

# Intellectual Capital and Measurement Methods: Some Specific Contributions from the Literature

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## **ABSTRACT**

The goal of this paper is to see what contributions the specialized literature makes on methods of measuring the intellectual capital. It was found that they are a plethora of methods with little or no association between them that can constitute a common denominator and that allow for widespread application to any company, any activity sector and at any moment of time. Given the intangible nature of intellectual capital, ways of measuring it prove difficult to apply generically. It appears that, if a company is capital intensive even though it has fewer workers, it has more intellectual capital than one that is labor intensive and has more workers. However, the reverse is also likely to occur. Thus, more than measuring the intellectual capital, it is urgent to have a definition of it in order to move on to the phase of its measurement and general application, in reality. It is a reality far from contemporaneity, even if important progress is recognized.

**Keywords:** Intellectual Capital, Measurement Methods

## INTRODUCTION

The specialty literature on intangible assets is fundamentally based, with regard to its main element, the intellectual capital, in its definition, in the ways of measuring it and in obtaining a final value on how much it is worth. From its foundation, there is no consensus on how to define the intellectual capital. Certain authors such as Berzkalne and Zelgalve (2014) define it as the sum of *human capital* component, *structural capital* component and *capital employed* component, while Gogan and Draghici (2016) define it as being equal in the first 2 components, differing in the third, which is the *capital of customers* component. With regard to measurement methods, authors such as Sekhar *et al.* (2015), proceed with the method called *Multi Criteria Decision Making* (MCDM). It is an *Analytic Hierarchy Process* (AHP) that assigns weight to several indicators based on *Techniques for Order or Preference by Similarity to Ideal Solution* (TOPSIS), which, in its entirety, is known as *Delphi-AHP-TOPSIS*. It should be noted that the very basis of the definition adopted by Sekhar *et al.* (2015), is different from that of Berzkalne and Zelgalve (2014) and Gogan and Draghici (2016), having more 2 components. Rodov and Leliaert (2002), propose the *Financial Method of Measurement of Intangible Assets* (*Financial Method of Intangible Assets Measurement* – known by the acronym FiMIAM), to measure the intellectual capital. It is complex because it groups various elements into classes, which are the sole responsibility of the researcher. Housel and Nelson (2005), present another method that is difficult to apply because it is based on what is called *Knowledge Valuation Analysis* (KVA), which is, fundamentally, the income generated by the asset and which has to be known, so that it can be measured. This is based on processes that take place within companies. It is too theoretical to be applied, objectively, with a defined meaning, generating a concrete value of the intellectual capital. There is, therefore, a set of characteristics that define some methods of measuring the intellectual capital that do not contribute at all to the calculation of its value, in addition to not having a single and consensual definition. The *research question* that arises is to know: *what does the literature referring to methods of measuring the intellectual capital refer to? Does add any clarification that can be recognize as constituting progress in the right direction with regard to scientific development?* This paper is divided into 3 sections. The first, *Introduction*, makes a brief approach and framing of the theme of measuring the intellectual capital. The second, *Literature Review*, exhibits papers that specifically deal with the measurement of the intellectual capital, with a synthetic description of what is understood to be the most important. The third and last one presents the main *Conclusions*. The references used appear in *References*.

## LITERATURE REVIEW

Craciun and Scriosteanu (2008) put one of the central questions raised in the title of the paper: *how to measure the intellectual capital?* One of the needs that arise in this context has to do with the fact that the conversion of knowledge or intellectual capital into long-term value of a business, is of utmost importance, being the most visible focus from a practical than theoretical point of view. In

fact, this is related to the fact that there are difficulties in measuring intangible assets and their contribution to profits and, above all, the fact that companies are not successful in their efforts to reproduce the identified conditions, in addition to processes, which make it possible to create potential value in these intangible assets. Thus, there are challenges for companies to know which are the key elements in value creation (in cycles), which include strategic intangible and tangible assets, as well as how they should circulate within companies, interact and interrelate giving contributions so that companies develop in a sustainable way, increasing the qualifications held to create value. The non-existence of methods that identify the interrelationships and process conversions between intangible assets such as knowledge, skills, interrelationships and, in short, all the frameworks in which they add value, any systems to measure the performance results in not being able to translate the true performance of companies or even reveal what standards should be adopted to create value. These authors contribute with this paper, on definitions and methods as well as designs and ways of measuring the performance of the intellectual capital, in addition to implementing it. A set of reasons underlie the importance of measuring intangible assets, among which the authors highlight 3: the amount invested in them has made it more important than tangible assets; market and accounting values have shown to be increasingly different from each other and, from a strategic point of view, companies' intellectual capital has become the key to their competitive advantages. It is extremely important to build indicators to measure business performance. Craciun and Scriosteanu (2008) put forward 6 possible types of systems for measuring the intellectual capital: using one of the structures that make up the intellectual capital, identifying which assets should be controlled in each of its classes, which occurs via identification of the desired outcomes, determination of the key success factors that make the desired results to be achieved and link them to business performance, design control indicators of the key success factors, measurement and monitoring of these for a certain period of time and, for completion, revision and adjustment that may prove necessary. As ways to measure the intellectual capital, we highlight 4: human resources (such as the composition of management bodies and satisfaction of human resources), customers (composition, management and customer satisfaction), technology (includes reach, functions and applications information technology systems) and, finally, processes (it also includes the scope, equipment and its efficiency in business activities). The authors conclude that measuring the intellectual capital is increasingly important to know how it creates value. Ideas and information are increasingly important than capital in a financial sense. Externally sourced requirements are increasing with regard to intangible assets. Thus, company managers are coerced into making decisions to measure the intellectual capital and distribute information in order to know how companies, in general, create value for stakeholders, workers, customers and investors.

Morady (2013), in addition to the 2 previous authors, also approach the methods of measuring the intellectual capital. It is based on 2 generic types: based on the Financial Statements and on market values. As the difference patented by the 2 has grown more and more, in which the first assumes higher values than the first, one of the reasons found in the explanation base is the fact that the intellectual capital is excluded from the Financial Statements. Due to this perception, the value of profits and financial factors must be estimated, which implies that it encompasses the strategic analysis, the Financial Statements and the anticipation

of further business developments. There are 4 methods of measuring the intellectual capital: those based directly on capital (estimation of the value of intangible assets or the intellectual capital), market investment methods (market value on the Stock Exchange, v, g.), ROA and Scorecard methods (when elements other than intangible assets are identified). These authors reveal the existence of 17 models for measuring the intellectual capital: Skandia Model (sum of the intellectual capital plus accounting value, which is equal to market value, with the intellectual capital being equal to the sum of human capital component plus structural capital component), Roos & Roos Categorization (same as the previous model but differing in segmentation and details), Model of the Intellectual Capital (approaching scorecard-type approaches, aiming to visualize and transfer the intellectual capital and the resulting value thereof), Brooking's Technology Model (analyses the value of a company via 20 questions on 4 components of the intellectual capital - brands, human resources and their skills, intellectual property and infrastructure), Monitoring Pattern of Intangible Assets (composed of net tangible assets, external structure and knowledge capital: internal structure and individual skills), Economic Value Added (EVA) ( $\text{Net Operating Profits After Tax (NOPAT)} \times (\text{Weighted Average Cost of Capital (WACC)} \times \text{Capital Invested (Equity + Long Term Debt at the Beginning of the Period)})$ ), Sveiby's (2018) Model (based only on management, with all tangible and intangible assets resulting from it), Balanced Scorecard Pattern (based on 4 aspects: internal processes, customers, growth and learning and corporate finance), Tobin's Q Pattern (market value/asset value, ie, the replacement cost of assets), Sullivan's Pattern (consisting of the sum of human resources, intellectual assets and intellectual property), Mcelvar's Model (the Skandia model plus social capital plus creative social capital), Human Resources Accounting (human resources at book values), the Invisible Balance Sheet (form of disclosing intangible assets developed by Sveiby (2018)), Human Resources Accounting and Costing (calculates the invisible costs related to human resources and that reduce business profit), Market Value to Book Value (difference between market value and book value of a company), Value Probe (consists of assigning the book value to 5 categories of intangible assets: assets, skills, norms and values, technology, processes and management), Methods for Measuring the Intellectual Capital of Technology Server Model (divides the knowledge of a company in 4 categories: human assets, infrastructure assets, intellectual assets and market assets).

Chen *et al.* (2004), present a new model for measuring the intellectual capital through an empirical study. The goal is not centered on knowing the value of the intellectual capital because, for these authors, knowledge of it, is not important, even because the calculation formula, is very complex and even impossible to calculate. What is important is that the formula provides a way for management to manage information in a timely manner in such a way that it allows, via their feedback, to modify business strategies related to the intellectual capital, especially, in the long-term with regard to competitive advantages through knowledge. Thus, measuring the intellectual capital effectively and in trend of the constituent elements, is the main goal more than measuring its value. The authors selected a group of companies belonging to the high technology sectors. Information is omitted about how many were. Just that they were chosen at random and that managers answered to a survey alluding to the topic in question. They built an index, composite with different weightings of the 4 components

used in the definition of the intellectual capital: structural capital component, human capital component, customer capital component and innovation capital component. Thus, an intellectual capital measurement model, was designed based on a system of the intellectual capital indexes, in order to provide a management tool. The authors concluded that there is a significant relationship between each of the components of the intellectual capital of the companies in the sample and their performance, providing the validity and rationality of the model presented, to measure the intellectual capital. On the other hand, the authors also conclude that, there is a relationship between the 4 components among themselves, which should be an incentive for the management and improvement of the same components in an integrated way.

Marr and Chatzkel (2004), insert the topic of measuring the intellectual capital in the triad of management, measurement and its dissemination. It presents reasons through which these 2 authors understand that the topic of the intellectual capital is at a crossroad. Once there is awareness that the intellectual capital is important, then it is up to researchers and practitioners to evolve to a higher level, which includes taxonomies, methods, in such a way that it allows to present conceptual definitions of the intellectual capital, better justify why companies need to measure and manage this, and increase clarity on terms such as measurement, evaluation and others. Greater rigor in research methods is also necessary in order to test and validate theories that already exist on the topic.

Guthrie (2001) also focuses on the management of the intellectual capital, its measurement as well as its dissemination. This is a presentation at a Conference and is divided into 4 topics covered: explaining the growing importance of the intellectual capital, synthesizing the latest in the literature on the intellectual capital, synthesizing research on the dissemination of the intellectual capital and, finally, future directions on the research regarding this same intellectual capital. In a nutshell, the author states that it is simple to identify the barriers to improvements with regard to the intellectual capital. The biggest challenge is to define a consensus on the need to disclose it, what to disclose and how. With regard to its specific measurement, and assuming that it is worth measuring the intellectual capital, should traditional methods be adopted or should new ones be built? When and how should information about the value of the intellectual capital be disclosed? The question still arises whether, in this context, we are in a position to assess whether the knowledge of business management is directed and applied in the right direction.

Aitouche *et al.* (2015), make a comparison between 3 methods of measuring the intellectual capital, placing them according to a priority criterion. These are the intellectual capital dynamic valuation (IC-dVal), the value added intellectual capital (VAIC) and the national intellectual capital index (NICI). IC-dVal, consists of a strategic approach to the intellectual capital in a dynamic way, and which includes 4 dimensions related to competitiveness: resources, processes, construction of intangible assets and outputs. VAIC is a method of measuring and controlling the creation of value in activity sectors. It gives you an idea of how much new value was created for every € invested in each resource. If it is higher (low) the better (worse) is the business in the activity sector in question. It is equal to HCE+SCE+CEE, being, respectively, the efficiency of the human capital component, the efficiency of the structural capital component and the efficiency of the employed capital component. As a whole, it allows you to know

the business efficiency as a whole. Finally, the NICI is a way of evaluating the intellectual capital of a country in which the index is based on the idea that the intellectual capital is composed of 4 components: human capital (knowledge), capital processes (non-human warehouses knowledge), renewable capital (a country's future intellectual wealth) and market capital (a country's capabilities). In global terms, they conclude that, although there are these 3 methods, at the same time, 24 criteria are used that cover aspects of the intellectual capital which allows for comparisons. According to 10, the authors compared and ordered, using the *Analytics Hierarchy Process* (AHP). In terms of outcomes obtained, the methods proved to be close to some criteria and far from others. The ranking allowed us to conclude that the NICI method, proved to be the most appropriate according to the criteria, including macro measures, used by stakeholders, to cover aspects related to the intellectual capital, quantifiability, frequency of use and applicability stand out. The IC-dVal method, was found to be in second place and the VAIC in third, according to the criteria used. If more criteria had been used, the analysis would have been more significant.

Lee and Guthrie (2010) carry out an analysis of procedures for visualizing and measuring the intellectual capital in companies that are listed on stock exchanges. To this end, they devised a research method not only to study the intellectual capital but also to find out how it flows in highly related markets. The method used is that of content analysis and multivariate statistics and the source of information on the companies comprising the sample were those with public access and the reports contained in <www.factiva.com>, which were accessed on April 8, 2009. Were selected 156 companies and the indicators were related to performance and technological information related to them. The authors concluded that content analysis was the appropriate technique to analyze the 156 companies with regard to the intellectual capital, namely, in the human capital component, internal and external capital components and relational capital component.

Gogan *et al.* (2015), carried out a paper that fundamentally aims to propose a model for measuring structural capital component, one of the components of the intellectual capital. For them, structural capital component consists of everything that sustains human capital component and, in particular, includes business organization processes, procedures, technologies, information and intellectual property rights, as mentioned by Gogan *et al.* (2015) in Malhotra (2003). Also Van Caenegem (2002), referenced by the same authors, emphasizes that structural capital component is what is left over when workers leave the company, which includes elements such as database structures, manuals and training materials. It is a notion based on human capital component and combinations of knowledge and intangible assets resulting from processes within the organization. It includes efficiency, innovative procedures and access to coded information that then transforms into knowledge. As the main conclusions drawn by the authors, there is the fact that, in order to obtain competitive advantages, companies must understand that intangible assets represent an increasing value when compared to tangible assets. The measurement of structural capital component must be carried out via models that must be implemented to effectively obtain and manage this form of capital. Only in these circumstances can be seen the benefits of such. Hence, in recent decades, according to the authors, this structural capital component has rapidly assumed a

greater preponderance. Hence, the constituent elements and their knowledge, are of invaluable help in this field. In summary, the proposed model is based on 2 strands: investment and development as well as research and intellectual property rights. In each of these aspects, there are resources to be used, processes and outcomes to be obtained, within the scope of the defined model.

## CONCLUSIONS

A brief presentation of the main specific literature on the measurement of the intellectual capital, gave some valid contributions to better understand what new clues can be adopted for this purpose. However, it appears that no suitable measurement method that can be used in any company and activity sector was presented. On the other hand, there is an underlying obstacle of not having a single basis definition applicable in reality and accepted by the scientific community.

It appears that the methods of measuring the intellectual capital, in some authors, are nothing more than content analysis of reports, which are already in the past, and that perhaps they could not be replicated again to new samples. Basically, what is intended is a method of measuring the intellectual capital, which is only a means to reach the end, which is to know its value. If its definition is not common, whatever method is adopted, it does not allow reaching a concrete value that can be repeated year after year and applied to any company.

In this context, the contribution of the consulted literature gives contributions that fall short of what would be desirable and, above all, what is required in the domain, and even more, if the topic of the intellectual capital is related to other aspects: innovation and performance, in particular.

Given the intangible nature of many components associated with the intellectual capital, this is not surprising. But, however, it emphasizes that, as the need is greater, the available knowledge that should exist to answer to that need, would also be greater. Thus, the allusive literature, it can be said, moves away from the core of the goals associated with the intellectual capital. The answers remain to be given satisfactorily.

The most that can be said is that, there may be separate answers, in which a definition, a method of measuring (but not any) and obtaining a value can be applied to a specific situation, but not in a generalized way to any case.

With regard to the *research question*, it was concluded that the literature selected refers to a plurality of methods for measuring the intellectual capital, but it does not provide an unequivocal answer to the method, nor is it based on a consensual definition and, therefore, does not allow the calculation of a value of the intellectual capital as if it were any product and/or service provided. It does not add clarification towards progress on the topic. On the contrary, some authors position themselves in a contradictory way, which does not allow for steps forward with regard to scientific development. What is observed are steps in several directions without a single arrival point, or close to it.

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