

THE PROFITABILITY AND ITS RELATION TO THE INTELLECTUAL CAPITAL OF BRAZILIAN BANKING SECTOR COMPANIES

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ABSTRACT

The scope of this study is to present the relation that exists between investing in intangible assets, mainly the intellectual capital, and the income index present in the companies of the Brazilian banking sector, focusing in both private and public groups. Data was collected through finances reports published at BM&FBOVESPA between 2007 and 2013. In this research, the method proposed by Pulic (2000) was used, whom developed an efficiency measure of the corporative intellectual capacity, the VAIC (Value Added of Intellectual Coefficient). Calculations were performed using the researched variables. In the end, it was observed that in terms of human resources along with financial resources efficiency, the private sector is the main source of strength. But it was observed as well, that in the public sectors, the financial resource is the most influent.

Keywords: *Intangible, VAIC, Profitability Index*

1. INTRODUCTION

The business management field, among all other sciences, lives in an environment that suffers constant changes. Adapting is a task that all companies work non-stop to accomplish.

The science might mix with art, where this comes to complement the data brought by the accounting science. The analysis of the financial data is considered an art, it depends on the science of subsisting, and through it extracts data to be transformed in information, useful for all decision-takers. The accounting science captures the economic information which occurs on the company environments, process it and return it under the form of financial statements. However, some types of information go unnoticed, not only by the accounting science but for many others, for being hard to identificate and measured. And one of these information is knowledge.

The knowledge impacts extremely and directly the worth of the organization and the solid view of this resource, but the available technologies provide not always visible benefits, being it on financial reports as it is on the whole construction of the company, benefits that aggregate worth and cause significative changes.

These resources available on the companies can be named intellectual property, intangible assets, knowledge value, and intellectual value among many others. (Andriesson, 2005; Kristandl & Bontis, 2007).

This study aimed to gather these information which involve knowledge and transform them into indicators using the methodology suggested by Pulic (2000), the VAIC (*Value Added of Intellectual Coefficient*).

The main goal was to identify if was there any relation between distinct nature indicators, the profitability ones representing the economic and financial, and the VAIC with all its variable, and if they are related as well in the Brazilian Baking Sector listed at BM&FBovespa.

The choice for the banking sector was based on the high interest rates of the Brazilian economy, and that may affect directly the sector's profitability and also because it is one branch of activity present in most of Brazilian

cities and with strong relation with BM&FBovespa, being able to collect a representative sample from the sector.

This paper is structured in the following order: First, the Theoretical revision which will address several conceptual aspects related to the theme. Following it there is a chapter related to the methodology used on this research, and finally the analysis of all the data and conclusions.

2 LITERATURE REVIEW

2.1 Conceptual Aspects

The accounting as a Science might be summarized as the art of good information. However, its informative aspect is not restricted only to its financial statements. The border of the information goes beyond traditional reports. The financial and economic informations are extracted through these reports. However this new element that must be taken into consideration rises to emphasize its information power. It is not a new approach, but it is gathering lots of attention, given its importance in the modern days.

New sources of wealthness appear every day in this world of accelerated changes. Companies face this market prospects which says that their active assets might not be the most valuable competitive factor so far.

Basu and Waymire (2008) highlight the fact that business organizations copete for resources in a constant-changing environment, and the ones which survive are the one who adapt best to this environment, consciously or not. This being, researchers try to argue that the companies' continuity is present at the adaptation process to the environment they are in, and that the company main role is a mix of ideas, knowledge and information to coordinate the production and delivery of goods and services efficiently.

The knowledge became a financial resource more important than the matter, and most of the time more important than the financial capital (Drucker, 2003). The author proposes the idea that the basic economic resource is not the capital, neither the natural resources nor labour, but the knowledge, stating that we live in an age where the intellectual capital is the most important asset inside companies. Next some concepts are approached relative to the intangible assets and the intellectual capital, which in this paper will be named as synonyms, but having distinct origins.

2.2 Intangible assets: concept and importance

At today's conjuncture, the service sector growth through the industrial society's evolution should not be assigned as resulting only from its tangible assets, for they are not the only matter responsible for these results.

The theory of the contemporary administration brings a new concept of organizational capital, this being that the approaches that traditionally values the physical capital as a differential financial element, have been losing space to the ones who consider intangible assets as the main elements able to effectively add value to products and services.

In terms of concepts and definitions, under the management aspect, Klei and Prusak (1994) defined intangible assets as the intellectual matter that might me formalized, captured and exploited to produce an active of higher value.

According to Abhayawansa (2011), intangible asse tis the same as an immaterial active, which includes values that might not find material matching, as for example: commercial funds, patents, copyright, softwares, customer portfolio, and intellectual capital, among many others. Not having a physical excistence, makes its value to be restricted by the rights and advantages which its possession gives in advance to its owners.

Sullivan and Sullivan (2000) defined intangible assets as being the knowledge converted into profit, and according to Lev (2003), the concept includes characteristics from an active asset, defining how the right to future financial benefits and that do not possess physical or financial shape.

According to Iudicibus, Martins, Gelbke, and Santos (2010), intangible assets are considered "invisible", non-palpable or concrete but being originated from human intelligence and intellectual resources.

Other authors seek to find some concept to understand the word according to its etimology. According to (Schmidt & Santos, 2009, p.4):

The term intangible comes from Latin tangere, or Greek tango, which means "touch". Therefore, intangible assets are the ones who cannot be touched for not

having physical body. However, the attempt to relate the etymology to the word's accounting definition will not be successful. This being because many assets do not possess tangibility but are classified as being tangible, such as advanced expenses, trade notes to receive, financial investments and etc.

Fernández-Alles and Ramón (2006) state that the essential characteristic present in a tangible or intangible asset, is that fact that it is an entity (an object with actual existence, in opposite to its qualities or relations over which ownership rights can be established from which many benefits are generated to its owner).

The main highlight of the intangible importance is the fact that it gathers attention from the IASB (*International Accounting Standards Board*), agency based in London, which seeks to harmonize the international accounting practice. This agency is responsible for issuing standards named IFRS (*International Financial Reporting Standards*) and its statements named IAS (*International Accounting Standard*). In 1998, a new accounting standard was developed, named IAS 38 which was revised at 2004 and 2008. In Brazil it was named CPC 04 (Committee of accounting pronouncements) and according to this standard, the companies must publish some intangibles in their annual reports. However, most of these elements are kept hidden in order to a few recognizing criteria at this standard.

Kristandl and Bontis (2007) mention the fact that, as much as in the academic community as in the literature, there are controversies about the definitions which seek to concept what exactly are intangible assets, what are the main terms for it and if there is a hierarchy among them.

However Cañibano, Garcia-Ayuso, and Sánchez (2000) mention the fact that however none of the definition of intangibles proposed in the accounting literature have gained general acceptance, it is possible to identify a series of basic characteristics that are common between them. Authors mention that they are generally defined as sources of likely future economic benefits and that it lacks physical substance, that it has market value and belong or are managed by the company

Because of the broad range of concepts to this word, according to Ali and Merve (2012) what really matters is that the market has acknowledged the value of knowledge and other intangible factors a long time ago, this being the the reason why many times, companies are worth much more than their actual financial value.

2.3 Intellectual Capital

Global economy has switched sights. According to Schmidt and Santos (2009), the Age of Information and Knowledge became the main commodity, and main propeller of all economic activity. The authors state that organizational intelligence (smart people working on a smart way) no longer has a secondary role, becoming the primary role in every company.

Human Capital is composed of everyone who is part of the organization. All the talents that have the need to be maintained and developed. It is an invisible capital made out of intangible assets, and considered as a competitive advantage.

St-Pierre and Audet (2011), state that the human capital might be understood as being the skills, the knowledge and the know-how of everyone involved in the company, becoming a high value asset inside organizations, because its source is the creativity and innovation. However, the risk must be taken in account, because it does not belong to the company itself, but to every individual inside it. (Edvinsson & Malone, 1997).

For Stewart (1997), the intellectual capital corresponds to the group of knowledge and information found in the organizations, which aggregate value to the product/service, by applying intelligence, and not financial capital to the business, which provides competitive advantage.

Antunes (2008) states that this knowledge factor as being an economical resource, and highlights that “admit the knowledge as an economical resource imposes new paradigms in the way we value an organization, because it generates intangible benefits which will change its heritage”.

Axtle-Ortiz (2013) divide the intellectual capital in: structural, human and relations capital.

According to the authors, the human capital is the knowledge that people or groups of people have and the ability to learn and share certain acquisitions with other members of the company. Inside the human capital, values and attitudes are inserted, along with abilities and skills.

The structural capital is the group of knowledge and intangible assets that are priority at the organization. It is subdivided in organizational capital and technological capital.

Lastly, the relations capital is about the knowledge which is incorporated to the organization as consequence from the value derived from the amount and quality of the relations with different agents and market and the whole society. It is subdivided in social capital, and business capital.

According to the literature it is possible to conclude that the intellectual capital is made out of the thinking part (human capital) and the not thinking part (structural capital), (Melo & Galan, 2011).

Recognizing the fact that the knowledge is a financial resource breaks standards of the value of the human being, as well as the way to value an organization, because they might provide benefits which will alter its own heritage.

To bring these concepts into accounting is a task that still has a long way ahead. However, it is possible to trace relations from these elements, extracted from financial samples, with traditional indicators, as profitability, which will serve as variable to this study, which concepts will be demonstrated below.

2.4 Profitability

Every investor or entrepreneur hopes that the invested capital will be paid properly and, on the other side, the funders or capital providers expect that the one who was funded will be able to provide enough profit to pay back its actives and fundings (Matarazzo, 2010).

So, in a simple way, the definition of profitability might be the expected return over an investment. Also it can be understood as the level of return from a business and the profit obtained by the company.

To obtain the data and information relative to this “refund” to use them in a proper way, an analysis is needed through some index.

Matarazzo (2010) states that the profitability index shows us the actual profitability of the invested capital, this being, how much they yield, and therefore what was the rate of economic success of the company.

These indexes play an important role for effect decision making, because of its application in investments.

An audience that should use this tool is the capital market investor though the purchasing of shares. In order to choose a company later, some thorough analysis must be performed in the company’s balance that could be invested on, because the investor’s interest is based on the profitability. In this context, two indicators are important to evaluate if the investor was successful on its decision, the Return On Investment (ROI) and the Return On Equity (ROE), which are variables in this study.

The ROI’s mains objective is to measure the global efficiency of the company’s management, focusing in the profit with it total investments. If there are no significative variations in the assets, the analyst can choose to mediate the direct relations between the net income and the asset’s balance. Otherwise, the average asset is used, which is obtained through the sum of the total asset from the last exercise with the current year’s total asset, divided by two. In this work, the first option will be used with the following formula:

Formula 1 – ROI calculation

$$\text{ROI} = \text{Net income} / \text{Total Assets} \times 100$$

Source: (Matarazzo, 2010)

The ROE index presents the return that the company shareholders get according to their investment on the company, with the following formula:

Formula 2 – ROE Calculation

$$\text{ROE} = \text{Net Income} / \text{Equity} \times 100$$

Source: (Matarazzo, 2010)

The financial indicator itself is not very representative. They become of higher importance when compared to other indicators. In this paper, an analysis was made comparing an efficiency indicator of the intellectual capital that will be demonstrated below.

2.5 Intellectual Capital Efficiency Indicator

Pulic (2000) developed a method which measures the efficiency of the value aggregated by the company intellectual capacity, named VAIC. According to the author, the companies market value is generated from the sum of both invested capital and the intangibles, this being composed by human and structural capital.

This method aims to provide information about the creation efficiency and value of both capital, tangibles (actual capital) and the intangibles (human/structural capital). This method measures indirectly the intangibles through the efficiency measure of three variables of the invested capital: Invested Capital Efficiency, Human Capital Efficiency and Structural Efficiency Capital. The higher the sum of these indicators, higher the VAIC will be, demonstrating higher efficiency in the value creation of a company.

Pulic (2000) was the first to test his methodology, using a 250 company wide sample, all listed in Vienna stock exchange.

The VAIC is one of the most used method as the coefficient of the intangible assets use. Differently from other methods, the VAIC methodology is not only developed to the company level, but also for country government, business sectors and other levels (Pal & Soriya, 2012)

The steps to calculate the VAIC are described below, according to the method suggested by (Pulic, 2000).

- 1) AV = Added Value generated by the company. Reported at the AVR (Added Value Report);
- 2) LE = Labour Expenses. Reported at the AVR;
- 3) CE = Capital employed. Total value of the Equity/
- 4) SC = AV – LE (proxy to the structural capital)
- 5) HCE = AV/LE (Human capital efficiency indicator)
- 6) SCE = VA/CE (invested capital efficiency indicator)
- 7) CEE = SC/AV (Capital efficiency structural indicator)
- 8) VAIC = HCE + SCE + CEE.

The adoption of this methodology is mentioned for providing certain benefits (Chen, Cheng, & Hwang, 2005; Firer & Williams, 2003; Sullivan & Sullivan, 2000). According to the authors it is easy to calculate, it is consistent, predicts standard measures, allowing the comparison between companies and countries, as well as the data which are provided by financial statements, which are usually audited.

3. METHODOLOGICAL ASPECTS AND HYPOTHESIS

3.1 Adopted Perspective

Regarding the objectives, the research is characterized as descriptive because it aims to identify the correlation between the VAIC and the profitability index of the companies. In Andrade (2002) point of view, the descriptive research aims the observation of facts, recording, data analysis, sorting and understand them.

The approach of the theme in research is quantitative. Hanson and Grimmer (2007, p.62) state: “the quantitative methodology involves collecting and analysis of numerical data and applies it through statistics tests. The quantitative research puts in numbers the opinions and information so they can be sorted and observed”.

The research procedures are outlined by the documental research. According to Teophilo and Martins (2007), this method is used the most to solve problems, or to get to gain knowledge through the book research, as well as articles and newspapers, collecting, selecting, analyzing and interpreting the previous published theoretical contributions about this subject.

3.2 Data collection

The data collection method was performed through the access to information available at the BM&FBovespa, through the gathering and analysis of data presente constantly in financial statements.

To construct the sample, 14 companies out of 28 that are part of the banking sector at BM&FBovespa were used, and from this 13, 50% were private companies and 50% public or mixed companies. The research was based on periodics published between 2007 and 2013.

3.3 Methodology

The main goal of this research is to identify if is there any correlation between the VAIC and the profitability index of the companies, namely the ROI and ROE.

Therefore, it is expected that these investments might be positive correlated and the theoretical assumption is formulated according to the following hypothesis:

H_A = The VAIC is positively correlated to the profitability indicators ROE and ROI of the Brazilian Banking Sector companies.

This hypothesis is based at the relation between the VAIC and the profitability index. In overall, the intention is also to evaluate how the VAIC components are related to these indicators, evaluating each element separated. Therefore, three additional hypotheses will be presented to test the effect of each one of them:

H_{A1} = The HCE is positively related to the profitability indicators.

H_{A2} = The SCE is positively related to the profitability indicators.

H_{A3} = The CEE is positively related to the profitability indicators.

4. DATA ANALYSIS

The data analysis of this paper, in accordance to the methodology, had as initial objective to perform a descriptive analysis of all collected data, with the main goal to evaluate broadly the initial results which will serve as support for the analysis sequence.

The data was separated in three groups: the global data, where the public and private banks initial results are stated, which is further subdivided in other two groups: one related to public banks, and other related to the private banks.

The global data is described in board 01:

Board 01- Descriptive Statistics for the global data

	Number Observed	Minimum	Maximum	Average	Deviation
ROE	96	-29,0%	71,4%	20,9%	13,8%
ROI	96	-3,2%	7,1%	2,3%	1,4%
HCE	96	-,635	6,407	2,835	1,140
SCE	96	-,108	1,359	,561	,307
CEE	96	-,885	2,575	,614	,291
VAIC	96	-,291	7,495	4,010	1,223

Source: Research data

At the profitability indicators, ROE and ROI, the average obtained were 20.9% and 2.3% respectively. The negative value is due to the fact that some companies presented losses in the time researched. The expressive differences of both indicators are due to the specific characteristics of the studied sector (banking), where the third-party investing is more expressive in relation to the company own capital, once the banking sector usually keep a high level of financial leveraging, typical from this sector.

In relation to the Value Added of Intellectual Coefficient, VAIC, it was observed that the sector average in the studied period was 4.010, having a maximum value of 7.495.

Board 02 presents the same indicator, however, considering only the private sector.

Board 02 – Descriptive Statistics to the private sector

	Number Observed	Minimum	Maximum	Average	Deviation
ROE	47	-29,0%	48,0%	15,7%	13,0%
ROI	47	-3,2%	7,1%	2,1%	1,6%
HCE	47	-,635	6,407	3,391	1,334
SCE	47	-,108	,786	,361	,187
CEE	47	-,885	2,575	,692	,380
VAIC	47	-,291	7,495	4,445	1,487

Source: Research data

By analyzing the private banking data, it was observed that at the profitability indicators – ROE and ROI – Both are below the global average, and that the minimum values found at the global data come from the private banks, and that the standard deviation is really close to the average, stating that there is an expressive distance

between the minimum and maximum value. Regarding the VAIC, it was above the global average. This result is due to the strong presence of Intellectual Capital (HCE) which is higher than the average, and the fact that the other indicators which create the indicator are really close to the global average.

Board 03 presents the same data, however, regarding the public banks.

Board 03 – Descriptive Statistics of the Public Banks

	Number Observed	Minimum	Maximum	Average	Deviation
ROE	49	1,5%	71,4%	26,0%	12,9%
ROI	49	0,4%	5,9%	2,5%	1,2%
HCE	49	1,041	3,889	2,301	,519
SCE	49	,198	1,359	,753	,276
CEE	49	,039	,743	,539	,132
VAIC	49	1,624	5,171	3,593	,691

Source: Research data

Analyzing the board above, it is possible to observe the similar results obtained to the previous board (02), having only the inversion of relation to the profitability indicators, where the maximum global value comes from the public banks, and the standard deviation is more distant from the average. The VAIC is below the global average. This fact is due to the Human Capital (HCE), which is the main variable in this calculation, is inferior to the global average and the other indicators to be close to the global average.

In sequence were performed some correlation analysis. The distribution criteria of the boards were the same as the one adopted at the descriptive statistics. Initially the global data and then the individual data of the public and private banks.

The correlation analysis main goal is to observe if there any relation between the studied variables. A more accurate way to measure the kind of strength of a relation between two or more variables is the Correlation Coefficient. This coefficient is a strength and direction measure of a linear relation between variables, being represented by the “r” letter. The formal name is Pearson Correlation Coefficient and its range varies from -1 to 1 (Larson & Farber, 2013).

Once the “r” is calculated there is a need to know if there enough evidence to decide if the correlation coefficient is significant. Therefore the significance level is used, which is the assumed error rate. This rate might assume different values, and the lower it is, higher will be the certainty of the studied data. The significance level is obtained through the calculation of the probative value, denominated *p-value*.

In order to the correlation coefficient to be significant, it is needed that the *p-value* to take a smaller value than the error rate. In this research, the error rate adopted was 5% or 0,05. The Board 04 demonstrates a global analysis of the companies studied.

It is noteworthy that in regard to the correlation analysis, tests were performed to identify possible problems of multicollinearity, and there were no facts like this in the performed analysis.

Board 04 – Correlation of the studied variables – global

	ROE	ROI	HCE	SCE	CEE	VAIC
ROE Correlação Pearson	1					
P-Value						
ROI Correlação Pearson	,759	1				
P-Value	,000					
HCE Correlação Pearson	,204	,567	1			
P-Value	,046	,000				
SCE Correlação Pearson	,818	,411	-,200	1		
P-Value	,000	,000	,050			
CEE Correlação Pearson	-,063	,062	,288	-,183	1	
P-Value	,543	,549	,004	,074		
VAIC Correlação Pearson	,381	,646	,950	,021	,460	1
P-Value	,000	,000	,000	,841	,000	

Source: Research Data

In a global analysis, considering the public and private banks, it is observed to have a relation between the profitability indicators (ROE and ROI) and the VAIC, once the *p-value* takes, in both cases, the value of 0.000 which is below the significance level of 0.05. These data states that the correlation is stronger when comparing the VAIC to the ROI 0.646 and smaller to the ROE 0.381.

In this evaluation is possible to observe, regarding the ROI, that among the components which create the VAIC, there is correlation between the Human Capital (HCE) and the Invested Capital (SCE) and no correlation with the Structural Capital (CEE). This shows us that, in a general way, that the banks give more importance in investments at the intellectual capital (0.567), and not so much in the financial capital (0.411), and there is no correlation to the structural capital. It works in a different way with the ROE, which has a strong connection to the SCE (0.818), and no significant correlation to all the others, showing that regarding this indicator there is a strong influence of the financial capital, what might be understood by the sector that was evaluated.

The following tables break down these global indicators to individual indicators, namely among public and private banks, with the main goal to evaluate if the trends stated at the global data is confirmed in both sectors.

Table 05 – Correlation between the studied variables – public banks

	ROE	ROI	HCE	SCE	CEE	VAIC
ROE Correlação Pearson P-Value	1					
ROI Correlação Pearson P-Value	,732 ,000	1				
HCE Correlação Pearson P-Value	,184 ,206	,393 ,005	1			
SCE Correlação Pearson P-Value	,839 ,000	,490 ,000	-,040 ,784	1		
CEE Correlação Pearson P-Value	,231 ,110	,420 ,003	,912 ,000	,017 ,906	1	
VAIC Correlação Pearson P-Value	,518 ,000	,571 ,000	,909 ,000	,373 ,008	,883 ,000	1

Source: Research Data

Regarding to the public banks, a balance between both profitability indicators can be observed, which presents correlation, once the *p-value* in both cases is 0.000, smaller than 0.05, where both values are next to each other. In both cases there is a correlation with the Invested Capital (SCE), showing strong dependence of the financial values. Regarding the ROI, this correlation also is also present at the Structural Capital (CEE). Therefore, the ROI correlates with all three components of the VAIC, having as the main component the financial (SCE), something that does not happen with the ROE which presented strong correlation only to the SCE.

Identical procedure was performed regarding the private banks, which results are presented on the table #06.

Table 06 – Correlation between the studied variables – private banks

	ROE	ROI	HCE	SCE	CEE	VAIC
ROE Correlação Pearson P-Value	1					
ROI Correlação Pearson P-Value	,814 ,000	1				
HCE Correlação Pearson P-Value	,648 ,000	,868 ,000	1			
SCE Correlação Pearson P-Value	,812 ,000	,401 ,005	,337 ,021	1		
CEE Correlação Pearson P-Value	-,023 ,880	,025 ,867	,088 ,556	-,045 ,765	1	
VAIC Correlação Pearson P-Value	,678 ,000	,835 ,000	,962 ,000	,416 ,004	,329 ,024	1

Source: Research Data

The private banking sector presents the correlation between both indicators (profitability and VAIC) as well. In both cases the *p-value* was inferior to the significance level. In this case the correlation was observed with the

ROI in a smaller degree than the ROE. The ROI presented strong correlation to the Human Capital (HCE) and also to the Financial Capital (SCE), however, in a smaller degree to the Structural Capital (CEE).

The ROE was observed to be strongly correlated to two out of the VAIC indicators, being related primarily to the Structural Capital (CEE). It is noteworthy that in this case, the Structural Human Capital Indicator (HCE) presented to be strongly correlated to both profitability indicators.

Using all these analysis, the study was performed and the conclusion is presented below.

5. CONCLUSION

This study aimed to identify the relation that exists between both profitability indicators (ROE and ROI), being these economic and financial indicators, and the Value Added of Intellectual Coefficient (VAIC) and the variables that make part of it, with the main goal to evaluate if two groups with different natures have any correlation.

The methodology used to calculate the intellectual capital efficiency was the VAIC, which was previously used by few other similar studies (Bontis, Keow, & Richardson, 2000; Britto, Monetti, & Jr, 2014; Cohen & Kaimenakis, 2007; Lapina & Lentjushenkova, 2014).

Considering both perspectives, an economic and financial, and another of innovation focusing on the intellectual capital, it is possible to get to the following conclusions:

Considering the range of the sampling, the average VAIC of the Brazilian banking sector is 4.010, being slightly superior at the private banks value of 4.445, and inferior at the public banks, 3.493. The main variable is the model of structure of the Human Capital (HCE), which the sector average was 2.835, being 3.391 to the private sector and 2.301 to the public sector. This data shows that the private institutions have a bigger concern and invest even more on the human capital. The origin of this difference was not investigated for not being part of the scope of this study.

In the analysis of the correlation it was found that, in a general way, both sector, public and private, present correlation between both ROE/ROI and the VAIC. Focusing on the ROI, it was stronger (0.646) in which two variables (HCE and SCE) presented correlation, and CEE presented none. Comparatively to the ROE the correlation was smaller (0.381) and there was correlation only to one of the variables (SCE). This being, from all the variables that make part of the VAIC only one of them (SCE) presented correlation to the profitability indicators.

When breaking down the indicators, it was observed that in the public sector, there was a correlation between the analyzed variables, being both pretty close, (0.518) to the ROE and (0.571) to the ROI. The ROE presented the strongest correlation to the CEE (0.839), but none to the other variables. The ROI presented correlation to two out of the three variables, SCE and CEE, not presenting any relation to the Human Capital variable (HCE).

In the private sector, it presented a strong correlation, being 0.678 to the ROE and 0.835 to the ROI. It is noteworthy that in the private sector, the Human Capital variable (HCE) presented a strong correlation with both profitability indicators, showing that the private sector is investing in the human capital way more than the public sector. The ROE had a strong correlation with two out of three of the studied variables (HCE and SCE), showing that beyond the investments over the human capital, the financial capital also exerts strong influence. Regarding to the ROI, it was found a correlation only to the human capital (HCE).

Also, the reasons of these differences between both sectors were not investigated, being a possible aim for future studies.

Answering the Hypothesis H_A , we can conclude that the VAIC is positively related to both profitability indicators, both in the public and the private sector, where it is a stronger relation.

Regarding the additional hypothesis H_{A1} , it is possible to say that the variable HCE is related positively to both ROI and ROE at the private sector, with no relation at the public service. The H_{A2} , it follows that the SCE variable finds correlation in the public sector with both ROE and ROI, when in the private sector, the relation is only to the ROE. The H_{A3} concludes that the variable CEE finds correlation only at the public sector in relation to the ROI, with no other correlation.

In a general way, it is possible to conclude that the Brazilian Banking Sector, in human capital efficiency terms, draws strength only in the private sector, where not only the human capital exerts strong influence, but the financial capital as well. In the public sector, the strongest influence is still the financial capital, over the others.

This research aimed to demonstrate that both profitability indicators (ROI and ROE) and VAIC are both distinct ideas, but they are not rivals. The VAIC measures the dimension and performance that is not considered in other traditional standards. This being, the VAIC can be considered as a complementary indicator to the ones previously used, and because of this, it might be included as an efficiency and innovation indicator, basically because the data that is necessary to perform the calculations are extracted whole from the financial statements published by the companies, just as the profitability indicators.

The model created by Pulic (2000) about the added value and the value creation inside a knowledge economy context, is the strongest point of his model, exposing that it is possible to measure the knowledge inside the companies.

REFERÊNCIAS

- Abhayawansa, S. (2011). A methodology for investigating intellectual capital information in analyst reports. *Journal of Intellectual Capital*, 12(3), 446-476.
- Ali, U., & Merve, K. (2012). Value relevance of voluntary disclosure: evidence from Turkish firms. *Journal of Intellectual Capital*, 13(3), 363-376.
- Andriesson, D. (2005). Implementing the KPMG Value Explorer: Critical success factors for applying IC measurement tools. *Journal of Intellectual Capital*, 6(4), 474-488.
- Antunes, M. T. P. (2008). *Capital Intellectual*. São Paulo: Atlas.
- Axtle-Ortiz, M. A. (2013). Perceiving the value of intangible assets in context. *Journal of Business Research*, 66(3), 417-424.
- Basu, S., & Waymire, G. (2008). Has the importance of intangibles really grown? and if so, why? *Accounting and Business Research*, 38(3), 171-190.
- Bontis, N., Keow, W., & Richardson, S. (2000). Intellectual Capital and Business Performance in Malaysian Industries. *Journal of Intellectual Capital*, 1(1), 85-100.
- Britto, D. P., Monetti, E., & Jr, J. d. R. L. (2014). Intellectual capital in tangible intensive firms: the case of Brazilian real estate companies. *Journal of Intellectual Capital*, 15(2), 333-348.
- Cañibano, L., Garcia-Ayuso, M., & Sánchez, P. (2000). Accounting for intangibles: A literature review. *Journal of Accounting Literature*, 19, 102.
- Chen, M.-C., Cheng, S.-J., & Hwang, Y. (2005). An empirical investigation of the relationship between intellectual capital and firms' market value and financial performance. *Journal of Intellectual Capital*, 6(2), 159-176.
- Choong, K. K. (2008). Intellectual Capital: definitions, categorization and reporting models. *Journal of Intellectual Capital*, 9(4), 609-638.
- Cohen, S., & Kaimenakis, N. (2007). Intellectual Capital and Corporate Performance in Knowledge-intensive SMEs. *The Learning Organization*, 14(3), 241-262.
- Drucker, P. (2003). *Sociedade Pós-Capitalista*. São Paulo: Actual.
- Edvinsson, L., & Malone, M. S. (1997). Intellectual Capital: realizing your company's true value by finding its hidden brainpower. *HarperCollins Publishers, New York, NY*.
- Fernández-Alles, M. d. I. I., & Ramón, V.-C. (2006). Reconciling institutional theory with organizational theories. *Journal of Organizational Change Management*, 19(4), 503-517.
- Firer, S., & Williams, S. M. (2003). Intellectual capital and traditional measures of corporate performance. *Journal of Intellectual Capital*, 4(3), 348-360.
- Hanson, D., & Grimmer, M. (2007). The Mix of Qualitative and Quantitative Research in Major Marketing Journals, 1993-2002. *European Journal of Marketing*, 41(1/2), 58-70.
- Iudicibus, S., Martins, E., Gelbke, E. R., & Santos, A. (2010). *MANUAL DE CONTABILIDADE SOCIETÁRIA: Aplicável a todas as Sociedades de Acordo com as Normas Internacionais e do CPC* (1 ed.). São Paulo, Brasil: Atlas.
- Klein, D. A., & Prusak, L. (1994). Characterising Intellectual Capital. *Ernst & Young, Cambridge*.
- Kristandl, G., & Bontis, N. (2007). Constructing a definition for intangibles using the resource based view of the firm. *Management Decision*, 45(9), 1510.
- Lapina, I., & Lentjushenkova, O. (2014). Intellectual Capital Investments Influence on Entrepreneurship and Economic Performance. *Journal of Business and Management*, 1(1), 16-32.
- Larson, R., & Farber, B. (2013). *Estatística Aplicada* (4ª ed.). São Paulo.
- Lev, B. (2003). Facts and fiction. *Journal of Economic Perspectives*, 7(2), 27-50.

- Matarazzo, D. C. (2010). *Análise Financeira de Balanços: Abordagem básica e gerencial* (7ª ed.). São Paulo: Atlas.
- Melo, T., & Galan, J. I. (2011). Effects of corporate social responsibility on brand value. *Journal of Brand Management*, 18(6), 423-437
- Pal, K., & Soriya, S. (2012). IC performance of Indian pharmaceutical and textile industry. *Journal of Intellectual Capital*, 13(1), 120-137.
- Pucar, S. (2012). The influence of intellectual capital on export performance. *Journal of Intellectual Capital*, 13(2), 248-261.
- Pulic, A. (2000). VAIC - an accountig tool for IC management. *International Journal of Technology Management*, 20(5-7), 702-714.
- Schmidt, P., & Santos, J. L. d. (2009). *Avaliação de Ativos Intangíveis* (2ª ed.). São Paulo: Atlas.
- St-Pierre, J., & Audet, J. (2011). Intangible assets and performance: Analysis on manufacturing SMEs. *Journal of Intellectual Capital*, 12(2), 202-223.
- Stewart, T. (1997). *Capital intellectual: a nova vantagem competitiva das empresas*. Rio de Janeiro: Campus.
- Sullivan, P. H., Jr., & Sullivan, P. H., Sr. (2000). Valuing intangibles companies - An intellectual capital approach. *Journal of Intellectual Capital*, 1(4), 328-340.
- Teóphilo, C. R., & Martins, G. A. (2007). *Metodologia da Investigação Científica para Ciências Sociais Aplicadas*. São Paulo: Atlas.