



VALUE ADDED INTELLECTUAL CAPITAL COEFFICIENT (VAIC) AND BUSINESS PERFORMANCE: THE IMPACT OF INTELLECTUAL CAPITAL ON SMALL AND MEDIUM-SIZED ENTERPRISES PERFORMANCE

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Resumo

O rápido crescimento de empresas intensivas em tecnologia em uma economia baseada no conhecimento, sinaliza a importância da gestão do capital intelectual no meio corporativo. A literatura sobre o tema aponta que este ativo intangível contribui para o desempenho, competitividade e sustentabilidade financeira das empresas. Este fato é marcante especialmente nos países em desenvolvimento, onde as pequenas e médias empresas são consideradas o motor do crescimento, devido à sua capacidade de geração de empregos, flexibilidade e inovação. Mediante a esse ajuizamento, este estudo visa investigar como este ativo intangível é classificado e medido por acadêmicos e qual a sua relação com o desempenho financeiro de pequenas e médias empresas. Esta pesquisa emprega a revisão sistemática da literatura, para identificar os fatores críticos de sucesso que associam os fatores supracitados, em uma ampla perspectiva analítica sobre a mensuração do capital intelectual. Como resultado, as categorias monetárias e não monetárias dos métodos de medição do capital intelectual estão descritas neste estudo e as descobertas sugerem que as empresas com maior desempenho financeiro realizam de forma mais eficiente o potencial de seu capital intelectual.

Palavras-chave: Capital intelectual. Valor adicionado pelo capital intelectual. VAIC. Pequenas e médias empresas. Desempenho do negócio.

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Abstract

The rapid growth of technology-intensive companies in a knowledge-based economy indicates the importance of intellectual capital management in the corporate environment. The literature on these subject points out that this intangible asset contributes to the performance, competitiveness and financial sustainability of companies. This fact is particularly striking in developing countries, where small and medium-sized enterprises are considered to be the engine of growth, due to their ability to generate jobs, flexibility and innovation. Through this filing, this study aims to investigate how this intangible asset

is classified and measured by academics and what is its relationship with the financial performance of small and medium-sized companies. This research employs a systematic review of the literature, to identify the critical success factors that associate the aforementioned invoices, in a broad analytical perspective on the measurement of intellectual capital. As a result, the monetary and non-monetary categories of intellectual capital measurement methods are described in this study and the findings suggest that companies with higher financial performance realize the potential of their intellectual capital more efficiently.

Keywords: Intellectual capital. Value added intellectual coefficient. VAIC. Small and medium-sized enterprises. Business performance.

1 INTRODUCTION

The ability to innovate seems to be a fundamental requirement for the growth and sustainability of small businesses. In fact, recent studies indicate a positive relationship between two components of intellectual capital, human capital and organizational capital and the organizational performance of small and medium-sized companies. On the other hand, the role of intellectual capital in facilitating innovation and the performance of SMEs is still a challenge for the academic community [1]. Equally, despite the fact that small and medium-sized enterprises (SMEs) generate a significant economic impact in most economies, the failure rates of these companies remain high according to recent studies. However, few authors have devoted themselves to studying the influence of intellectual capital on the business performance of SMEs, even knowing that correlation between intellectual capital and innovation has already been demonstrated in previous studies [2].

According to [3], [4], [5], [6], [7] and [8], traditional measures of financial performance are not enough to value knowledge firms. Companies need to improve their disclosure and reporting of intellectual capital and value creation strategies. In response to the need for IC valuation, several methods to measure various researchers, such as, Skandia IC Report Method [4], Intangible Asset Monitor Approach [9] and Value Added Intellectual Coefficient (VAIC) Model [10] and [5], have developed IC and its performance. Among these methods, Pulic's VAIC is widely adopted by academics and practitioners as a method to measure IC and reflect the market value of corporations. To [5], the value added intellectual coefficient (VAIC), is an indirect measure of efficiency of the value added (VA) of corporate IC, and provides information about the efficiency of tangible and intangible assets that can be used to generate value to a firm. Indeed, VAIC has been widely adopted by academics and practitioners [11], as it allows monitoring and measuring the value added based on the efficiency of firm's IC [68]. Furthermore, VAIC allows measuring the individual components of IC: physical and financial capital (CEE), human capital (HCE), and structural capital (SCE) ([12], [10] and [5]).

The present research, which is exploratory, carried out a systematic literature review (SLR), adopting the Kitchenham protocol [13]. The qualitative approach included bibliographic / documentary research and exploratory research, aiming to meet more appropriately the objectives proposed for the work. This study is based on a practical and relevant problem that aims to investigate the impact of intellectual capital on the organizational performance of small and medium-sized enterprises (SMEs). Therefore, this research is justified by dedicating itself to contribute to academic and scientific progress, aiming at improving the understanding of the referred research problem.

The study is organized in four sessions. The first session is reserved for the main concepts that theoretically support the research and focus on the problem of IC and small and medium-sized enterprises financial performance. The methodological procedures adopted are

presented in the second session. The third session discusses and presents the results obtained. The last session is dedicated to the conclusions.

2 THEORETICAL FRAMEWORK

This study is willing to investigate the relationship between intellectual capital and the financial performance of small and medium-sized enterprises through Ante Pulic's VAIC framework [5]. To this end, the concepts that permeate the theme necessary for the development of this research are presented in this chapter.

2.1 Intellectual Capital

Aiming to contribute to a universal intellectual capital definition, [14] defined Intellectual capital (IC) as the intellectual material that can be formalized, captured and leveraged to produce a higher value asset. Years later, [15] defined IC as the possession of knowledge, applied experience, organizational technology, customer relationships and professional skills that provide a competitive edge in the market. Table 1 presents the mains authors and their definition of intellectual capital (IC).

Table 1 - Selected definitions on IC

Author	Definition
[21]	Intellectual material that has been formalized, captured and leveraged to produce higher value assets.
[24]	Knowledge that can be converted into value.
[17]	Possession of knowledge, applied experience, organizational technology, customer relationships, professional skills that provide a competitive edge in the market, the organization's relationships and community influence.
[20]	Knowledge that can be converted into profits.
[19]	Nonmonetary and non-physical resource, strongly contributes to value creation through employee's knowledge and organizational processes, databases and relationships.
[20]	The group of knowledge assets that are attributed to the value creation of an organization.
[21]	Categories such as advertising (marketing), distributing, training (human resources), R&D, brands, copyrights, covenants not to compete, franchise, future interest, licenses, operating rights, patents, record masters, secret processes, and trademarks.
[22]	The sum all knowledge and knowing capabilities that allows firms to gain and/or maintain a sustainable competitive advantage.
[23]	Intangible assets as claims of future benefits, but without physical or financial form.

Source: Author, 2020

2.1.1 Human Capital (HC)

According to [24], human capital (table 2) is typically recognized as a firm's most valuable asset as it underlies the organization's capability to make decisions and allocate resources. This enables human capital to become a source of innovation and strategic renewal.

Table 2 - Selected definitions on HC

Author	Definition
[25]	HC is the accumulated capabilities of individuals responsible for providing customer solutions.
[26]	It represents the knowledge, skills, learning capacity, experience and know-how of employees. Some examples of HC are the experiences, learning capacity, teamwork capacity, innovation capacity, Know-how, experience, flexibility, motivation, satisfaction, loyalty, formal training and education.
[27]	HC refers to the sum of employee's knowledge, competence, innovativeness, commitment and wisdom.

Source: Author, 2020

2.1.2 Structural Capital (SC)

According to [28], structure capital (table 3) is a mix of all elements, namely institutionalized databases in the form of methods and policies that an enterprise has, records and information technologies used for documentation in various configurations, organizational culture, financial relations and patents. Deeply, [29] defined SC to be the capability of an organization to transform human capital knowledge into the tangible assets like software, databases, computer systems, routines, procedures and strategies to create value for the organization.

Table 3 - Selected definitions on SC

Author	Definition
[25]	SC refers to the capabilities of the organization to meet market requirements.
[30]	It consists, briefly, of the stock of knowledge that stays in the organization at the end of the day, after the employees go home. This means, it is the tacit and explicit knowledge that is contained in documents, routines and organizational culture, which remains in the organization after the individuals have left.
[31]	SC comprises the firms most valuable strategic assets, such as, organizational capabilities, culture, processes, patents, copyrights, trademarks, databases, and so on.

Source: Author, 2020

2.1.3 Relational Capital (RC)

Relational capital (table 4) is an asset that resides in the social relationships and networks among individuals, communities, or society ([333 and [44]). It also includes brands, customers, customer loyalty, distribution channels, business alliances, joint research efforts, and financial contacts, licensing agreements and franchising agreements [34].

Table 4 - Selected definitions on RC

Author	Definition
[25]	RC points to the extent and intensity of the organization's relationships with customers.
[35]	It is the sum of all the relations which an organization develops through the course of conducting business with customers and different marketing channels.

[36] RC is the knowledge obtained through the establishment of relationships with external stakeholders.

Source: Author, 2020

3 MEASURING INTELLECTUAL CAPITAL

Our goal is to introduce the importance to measure intellectual. Then, the aspects and characteristics of the Value Added Intellectual Coefficient (VAIC) are discussed. Finally, a brief investigation correlating the impact of intellectual capital on the financial performance of small and medium-sized enterprises is presented.

3.1 Intellectual Capital measurement

According to the traditional accounting practices the book value of an organization is solely calculated from its financial statements. The simplistic method of such a calculation includes subtracting liabilities from the firm's total assets. As a result, conservative accounting practices failed to account one the most important intangible assets of every organization: IC ([37] and [8]). IC measuring methods can be grouped broadly under two categories: those that do not use a monetary valuation and those that attempt to estimate dollar values of IC. Some of the most relevant ones are described on table 5.

Table 5 - Dollar and Non-dollar valuation of IC models

Models	Type	Author
The Balance Scorecard	Non-monetary	[38]
The Technology Broker method	Non-monetary	[39]
The Skandia IC Report method	Non-monetary	[24]
The IC-Index	Non-monetary	[40]
The Intangible Asset Monitor approach	Non-monetary	[9]
The Heuristic Frame developed	Non-monetary	[41]
The Vital Sign Scorecard	Non-monetary	[7]
The Ernst & Young Model	Non-monetary	[42]
The Tobin's q method	Monetary	[43]
The EVA and MVA model	Monetary	[44]
The Market-to-Book Value model	Monetary	[37]
The VAIC Model	Monetary	[10], [5]

Source: Author, 2020

3.2 The Value Added Intellectual Coefficient (VAIC)

Despite the increasing recognition of intellectual capital in driving firm value and competitive advantages, an appropriate measure of firms' intellectual capital is still in infancy [5]. Instead of directly measuring firms' intellectual capital, VAIC proposes a measure of the efficiency of value added by corporate intellectual ability.

3.2.1 The empirical use of VAIC

The major components of VAIC can be viewed from a firm's resource base: physical capital, human capital, and structural capital. VAIC is being increasingly used in business and academic applications, as shown on table 6.

Table 6 - The use of VAIC Model – A review of Empirical Studies on IC

Author	Title
[45]	Intellectual Capital and Business Performance in Malaysian Industries.
[46]	Testing the Relationship between Intellectual Capital and Business Performance: Evidence from South Africa.
[47]	Intellectual Capital and Firm Performance of IC Design Companies in Taiwan.
[48]	An Empirical Investigation of the Relationship between Intellectual Capital and Firms' Market Value and Financial Performance in Context of Commercial Banks of Bangladesh.
[49]	The Implications of Intellectual Capital on Performance Measurement and Corporate Performance.
[50]	Intellectual Capital and Business Performance: Evidence from Banking Industry
[51]	Intellectual Capital Efficiency and Firm Performance: Study on Malaysian Financial Sector.
[52]	An Empirical Study of the Impact of Intellectual Capital on Business Performance.
[53]	Intellectual Capital and Firm Performance.

Source: Author, 2020

3.2.2 The VAIC method

[5] was one of the first scholars in the field of IC research to focus explicitly on the connection between IC and economic performance and the first to base his analyses solely on company balance sheet figures. Another factor that sets [5] apart from the rest of the field is that he straightforwardly applies established IC concepts in the realm of company economics. The author's model assigns explicit economic values, value added (VA) and capital employed (CE), to human capital (HC) and structural capital (SC) and on this basis generates an unambiguous VAIC index. Based on these definitions and assumptions VAIC is calculated as the direct sum of key efficiency figures, which in turn are calculated as ratios:

$$\begin{aligned} \text{Capital employed efficiency: } CEE &= VA/CE; \\ \text{Human capital efficiency: } HCE &= VA/HC; \\ \text{Structural capital efficiency: } SCE &= SC/VA. \\ \text{VAIC} &= CEE + HCE + SCE \end{aligned}$$

The capital employed efficiency (CEE) of a company, its human capital efficiency (HCE) and its structural capital efficiency (SCE) are calculated. CEE describes how much value is created in one monetary unit invested in financial or physical capital. HCE correspondingly describes how much a company creates through one monetary unit invested in its human resources. With SCE, information can be obtained about how much capital a company can create through structural capital (SC). Finally, $VAIC = CEE + HCE + SCE$, indicates how much value a company creates in total per monetary unit invested.

3.3 Small and Medium-Size Enterprises

In accordance with the Brazilian Accounting Pronouncements Committee (CPC) on its technical pronouncement regarding the accounting for small and medium-sized enterprises [54] and the linkage to the International Financial Reporting Standard for Small and Medium-sized Entities, SMEs are described as enterprises that:

- have no public accountability obligation;
- prepare general purpose financial statements for external users. Examples of external users include owners who are not involved in running the business, existing and potential creditors, and credit rating agencies.

In turn, [23] states that the purpose of the financial statements of small and medium-sized companies is to provide information on the financial position (balance sheet), performance (comprehensive income and result) and cash flows of the entity, which is useful for decision making by a wide range of users. Financial statements also show the results of management's diligence. Management's responsibility for the resources entrusted to it.

3.4 The correlation between VAIC and SMEs financial performance

To investigate the relationship between Intellectual capital and SMEs financial performance, is wise to correlate VAIC and other indicators of corporate performance, such as Return on Assets (ROA) and Return on Equity (ROE). According to [55], financial performance can be proxied by ROA, which is considered as a measure of the company's ability to generate profits by using the total assets (wealth) that the company has after adjusting for costs to fund these assets [56]. And ROE, which is often referred to as the rate of return on net worth. This is the company's ability to generate profits with its own capital so that this ROE is referred to as its own profitability.

4 METHODOLOGY

In exploratory researches we are looking for clues, trying to get a better picture of the research variables and relationships. Besides variables already studied, identified in the literature review, we might deal with specific variables for the investigated subject that might lead us to new explanations and theories [57].

4.1 Systematic Literature Review (SLR)

A systematic review of the literature is a means of identifying, evaluating and interpreting all available research relevant to a specific research question, topic area or phenomenon of interest. Individual studies that contribute to a systematic review are called primary studies.

4.1.1 Primary Studies

During the preparation for the SLR, primary studies were carried out in digital libraries and the search strings were built from the question structures and necessary adaptations were made according to each database (table 7). Seventy-three documents were analyzed, including scientific articles and dissertations, focusing on: Intellectual capital, VAIC, value creation and small and medium-sized enterprises. Of the seventy-three selected documents, fifty-two documents are related to intellectual capital and value creation. Sixteen documents addressed

VAIC methodology and five related to intellectual capital and small and medium-sized enterprises. Since the publications took place in several years, the studies are subdivided by range. The provision of data year by year would compromise visualization.

Table 7 - Number of documents per type and publication year

Type	Publication year range					Total
	1995-2000	2001--2005	2006-2010	2011-2015	2016-2019	
Dissertation			1	2		3
Journal	5	16	20	21	6	68
Report				1		1
Thesis				1		1
Total per year range	5	16	21	25	6	73

Source: Author, 2020

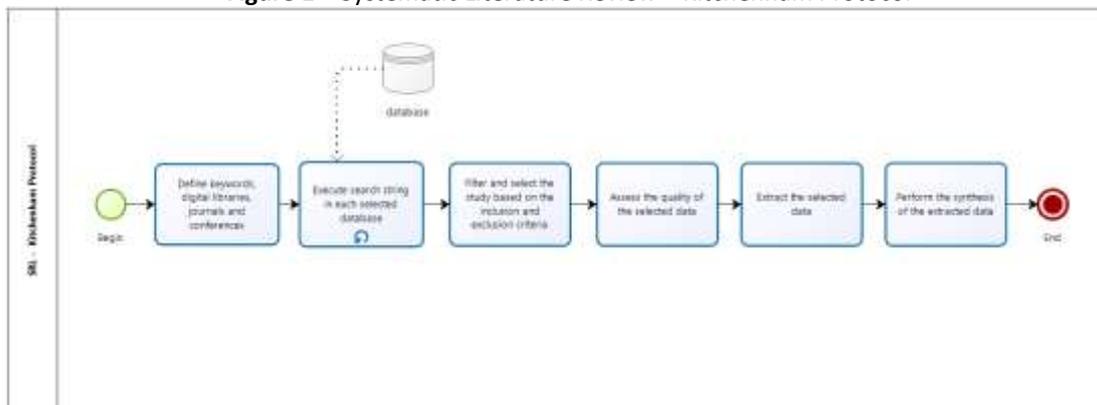
In terms of quality, out of 68 primary searched articles, approximately 87% (45) are Qualis-Capes qualified between B2, A2 and A1. Which demonstrated in an objective, consistent manner, with the necessary rigor and relevance, the concepts that support the theoretical foundation of the research.

4.1.2 Systematic Review

A systematic review is a means of evaluating and interpreting all available research relevant to a particular research question, topic area, or phenomenon of interest. Systematic reviews aim to present a fair evaluation of a research topic by using a trustworthy, rigorous, and auditable methodology [13]. Individual studies contributing to a systematic review are called primary studies; a systematic review is a form a secondary study.

This study has carried on a SLR, following the Kitchenham’s guidelines [13] according to the research strategy (figure 1). The guideline covers three phases of a systematic review: planning the review, conducting the review and reporting the review. Once the procedures were defined, the protocol was applied and the results are described at table 8.

Figure 1 – Systematic Literature Review – Kitchenham Protocol



Source: Author, 2020

For the execution of the SLR, the authors chose to use a software called StArt (State of the Art through Systematic Review). StArt provided support to the SLR process activities and end up being a powerful tool to aim the expected results. The search results were exported

from the search engine as a BibTex file and then, imported into StArt. Tabel 8 describes the procedures performed at the SLR.

Table 8 - Procedures performed at the SLR

SLR Steps	Description
Main question	Is it really possible to stablish a relation between value added intellectual capital coefficient (VAIC) and business performance in small and medium-sized enterprises (SMEs)?
Data selection	Among databases, indexers, virtual libraries and search tools, the following were selected: IEEExplore: <http://ieeexplore.ieee.org>; Ebsco: <https://search.ebscohost.com>; Science Direct:<https://www.sciencedirect.com>; Wiley Online Library:< https://onlinelibrary.wiley.com>; Scopus Preview:<www.scopus.com>; Google Scholar: <scholar.google.com.br>; Academia.edu:<https://www.academia.edu>.
Search strings	Three search strings were generated from the combination of key terms and synonyms: Intellectual capital, structural capital, human capital, SMEs, entrepreneurship, VAIC, value creation efficiency.
Study selection criteria - (I) inclusion and (E) exclusion)	(I) Studies that answer the research question; (I) Studies that present primarily or secondarily good practices, strategies and successful techniques, related to the objective of this study, and that can be adopted in the identification of this objective;(I) Papers discussing the relation between Value Added Intellectual Capital and venture performance; (I) Papers discussing the technical aspects of Value Added Intellectual Capital (VAIC). (E) Studies that are clearly irrelevant to research, according to the research questions raised; (E) Studies that are clearly irrelevant to research, according to the research questions raised; (E) Redundant studies; (E) Studies that do not answer any of the research questions; (E) Studies that have not been published between January / 2015 and January / 2020.
Document analysis and criteria application	Out of a total of 4,382 studies obtained in the research, 410 (9%) were obtained via IEEE, 879 (20%) Science Direct, 29 (1%) Scopus, 2.171 (49%) Google Scholar, 516 (12%) Ebsco, 346 (8%) Wiley Online Library and 31 (1%) via Academia.edu. In total 35 studies were selected, all articles. Another 14 articles considered relevant to the study, but with a publication date prior to 2015, were also selected to compose this work. A final amount of 49 academic articles was obtained.

Source: Author, 2020

5 RESULTS

Table 9 shows the number of documents selected with the systematic literature review (SLR), indicating the type and year of publication. As can be seen, out of the 35 selected articles, about 57% are Qualis-Capes articles. The remaining 43% have no Qualis-Capes, but shows relevance to the searched theme. The selected researches were published in the last 5 years, so that the information gathered and studied was current.

Table 9 - Number of articles sorted per type and publication year

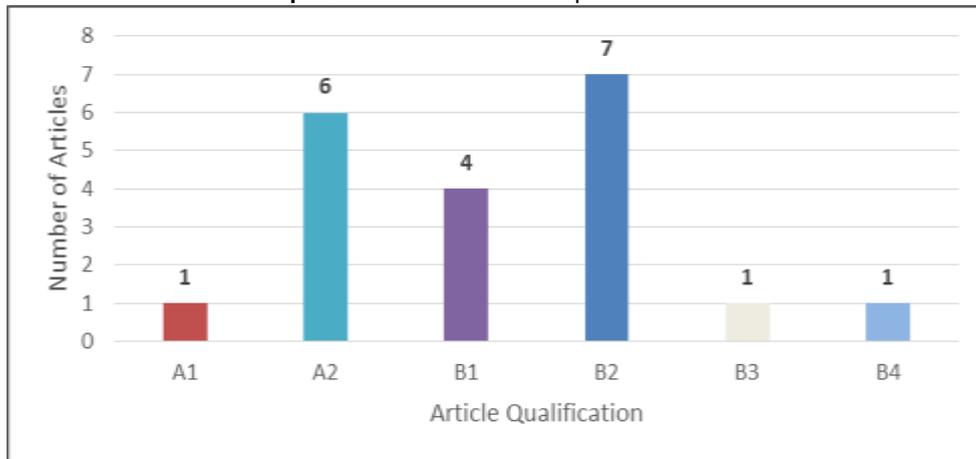
Type	Publication year					Total
	2015	2016	2017	2018	2019	
Articles w/ Qualis	5	6	3	4	2	20

Articles wo/ Qualis	3	5	4	1	2	15
Total per year	8	11	7	5	4	35

Source: Authors, 2020

As for the quality aspect of the information gathered, an attempt was made to select a greater quantity of articles with Qualis-Capes. The journals are categorized by the Coordination for the Improvement of Higher Education Personnel (Capes) with qualifications between A1 and B4. Graph 1 shows the distribution of articles according to their qualification. It is noted that approximately 35% of the articles are concentrated in journals with qualifications between A1 and A2; about 60%, between B1 and B3; and only 5% qualify B4.

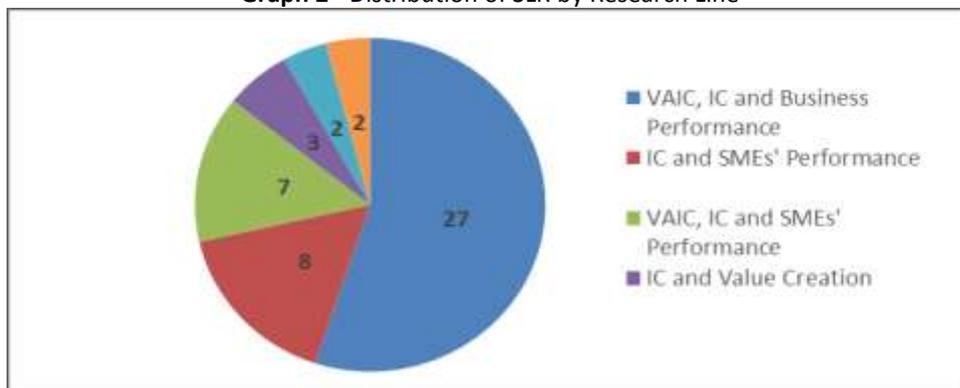
Graph 1 - Distribution of SLR qualified articles



Source: Author, 2020

Out of the 14 articles considered relevant to the study, but with a publication date prior to 2015, 13 qualified Qualis-Capes. Approximately 21% of the articles are concentrated in journals with qualifications A1; about 79%, between B2 and B3. The systematic literature review (SLR) included information about the value added intellectual coefficient and the organizational performance of small and medium-sized enterprises, so that it was possible to identify the relation between VAIC and SMEs' performance. The SLR also allowed for a greater understanding of how information and knowledge are present in this context. The 49 selected documents were categorized by research line as shown in graph 2.

Graph 2 - Distribution of SLR by Research Line



Source: Author, 2020

6 CONCLUSIONS

In the knowledge economy intellectual capital is considered as important strategic assets to large as well as small companies. Researchers have long argued that intellectual capital is a critical factor in firm performance ([58]; [59]; [60]; [61] and [62]), particularly for SMEs, which may have difficulties competing on scale or scope ([63] and [64]). Further, since intellectual capital is represented by the acquisition, communication, and codification of knowledge ([65] and [62]).

Our findings concluded that the value added intellectual coefficient (VAIC) and the organizational performance of small and medium-sized enterprises (SMEs) are related. Among the intellectual capital components, the importance of the human capital was observed. Once the decrease or increase in employee turnover seems to be a key factor for maintaining competitive advantage. However, professional training programs and performance evaluations are still a challenge for SMEs.

The results showed that human capital positively impacts on SMEs financial performance and appears to be highly relevant element for the success of small and medium-sized enterprises. Regarding structural capital, our findings identified a trademark concern, but also reveals a lack of system acquisition and processes supporting innovation, demonstrating that the ability to innovate seems to be the challenge to small and medium-sized enterprises.

Moreover, concerning relational capital, our study concluded that enterprises are aware of the need of offering solutions to customers and reduce problems, despite of their fragility in having processes that allow customers to participate more effectively. Finally, our findings concluded that ROA and ROE are positively correlated with VAIC. In other words, the study suggests that IC can positively enhance firms' financial performance and generate wealth, proving that IC, as a strategic asset, is essential to achieving competitive advantage.

The current study presents several contributions to a better understanding on how IC impacts on SMEs financial performance. Also, the study contributes to the literature of intellectual capital by a vast analysis of documents by the SLR. One of the limitations of current study is related to the fact that there are still not many studies that correlate VAIC and SMEs financial performance, which makes the source of this specific data rather limited.

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