA took control over the management of Luisiânia S.A. On December 31, 2009, Brasília S.A. shall prepare consolidated financial statements. With respect to the subsidiary's income statement, what period shall be consolidated?	a) May to December, 2009. b) only from 2010. c) January to December, 2009. d) September to December, 2009.

Note. Source: Federal Accounting Council (2012). Technical Qualification Test and Sufficiency Examination. Recovered on August 10, 2012, fromhttp://www.portalcfc.org.br/coordenadorias/desenvolvimento_profissional/exames/exame_de_qualificacao_tecnica/

Note that a greater percentage of answers occurred in wrong alternatives, 70% in Group 1 and 51% in Group 2, according to table 5.

Table 5
Amount of correct and wrong answers in the first question

Groups	Correct	%	Wrong	%	Total		%
Group 1	15	30	35	70	50		100
Group 2	23	49	24	51	47		100

Note. Source: research data.

In this question, group 2, who did not study the subject of international accounting, obtained a higher number of successful answers, with 49%, and, therefore, the smallest amount of choice of wrong alternatives. The judgment occurred on the period of consolidation of the subsidiary's income statement. In the analysis of the data, most respondents were undecided between the answer of letter A (May to December, 2009) and letter D (September to December, 2009). In this case, a matter of judgment is perceived, where students interpreted and decided in situations of multiple suggestions with a high level of complexity related to the period of time of the object of consolidation. The anchorage and adjustment heuristic explains the errors when estimates are made on time intervals, given the degree of uncertainty of the question.

b) Revenue recognition

The second question addressed CPC 30 (2009), which addresses the Revenue Recognition. The revenue from the sale of assets shall be recognized when the following

conditions are met: a) the entity has transferred to the buyer the most-significant risks and benefits inherent to the ownership of assets; b) the entity does not maintain continuous involvement in the management of assets sold to a degree that would be normally associated to the ownership or effective control of such assets; c) the revenue value can be reliably measured; d) the economic benefits associated with the transaction are likely to flow to the entity; e) expenses incurred or to be incurred related to the transaction can be reliably measured (RES CFC 1187/09). Table 6 shows question 2 and Table 7 presents the students' answers thereto. The correct answer is the letter D.

Table 6
Second question

Question	Answer alternatives
2. The company Joinville SA, based in São Paulo, sold a machine for wood lamination for R$ 50,000.00 to the company Blumenau Ltda., headquartered in Mato Grosso do Sul. Billing took place on 5/2/2009; The issue of the machine occurred on 6/2/2009; and the delivery thereof occurred on 10/2/2009. The sales agreement provides that the company Joinville S.A. undertakes to install the machine in the company Blumenau Ltda., which requires two days of work. Finally, after a 30-day inspection and testing period, if everything happens according to the contract, the buyer shall issue a machine acceptance agreement, simultaneously releasing the payment of the obligation resulting from the purchase. According to NBC T 19.30 - Revenue, approved by CFC Resolution No. 1,187 / 09, the RIGHT opportunity for revenue recognition is:	a) at the time of issuance of the invoice, since at that moment the right to receive from the customer and the relevant clearance on inventories are recognized in the books. b) at the moment of issue of the goods, because at that moment the taxable event related to the Tax on the Circulation of Goods and Services (ICMS) takes place. c) at the moment of delivery of the goods to the customer, because at this moment the customer declares that he received the goods by signing on the Invoice stub. d) when the buyer accepts delivery, and the installation and inspection are completed.

Note. Source: Federal Accounting Council (2012). Technical Qualification Test and Sufficiency Examination. Recovered on August 10, 2012, from http://www.portalcfc.org.br/coordenadorias/desenvolvimento_profissional/exames/exame_de_qualificacao_tecnica/

The percentage of wrong answers in both groups was high, exceeding 70%. Group 1 had a higher rate of correct answers, with 24%, while group 2 had 19%, according to Table 7.

Table 7
Amount of correct and wrong answers in the second question

Groups	Correct	%	Wrong	%	Total	%
Group 1	12	24	38	76	50	100
Group 2	9	19	37	79	47	100

Note. Source: research data.

By analyzing the data, we observe that the highest amount of answers to this question were the answer of letter A (at the time of issuance of the invoice, since at that moment the right to receive from the customer and the relevant clearance on inventories are recognized in the books), indicating the general rule of revenue recognition. However, the correct answer is letter D (when the buyer accepts the delivery, and the installation and inspection are completed). Note that the judgment associated the heuristic of availability and anchoring and adjustment, namely, the degree of ease to bring to me memory what is perceived as relevant occurrences of a fact. The alternative provided in letter A addresses the normal procedure of sales of stocks, which is usually associated as an anchor in the reasoning of the question.

c) Non-current assets held for sale and discontinued operations

The next question refers to the non-current assets held for sale and discontinued operation - discontinued CPC 31 (2009). This standard aims to establish the accounting of non-current assets available for sale and the presentation and disclosure of discontinued operations. The criteria for classification of assets held for sale: a) measured by the lowest between the book value then recorded and the fair value less sales costs, and that the depreciation or amortization of these assets are ceased; b) separately presented in the balance

sheet and that the results of discontinued operations are separately presented in the income statement. Table 8 presents question 3 and the answer alternatives. Table 9 presents the students' responses thereto. The correct answer is the letter C.

Table 8
Third Question

Question	Answer Alternatives
One entity is reorganizing its activities into 3 industrial units due to a significant reduction in the demand for the products they produce. Units "X" and "Y" shall have their activities terminated until the end of the current year. Only one machine, in unit "Z", that corresponds to a production line shall be temporarily deactivated, being maintained and preserved to be reactivated when there is an increase in the demand for the products. In accordance with NBC T 19.28 - Non-current Assets Held for Sale and Discontinued Operations, choose the option that presents the CORRECT treatment considering the year-end discontinued operations.	a) Only the machine in Unit "Z" shall be considered discontinued operation. b) Units "X" and "Y" and the machine of unit "Z" shall be considered discontinued operations. c) Units "X" and "Y" shall be considered discontinued operations. d) Units "X" and "Y" shall not be considered discontinued operations. Since they shall be terminated only; and the machine of unit "Z" shall not be considered discontinued, since it can be reactivated when demand increases

Note. Source: Federal Accounting Council (2012). Technical Qualification Test and Sufficiency Examination. Recovered on August 10, 2012, from http://www.portalcfc.org.br/coordenadorias/desenvolvimento_profissional/exames/exame_de_qualificacao_tecnica/

In the third question, we notice a significant difference between the two Groups. Group 1 had a low percentage of correct answers, with only 12%, while Group 2 reached 43% of correct answers, according to Table 9.

Table 9
Amount of correct and wrong answers in the third question

Groups	Correct	%	Wrong	%	Total	%
Group 1	6	12	44	88	50	100
Group 2	20	43	27	57	47	100

Note. Source: research data.

By analyzing the answers, the judgment of the two Groups fell on the answer of letter D (Units "X" and "Y" shall not be considered discontinued operations. Since they shall be terminated only; and the machine of unit "Z" shall not be considered discontinued, since it can be reactivated when demand increases). The correct answer corresponds to the alternative of letter C (Units "X" and "Y" shall be considered discontinued operations).

The judgment on this question consisted of whether unit "Z" should be considered discontinued at the year-end. I.e., most respondents had no doubt that units X and Y were considered discontinued. We noticed the association of the heuristic anchorage and adjustment relating the availability by which people adjust their assessments by means of certain reference points called purpose anchors. Matlin (2003) points out that this theory can serve as an anchor, that decision-makers start from a initial point to the adjustments in final decision. However, there is a cognitive bias, mainly in Group 1, which shows a perceptual misrepresentation culminating in an imprecise judgment in solving the issue.

d) Measurement of construction contracts

Question 4 observed the CPC 17 (2009) addressing the measurement of Construction Contracts, which recommends that the contract revenue should include: (a) the initial amount of revenue in the contract and (b) variations in the contracted labor, claims and incentive payments. The judgment involves an environment of uncertainty and assessment of the contractual revenue estimate. Table 10 shows the question and answer alternatives. Table 11 shows the results. The correct answer is the letter A.

Table 10
Fourth question

Question	Answer Alternatives
NBCT 19.21 – Construction Contracts states that contract revenue is measured by the fair value of the consideration received or receivable. The measurement of contract revenue can be affected by uncertainties that depend on the outcome of future events. Estimates often need to be revised, as events occur and uncertainties are resolved. Therefore, the amount of contractual revenue may increase or decrease from one period to the other. Choose the option that shows the CORRECT example of this type of event.	a) Contracting party and contracted party may agree upon variations or claims that increase or decrease the contract revenue in a period subsequent to that in which the agreement was initially agreed upon. b) The amount of expenditure estimated in fixed price contracts may increase as a result of cost increase clauses. c) The amount of contract revenue may decrease as a result of penalties arising from delays attributable to third parties. d) When the fixed price contract is related to the completion of each unit, the contract revenue remains fixed proportionally to the units completed.

Note. Source: Federal Accounting Council (2012). Technical Qualification Test and Sufficiency Examination. Recovered on August 10, 2012, from http://www.portalcfc.org.br/coordenadorias/desenvolvimento_profissional/exames/exame_de_qualificacao_tecnica/

In question 4, there is greater alignment in the responses of the two Groups. The question indicates that the measurement of contract revenue can be affected by uncertainties that depend on the outcome of future events, as shown in Table 11.

Table 11
Amount of correct and wrong answers in the third question

Groups	Correct	%	Wrong	%	Total	%
Group 1	19	38	31	62	50	100
Group 2	18	38	29	62	47	100

Note. Source: research data.

The wording of the question indicates the time factor as a conflict and evaluation point. By analyzing the answers, we found that the doubt in the students' thinking was between alternative A (Contracting party and contracted party may agree upon variations or claims that increase or decrease the contract revenue in a period subsequent to that in which the agreement was initially agreed upon) and letter D (when the fixed price contract is related to the completion of each unit, the contract revenue remains fixed proportionally to the units completed).

The association of the proportional recognition of the contract revenue with alternative D may indicate a relation to the information familiarity and availability. Matlin (2003) points out that if the problem requires so you remember examples. In this case, it was framed in situations that represent the heuristics of availability.

e) Business combination - identification of the purchaser - IFRS for PMEs

Question 5 questioned the IFRS for PMEs - Business combination - identification of the purchaser. According to NBC TG 1000, a purchaser shall be identified in all business combinations. The purchaser is the combined entity that takes control of other entities. Table 12 shows the question and Table 13 the answers. The correct answer is the letter D.

Table 12
Fifth Question

Question	Answer Alternatives
According to NBC TG 1000 - Accounting for Small and Midsize enterprises (PMEs), a purchaser shall be identified in all business combinations. Although sometimes the identification of the purchaser may be difficult, there are usually indications of its existence. Choose the option that	a) If the fair value of one of the combined entities is significantly greater than the fair value of the other combined entity, the entity with the highest fair value is likely to be the purchaser. b) If the business combination is effected through exchange of ordinary equity securities with voting rights in cash or other assets, the entity that is rendering cash or other assets is probably the purchaser. c) If the business combination results in the management of one of the combined entities, being able to control the selection of the management board of the resulting combined entity, the entity whose management is able to control is probably the purchaser.

does NOT indicate the existence of a buyer.	d) If the equity value of one of the combined entities is significantly higher than the equity value of the other combined entity, the entity with the highest equity value is likely to be the purchaser.

Note. Source: Federal Accounting Council (2012). Technical Qualification Test and Sufficiency Examination. Recovered on August 10, 2012, from http://www.portalcfc.org.br/coordenadorias/desenvolvimento_profissional/exames/exame_de_qualificacao_tecnica/

In the fifth question, the disagreement between Groups was bigger, as well as between the answer alternatives. Group 1 had the lowest percentage of correct answers, with 18%, while Group 2 had a better rate, with 36%. Most of the wrong answers occurred in the alternatives of letters B and C, while the correct answer was letter D, as shown in Table 13.

Table13
Amount of correct and wrong answers in the third question

Groups	Correct	%	Wrong	%	Total	%
Group 1	9	18	41	82	50	100
Group 2	17	36	30	64	47	100

Note. Source: research data.

The analysis presented in the wording of the question highlights the need for judgment in the alternatives proposed by mentioning the non-indication of a purchaser. Noted that the other three alternatives (A, B and C) are part of NBC TG 1000 (item 19.10). It is assumed that most respondents were unaware of the ways that the acquirer is identified as determined by the specific standard. When the heuristics of availability is contaminated by factors such as unawareness of contents, it leads to incorrect decisions in solving an event.

f) Revenue from Public Grant

The last question covered the CPC 07 (2010), which addresses the recognition of revenue originated from Public Grant. Item 12 addresses the accounting: "A public grant shall be recognized as revenue over the period against the expenses intended to compensation, on a systematic basis, provided that the conditions for the Pronouncement are met. The public grant can not be credited directly to the equity." Table 14 shows the question and answers. Table 15 shows the answers. The correct answer is the letter C.

Table 14
Sixth Question

Question	Answer Alternatives
A business company received a public grant aimed to offset costs with hiring, training and maintaining a minimum number of employees during the first three years of operation. The grant was received through deposit in a freely available current account upon the signature of protocol with the state government. According to NBC TG 07 – Public Grant and Assistance, the amount received by the company shall be:	a) immediately recognized in the Equity, under Tax Incentive Reserve account. b) immediately recognized in the income for the period and, once the result has been recorded, registered under Tax Incentive Reserve account. c) recorded in the liabilities and recognized as income during the period and against the expenses intended to compensation, on a systematic basis. d) recorded in equity and recognized as income at the end of the period in which the expenses intended to compensation shall occur, and on a systematic basis.

Note. Source: Federal Accounting Council (2012). Technical Qualification Test and Sufficiency Examination. Recovered on August 10, 2012, from http://www.portalcfc.org.br/coordenadorias/desenvolvimento_profissional/exames/exame_de_qualificacao_tecnica/

By analyzing the answers of question 6 there was no consensus among the respondents in Group 1, i.e., we found that all alternatives were proportionally chosen, while in Group 2, the mostly chosen alternative was the option of the letter A (immediately recognized in the Equity, under Tax Incentive Reserve account), according to Table 15.

Table 15
Amount of correct and wrong answers in the third question

Groups	Correct	%	Wrong	%	Total	%
Group 1	13	26	37	74	50	100
Group 2	14	30	33	70	47	100

Note. Source: research data.

The correct answer to question 6 is letter C (recorded in the liabilities and recognized as income during the period and against the expenses intended to compensation, on a systematic basis). The public grant measurement basis occurs upon the receipt of the amounts deposited in the company's current account. In this case, the judgment relies in the recognition of the entity's balance sheet and income statement. The form of recognition and registration of the public grant was the main point of judgment of the question.

The table below provides the total of correct answers to questions 1 to 6 related to the time of experience of participants.

Table 16
Comparative table of students with and without experience in accounting

Question	Content	Total Correct Answers	%	Less than 1 year experience	%	More than 1 year experience	%	SEC	%
1	Consolidated Statements	38	39	5	27	22	48	11	34
2	Revenue Recognition	21	22	3	16	13	28	5	16
3	Discontinued Operations	26	27	5	26	14	30	7	22
4	Measurement of Construction Contracts	37	38	7	37	17	37	13	41
5	identification of the purchaser - IFRS for PMEs	28	29	6	32	15	33	7	22
6	Recognition of Public Grant	27	28	2	11	19	41	6	19
	Average	30	30	5	25	17	36	8	26

Note. SEC – No accounting Experience.
Source: research data.

Table 9 shows an average of 30% of correct answers to the six questions by the two Groups. The question with the highest percentage of correct answers was question 1, with 39%, and question 4, with 38%, which address the consolidation of the financial statements and the measurement of construction contracts, respectively. In the first question, the object of judgment consisted of the recognition period and, in question four, the measurement of contract revenue that occurs in an uncertainty environment. The second question presented the lowest percentage of correct answers for the two Groups. It addresses the revenue recognition period, which corresponds to 22% (CPC 30, 2009).

Comparing the students with and without experience in accounting (SEC), we observe that students with more than 1 year experience in accounting had an average percentage of 36%, while those with no accounting experience (SEC) had an average of 26%, which represents a difference of 10%. The comparison between students with more than 1-year experience and students with less than 1-year experience is similar to the previous result, namely, 11% higher. The results provide evidence that the experience in the accounting area is a relevant factor for decision-making. Cardoso and Oyadomari (2010, p. 1) emphasize that the intention "is not to prove that this fact decisively determine that the professional experience affect the decision of the individual, but to demonstrate that this type of analysis can be carried out in depth in future Studies in the area of behavioral accounting ".

5 CONCLUSION

This article aimed to evaluate the judgment and decision-making capacity of accounting sciences students in solving questions related to international accounting standards. The study conducted a survey research, classifying students into two Groups: Group 1, who attended the course, and Group 2, who had not attended the course of Notions of International Accounting. Six questions requiring the judgment of students were selected from the Federal Accounting Council (2010, 2011 and 2012). According to the characteristics of the study, we sought the association with classical decision-making heuristics: representativeness, availability, anchoring and adjustment.

The study outlined two specific objectives. The first was to assess whether the students attending the course of international accounting perform better in questions involving judgment and decision-making on international standards. We found that the performance of the students was not better after attending said subject. Group 1, who had attended the course, performed better than Group 2, which had not attended the course, only in two out of the six questions proposed. The Course of International Accounting Notions has a workload of only 30 classroom hours, which may be a limitation to the results found hereunder.

With regards to the second objective, i.e., to investigate whether students with more than 1-year experience in the accounting area perform better in questions involving judgment and decision-making, we found that students with more than 1-year experience obtained indeed a higher percentage of correct answers, if compared to those with less than 1-year or no experience in accounting (SEC), in line with the results verified by Cardoso and Oyadomari (2010).

In matters involving judgment and decision-making, it is common to use deductive reasoning to solve questions presenting ambiguous answers or lack of information (Matlin, 2003). By analyzing the heuristics that involve judgment and decision-making, we found a greater use of the heuristics of availability and anchoring and adjustment in the analyzed questions. In a general overview, the average percentage of correct answers in the six questions was considered relatively low, corresponding to 30%. However, it does not invalidate the results, instead, it draws attention to the limited degree of rationality in decision-making. Moreover, worth mentioning that cognitive bias can be triggered by the use of heuristics, which was also observed by Macedo and Sources (2009).

From a general analysis (combining the correct answers of both groups), we found that question 1, which addresses the consolidation of financial statements, and question 4, regarding the measurement of construction contracts, had a better performance (≥ 38%), while question 2, which addresses the revenue recognition, had the worst performance, of 22%. The remaining questions 3, 5 and 6, addressing the discontinued operation, the identification of the IFRS acquirer for SMEs and the recognition of public grant revenue, respectively, had an average performance of 28%.

The information hereof cannot be generalized, since this is a research predominantly quantitative applied only to one IES, but, like other researches of similar nature, its findings demonstrate relevant points that reinforce the judgment and decision-making capacity as ability of the Accountant. Other limitations relate to the application of the research to students who did not attend the course of international accounting. The contents covered in the questions may not have been object of study in the course of international accounting or other curricular components. We understand that more studies are necessary for further deepening the topic. The investigation of students from other higher education institutions is recommended, to make it possible the comparison of the results. We understand that there may be different results if research is conducted with students from other regions and institutions.

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ASSET PRODUCTIVITY ASSESSMENT: A CASE STUDY IN A DISPOSABLE PRODUCT FACTORY

RODNEY WERNKE
Counter PhD in Production Engineering/UFSC. Professor at the PPGCCA/UNOCHAPECÓ and at the Business Administration Course/UNISUL. ***Address:*** *Av. José Acácio Moreira, 787, Dehon | Tubarão/SC | Brazil.*
E-mail: *rodneywernke1@hotmail.com*

IVONE JUNGES
Economist. PhD in Production Engineering/UFSC. Professor at the Business Administration Course/UNISUL. ***Address:*** *Av. José Acácio Moreira, 787, Dehon | Tubarão/SC | Brazil.*
E-mail: *ivone.junges@unisul.br*

LIA SCHLICKMANN
Undergraduate degree in Business Administration/UNISUL. ***Address:*** *Av. José Acácio Moreira, 787, Dehon | Tubarão/SC | Brazil.*
E-mail: *lia_schlickmann@hotmail.com*

ABSTRACT

This article reports a case study on the comparative measurement of factory assets' productivity of a disposable plastic products' factory within four indicators: ROI (Return on Investments), ROA (Return on Assets), EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization) and EVA (Economic Value Added). It was intended to answer a question related to the evolution trend of these indicators in the context of the company researched during the second half of 2014. Thus, the inherent concepts to the mentioned analysis parameters are initially disclosed. After that, the methodological aspects of the case study (descriptive and qualitative) are discussed. Then, the steps taken to calculate the above indicators are described. Finally, the results obtained are presented and discussed. It was concluded that the trend was inadequate on the productivity of assets, because the values obtained indicate low productivity of the used assets. Furthermore, it was found a divergent evolutionary trajectory of the measured parameters, indicating conflicting scenarios among them. At the end of this study, some limitations were highlighted and the conclusions of the study are mentioned.

Keywords: *Productivity of assets. Comparative. Disposable Factory.*

1 INTRODUCTION

Assessing the company's performance based on the profit earned in a given period can lead managers and shareholders to the wrong conclusions. Especially in those companies that use large amounts of assets, the value of the profit may not reflect whether the result generated was consistent with the economic potential of the company or not. In this regard, Anthony and Govindarajan (2002, 320) point out that "the emphasis on profits, without considering the assets employed to generate them, is an inadequate principle of control" in companies that operate in asset-intensive sectors. Therefore, managers should be concerned with measuring the assets'

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productivity and extract from this assessment subsidies to select initiatives that maximize investor wealth.

This context of high investment in assets is also identifiable in industrial ventures, due to the need for investments in fixed assets (machines, buildings, etc.) and in current assets (inventories and financing of sales in the long term) to support the manufacturing activities and commercialization. As a result, it would be up to the manager to assess the adequacy of the assets' productivity that he manages by means of accounting metrics such as ROI, ROA, EVA and EBITDA. However, even if they can be used for this purpose, this study proclaims the assumption that these four indicators may present conflicting results with each other or have different evolutionary trajectories over a period in a given company. This is problematic since one indicator may reveal one promising situation and another may show unfavorable trajectory. And this was the reason for the investigation of this possibility within a large industrial company, in which managers focused exclusively on the performance measured by EBITDA and the other indicators were not measured.

In order to clarify this doubt, this research aimed to answer the following question: was the evolution of the ROI, ROA, EVA and EBITDA indicators during the second half of 2014 similar or divergent in the context of a plastic disposable products factory? In order to obtain the answer it was established as aim to measure the performance of the company surveyed through the four accounting indices cited.

The main aspect that justifies this comparative approach is that in the company studied, EBITDA was used as the main metric for the assessment of the operational performance, besides serving as a single parameter to establish the variable remuneration of the managers. This procedure is in line with the one mentioned by Kraus and Lind (2010), among others, that EBITDA has been used to manage companies, estimate the value of ventures and serve as a basis for the payment of bonuses to executives, among other applications. However, Tortella and Brusco (2003) and Bassan and Martins (2014), among others, record that EVA has also been used to measure companies' performance, analyze results and determine the value of variable compensation of managers.

Thus, within the industry in question, these similar utilities between the mentioned indicators can raise doubts about the pertinence (or not) of the parameter to be prioritized in order to assess the operational performance and to base the calculation of the employees' annual bonus. For example, if the developments (or trends) of these indicators diverge (in a favorable and unfavorable indicators), or if the scenarios resulting from these forms of assessment are conflicting (positive versus negative), perhaps executives' remuneration is tied to that of leads to the path that does not allow to fully optimize the funds available in the organization. In addition, even if this study is confined to a specific company (i.e., it is a case study), it was considered that this research gap deserves to be explored with attention, since the same doubt may be present in other companies that use EBITDA as an indicator of performance and/or link it to employee compensation.

To this end, a bibliographic review was initially carried out, addressing the main concepts essential to understanding the subject. Subsequently, after mentioning the organization studied, the following steps are described to assess performance based on the selected indicators and the management information obtained are discussed. Finally, some limitations related to the methodology used are discussed and the conclusions are presented.

2 REVIEW OF THE LITERATURE

The comprehension of this study involves the understanding of the motivations to carry out the assessment of the assets' productivity and the knowledge of the indicators used, as evidenced below.

2.1 Reasons to prioritize assets' productivity

Drucker (2004) comments that companies' managers are paid to create wealth rather than control costs. In this direction, the companies need to be directed as living organisms, as entities in continuity, whose objective is the creation of wealth. To this end, administrators need

information that will enable them to exercise appropriate judgment about the productivity of the funds used.

Anthony and Govindarajan (2002) argue that the purpose of assessing asset's productivity is to provide useful information for making decisions about the assets used and to motivate executives to make the right decisions and to evaluate the performance of a company's units. They also highlight that, except in some types of service provider organizations, in which the capital used is irrelevant, the essential aim of profit-oriented companies is to achieve a satisfactory return on capital invested. Thus, in order for the manager to assess the performance relative to the profit obtained by the company in relation to the result achieved by the competitors (or other divisions of the organization itself), it is necessary to consider the volume of the assets used.

In addition, a study by management consulting company A. T. Kearney (2002, p.90) cites that "asset's productivity is the way to identify the efficiency with which the company transforms asset's investments into sales and profits. The reasons for worrying about this issue are as diverse as the results that increased productivity is capable of generating."

Thus, the mentioned research shows that the main reasons to be considered are:

a) Generation of shareholder value: research with companies in the asset intensive sectors detected a strong correlation between the total return to the shareholder and the assets' productivity. This correlation was initially evident in a consumer goods company that carried out an asset productivity increase program, reduced operating costs by 12%, increased factory capacity by 20%, reduced fixed assets by 10%, and postponed capital investments of $150 million.
b) Boosting profitable growth: companies that focus on maximizing productivity of existing assets achieve growth in profit and share value. The focus on asset's productivity, which also increases overall productivity, ensures that capital investments are done efficiently.
c) To identify and promote synergies in mergers: merging companies can use a program to increase the assets' productivity to extract synergistic benefits that allow identifying and eliminating overlaps between partners.
d) To promote cost leadership: measuring asset productivity can be used to promote cost leadership, because companies that spend poorly are the main candidates for productivity gains. When they eliminate unproductive assets and extract higher levels of productivity from the others, they reduce both fixed costs and variable costs.

2.2 Financial indicators used

Even if we consider that financial aspects that are responsible for the performance of a company (Bortoluzzi, Ensslin & Ensslin, 2011, Skrinjar, Bosilj-Vuksic & Indihar-Stemberger, 2008), in this study, only financial indicators were prioritized in order not to expand the focus too much.

In this direction, Casarotto Filho (2002) argues that by crossing information on the balance sheet with the performance of the period (it was verified in the income statement) it is possible to obtain disparate indicators of productivity of asset accounts, aiming to optimize the performance of the funds used.

To that end, Anthony and Govindarajan (2002) record that in deciding the investment base to be used in performance assessment, two questions should be asked: (1) what are the practices induce unit executives to use their assets efficiently and to acquire the correct volume of new assets? (2) what are the best procedures to assess the performance of the unit as an economic entity? Such authors understand that when the company's profit (or unit) is correlated with the assets used, executives strive to improve their performance in this respect, and senior management wants their decisions to be made in the best interests of the company.

In addition, A. Kearney's (2002) survey mentions that there are three ways of measuring the productivity of a company's fixed assets:

1) To confront sales with the amount made up of equity, facilities and equipment in net terms (PP & E net), that is, depreciation is already discounted. This measure, better known as net capital, is used by companies to examine the productivity of competitors and to estimate their performance. By this form of assessment, we get the answer to the

question: how many dollars in assets are needed for every dollar obtained from the sale of a product? However, there is a setback for this measure: although it may identify a problem, it does not provide clarification about exactly "what" it is.

2) To examine the returns of the company: it is to assess the relation between the net profit and the PP & E Liquids. This calculation reveals what types of income the company is getting for money invested in assets.
3) To measure the return on Assets (ROA) is also a measure applicable to fixed assets.

From the aforementioned paragraphs, the indicators described in the sequence were used in this research.

As for ROI (Return on Investments), Kassai, Kassai, Santos and Assaf Neto (2000, p. 174) assert that this index is the "simplest expression of the measure of return on investment", is a rate determined from data accounting. For this purpose, an equation is used in which the result of the period is divided by the value of the investment. That is, "the operating profit comes only from the normal activities of a company, excluding the amount of financial charges." On the other hand, the value to be considered as investments is the amount equivalent to the net asset, which is given by "total assets minus operating liabilities (suppliers, taxes, salaries, dividends, accounts payable, etc.)."

Regarding the adoption of ROI as a parameter of assessment of the return of invested funds, favorable opinions are found regarding this. Warren, Reeve, and Fess (2001, 277) mention that ROI is useful for measuring return on investment because it involves factors such as revenues, expenses, and invested assets controllable by the managers of each company division. Thus, "by measuring the profitability relative to the sum of the assets invested in each division, the rate of return on investment can be used to compare divisions. The higher the rate of return on investment, the better the division's performance in using its assets to generate profit."

Horngren, Foster and Datar (1999) report that the analysis of ROI components may indicate that this performance measure can be improved by increasing revenues or decreasing costs or decreasing investments. They assert that ROI can often offer better performance subsidies when analyzing the components in which it originates.

However, the ROI has aspects that can be considered unfavorable to its use. Lopo, Brito, Silva and Martins (2001, p. 241) note that the ROI brings with it the limitations arising from legally required accounting criteria (such as inventory valuation method, depreciation method used or accounting for expenses with Research and Development as the period expenses or capitalization for subsequent amortizations) and it is influenced by the age of the assets, since "companies with older permanent assets, especially when the effects of inflation are ignored, may present more favorable indicators." Such authors argue, however, that the main disadvantage of this indicator is that ROI "ignores the company's financing policy. Therefore, it disregards the influence of the capital structure in balancing risks and returns, aspect that affects the share price".

In relation to the ROA (Return on Assets), Young and O'Byrne (2003, p.239) note that it is "a particularly interesting approach as it involves a progressive breakdown of ROA and produces important insights" on sources of wealth generation. They point out that ROA is a measure of operating profitability, since the numerator (the net operating profit after tax, also known as NOPAT - Net Operating Profit After Tax) measures what would be the company's profit if all its assets had been financed with investor capital. Thus, the NOPAT, "neutralizes the influence of the financing of the assets on the profit. In that sense, it measures the profitability of the company's net assets, regardless of how they are financed".

As to the importance that can be attributed to the detailed knowledge of these two factors, Padoveze and Benedicto (2004, p 104) attest that, if "margin" is the fundamental element to obtain profitability, the way to achieve it is the "turnover". The authors also state that the word "turnover" symbolizes the productivity of the investment realized, represented by the speed with which the assets are operationalized, and are able to transform the inputs into sales. That is, "since total assets represent investments in the company, the more sales it makes, the more productive the company's assets are. The more a company manages to bill with the same investment value, the more likely it is to make a profit'". Thus, the greater the turnover obtained,

the greater the opportunity to reduce the profit margin in the sale of the products, leading to a greater competitiveness due to the lower prices that can be practiced.

According to Schmidt, Santos and Martins (2014), EVA (Economic Value Added) is a financial management system that measures the return that own and third party equity bring to their owners. It measures the difference between the return on capital invested in a company and the cost of that capital. Bruni (2013) reports that the EVA proposes an adjustment in the calculation of net income, incorporating the opportunity cost of equity capital. Thus, broadly, the EVA can be presented as net profit deducted the opportunity cost of equity. This parameter prioritizes "value generation", which, for Padoveze (2013), exists when the corporate profit is equal to or higher than its cost of capital (or opportunity cost). Therefore, creating value for the shareholder happens when the company gets the desired profitability, or more. When the company in a given year cannot achieve the desired profitability, it is understood that there is destruction of value.

As for the calculation of this indicator, Young and O'Byrne (2003) understand that EVA is equal to NOPAT minus the cost of equity capital. In the case of Net Operating Profit After Tax (NOPAT), it should be considered as the operating profit of the company, already deducted income tax, which represents how much the current operations of the company generated profit. About the cost factor of capital emphasize that it is equal to the invested capital of the company (also called capital or capital used) times the weighted average cost of capital. The weighted average cost of capital is known as WACC (Weighted Average Cost of Capital). It is equal to the sum of the costs of each capital component - short- and long-term debt and shareholders' equity - weighted by its percentage share, at market value, in the capital structure of the company. These authors also assert that the capital invested is the sum of all the company's financings, separated from short-term non-onerous liabilities (such as suppliers, salaries and miscellaneous provisions). That is, the capital invested is equal to the sum of the net equity that belongs to the investor with the short and long-term loans and financing belonging to creditors.

Young and O'Byrne (2003) also report that invested capital is deducted from short-term liabilities other than current assets (ie all current assets, except cash). Although almost all liabilities are to some degree onerous (if it were not so the company's creditors, assuming competitive market, they would break), separating the interest component from certain accounts as suppliers rarely justifies the effort. In addition, the entire cost of goods and services purchased from suppliers, including interest portion, is reflected either in the cost of goods and services sold, or in general, administrative and sales expenses. Consequently, the company is charged, although indirectly, for such financial costs. When the return generated by the use of "net" assets (ie the sum of cash, working capital needs and fixed assets) exceeds the cost of invested capital, EVA is positive. The return on net assets (RONA - Return On Net Assets) is calculated as follows: RONA = NOPAT / Net Assets. When the RONA is greater than the WACC, the EVA will be positive. Otherwise it will be negative. This is because: EVA = (RONA - WACC) x Invested Capital.

It should be noted that in the literature other possibilities of calculating EVA can be found, such as those cited by Kassai *et al.* (2000), Ehrbar (1999), Copeland, Koller and Murrin (2000), Stewart (2005), among others. It is important to note that the researches of Martins and Martins (2015), Keef, Khaled and Roush (2012), Miller (2009), Pierru (2009) and Bade (2009) describe limitations related to the use of this concept in certain situations.

In terms of the informational benefits provided, Wernke, Maia and Lembeck (2013) mention that EVA has the capacity to provide a way to assess the performance of the entity that takes into account the company's capital structure and its remuneration rates. Thus, it can be considered an adequate indicator to show the performance of the managers in the use of the capital made available by the investors and/or raised with the banking institutions. In addition, it is able to provide a comprehensive view on the appropriateness of funds invested in assets and on the impact of funding rates on the main sources of funds. Stewart (2005) argues that the most important advantage of EVA is that it is the only measure of performance that connects directly to the intrinsic market value of a company. In view of this, this is the measure that the author recommends for the definition of goals, for the allocation of capital, for the assessment of performances, for bonus plans and for communication with the big investors.

On the other hand, Regis, Santos and Santos (2010) attribute to the EVA some limitations, highlighting that (*i*) it may lead to a restriction on the company's growth, given that the expectation of rapid results may prevent interest in larger projects; (*ii*) it may imply difficulties in obtaining loans from financial institutions, since the EVA calculation highlights the remuneration of third-party capital and the more indebted the company is, the greater the attributable risk, and (*iii*) such indicator gives an exaggerated emphasis on the generation of profits, it is applicable only to companies governed by economic purposes.

Martins, Diniz and Miranda (2012) commented that in addition to being dependent on accounting criteria and therefore bearing the same problems of standards, accounting models, lack of monetary correction and others, it does not take into account the market value of Net Equity for its calculation. This is perhaps the biggest failure in your application because, when calculated on the book values, you are also calculating the value added in relation to the capital invested in the company, and therefore does not represent the economic value added to the current investor.

Kumar (2013) compared the EVA with accounting measures (such as Net Income, Net Operating Profit after Income Tax, Cash Flow from Operations and Earnings per Share) in 23 industries in India during the years 2000 to 2009. He found, that the EVA could not be considered superior to the mentioned indicators in terms of evidencing the reasons that generated higher aggregate market value (MVA).

As for the EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization), this corresponds, according to the Alcade (2010)'s understanding, to the cash generated by the genuinely operational assets, since profit before interest (assets or liabilities), taxes on profit and before depreciation, amortization, corresponds to the cash potential that a company's operating asset is capable of producing, before including the cost of any capital. Thus, EBITDA does not correspond to the cash flow generated physically, since, in general, sales are not received in cash and expenses also are not. It represents the cash produced by the assets, before computing the financial income and expenses and after receiving all the revenues and payment of all expenses.

Colombo, Hoffmann, Platt Neto and Bolfe (2014) report that EBITDA is an indicator released by companies worldwide, in addition to being frequently cited among analysts for showing the profitability of the business. As EBITDA was not mandatory in the financial statements, it remained devoid of legal regulations regulating its calculation and disclosure until 2012. Therefore, Instruction no. 527 of the Brazilian Securities and Exchange Commission (CVM) was published in order to govern, in Brazil, the voluntary publication by the listed companies of this statement.

As for the benefits from this indicator, Alcalde (2010) lists the following aspects:

a) Easiness to obtain, as some adjustments in the traditionally published accounting result are sufficient.
b) It allows comparing companies, of the same sector or not, since it tries to exclude the effects of fund raising for commercial activity and strictly accounting decisions (such as depreciation, amortization or exhaustion criteria used). As a result, it would standardize results from disparate contexts and make it possible to compare the efficiency or productivity of different entities.
c) Especially for analysts outside the company, EBITDA may be a shorter way to estimate the company's possible cash generation and compare it to its indebtedness. That is, to measure the degree of commitment of cash generation with the payment of creditors.

However, White, Sondhi and Fried (1997), Eastman (1997), Stumpp (2000), King (2001), Szuster, Cardoso, Szuster, Szuster and Szuster (2008) and Martins et al. (2012) listed some unfavorable points associated to EBITDA, among which are the following aspects:

1) The use of this indicator is not recommended for companies that use assets with a short useful life or that lack equipment whose technologies need to be constantly updated or replaced.
2) In the case of ventures that usually finance the acquisition of fixed assets in financial institutions (as is the case of the company cited in the case study of this research), disregarding the interest of these credit operations as "operational" tends to be

problematic. By making this exclusion in the EBITDA statement, an expressive increase in the result is generated, even if such financial expenses are part of the daily life of this type of business.

3) The strong dissemination of this indicator is more related to the attempt to assess companies for the purpose of acquisition, associating their value with a "multiple". However, business in distinct or disparate industries should never be compared as simply as this. That is, it is a mistake to claim the value of a company selling based on a multiplier "x" on its sales (in monetary value or in physical quantities).
4) The EBITDA result can be strongly influenced by accounting policies related to postponing/anticipating the date of recognition of expenses / revenues or accounting for assets (write-offs and depreciation, for example). As a result, the manager may be attempted to "improve" the value of this parameter to get a better picture of the company to the market or investors or to increase its performance bonus (if linked to EBITDA).
5) Another aspect that contributes to the use by financial analysts is the "impression" that the result corresponds to "cash generation". However, EBITDA does not equate to the company's probable free cash flow, because it does not consider the reinvestment needs that are usually mandatory in most commercial ventures.

2.3 Previous research

As for studies with approaches similar to the one applied in this article, queries were made to the Scopus, Science Direct and Capes Journals Portal databases. From the keywords "ROI" ("Return on Investments"), "ROA" ("Return on Assets") "EVA" (or "Economic Value Added") and "EBITDA" (or the description of that acronym) researches have brought 30 texts that addressed these terms when using "Advanced Search" with "and" between them. Only four studies (Mendéz, 2007; Hong, 2010; Hazarika, 2014; Wernke, Junges & Schlickmann, 2015) reported the joint measurement of indicators.

The first study investigated whether EBITDA could be considered a value aggregation metric. For this purpose, it used a sample of 23 Chilean companies whose annual performances were measured in terms of EVA, EBITDA and EBITDA Margin in the period 2000/2004. In the comparison between these two indicators, the researcher concluded that there is a certain relationship between these in most of the 23 companies surveyed, but that in seven of them, this did not occur. Thus, he recommended parsimony in this respect and suggested new research with this approach (Mendéz, 2007).

The second article studied a group of Korean companies from various sectors to investigate the relationship between knowledge assets (employees, structural assets and marketing resources) and metrics such as EVA, EBITDA, MVA (Market Value Added) and stock price. They concluded that there was a more significant relationship between the performance of these indicators and the knowledge assets in non-manufacturing companies and a less relevant link in manufacturing companies (Hong, 2010).

The third study analyzed the relationship between EVA, MVA, EBITDA and Capital Invested in telecommunications companies traded in the Dubai (United Arab Emirates) stock market between 2008 and 2013. The author concluded that there was significant relationship between EVA and MVA only (Hazarika, 2014).

The fourth study compared the evolution of EVA and EBITDA in a Brazilian manufacturing company, month by month, in 2014. The authors concluded that the two indicators presented divergent evolution and conflicting results in that context searched (Wernke et al., 2015).

Therefore, articles comparing the ROI, ROA, EVA and EBITDA performance in Brazilian privately held manufacturing companies were not found in the searches performed in the cited databases. With this, it is understood that there is a research gap that deserves to be explored with the emphasis intended in this study.

3 METHODOLOGY

As for the typology of aims, this research can be classified as descriptive, since, according to Scapens (1990), this category emcompass those studies that describe the accounting systems, techniques and procedures currently used in practice. According to Gil (1999), this modality aims to describe characteristics of a particular population or phenomenon, or the establishment of a relationship between variables. In this direction, Andrade (2002) points out that the descriptive research is concerned with observing the facts, recording them, analyzing them, classifying them and interpreting them, without the interference of the authors of the study. As for the procedures adopted, it is characterized as a case study, which, according to Yin (2005), is an empirical investigation that investigates a contemporary phenomenon within its real life context, especially when the limits between the phenomenon and the context are not clearly defined. In this case, it concentrates on certain object(s) and its conclusions are limited to its context.

Within the approach to the problem, research can be classified as "qualitative," as Richardson (1999, p. 80) calls the studies that "can describe the complexity of a given problem, analyze the interaction of certain variables, understand and classify dynamic processes experienced by social groups". Thus, based on the quantitative data (accounting and financial) collected, it was possible to carry out a qualitative analysis through a comparative study between the performance indicators targeted.

The selection of the company searched was based on the criterion of easy access to data, since one of the authors is an employee of the company. Data collection was carried out in March 2015 and, initially, the technique of informal conversations (unstructured) was used with the manager and the accountant to know the current situation with regard to the accounting reports available and the performance assessment forms used. Then, the data required to perform the work in the existing internal controls and in the published financial statements were collected, as well as other more specific information provided by the entity's management. That is, numerical data were collected by researchers in specific internal controls (such as financial statements, funding control worksheets, loan and financing contracts, ERP reports used in the company, etc.) and gathered in a database specifically elaborated in Excel spreadsheet. The data collected was complemented by additional information obtained from the discussions held with the two professionals mentioned (such as the current form of performance's assessment, the expectation of shareholder remuneration to be considered in the calculation of the EVA and other relevant non-documentary aspects). In this way, we have complied with Yin (2005)'s recommendation, which highlights that, in case studies, the researcher must follow three principles for the collection of information: (*i*) to use several sources of evidence (triangulation); (*ii*) to create a database and (*iii*) to maintain the evidence linkage.

In addition, as regards the formal aspects, in order to attest to the methodological rigor of this case study, the parameters recommended by Marques, Camacho and Alcantara (2015) were used. That is:

a) As for the object of study: it sought to understand the phenomenon proposed in its real context; the reason for adopting this research strategy was explained; there is a link between the phenomenon in question and the context of the research; the research question is clearly formulated and the type of study is evidenced (descriptive).
b) As for data collection: there are multiple forms of evidence (interviews with manager and accountant, data from internal controls and accounting etc.) that allow the triangulation of data; it is possible to attest to the reliability of the data by the internal and accounting controls used; operational measures (such as measured assets productivity indicators) were evidenced to validate the study construct; there is an explanation as to how the data were obtained and there is the possibility of replicating the data collection in another context.
c) As for the data analysis: the results of the research reflect the data collected and there was use of previous theory to base the analyzes.

d) As for the results: contributions were reported in the generation of knowledge in relation to previous studies and made alerts for points that still need to be continued in this type of research (mentioned in a subsequent section).

In this direction, the procedures performed to carry out the research are presented in detail in the following items.

4 PRESENTATION OF DATA AND DISCUSSION OF RESULTS

The research was carried out in the "ABC" industry (a fictitious name at the request of the administrators), a closely held corporation that operates in the manufacture of disposable plastic products, headquartered in the southern municipality of Santa Catarina. Due to the characteristics of its activity, this type of venture requires high value investments in assets (mainly machinery, physical facilities and working capital) and EBITDA was the main performance measurement metric used by managers. As a result, managers were suggested that the evolution of this indicator be compared with other indicators, as described in the following sections.

4.1 Survey of initial data

Initially, data related to the Balance Sheet for the six months of the second half of 2014 were obtained, together with the accounting of the company surveyed, as summarized in Table 1, in summary form.

Table 1
Balance Sheet for the months of the second half of 2014

(In thousands of reais)

Assets	jul/14	aug/14	set/14	oct/14	nov/14	dec/14
Current	297,710	315,591	349,913	329,750	369,590	343,504
Non-Current	439,949	453,192	422,187	417,922	418,304	419,626
Total Assets	737,659	768,783	772,100	747,672	787,894	763,130
Liabilities	**jul/14**	**aug/14**	**set/14**	**oct/14**	**nov/14**	**dec/14**
Current	307,228	318,995	339,730	358,665	384,360	344,449
Non-Current	310,842	317,962	299,545	252,658	267,961	293,931
Net Equity	119,589	131,826	132,825	136,349	135,573	124,750
Total Liabilities	737,659	768,783	772,100	747,672	787,894	763,130

Note. Source: data provided by the accounting of the company surveyed.

Subsequently, the Income Statement for the months encompassed by the survey was obtained, as shown in Table 2 in synthetic format.

Table 2
Monthly Income Statement for the months of the second half of 2014

(In thousands of reais)

Items	jul/14	aug/14	sep/14	oct/14	nov/14	dec/14
Net operating revenue	74,120	64,778	68,362	78,191	70,073	60,295
Cost of goods sold	(55,355)	(53,189)	(52,417)	(59,527)	(54,346)	(48,198)
Gross operating profit	18,765	11,588	15,944	18,664	15,728	12,097
Profit (loss) before Income Tax	26	3,300	1,833	3,924	245	(3,745)
Net profit (loss)	26	12,662	994	3,631	415	(8,242)

Note. Source: data provided by the accounting of the company surveyed.

As highlighted above, the main performance measurement metric used by the company's management was EBITDA, whose performance over the last six months of 2014 was as evidenced in Table 3.

Table 3
EBITDA for the months of the second half of 2014 (in thousands of reais)

Months	jul/14	aug/14	sep/14	oct/14	nov/14	dec/14
EBITDA	12,099	9,459	9,105	10,966	7,817	5,404

Note. Source: data provided by the accounting of the company surveyed.

4.2 RSI/ROI Calculation

The Return on Investment indicator (RSI or ROI) expresses how much each real invested of equity capital (PL) and onerous third-party capital (short and long-term loans and financing) was able to generate profits in the period. As for the second half of 2014, the results obtained based on the data collected were presented in Table 4.

Table 4
Return on Investments (RSI) or Return on Investments (ROI) of the second half of 2014

Monetary values in thousands of reais and rounded (no values after the comma)						
Items/months	jul/14	aug/14	sep/14	oct/14	nov/14	dec/14
a) Profit before Income Tax (R$)	26	3,300	1,833	3,924	245	- 3,745
b) Investiments (b.1+b.2+b.3) - R$	395,304	411,136	405,767	402,546	419,112	395,461
b.1) Loans/financing CP	83,776	89,738	83,610	115,822	117,966	82,453
b.2)Loans/financing LP	191,939	189,572	189,332	150,375	165,573	188,258
b.3) Net Equit	119,589	131,826	132,825	136,349	135,573	124,750
c=a/b) RSI/ROI	0.006%	0.803%	0.452%	0.975%	0.058%	-0.947%

Note. Source: prepared by the authors.

The results of this indicator showed that, in July, the company's profit of R$ 26 represented only 0.006% of the amount invested in the month (R$ 395,304). This result can also be interpreted as follows: each R$ 100.00 invested in the company provided a return of only R$ 0.006. In August, the return on investment increased to 0.803% and fell to 0.452% in the following period. In October the RSI/ROI increased to 0.975%, but fell to 0.058% in November and, in December, was negative (-0.947%).

On the basis of these indices, it is valid to suggest to shareholders that they compare the results found in this indicator with those of similar companies (benchmarking) or that they compare the results obtained with the desired TMA (Minimum Rate of Attractiveness). If they conclude that the performance was inadequate, they should study measures aimed at (*i*) increasing the value of "Operating Profit" (such as initiatives aimed at reducing costs and expenses, increasing employee productivity and equipment, reducing idle capacity, etc.); (*ii*) reduce the value of "Investments" (with measures that reduce the need to raise funds in an onerous manner, decrease the value of "Total Assets" and increase "Operating Liabilities", such as obtaining higher payment periods with suppliers, among other possibilities).

4.3 RSA/ROA Calculation

The indicator known as "Return on Assets" (RSA/ROA) expresses the return achieved with the funds invested by the entity in assets over a given period. The calculation of this index involves the determination of the "Sales Margin" and the "Assets Turnover", as detailed in Table 5.

Table 5
Return on Assets (ROA) - second half of 2014

Monetary values in thousands of reais and rounded (no values after the comma)						
Items/months	jul/14	aug/14	sep/14	oct/14	nov/14	dec/14
a) Sales margin (1/2)	0.03%	19.55%	1.45%	4.64%	0.59%	-13.67%
1) Net profit (after Income Tax) - R$	26	12,662	994	3,631	415	-8,242
2) Net sales (R$)	74,120	64,778	68,362	78,191	70,073	60,295
b) Assets Turnover (3/4)	0.10	0.08	0.09	0.10	0.09	0.08
3) Net sales (R$)	74,120	64,778	68,362	78,191	70,073	60,295
4) Assets (R$)	737,659	768,783	772,100	747,672	787,894	763,130
c=a/b) RSA/ROA	0.003%	1.647%	0.129%	0.486%	0.053%	-1.080%

Note. Source: prepared by the authors.

The RSA/ROA can be interpreted in the month of July as follows: each R$ 100.00 allocated to the Assets provided R$ 0.003 (or 0.003%). In August this performance was the best of the focused semi-annual series, as it increased to 1.647%. However, in the month of September it decreased to 0.129%; in October was 0.486%; in November it fell again to 0.053%, and ended the semester with the worst performance (with -1.080%). Similar to the aforementioned RSI/ROI results of the previous section, the results may be considered inadequate since they represent a low return on the volume of resources destined to the company's assets.

To improve Return on Assets performance, managers should consider alternatives that aimed at (*i*) increasing sales (expanding sales of the most profitable products or selling waste and by-products to other companies); (*ii*) reducing costs (minimizing the consumption of raw materials or reducing the value of the respective acquisition cost, reducing the consumption of electricity in production, reusing inputs from the manufacturing process, etc.); (*iii*) the reduction of expenses (reducing administrative expenses such as telephone, mail, internet, electricity, water, payroll, etc., sales expenses such as advertising, commissions, taxes on invoicing via tax avoidance, etc. and financial expenses such as bank fees, interest payments etc.); (*iv*) the reduction of Current Assets (measures to reduce the volume of funds used in inventories or to reduce the collection period of sales contribute to the asset has a lower value in the period, which increases the "turnover" indicator of assets); (*v*) the lower investment of funds in Fixed Non-current Assets (actions that reduce idle installed capacity, such as increasing the number of work shifts, demobilization of inactive machinery, or sale of idle or non-productive real estate, etc.).

4.4 EVA Calculation

The EVA informs that the company creates wealth only when the result of its operational activities is sufficient to cover, in addition to the respective costs and expenses, also the cost of raising funds (own and third parties) used in the venture. Thus, EVA can be defined as the amount resulting from the deduction of the "cost of capital" from the "profit" obtained by the company at any time. If the result is negative, there will be destruction of investors' wealth; if the EVA is positive, it means the company has generated wealth for shareholders.

Among the possibilities of methodologies regarding the determination of EVA, to calculate this indicator within the company under study was chosen the formula: EVA = [RSAL (in %) - CMPC (in %)] x Invested Capital (in R$), due to the availability of data. Then, due to the need to obtain the values related to the factors of this equation, the following steps were followed.

4.4.1 Adjusting the accounting balance to the EVA standard

To determine the EVA by means of the equation mentioned, it is necessary to adjust the accounting balance sheet to a specific format to determine the value of the "Invested Capital". Regarding this, Table 6 shows the composition of the capital invested by the company in the second half of the year focused.

Table 6
Invested Capital on the second half of 2014 (values in thousands of reais)

Items/months	jul/14	aug/14	sep/14	oct/14	nov/14	dec/14
(a) Onerous Liabilities	275,715	279,310	272,942	266,197	283,539	270,711
(a.1) Loans and Financ. (CP)	83,776	89,738	83,610	115,822	117,966	82,453
(a.2) Loans and Financ. (LP)	191,939	189,572	189,332	150,375	165,573	188,258
(b) Net Equity	119,589	131,826	132,825	136,349	135,573	124,750
(c=a+b) INVESTED CAPITAL	395,304	411,136	405,767	402,546	419,112	395,461

Note. Source: prepared by the authors.

That is, the value of "Invested Capital" is made up of own resources (Net Equity) and funds raised in an onerous way with third parties (short and long term loans and financing). For

example, in July 2014, the invested capital is made up of R$ 83,776 of Short-Term Loans and Financing, R$ 191,939 of Long-Term Loans and Financing and R$ 119,589 in Net Equity, totaling R$ 395,304 in that period.

*4.4.2 T*he Return on Net Assets Calculation (RSAL/RONA)

The second step to calculate the EVA referred to the determination of the indicator known as RSAL/RONA, whose researched reality is evidenced in Table 7.

Table 7
Return on net assets (RSAL) on the second half of 2014

Monetary values in thousands of reais and rounded (no values after the comma)

Items/periods	jul/14	aug/14	sep/14	oct/14	nov/14	dec/14
a) Profit for the period	26	12,662	994	3,631	415	-8,242
b) Invested Capital (or Net Assets)	395,304	411,136	405,767	402,546	419,112	395,461
c=a/b) Return on Net Assets (RSAL)	0.006%	3.080%	0.245%	0.902%	0.099%	-2.084%

Note. Source: prepared by the authors.

As seen previously, in order to calculate the RSAL/RONA, it is necessary to divide the profit of the period by the value of the "Invested Capital" (also known as Net Assets or RONA). For example, in July/2014 the net profit for the period was R$ 26, with the invested capital of R$ 395,304. Therefore, the return on net assets (RSAL/RONA) was 0.006% in that month (R$ 26 / R$ 395,304 X 100).

4.4.3 Weighted Average Cost of Capital Calculation (CMPC/WACC)

The CMPC/WACC is the weighted average cost of raising funds (from third parties and own) that the company incurred during the period. In this sense, it was necessary initially to survey all sources of funds used by the company during the last six months of 2014. However, it is interesting to note that credit operations could be settled during the focused semester and/or contracted other(s). As a result, after obtaining the grid of foreign funds used by the company during the semester surveyed, it was possible to calculate the CMPC/WACC of all the months covered, including also the capital in the calculation, as exemplified in Table 8.

Table 8
CMPC/WACC Calculation referring to July 2014

Sources of Funds	Outstanding balance R$	Participation in Invested Capital	Interest Rates (%)	CMPC or WACC (%)
Banco Badesc	11,040	2.79%	1.47%	0.04%
BES Inv. Do Brasil S.A.	10,219	2.59%	1.39%	0.04%
Bic Banco	15,026	3.80%	1.44%	0.05%
BTG Pactual	20,105	5.09%	1.47%	0.07%
Others...	99,736	25.23%	-	-
Net Equity	119,589	30.25%	2.94%	0.89%
Total Invested Capital	395,304	100.00%	-	1.83%

Note. Source: prepared by the authors.

Since in July 42 credit operations were contracted, due to space constraints, it was decided to highlight in Table 8 only some of these sources of financing (as an example) and group the others in the line "Others ...". Then, for each external source of funds, the outstanding balance (in R$) at the end of the period (column 2), the respective percentage participation in the total amount of capital invested in the month (column 3), and the rate of remuneration of these capitals invested in the month (column 4). Also, to calculate the total value of the invested

capital, the amount related to the Net Equity of the month, as expressed in the penultimate row of Table 8, was inserted.

It should be noted that the monthly interest rates, in the case of loans and financing to third parties, were those contractually expressed when raising these funds. As for shareholder's remuneration, the rate of 2.94% per month was used because this was the "TMA" reported as the one sought by the company's owners. In the example of Table 8, the calculated CMPC/WACC was 1.8274% per month (sum of the last column) for the cited period. This means that the company's operating activities should provide enough profit to generate return on net assets (RSAL/RONA) greater than this cost of capital in order to generate wealth (positive EVA).

The results of the CMPC/WACC calculations for all the months of the semester revealed that there were small swings in rates during the six months covered (1.8274% in July, 1.8074% in August, 1.8430% in September, 1.8989% in October, 1.8025% in November and 1.8646% in December).

4.4.4 EVA Calculation

The data cited in the previous sections allowed us to determine the company's results in terms of EVA during the months of the target period. Thus, in order to present the scenario identified in this context, Table 9 was elaborated.

Table 9
EVA of the second half of 2014

Monetary values in thousands of reais and rounded (no values after the comma)

Items/periods	jul/14	aug/14	sep/14	oct/14	nov/14	dec/14
1) RSAL/RONA	0.0065%	3.0798%	0.2451%	0.9021%	0.0990%	-2.0841%
2) CMPC/WACC	1.8274%	1.8074%	1.8430%	1.8989%	1.8025%	1.8646%
3=1-2) DIFERENCE	-1.8209%	1.2723%	-1.5980%	-0.9968%	-1.7034%	-3.9488%
4) INVESTED CAPITAL (R$)	395,304	411,136	405,767	402,546	419,112	395,461
5) EVA OF PERIOD (R$)	-7,198	5,231	-6,484	-4,012	-7,139	-15,616

Note. Source: prepared by the authors.

As can be seen in Table 9, the EVA calculation was done as follows (with data referring to the month of July, as an example):

1) The return on net assets (RSAL/RONA) was 0.0065%.

2) The weighted average cost of capital (CMPC/WACC) reached 1.8274%.

3) The difference between RSAL and CMPC was negative (-1.8209%).

4) The total amount of capital invested in that month was R$ 395,304 (thousands of reais).

5) The economic value added (EVA) in the period was R$ -7,198 (thousands of reais), representing "destruction of investor wealth".

When analyzing all the periods covered, it was verified that the individual performance of the other months was as follows: in August R$ 5,231 (positive EVA = wealth creation); in September: R$ -6,484 (wealth destruction); in October R$ -4,012 (wealth destruction); in November R$ -7,139 (wealth destruction) and in December R$ -15,616 (wealth destruction). That is, in most months the result in terms of Economic Value Added (EVA) was negative, which implies to conclude that in those periods there was "wealth destruction". This occurred when the return obtained with the net assets used was lower than the weighted average cost of capital (RSAL < CMPC) in the month. However, only in August 2014, it was verified that the EVA was positive, which was motivated by an index of 3.0798% of RSAL, against 1.8074% of the CMPC/WACC. The difference between the two parameters was 1.2723%, which, multiplied by the capital invested in the month (R$ 411,136), generated an aggregate economic value (EVA) of R$ 5,231 (positive, because RSAL> CMPC).

Based on the poor results identified for the EVA in the entity in question, managers should study the applicability of measures to optimize this performance, such as reducing the

cost of raising funds from third parties; try to increase profit without investing more capital (by improving productivity or prioritizing the most profitable product lines); reduce capital invested in operational activities (with initiatives related to the demobilization of idle assets and/or reduction of inventories, for example); invest only in projects or segments with a return greater than the CMPC/WACC and sell assets whose return is lower than the CMPC/WACC.

5 CONCLUSION

The company management used EBITDA as the main performance measurement metric and in this study three other indicators were measured, as shown in Table 10.

Table 10
Comparison of indicators during the second half of 2014

Monetary values in thousands of reais and rounded (no values after the comma)

Indicators	jul/14	aug/14	sep/14	oct/14	nov/14	dec/14
EVA (R$)	-7,198	5,231	- 6,484	- 4,012	- 7,139	- 15,616
EBITDA (R$)	12,099	9,459	9,105	10,966	7,817	5,404
RSI/ROI (%)	0.006%	0.803%	0.452%	0.975%	0.058%	-0.947%
RSA/ROA (%)	0.003%	1.647%	0.129%	0.486%	0.053%	-1.080%

Note. Source: prepared by the authors.

The evolution presented in Table 10 shows that the month of August was the one with the best performance in all indicators, while the month of December can be classified as the most problematic. However, two aspects are worth highlighting in relation to the measured context. The first concerns the low return provided by the company's activities, both in terms of investments (RSI/ROI) and RSA/ROA. Especially in the months of July, September, November and December, the profitability of funds invested in the company was at levels, a priori, undesirable for shareholders.

The second point to highlight is that, while for EBITDA the company's performance is adequate for the entirety of the months (even with a downward trend in the first half), the EVA showed that in 5 out of 6 months the return on net assets (or invested capital) was lower than the weighted average cost of capital. With this, there was wealth destruction in those 5 months and only in August, the picture was positive (with wealth creation). The divergence in these two ways of analyzing the venture emphasizes the importance of choosing the appropriate indicator(s) to identify the company’s performance; otherwise it would jeopardize managers' decisions about the pertinence of maintaining existing policies or about the need to change them.

As seen previously, by focusing on EBITDA, the company's managers are led to believe that the situation would be better than it really is if the business's ability to generate enough profit to remunerate all sources of funds (by itself or others) through the EVA. As a result, it was suggested that managers should also monitor the capacity of this plant to add economic value, as well as to consider the feasibility of measures that can improve this result.

In view of the above, the authors consider that they have answered the research question, as well as having achieved the proposed objective. That is, as the study question asked about the existence of similarities or divergences in the evolution of the indicators, it was evident (Table 10) that there were discrepancies in the trajectory of the parameters measured in the months covered. Then, as the aim of the research was to measure the performance of the company surveyed through four accounting indicators, the authors concluded that the evolution of the productivity of the accounting assets had different performances (positive in some parameters and negative in others) and divergent trajectories (especially in the case of EBITDA and EVA). In addition, the evolution of these metrics for corporate performance’s assessment was commented on in the previous sections, and was concluded due to the inadequacy of the results obtained, given the low productivity of the assets presented by the company in the half year covered.

As limitations associated with the study, the following aspects should be highlighted:

a) Exclusive focus on financial indicators: even if non-financial indicators can include other aspects that affect the productivity of assets, priority was given exclusively to the assessment in this regard, by financial indicators. In this sense, it is worth noting that neither of these two categories of indicators can be considered immune to criticism or that they can be applied without restrictions in the assessment of the productivity of assets.
b) Restriction of the findings to the company surveyed: because it is a case study, the conclusions are limited to the context of the company in question. Thus, the possible application of the same procedures in another company will probably require adaptations.

Finally, it is suggested that future studies focus on subjects such as the possible need for adjustments in the accounting database used (to assure greater reliability in the comparison of these indicators) and/or to discuss different factors or approaches that allow to conclude on the adequacy or not to use these indices in a comparative way to assess the assets' productivity.

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LONG-TERM DEBT AND PERFORMANCE IN CRISIS TIMES: EVIDENCES OF COMPANIES FROM BRAZIL AND LATIN AMERICA

DERMEVAL MARTINS BORGES JUNIOR
Undergraduate degree in Business Administration from Federal University of Uberlândia. Graduate student of the Graduate Program in Business Administration of the Federal University of Uberlândia. ***Address****: Av. João Naves de Ávila, 2121, Bloco 5M, Sala 109 M., Santa Mônica | 38400-902 | Uberlândia/MG | Brazil.*
E-mail*: dermevaljr14@gmail.com*

LUCAS ALVES DUARTE DE SARVAS
Undergraduate degree in Technology in Management Processes from Uberaba University. Graduate student of the Graduate Program in Business Administration of the Federal University of Uberlândia. ***Address****: Av. João Naves de Ávila, 2121, Bloco 5M, Sala 109 M., Santa Mônica | 38400-902 | Uberlândia/MG | Brazil.*
E-mail*: lucas_sarvas@hotmail.com*

JULIANA RODRIGUES OLIVEIRA
Undergraduate degree in Business Administration from Uberaba University. Graduate student of the Graduate Program in Administration of the Federal University of Uberlândia. ***Address****: Av. João Naves de Ávila, 2121, Bloco 5M, Sala 109 M., Santa Mônica | 38400-902 | Uberlândia/MG | Brazil.*
E-mail*: jujuro19@yahoo.com.br*

KÁREM CRISTINA DE SOUSA RIBEIRO
PhD in Business Administration from the University of São Paulo. Professor of the Graduate Program in Business Administration of the Federal University of Uberlândia. ***Address****: Av. João Naves de Ávila, 2121, Bloco 5M, Sala 109 M., Santa Mônica | 38400-902 | Uberlândia/MG | Brazil.*
E-mail*: kribeiro@ufu.br*

ABSTRACT

This study aimed at examining the effect of long-term debt on the performance of Brazilian and Latin American companies, encompassing the previous economic scenario, during and after the global crisis of 2008. It was considered in this study the accounting data from public companies listed in stock exchanges of Brazil, Chile, Argentina, Colombia, Mexico and Peru within the period of 2007 to 2015. It was elaborated a multiple linear regression model with panel data based on the literature of the subject. It was used Stata software for data analysis. The results indicated that for companies from Latin America, except Brazilians, there is a negative relationship between long-term debt and performance. In the case of Brazilian companies, for such relationship, the results were inconclusive.

Keywords: *Capital structure. Long-term debt. Performance.*

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1 INTRODUCTION

One of the most important decisions for companies within the corporate finance is related to the choice of the debt policy or capital structure. This is a fundamental decision, given the effect it can have on the value of the organization. In general, the capital structure represents the mix between third-party and equity capital used to finance the operations of a particular company. There are several possibilities for building a capital structure. Among the ways to measure these various possibilities of capital structure is the long-term debt, which consists of an indicator of capital structure used in the financial analysis and expresses the ratio between long-term debt and total debt (Abor, 2007).

According to Cole, Yan and Hemley (2015), capital structure theory and its relationship to corporate performance has been a controversial issue in corporate finance over the years. Many persons argue that companies should use third-party capital as the main source of financing for the tax benefit, since the interest paid on the debt is deductible from the tax payable. Then, they can increase net profit in the period. However, the problem of financing with third-party capital is to increase the company's debt, which increases its risk. On the other hand, although equity capital financing is not subject to this situation, it does not obtain the tax benefits provided by the financing with third-party capital, since dividends do not deduct taxes.

In addition, Cole *et al.* (2015) still state that, at first, it may seem that the way in which a company chooses how its operations are financed is independent of its current performance. Similarly, Modigliani and Miller (1958), when introducing studies on capital structure, concluded that the company's value is independent of its capital structure, assuming markets are perfect. However, with the evolution of the research on the subject, it can be noticed that several studies, such as Abor (2005), Abor (2007), Zeitun and Tian (2007), Lara and Mesquita (2008), Ebaid and Pratheepkanth (2011) have already demonstrated a statistically significant relationship between capital structure and performance.

In view of this, considering the importance of the capital structure and its relation to performance, in addition to the periods before and after the economic crisis of 2008, this study seeks to answer the following question: what is the impact of long-term debt on the profitability of Brazil and the rest of Latin America companies in the pre-, pos- and during crisis period of 2008?

The study aimed at examining the effect of long-term debt on the performance of Brazilian and Latin American companies between 2007 and 2015, encompassing the previous economic scenario, during and after the global crisis of 2008. In order to achieve the general objective, the following specific aims are listed: i) to review scientific studies that consider aspects such as capital structure and performance; ii) to collect accounting data and indicators of the organizations studied; iii) to develop and apply multiple linear regression models for the companies in the analyzed regions; iv) to examine and compare the results obtained.

This study is justified by the fact that, although there are several studies that address the relationship between capital structure and performance, few of them consider these variables in periods marked by economic crisis, even more taking into account the specificities of Brazilian companies compared to the others companies in Latin America. In addition, this study contributes to the capital structure literature by providing evidence of the effect of long-term debt on corporate performance in different countries, especially in a critical period when organizations try to re-establish themselves in the market after years of economic recession world.

2 THEORETICAL FOUNDATIONS

In this section, we first describe the main concepts that involve capital structure and long-term indebtedness. Next, we present previous studies that investigated the relationship between capital structure and performance.

2.1 Capital structure and long-term debt

According to Assaf and Lima (2011), business organizations, in order to carry out their activities, need constant capital, either for the maintenance or expansion of the company. In other words, organizations, regardless of their size, need to finance their activities in the short, medium and long-term. Batista, Siqueira, Novais and Figueiredo (2005) state that this financing process is called by the specialized literature as capital structure. It is extremely important to the companies, since mistaken or wrong decisions regarding the organization capital have negative effect on the cost of capital. The opposite is also true, that is, right decisions in relation to the capital structure, in turn, can reduce the cost of capital for the organization. In both cases it can be noticed that the profit of the company is directly affected by the cost of capital.

Conceptually, Assaf and Lima (2011) define the capital structure as the sum of two sources of financing: own funds and those of third parties. Thus, to better understand this issue it is necessary to analyze how a company is formed. As a general rule, the organization is formed by the following elements: assets, rights and obligations. According to Batista *et al.* (2005), the assets and rights form the company's assets, while, the liabilities, the organization's liabilities. To make investments in the company's assets, it is necessary to use the financing and it has two sources: own and third-party funds.

Own funds and third-party capital are recorded differently in the company's balance sheet. While the first one is allocated to net equity, the third parties capital deals with financing obtained from financial institutions, among other types of obligations that are denominated as a due obligation. Obviously, the correct management of the company's assets and liabilities implies a large difference in its profitability and, consequently, in the application of funds in the capital market. In this line, the importance of controlling and managing sources of financing, own and third parties funds increases, since this affects the company total value (Batista *et al.*, 2005).

The understanding is very simple: the greater the dependence of the organization of third-party capital, the more insolvent the company is. But, as debt reveals itself as a source of funds of significant importance for the organization, this ends up being the strategy used by the companies in the continuity of their activities. This strategy is present in several organizations in Brazil. In this sense, the study by Fonseca, Silva, Assis, Nazareth and Ferreira (2014), which encompassed the capital structure and debt index of three large organizations in the country, showed that all of them have their main source of financing in third-party capital.

Managing the capital structure of a company efficiently is undoubtedly a decisive factor for the continuity of organizations in their market. In this sense, Fonseca *et al.* (2014) report in their study the researches of other authors and observe that for some time researchers are concerned with describing what would be the optimal capital structure for organizations.

In addition, according to the explanation of Fonseca *et al.* (2014), the organization can choose the capital structure it wants, but it must be aware of this, since a very large degree of debt to third parties can result in insolvency and, consequently, bankruptcy or recovery of the company. They also observed that the capital structure of companies presents differences in relation to their size, because while small organizations have a higher level of debt in the short term, large corporations have a more pronounced level of debt in the long term. In this way, understanding these differences is important, since the companies that are in debt in the short term are more subject to the oscillations of the economy.

2.2 Previous studies

Pratheepkanth (2011) studied all companies listed on the Colombo Stock Exchange, the main stock exchange in Sri Lanka, between 2005 and 2009, in order to verify the impact of the capital structure on the performance of Sri Lankan companies. Among the observed results, it was verified that there is a negative relation between capital structure and return on assets (ROA), reflecting the high financing costs between these companies.

In this sense, Lara and Mesquita (2008) also studied the influence of capital structure on profitability, having, however, as sample 70 Brazilian companies. The results indicated a great dispersion among the different sources of capital used by these companies. Own funds are the

ones with the lowest variability. In addition, it was verified, the relationship between rate of return and debt, the inverse relationship for long-term financing and direct relationship to equity capital.

When analyzing the relationship between capital structure and profitability of Ghanaian listed companies in the Ghana Stock Exchange between 1998 and 2002, Abor (2005) showed a positive relation between short-term debt and return on net equity (ROE) , suggesting that more profitable companies tend to borrow more in the short term to finance their operations. On the other hand, long-term debt was negatively correlated with ROE.

Abor (2007) also examined the relationship between capital structure and performance of small and medium companies in Ghana and South Africa between 1998 and 2003. In this research, the results indicated that short-term debt is negatively related to Gross Profit in companies of both countries. Long-term debt was positively related to Gross Profit, both for Ghanaian and South African companies. Also, with a sample of South African companies, Fosu (2013) studied 257 companies listed on the Johannesburg Stock Exchange between the period 1998 and 2009 and found that financial leverage has positive effects on their performance. However, the squared leverage coefficients were significantly negative, suggesting the existence of an optimum point, that is, high levels of financial leverage may have an adverse effect on companies performances.

Zeitun and Tian (2007) investigated the effect that the capital structure exerts on the performance of Jordanian companies, having as a sample 167 companies studied between 1989 and 2003. Among the results found, there was a statistically significant and negative relation between the long-term debt and return on assets (ROA). Another interesting finding in this study was the positive relationship found between short-term debt and performance, as measured by Tobin's Q, suggesting that companies with high short-term debt have high growth and performance rates.

Nguyen and Nguyen (2015) examined the impact of capital structure on the performance of listed companies in the Ho Chi Minh City Stock Exchange, considered the largest stock exchange in Vietnam, with data from 2006 to 2014. The results indicated that the capital structure influences the performance of these companies. It was found a negative relationship between measures of capital structure, including long-term debt, and ROA and ROE performance measures. This suggests that, in general; a high degree of leverage is associated with poorer corporate performance.

The study of Ebaid (2009) investigated the impact of choosing the capital structure on the performance of listed companies in the Egyptian Stock Exchange between 1997 and 2005 using three measures of financial performance previously verified: ROA, ROE and Gross Profit. The empirical tests indicated that the capital structure, including long-term debt, negatively impacts the performance of companies, when measured by ROA. On the other hand, the capital structure and short-term, long-term and total debt did not have a significant impact on the performance of companies when measured by ROE or Gross Profit. In view of this, it can be stated that the choice of capital structure, in general terms, has little influence on the performance of listed companies in Egypt.

Kudlawicz, Senff and Bach (2015) sought to verify the relationship between economic performance and capital structure of companies listed on the São Paulo Stock Exchange, but from the perspective of the efficiency frontier. The results obtained in the mentioned research showed that, in general, the companies with better performance and lower debt are closer to the efficient frontier, that is, they present greater financial efficiency.

When investigating the relationship between corporate performance, capital structure and the macroeconomic environment, using a sample of 1,594 Indian companies in the period between 1998 and 2011, Bandyopadhyay and Barua (2016) found empirical evidence that economic cycles significantly influence financing decisions and, consequently, the performance of organizations. Banerjee and Anupam De (2015) studied the impacts of capital structure decisions on the financial performance of companies listed on the Bombay Stock Exchange during the global pre-crisis period, between 2001 and 2007, and post-crisis period between 2008 and 2013. Among the results found, there was a negative relationship between the financial leverage and the profitability of these companies during the pre-crisis period, suggesting that an increase in third-party capital reduces performance.

3 METHODOLOGY

In this study, the data on publicly-listed companies listed on the Brazilian, Chilean, Argentine, Colombian, Mexican and Peruvian stock exchanges were considered during the period from 2007 to 2015. The period of analysis encompasses the previous economic scenario, during and after the global crisis of 2008, aimed at identifying the differences between the Brazilian and Latin American markets in terms of capital structure, especially long-term debt.

The data were collected from accounting statements and other indicators available in the software Economatica and adjusted to the dollar, given the heterogeneity of the currencies of the various countries studied. Multiple linear regression models were developed with panel data based on the literature on the subject. Stata software was used for data analysis.

As a dependent variable were considered the long-term liabilities, represented by the acronym ELP. Among the independent variables, profitability, represented by the return on assets (ROA), that is the result of the relationship between Net Profit and Total Assets, indicated in equation 1:

$$ROA = \frac{LL}{AT} \quad (1)$$

The leverage ratio (LEV) and companies size, represented by total assets (TA), were used for control purposes, culminating in the regression model according to equation 2:

$$ELP = \beta_0 + \beta_1 ROA + \beta_2 YEAR + \beta_3 LEVERAGE + \beta_4 AT + \varepsilon \quad (2)$$

On what:
ELP = Long-Term Liabilities
β = the constant;
ROA = represents the profitability;
YEAR = *dummy* variable for the years 2006 to 2015;
AT = the size, represented by the total assets;
LEV = leverage ratio;
ε = the statistical error.

From the presentation of the variables, Table 1 compiles the relationship between the performance and long-term debt variables, calculation form and expected result based on the theories presented previously.

Table 1
Summary and definition of variables supported on theoretical basis

Variables	Expected Result	Theoretical Basis
ELP x ROA	+	(0)
	-	(1, 2, 3, 4, 5, 6, 7, 8)
	Null	(0)

1) Abor (2005), 2) Abor (2007), 3) Zeitun e Tian (2007), 4) Pratheepkanth (2011), 5) Lara e Mesquita (2008), 6) Ebaid (2009), 7) Nguyen e Nguyen (2015), 8) Banerjee e Anupam De (2015)

Note. Source: own elaboration.

In order to minimize errors of interpretation, the variables were winsorized in order to treat the outliers. Similarly, to identify autocorrelation and multicollinearity problems, the Pearson correlation test and the Variance Inflation Factors (VIF) test were performed. Then the Breusch-Pagan, Chow and Hausman tests were analyzed for identification of the most suitable regression model for the study. Finally, the autocorrelation tests (Woodridge test) and heteroscedasticity (Wald test) were performed in the model.

4 RESULTS

As mentioned above, the data were divided into two groups: Latin America and Brazil. Table 2 presents the descriptive analysis of the sample, composed of Latin America. It can be noticed that the return on the average asset is greater than seven, with a maximum greater than twenty. To avoid distortions in the interpretation of the results, the total assets were used as a variable of size control, which can significantly affect ROA.

Table 2
Descriptive analysis for Latin American companies, except Brazilian companies

Variable	Observations	Average	Standard Deviation	Minimum	Maximum
AT	821	1,067,658	1,233,847	33,952	3,558,161
LEV	813	2.107011	1.19095	0.9	4.4
ROA	835	7.348982	5.461789	0.5	20.8
ELP	821	282,876.4	349,461.3	2,639	1,016,505

Note. Source: own elaboration.

Table 3 represents the descriptive analysis of Brazilian companies. It is possible to notice the large difference between the average ROA of Brazilian and Latin American companies, since in Brazil the average is greater than 1,400, which again reinforces the importance of control of the model by the variable size, represented by the AT variable.

Table 3
Descriptive analysis for companies in Brazil

Variable	Observations	Average	Standard Deviation	Minimum	Maximum
AT	7,239	6,527,716	29,700,000	0	354,000,000
LEV	7,183	19.10806	307	0	15,111
ROA	7,211	1,445.355	44,808	0	2,373,557
ELP	3,153	1,520,661	6,952,230	0	128,000,000

Note. Source: own elaboration.

The regression model applied for companies in Latin America, it is noted in Table 4, the existence of a negative ratio of 1% between the capital structure and profitability, in agreement with the studies of Abor (2005), Abor (2007), Zeitun and Tian (2007), Ebaid), Lara and Mesquita (2008), Pratheepkanth (2011), Nguyen and Nguyen (2015) and Banerjee and Anupam De (2015).

In addition, it is observed that the variables of total asset control (TA) and leverage ratio (LEV) show a positive and significant relationship to 1% in relation to long-term debt. The YEAR dummy shows a negative and significant relationship in 5% of long-term debt and the years 2008 to 2011 and 2013 to 2015, that is, long-term debt was reduced in those years, which include the pre- and post-crisis periods.

Table 4
Regression for companies of Latin America, except Brazilian

Variables	β	Error	*t*	Sig.	VIF
Constante	70,510.68	20,484.75	3.44	0.001	
ROA	-7,237.502	1,106.529	-6.54	0.000	0.922532
LEV	18,050.61	4,449.361	4.06	0.000	0.869726
AT	0.2556813	0.0058095	44.01	0.000	0.974534
YEAR					
2007	-25,694.44	21,802.26	-1.18	0.239	0.531443
2008	-49,639.08	23,453.65	-2.12	0.035	0.524736
2009	-63,385.97	23.650,85	-2.68	0.008	0.51459
2010	-52,700.07	24,291.2	-2.17	0.030	0.507932
2011	-51,238.68	24,716.03	-2.07	0.038	0.480878
2012	-39,273.35	25,543.22	-1.54	0.125	0.47908
2013	-62,136.99	25,634.89	-2,42	0.016	0.476571
2014	-46,856.4	24,607.57	-1.9	0.057	0.477014
2015	-57,125.95	24,217.38	-2.36	0.019	0.499645

Note. Source: own elaboration.

When applying the model in Brazilian companies, it can be noticed in Table 5 that it was possible to prove a relationship between long-term debt and profitability, contrary to studies by Lara and Mesquita (2008), which, when analyzing this relationship in 2008, identified a significant and inverse relationship between variables. One possible explanation for the divergence is the analysis period of the present study, that is, the previous period to the global crisis of 2008, the crisis itself and the post-crisis period.

In this sense, long-term debt is not significant in relation to the periods of 2007 and 2009. The year 2008 was marked by the positive relationship with long-term debt at a significance of 10%. Finally, it is noted that the global crisis of 2008 significantly impacted the capital structure of Brazilian organizations, especially long-term debt from 2010 onwards. It is also verified that there is a negative and significant relationship to 1%, which shows a reduction in the ELP of the companies and can be explained both by the lack of credit available in the country and by the apprehension of the managers to leverage their business in times of economic instability.

Table 5
Regression for companies in Brazil

Variables	β	Error	*t*	Sig.	VIF
Constant	31,086.96	7,822,122	3.97	0.000	
ROA	-446.213	418.6335	-1.07	0.287	0.934198
LEV	9.998.124	1,821.515	5.49	0.000	0.978802
AT	0.230482	0.001615	142.73	0.000	0.917546
YEAR					
2007	-95.7137	9,633.488	-0.01	0.992	0.609856
2008	16,934.07	9,465.279	1.79	0.074	0.605736
2009	11,871.67	9,956.244	1.19	0.233	0.598779
2010	-55,994.1	11,787.87	-4.75	0.000	0.896938
2011	-48,538.5	11,758.3	-4.13	0.000	0.8966
2012	-56,152.1	15,021.78	-3.74	0.000	0.905758
2013	-79,331.3	14,002.56	-5.67	0.000	0.90175
2014	-97,485	28,537.82	-3.42	0.000	0.879047
2015	-51,542.3	8,845.14	-5.83	0.000	0.892736

Note. Source: own elaboration.

The results presented here corroborate much of the previous studies performed in other countries regarding long-term debt and profitability, given their negative relationship to the profitability of Latin American companies. In Brazil, there was no statistical significance between the variables. The major contribution to the subject was the negative and significant relationship at the 1% level between the ELP and the period after the global crisis of 2008.

5 CONCLUSION

This study aimed at examining the effect of long-term debt on the performance of Brazilian and Latin American companies in the period between 2007 and 2015, encompassing the previous economic scenario, during and after the global crisis of 2008, with a view to the importance of the capital structure for companies. The results obtained contributed to the studies on the subject, mainly for providing evidence for different economic scenarios regarding the relationship between long-term debt and performance and partly to reinforce findings from previous studies of this nature.

The results indicated that for companies in Latin America, except for Brazil, there is a negative relationship between long-term debt and performance, corroborating studies on capital structure and performance, such as the works of Abor (2005), Abor (2005) 2007), Zeitun and Tian (2007), Ebaid (2009), Lara and Mesquita (2008), Pratheepkanth (2011), Nguyen and Nguyen (2015) and Banerjee and Anupam De (2015). In the case of Brazilian companies, there was no statistically significant relationship between long-term debt and performance, although evidence of changes in the capital structure of these companies has been found as of 2010, after the economic crisis.

As a suggestion for future studies it is recommended to use other measures of performance for the companies studied, in addition to ROA, such as Gross Profit and ROE, which, as presented previously, have already been considered in studies on capital structure. In addition, the use of macroeconomic variables is indicated as a way to broaden the measurement of the impacts of economic crises on the capital structure, since in this study it was chosen to use only the annual period for this.

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INSTITUTIONAL THEORY APPLIED TO MANAGEMENT ACCOUNTING: ANALYSIS OF THEORETICAL AND METHODOLOGICAL CONTRIBUTION OF INTERNATIONAL PUBLICATIONS OCCURRED IN THE 2006-2015 PERIOD

JOSÉ LUIZ VAILATTI
Graduate student in Accounting at the Federal University of Santa Catarina (UFSC). Professor of the Fayal Institute of Higher Education, Accounting Officer. ***Address****: Rua Lico Amaral, 205, Ap. 65 | Dom Bosco | 88307-010 | Itajaí/SC | Brazil.*
E-mail*: vailatti@conjel.com.br*

FABRICIA DA SILVA ROSA
PhD in Production Engineering from the Federal University of Santa Catarina (2011). Adjunct professor at the Federal University of Santa Catarina. ***Address****: Federal University of Santa Catarina, Accounting Sciences Department, Trindade | 88040-900 | Florianópolis / SC | Brazil.*
E-mail*: fabricia.rosa@ufsc.br*

ERNESTO FERNANDO RODRIGUES VICENTE
PhD in Administration from the University of São Paulo in 2004. Associate Professor at the Accounting Sciences Depatment, Socioeconomic Center, Federal University of Santa Catarina (CCN/CSE/UFSC). ***Address****: Federal University of Santa Catarina, Accounting Sciences Department, Trindade | 88040-900 | Florianópolis / SC | Brazil.*
E-mail*: ernesto.vicente@ufsc.br*

ABSTRACT

The purpose of this research is to analyze the approaches and methodologies used in international research, which used the Institutional Theory to evaluate aspects of changes in the use of management accounting practices in the period 2006-2015. The study is characterized as descriptive with quantitative approach. It uses a structured process of literature review through research in EBSCO databases, EMERALD, SCOPUS, SCIELO WEB OF SCIENCE, where 21 articles were identified in the period 2006-2015 which are aligned to the axes of the survey "Institutional Theory "and" Management Accounting". A bibliometric research was carried out in order to identify the annual distribution of articles into periodicals, nature of the objectives, the number of authors for journals, theoretical approach, problem approach, research techniques, technical information collection. The results revealed that the approach of the New Institutional Sociology dominated the study setting on changes in management accounting. All the three institutional isomorphism processes seem to shape the organizational field of accounting research. A small number of research using the approach of Old Institutional Economics was identified and no research used the approach of the New Institutional Economics. Even though they were few, a growing number of research using the approach of Old Institutional Economics and which evaluate the changes in management accounting from the organization's point of view were found.

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1 INTRODUCTION

The competitiveness scenario, the economic changes, the emergence of new products and the change in consumer desire are some of the aspects that make companies have to be constantly evolving. For this, they have at their disposal tools, techniques and management tools that aid in the decision making process.

In this sense, Reis (2011) states that the emergence and the consequent dissemination of new management techniques to support the decision-making process end up causing the breaking of old paradigms, in view of the permanent way in which these factors occur.

However, the implementation of new accounting techniques does not only depend on the organization's willingness, but also on the ability of the people who belong to it to implement the tools into their work routine. "Routines" are personal habits and can involve groups. As such, they are the components of institutions. In other words, routines are formalized or habits are institutionalized. "Institutions" can be considered as imposing social form and coherence on human activity, in part through continuous production and reproduction of habits of thought and action. (Scapens, 1994; Burns & Scapens, 2000).

Within the context of what institutions are, it will be possible to understand the context of organizations, considering that "the concept of institutions is not unique and depends on which theoretical aspect is used" (Frezatti, Rocha, Nascimento & Junqueira, 2009, 227). In addition, Frezatti *et al*. (2009) state that Institutional Theory is used to understand accounting within a specific context, as well as to show that this science cannot be analyzed as a mere isolated technical instrument, displaced from its operating environment.

The study of the Institutional Theory has aroused the interest in the area of social sciences and of the diverse approaches provided for in the literature of studies organizations. However, three possible approaches to this theory have been used in the accounting research: New Institutional Economics, Old Institutional Economics and New Institutional Sociology (Burns & Scapens, 2000; Guerreiro, Frezatti, Lopes & Pereira, 2005; Reis, 2011).

According to Guerreiro *et al.* (2005), the subject of stability and change in management accounting systems has been little explored in research in Brazil. On the other hand, it is a relevant subject of academic research abroad, mainly in Europe. According to the same author, the use of the Institutional Theory to explain the phenomena of stability and change in the management accounting systems, has been one of the approaches to be used.

The main studies related to the Institutional Theory are related to the New Institutional Sociology. According to Frezatti *et al.* (2009), based on a survey conducted in the period from 1997 to 2007, 77% of the studies were related to the New Institutional Sociology (NSI). However, the studies on the Old Institutional Economics (VEI) or New Institutional Economics (NEI) represented 9% and 8% of the studies of the subject, respectively.

Therefore, due to the importance of the subject to evaluate the changes in management accounting, is that the following research problem emerges: **What is the theoretical and methodological approach on Institutional Theory applied in Management Accounting most used in scientific research in international journals in the last 10 years?**

The purpose of this study is to analyze the approaches and methodologies of international research that have used the Institutional Theory to evaluate the changes in the use of Management Accounting in the period from 2006 to 2015.

This study is justified due to the need to identify the several researches that used the Institutional Theory to relate it to the practices of Management Accounting, aiming to explain the use of tools within the organizations, thus making it possible to identify the contributions of Institutional Theory in researches.

2 INSTITUTIONAL THEORY

Burns and Scapens (2000) suggest that the environment in which management accounting is practiced certainly seems to have changed, with advances in information technology, more competitive markets, different organizational structures, and new

management practices. Similarly, Reis (2011) states that in the current business environment, where one of the main characteristics is the high competitiveness among organizations, the emergence and the consequent dissemination of new management techniques to support the decision-making process, which eventually causes the breaking of old paradigms.

In this context of paradigm breaks, the dissemination of techniques of management accounting, which had been the subject of academic studies and practical applications in only a few companies, occurred. "This process of change in Management Accounting was the object of considerable academic studies from the 1990s on with the interest of research being directed to explore subjects related to accounting systems, accounting techniques and the role of the accountant" (Reis, 2011, p. 332).

Little attention has been paid to research to understand the processes through which these new systems and practices of management accounting have been incorporated or not into the routine of companies over time. However, Scapens (1994) and Guerreiro *et al*. (2005) state that theoretical knowledge within the management accounting is strongly guided by the neoclassical theory of the firm, but this theory does not constitute adequate theoretical framework to explain the development of management accounting systems.

In order to help researchers to find a way to better understand the changes that have occurred in the context of management accounting and which cannot be answered by neoclassical economic theory, the Institutional Theory arose (Scapens, 1994; Guerreiro *et al.*, 2005). For a better understanding of the use of Institutional Theory and aspects of change, the study of Veblen (1898) was sought, which discarded the idea that the actions of the individual are fully explicable in terms of socioeconomic circumstances, suggesting that humans are shaped by circumstances, as well as circumstances are shaped by individuals. Reis (2011) states that the analysis of any theory must be guided by historical and cultural characteristics. "The classical theory, originating from the early twentieth century and with an emphasis on the tasks, provided a solid understanding of how the organizational structure was organized and how it developed within strictly mechanistic analyzes" (Reis, 2011, p. 332).

According to Hogdson (1998), instead of a passive and substantially inert and immutable human nature, Veblen saw instincts and habits as the dynamic bases of intention and action. In addition, Veblen (1898) states that the theory of an institution can be expressed in the usual way life is performed, in which the individual tends to maintain normal equilibrium even over new formulated and required conditions. Thus, the changes that affect individuals derive from assigned values and characteristics understood by the environment.

Cultural aspects are also taken into account within an institution, as they may reflect directly on the processes of change. Veblen (1898) further states that an evolutionary economics must be the theory of a process of cultural growth, as determined by economic interest, a theory of a cumulative sequence of economic institutions expressed in terms of the process itself.·.

Thus, Management Accounting, under this aspect, which will be called Institutional, is now understood as a social process, whose research must analyze how social values are linked to economic actions, since many of the actions adopted in Accounting are implicit and difficult to detect by traditional methodologies (Reis, 2011).

Therefore, the Institutional Theory comprises a set of theoretical constructs coming mainly from economics, sociology and political science. Its three fundamental currents are the Old Institutional Economics (VEI), the New Institutional Economics (NEI) and the New Institutional Sociology (NSI). (Burns & Scapens, 2000; Guerreiro *et al.,* 2005; Frezatti *et al.,* 2009; Reis, 2011).

When analyzing the aspects of previous studies that have made a survey of the international journals, referred to in the subject Institutional Theory, highlighting the studies of Pereira (2012) and Cunha, Santos and Beuren (2015). The study of Pereira (2012) raised 37 articles in the period from 2006 to 2012, researched through the bases Sciense Direct, Emerald, Wiley Online Library, Mandeley, Oxford Jounals, JSTOR. Of the total of articles surveyed, 56.76% of studies used the Old Institutional Economics approach, 21.62% used the New Institutional Sociology and 21.62% used both approaches.

However, the studies of Cunha, Santos and Beuren (2015), only researched the Science Direct database until the year 2010. They identified 21 articles referred to in their subject of

Institutional Theory. In the study presented, the authors identified that 52.3% used the New Institutional Sociology approach, while 33.3% used VEI, 4.8% the New Institutional Economics (NEI) and 9.6% used both VEI and NSI. Following the main concepts on Institutional Theory will be addressed, in the three aspects used, to study the aspects related to the change in management accounting.

2.1 Old Institutional Economics

The purpose of the Old Institutional Economics (VEI) is the so-called "micro institutions". Studies are performed on the relationships between individuals within organizations. The purpose of this is to analyze the behaviors that produce a new social reality that after a process of change can be considered as institutionalized (Reis, 2011).

Considering Institutional Theory, according to VEI point of view, Institution is the main object of analysis and no longer the rational and maximizing behavior of decision-making individuals, as accepted by neoclassical theory. Thus, the concept of institution is relevant, although there is no simple and widely accepted definition (Reis, 2011). However, a definition of Institution given by Veblen (1919) is: a certain way of thinking common to a group of people.

In the evaluation of Burns and Scapens (2000), the institutions themselves evolve through a process of routinization of human activity. Thus, there is a duality between action (human activity) and the institutions that structure this activity. The same authors also state that organizational routines play an important role in the relationship between actions and institutions.

VEI sees individual behavior as an important part of the institutions. It strongly directs social and organizational life (Reis, 2011). The actions of the organization's individuals, shaped by rules and routines, over time, cause sedimented institutions to emerge. Individuals acting under (and sharing) rules and accounting routines make the institutions crystallized and referenced as socially adequate (Burns & Scapens, 2000; Guerreiro *et al.*, 2005; Frezatti *et al.*, 2009).

The process of management change in general and management accounting change specifically require a broad understanding of the context in which the organization is inserted, with an emphasis on established routines and institutions (Reis, 2011). In the context of management accounting, the rules comprise the formal management accounting systems, according to what is defined in the procedures manuals. Therefore, considering routines are the accounting practices actually in use, there will be a relationship between the rules and routines, but it is important not to confuse the two (Burns & Scapens, 2000).

In the context of the Old Institutional Economics, Burns and Scapens (2000) presented an institutionalization process model, represented by Figure 1, composed of the following steps: 1. Codification; 2 Incorporation; 3 Reproduction; 4 Institutionalization.

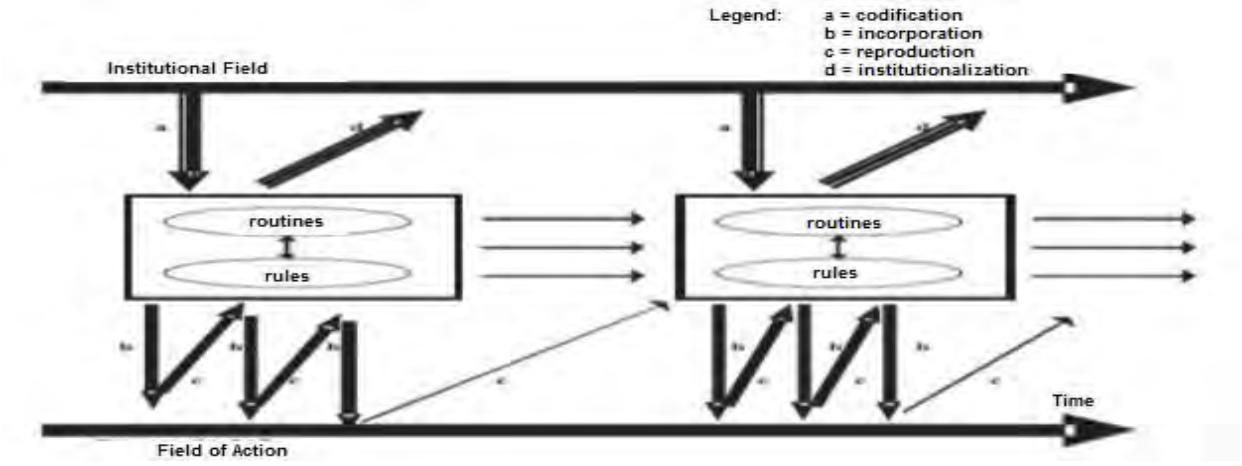

Figure 1
Organizational change model
Source: Guerreiro, Pereira e Frezatti (2008, p. 49) translated from Burns, J., & Scapens, R. W. (2000).

Conceptualizing management accounting change: an institutional framework. *Management Accounting Research, 11*, 3-25.

According to the authors, the process of institutionalization follows the following phases:

1. According to Figure 1, Burns and Scapens (2000) present the first process (arrow a) that implies in the codification of institutional principles in rules and routines. This process of codification is based on presuppositions of understanding the institutional principles through the creation of new meanings, values and powers;
2. The second process (arrow b) involves the actors articulated to the routines (and rules) that modify the institutional principles; Burns and Scapens (2000); Guerreiro *et al*. (2005) state that the incorporation process may involve conscious choice, but it is usually the result of reflexive monitoring and the application of tacit knowledge about how things are to be done;
3. The third process (arrow c) occurs as a repeated behavior, which leads to a reproduction of the routines. This reproduction may involve conscious or unconscious change, as discussed above;
4. The fourth and final process (arrow d) is the institutionalization of rules and routines that have been reproduced through the behavior of the individual actors. It is a dissociation of the patterns of behavior from their particular historical circumstances, so that rules and routines assume a normative and factual quality, which obscures their relation to the interests of the different actors.

In the process of incorporating and reproducing emerging routines, the intended rules can be modified as acceptable forms of behavior. What is considered acceptable will be influenced by the meanings and rules embedded in the ongoing routines. Also the powers of individual actors; all that will be shaped by existing institutions (Burns & Scapens, 2000))

Thus, change management in general, and management accounting change, in particular, requires a deep understanding of the organization's current context, especially its routines and institutions (Burns & Scapens, 2000). Therefore, VEI can contribute to the understanding of the process of institutionalization of rules and routines within the management accounting.

2.2 New Institutional Economics

Guerreiro *et al*. (2005) describe Coase (1937), North (1992) and Williamson (1992) as the main theorists within the New Institutional Economics. The New Institutional Economics (NIS) states that methodologically the individual is rational, however, with restricted cognitive ability. These individuals act under economic institutions that structure their behavior (Frezatti *et al*., 2009, p. 231).

In general, Coase's followers see transaction costs, which are less noticeable than production costs, as an important factor for decision making in companies (Guerreiro *et al*., 2005; Reis, 2011). The total costs, therefore, would be composed of production costs and transaction costs. However, it is common for conventional analyzes to focus only on production costs, which are easier to determine (Reis, 2011).

This is the first approach of Institutional Theory, which focuses on transaction costs, and performs an institutional analysis of how agents behave, institutionally, in relation to the environment in which it is inserted, once this environment is permeated of market imperfections (Reis, 2011).

In the design of the NEI, the transaction cost is the main reason for the existence of companies. "There are only companies because it is cheaper to carry out transactions from organizations than with people acting individually" (Frezatti *et a*l, 2009, p. 232). The instruments of this theoretical approach are the institutional arrangements of contracts and organizations in a competitive environment, whose management of firms is disciplined by the competitive pressure of markets (of assets, labor, etc.) (Guerreiro *et al*., 2005).

Guerreiro *et al*. (2005) state that the NEI focuses on the institutional environment as a set of social, legal and political rules that establish the basis of production, exchange and distribution, exerting a great influence on the behavior of economic organizations. Economic

organizations are a group of individuals engaged in a common purpose of achieving their objectives through market transactions.

Therefore, the costs of measuring the multiple dimensions of products and services exchanged or of measuring the agents' performances, as well as the costs of promoting agreements characterize transaction costs (Guerrero *et al*., 2005). Another very important point is the observation of economic activity made by Furubotn (2001). He suggests that positive transaction costs are omnipresent and unavoidable, and that decision makers are, by their very nature, very limited in their ability to acquire, store, retrieve, and process information.

As for the studies of Willianson (1992), Vandenberg (2002), state that the company is an institution in the sense that the transactions between divisions represent the interaction between these separable interfaces. Between producing or buying, decision making is the key and, in fact, virtually the only problem in Williamson's work (1992), and it is analyzed with reference to a limited number of well-specified concepts (limited rationality, opportunism, and asset specificity).

As for the study of North (1992), it is broader. According to Vandenberg (2002), it includes political decision-making and activities in civil society, as well as changes that take place over long periods of history, encompassing intra-organizational and inter-organizational private relations, as well as the development of the legal-environmental regulatory relationship that requires an understanding of the political system. In addition, it includes cultural, social, and cognitive processes that provide a structured rule and therefore also guide human interaction.

2.3 New Institutional Sociology

Structural changes in organizations appear to be less and less driven by competition or the need for efficiency. Instead, bureaucratization and other forms of organizational change occur as the result of processes that make organizations more similar, without, however, making them more efficient (Dimaggio & Powell, 1983).

Thus, the New Institutional Sociology (NSI) studies how the institutional environment, composed of rules, beliefs, traditions and the need for legitimacy, affects the behavior of organizations (Dimaggio & Powell, 1983; Frezatti, *et al.,* 2009). The main NSI concept relevant to management accounting is the notion of isomorphism. This phenomenon corresponds to the tendency that organizations have in resembling, due to pressures related to the external environment, thus creating an organizational similarity (Frezatti, *et al*., 2009). At the population level, Isomorphism suggests that organizational characteristics are modified in order to increase compatibility with environmental characteristics; the number of organizations in a population is a function of the environmental support capacity; and the diversity of organizational forms is isomorphic to environmental diversity (Dimaggio & Powell, 1983)

Therefore, this approach has as a unit of analysis the organizations. It studies changes in relation to institutionalized formal practices, which seek external legitimacy, contributing to the relationship between organizational structures and the environment in which they are inserted (Reis, 2011).

Taking into account the pressures represented in the current competitive environment, previously described, it can be considered that the conditions for institutional isomorphism are favorable. There is a degree of dependence between companies, which, coupled with the rapidity of change, leads to uncertainties and the high degree of connectivity of global information systems and their resulting complexity. They force organizations to become increasingly similar (Reis, 2011).

DiMaggio and Powell (1983) identified three mechanisms of isomorphisms, of which institutional changes occur, as shown in Table 1:

Table 1
Forms of institutional isomorphism

Isomorfism	Definition
Coercive	Results of coercive formal and informal pressures exerted on organizations by other organizations of which they are dependent and by cultural expectations of the society in which organizations function. Such pressures can be felt as force, persuasion, or as invitations to participate in collusion. In some circumstances, organizational change is a direct response to the government's mandate.

Continue

Table 1 (continuation)

Isomorfism	Definition
Mimetic	It derives from uncertainty and a powerful force that encourages imitation, because when organizational technologies are poorly understood, the objectives are ambiguous, or when the environment generates symbolic uncertainties, organizations model themselves over other organizations.
Normative	It results mainly from professionalization. Two aspects are important sources of isomorphism: one is the use of formal education and legitimation on a cognitive basis produced by university experts; the second is the growth and development of professional networks that extend through organizations and through which the new models spread rapidly. In addition, in many cases, professional power is attributed by the State as in the case of the activities of liberal professionals.

Note. Source: adapted from Dimaggio, P. J., & Powell, W. W. (1983). The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review, 48*, 147-160.

Table 1 concisely reveals the concept of each Isomorphism identified by the authors. According to DiMaggio and Powell (1983), in the Coercive Isomorphism can be given as an example the manufacturers adopt new rules against pollution by government determination, non-profit entities that must have formal accounting for compliance. Therefore, for example, the hand of the state in social organization, in view of the regulation of rules for better common life, can be seen in the Coercive Isomorphism.

Regarding Mimetic Isomorphism, DiMaggio and Powell (1983) presented as example American corporations that are implementing Japanese models to deal with personal productivity and also to solve major problems in their own companies. The rapid proliferation of the quality management process and quality of work and personal life issues in American companies is, at least in part, an attempt to model Japanese and European successess.

DiMaggio and Powell (1983) consider as important mechanism to encourage normative isomorphism the filtering of employees. Within many organizational fields, filtering occurs through the hiring of individuals from companies of the same sector, through the recruitment of employees from a narrow range of training institutions through common promotion practices for hiring senior executives from financial or legal departments and from skill level requirements to specific jobs.

3 METHODOLOGY

It is a descriptive research for describing characteristics of a particular population or phenomenon or establishing relations between variables. (Richardson, 1999; Beuren, 2014). In addition, the present research has a quantitative approach, since it is characterized by the use of statistical instruments, both in data collection and processing (Beuren, 2014). This type of study should be performed when the researcher wants to get a better understanding of the behavior of several factors and elements that influence a certain phenomenon (Richardson, 1999).

In relation to the operational procedures of survey data collection, a structured process was used in 5 databases of international scientific papers: *EBSCO, EMERALD, SCOPUS, SCIELO, WEB OF SCIENCE.*

Two axes of the survey were used: Institutional Theory and Management Accounting. And the period of analysis corresponds to the years 2006 to 2015. For the axis of Research Theory, the following keywords were used: Institutional Theory, Old Institutional Economics, New Institutional Economics, New Institutional Sociology. For the axis of Management Accounting Research, the following keywords were used: Accounting, Management Accounting, Management accounting change. The search for the articles was done through the mentioned keywords identified in the title, abstract and keywords of the articles available in the databases selected for this research.

After the consultation in the 05 bases, a result of 1,783 articles that were later exported to the software Endnote X7, excluding duplicate articles, remaining 1,362 articles. The next step was to exclude articles with titles that were not aligned with the subject. A total of 1,327 non-aligned articles were excluded, according to the researcher's perception, leaving 35 potential

articles with aligned titles remaining.

For the final stage, the articles were aligned and freely available in the databases used in the present study. Thus, 21 articles remained for analysis.

After the selection of the articles that compose the sample of this study, the analysis was carried out to verify: i) Institutional Theory Addressed; ii) Nature of the Purpose; iii) Problem Approach; iv) Technical Procedures; v) Data Collection Techniques.

4 RESULTS

In this section, the relation of the selected articles with their respective periodicals and year of publication are first presented. Afterwards, the Institutional Theory approach, the nature of the objective, the approach to the problem, the technical procedures and the data collection techniques used in the analyzed articles are evidenced. Table 2 presents the selected articles in the databases EBSCO, EMERALD, SCOPUS, SCIELO, WEB OF SCIENCE, identified by the year, title of the article and by the journal in which they were published. It can be noticed that in the analyzed period there was a frequency of publication practically in all the years, except for the year of 2010, when there was no publication. In addition, several journals have published subjects related to management accounting studies that have used some approach to Institutional Theory.

Table 2
Selected articles in databases

Seq	Year	Article Title	Journal
1	2006	Changes in accounting and financial information system in a Spanish electricity company: A new institutional theory analysis	Management Accounting Research
2	2007	Corporatization and accounting change. The role of accounting and accountants in a Malaysian public utility	Management Accounting Research
3	2007	Beyond competition: Institutional isomorphism in U.S. accounting research	Accounting Horizons
4	2008	Structuration theory and mediating concepts: Pitfalls and implications for management accounting research	Critical Perspectives on Accounting
5	2008	Accrual accounting does not necessarily mean accrual accounting: Factors that counteract compliance with accounting standards in Swedish municipal accounting	Scandinavian Journal of Management
6	2009	Explaining the choice of accounting standards in municipal corporations: Positive accounting theory and institutional theory as competitive or concurrent theories	Critical Perspectives on Accounting
7	2011	Routines in management accounting research: Further exploration	Journal of Accounting and Organizational Change
8	2011	The role of consultant-researchers in the design and implementation process of a programme budget in a local government organization	Management Accounting Research
9	2012	Management accounting change and sustainability: An institutional approach	Journal of Accounting and Organizational Change
10	2012	Factors influencing the preparedness of large unlisted companies to implement adapted International Financial Reporting Standards in Portugal	Journal of International Accounting, Auditing and Taxation
11	2012	Contracting out municipal accounting: The role of institutional entrepreneurship	Accounting, Auditing and Accountability Journal
12	2012	An analysis of the deinstitutionalization of inflation-adjusted accounting practices in Brazilian companies	Revista Contabilidade & Finanças - USP
13	2013	An institutional perspective on the development of Canada's first public accounts	Accounting History

Continue

Table 2 (continuation)

Seq	Year	Article Title	Journal
14	2013	Balanced scorecard adoption in portuguese organizations: Contingent and institutional variables	Intangible Capital
15	2013	The accounting profession's influence on academe: South African evidence	Accounting, Auditing and Accountability Journal
16	2013	Different scenarios for accounting reform in non-Anglophone contexts: The case of Japanese local governments since the 1990s	Accounting History
17	2013	Management accounting change in an Egyptian organization: An institutional analysis	Journal of Accounting and Organizational Change
18	2014	The development of accounting regulation in iraq and the IFRS adoption decision: An institutional perspective	International Journal of Accounting
19	2014	The reluctance of a developed country to choose International Public Sector Accounting Standards of the IFAC. A critical case study	Critical Perspectives on Accounting
20	2014	Institutional changes in university accounting education in post-revolutionary China: From political orientation to internationalization	Critical Perspectives on Accounting
21	2015	The impact of cultural factors on the implementation of global accounting standards (IFRS) in a developing country	Advances in Accounting

Note. Source: research data.

Table 2 shows the annual distribution of journal articles. As can be observed, the years 2012, 2013 and 2014 were the ones that had the highest number of publications, with 12 works in all. This result is in agreement with the researches of Pereira (2012) and Cunha, Santos and Beuren (2015), who affirmed that there has been an increase in the studies on changes in management accounting using some approach of Institutional Theory as of 2010.

Table 3 also shows that the journal Critical Perspectives on Accounting stands out with the largest number of publications, with 4 articles, representing 19.05% of the total. Following with 3 publications stand out the magazines: Management Accounting Research and Journal of Accounting and Organizational Change. Therefore, 3 journals represented 47.63% of the publications in Institutional Theory applied to research in management accounting. The largest number of researches in these journals is justified because they work on management accounting, human behavior, organizational structures. The research differs slightly from Pereira (2012), which presented the International Business Review with the largest number of publications, and from the Cunha, Santos and Beuren (2015) research, which resulted in Management Accounting Research magazine with the largest number of publications.

Table 3

Annual Distribution of Articles by Journals

JOURNALS	Number of Articles										Total	%
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015		
Critical Perspectives on Accounting			1	1					2		4	19.05
Management Accounting Research	1	1				1					3	14.29
Journal of Accounting and Organizational Change						1	1	1			3	14.29
Accounting, Auditing and Accountability Journal							1	1			2	9.52
Accounting History								2			2	9.52
Scandinavian Journal of Management			1								1	4.76
Journal of International Accounting, Auditing and Taxation							1				1	4.76

Continue

Table 3 (continuation)

JOURNALS	Number of Articles										Total	%
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015		
Revista Contabilidade & Finanças - USP							1				1	4.76
Intangible Capital								1			1	4.76
International Journal of Accounting									1		1	4.76
Advances in Accounting										1	1	4.76
Total	1	2	2	1	0	2	4	5	3	1	21	100.00

Note. Source: research data.

In Table 4 we sought to analyze the articles regarding the nature of the objectives. It is possible to identify that 62% presented a practical study as nature of the objectives. This result is close to that showed by Pereira (2012), which showed a little more than 50% of practical work. However, it is important to emphasize that the study of the Institutional Theory allows several possibilities for the expansion of theory and also application with respect to the understanding of the phenomena of reality.

Table 4
Nature of the Objectives

Nature of the Objective	Studies	Percentage
Theoretical	8	38%
Practical	13	62%
Total	**21**	**100%**

Note. Source: research data.

As for the number of authors per journals, it can be seen in Table 5 that, of the 21 articles surveyed, 8 present at least 2 authors, 6 articles present 3 authors and 5 articles present 1 author only. The articles show that 48 authors participated in the surveys, representing a several number of those who studied or study the subject of changes in management accounting based on the Institutional Theory. The result differs slight from the research by Cunha, Santos and Beuren (2015), in which 52.4% of articles had only 1 author. In addition, Critical Perspectives on Accounting published a publication of 11 different authors, followed by Management Accounting Research, which had a total of 7 authors who published studies on Institutional Theory.

Table 5
Number of authors per journals

JOURNALS	Number of Authors					Total Articles	%	Total Authors
	1	2	3	4	5			
Critical Perspectives on Accounting	1	1	1		1	4	19.05	11
Management Accounting Research		2	1			3	14.29	7
Journal of Accounting and Organizational Change	3					3	14.29	3
Accounting, Auditing and Accountability Journal		1		1		2	9.52	6
Accounting History		2				2	9.52	4
Accounting Horizons		1				1	4.76	2
Scandinavian Journal of Management		1				1	4.76	2
Journal of International Accounting, Auditing and Taxation			1			1	4.76	3

Continue

Table 5 (continuation)

JOURNALS	Number of Authors					Total Articles	%	Total Authors
	1	2	3	4	5			
Revista Contabilidade & Finanças - USP			1			1	4.76	3
Intangible Capital			1			1	4.76	3
International Journal of Accounting			1			1	4.76	3
Advances in Accounting	1					1	4.76	1
Total	5	8	6	1	1	21	100.00	48

Note. Source: research data.

The articles were also analyzed regarding the theoretical approach used by the authors to determine the Institutional Theory in order to explain changes in management accounting. Table 6 shows that 81% of the articles based the studies on changes in management accounting through the New Institutional Sociology (NSI) aspect. 19% of the articles were based on the Old Institutional Economics (VEI) aspect. No articles were found explaining the change in management accounting through the New Institutional Economics (NEI). This result diverges slight from the Cunha, Santos and Beuren (2015) research, where it was found that 52.3% of the studies on the subject of changes in management accounting are on NSI aspect, 33.3% on the VEI aspect and only 4.8% used the NEI aspect. However, Pereira (2012) research diverges both from the results of this research and from the results presented by Cunha, Santos and Beuren (2015), of which 56.76% used VEI and 21.62% used NSI.

Table 6
Theoretical Approach Used

Theoretical Approach Used	Studies	Percentage
New Institutional Economics - NEI	0	0%
Old Institutional Economics - VEI	4	19%
New Institutional Sociology - NSI	17	81%
Total	**21**	**100%**

Note. Source: research data.

Regarding the problem approach, 76% of the articles are qualitative, 19% quantitative and 5% use both approaches. Therefore, the predominance of qualitative studies is shown in Table 7, considering that in the qualitative research, because it is inductive, the authors sought to bring studies that could help to create a theory about changes in the field of management accounting. The Pereira (2012) and Cunha, Santos and Beuren (2015) researches did not present results on this subject.

Table 7
Problem Approach

Problem Approach	Studies	Percentage
Qualitative	16	76%
Quantitative	4	19%
Qualitative/Quantitative	1	5%
Total	**21**	**100%**

Note. Source: research data.

Regarding the analysis of research technique, Table 8 shows that 38% of the articles used the Bibliographic Research and 33% the Survey technique, as well as that there were still 14% of researches related to case studies. In addition, the techniques of documentary search, ethnographic study and also action research were used pro 5% each. Pereira (2012) research

presented some slight divergent results, since 29.73% of the studies used a theoretical essay, 18.91% a literature review and 16.22% a documentary search and interview, or a survey or case study.

Table 8
Research Technique

Technique	Studies	Percentage
Bibliographic research	8	38%
Documentary Search	1	5%
Survey	7	33%
Case study	3	14%
Ethnographic Study	1	5%
Action Research	1	5%
Total	**21**	**100%**

Note. Source: research data.

Table 9 shows the information collection techniques used by the authors. The technique can be: observation, observation-participant, documentary search, interview or questionnaire.

Table 9
Information collection technique

Information collection	Studies	Percentage
Observation	1	**3%**
Observation Participant	1	**3%**
Documentary Search	11	**35%**
Interview	7	**23%**
Questionnaire	7	**23%**
Without identification	4	**13%**
Total	**31**	**100%**

Note. Source: research data.

Therefore, it can be observed in Table 9 that 35% of the researches used the technique of collecting information, a documentary search. 23% also used the interview and questionnaires for data collection. However, in 13% of the articles it was not possible to identify the information collection technique used. The Pereira (2012) and Cunha, Santos and Beuren (2015) researches did not present any results regarding this question.

5 CONCLUSIONS

The purpose of this study is to analyze the methodological approach and the theoretical approach addressed in articles published in international journals from 2006 to 2015. For this, an exploratory-descriptive research was carried out, with a quantitative approach.

In this period, 21 articles were identified in international journals that used the Institutional Theory to explain changes in management accounting. The years 2012, 2013 and 2014 have concentrated most of the publications, showing that there is a growth in research related to the subject as proven by Pereira (2012) and Cunha, Santos and Beuren (2015).

The study also showed that the subject is published by several different journals, with emphasis on Critical Perspectives Accounting, Management Accounting Research and Journal of Accounting and Organizational Change, for presenting subjects related to the research line of such journals. The r Pereira (2012) research presented a greater number of publications in the journal Management Accounting Research, which confirms the tendency of this journal in the

publication of the subject.

Research also analyzed the nature of the objectives. It can be identified that 62% of the articles had a practical nature, a total of 48 authors for the 21 articles. Most articles have 1 to 3 authors, which to a certain extent confirms Cunha, Santos and Beuren (2015) research, who presented for the majority of articles 1 author only.

With respect to the approach of the Institutional Theory used, 81% of these articles approach the New Institutional Sociology to explain the changes in management accounting. It differs slight from the results presented by Cunha, Santos and Beuren (2015). Therefore, this research showed that the New Institutional Sociology approach dominated the scenario of the study on changes in accounting. The focus on Normative, Coercive and Mimetic Institutional Isomorphism had the purpose of seeking legitimacy through social expectations. Other studies, when applying Institutional Theory in the field of management accounting research, have proposed that institutional influences, rather than competitive forces, represent the current exclusion of non-financial accounting topics. All three processes of institutional isomorphism seem to shape the organizational field of research in management accounting.

However, the approach of Institutional Theory in the Old Institutional Economics (VEI) aspect has been gaining field to explain the changes in management accounting. It was observed in 4 studies that the process of institutionalization proposed by Burns and Scapens (2000) can explain the factors for the implementation of new processes or tools in the organizations, through the introduction of control rules, with the direct participation of the actors responsible for the execution of these processes (Englund & Gerdin, 2008, Bogt & Helden, 2011 Youssef, 2013).

There is a research gap for studies that include Management Accounting and Institutional Theory. The aspect of the Old Institutional Economics and the New Institutional Economics is still incipient in research on the subject. There are also few studies that jointly analyze the types of institutional approaches. The Institutional Theory has proved useful to explain aspects of changes in management accounting, with a view to making management tools can be institutionalized within organizations.

For future researches, studies may be carried out on a national basis, in comparison to surveys on international basis, in addition to the exploration of its contents, in order to identify in which circumstances the Institutional Theory is used to explain changes in management accounting.

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