

## INTANGIBLE ASSET EVALUATION APPROACHES: A LITERATURE REVIEW

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## ABSTRACT

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

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## 1 INTRODUCTION

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

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

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

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

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

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

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

## 2 THEORETICAL REFERENCE

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

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

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

Table 1  
**Terms used for intangibles**

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

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

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

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

## 2.1 Intangible Asset Evaluation Approaches

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

Table 2  
**Intangible Asset Evaluation Approaches**

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

**Continue**

**Table 2 (continuation)**

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

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

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

## 2.2 Categories of intangible asset evaluation approach

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

Table 3

### Categories of intangible asset evaluation approach

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

Continue

Table 3 (continuation)

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

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

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



Figure 1. Categories and the corresponding Intangible Asset Evaluation Approach

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

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

### 2.3 Framework of Intangible Asset Evaluation Approaches

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

Table 4

#### Framework of intangible asset evaluation approaches

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

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

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

## 3 METHODOLOGICAL PROCEDURES

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

### 3.1 Methodological Framework

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

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

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

### 3.2 Intervention Tool

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

#### 3.2.13.2.1 Procedures for data collection

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

#### 3.2.1.1 Selection of gross scientific articles

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

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

##### (i) Definition of keywords

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

##### (ii) Definition of databases

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

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

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

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

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

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

### 3.2.1.2 Filtering of gross scientific articles

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

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

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

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

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

Table 5  
Articles selected to compose the PB

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

Continue

**Table 5 (continuation)**

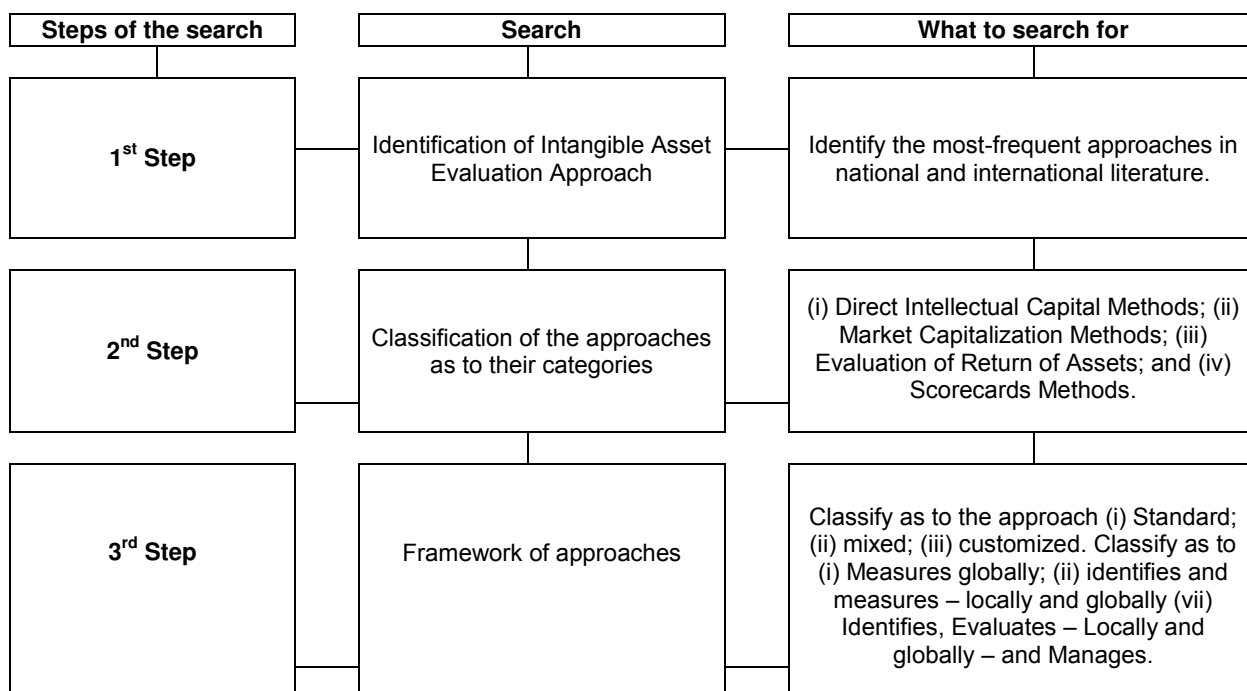
Article	Title	Year	Citations	Authors	Magazine
International	The IC Rating™ model by Intellectual Capital Sweden	2005	70	Jacobsen, K.; Hofman-Bang, P.; Nordby Jr, R.	Journal of Intellectual Capital
	The German guideline for intellectual capital reporting: method and experiences	2007	34	Manfred, Bornemann;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

**Note.** Source: research data.

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

### 3.2.2 Procedure for data analysis

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



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

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

#### 4 ANALYSIS OF RESULTS

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

##### 4.1 Intangible Asset Evaluation Approaches

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

Table 6  
**Intangible Asset Evaluation Approaches cited on PB**

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

Continue

Table 6 (continuation)

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

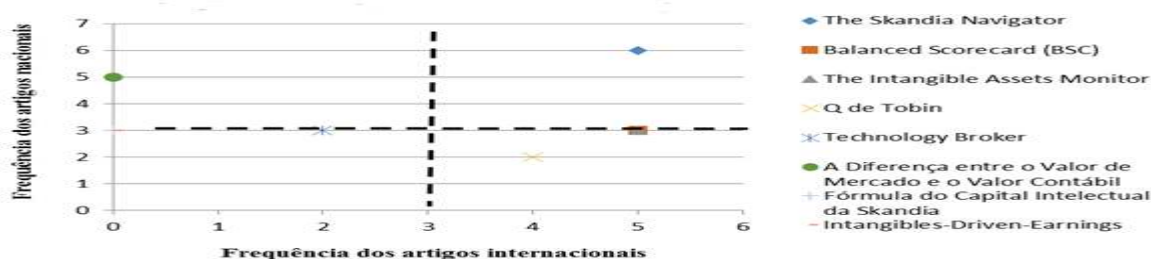
Note. Source: research data.

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

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

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

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



**Figure 3.** cross-referencing of evaluation approaches of intangible assets in national and international researches

Source: research data.

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

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

#### 4.2 Categories of Intangible Asset Evaluation Approach

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

Table 7

#### Categories of intangible evaluation approaches highlighted in national and international research

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

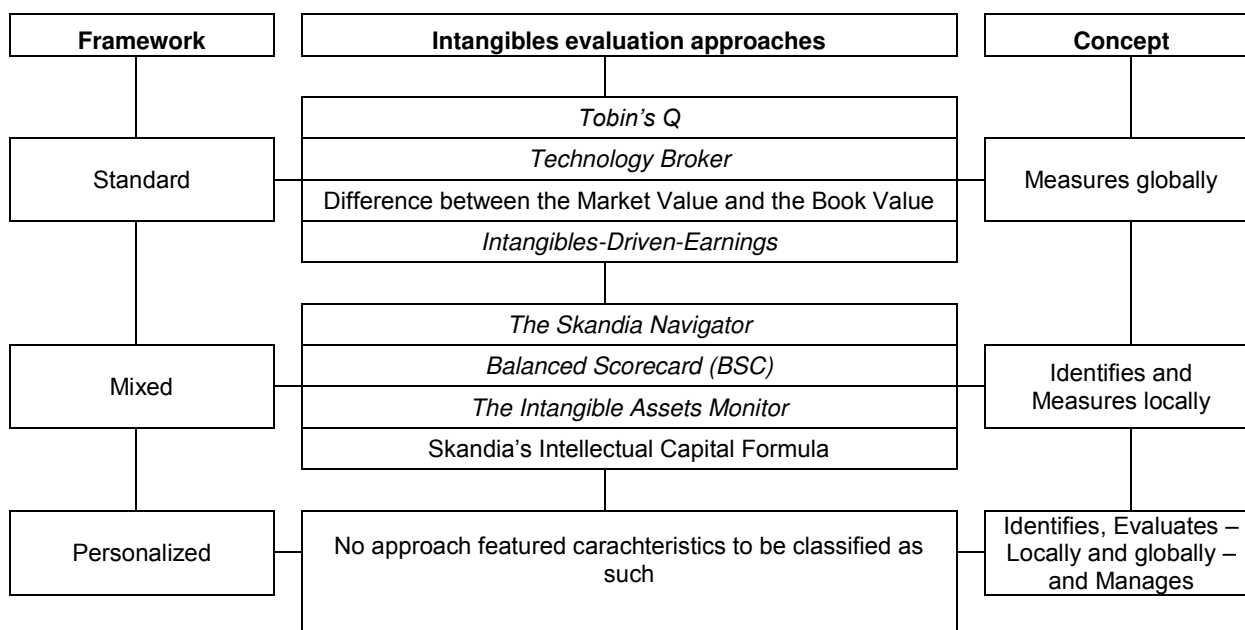
**Note.** Source: research data.

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

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

#### 4.3 Framework of Intangible Asset Evaluation Approach

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



**Figure 4.** Framework of intangibles evaluation approaches

Source: research data.

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

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

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

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

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

#### 5 FINAL CONSIDERATIONS

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

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

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

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

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

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

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

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