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The measurement of intellectual capital by VAIC method – example of WIG20

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Abstract

Intellectual capital has become a key resource for enterprises, but its measurement and reporting represents a major challenge for managers and researchers. The aim of this article was to establish the possibilities for using the Value-Added Intellectual Coefficient (VAIC TM) method to report intellectual capital of companies included in the WIG 20 index of the Warsaw Stock Exchange. This study also identified opportunities and threats arising from its use. The data necessary to perform the calculations in accordance with the VAIC method came from balance sheets and profit and loss accounts for the period 2010-2013. The VAIC method provides the means to measure intellectual capital and the efficiency of its individual components, allowing management intervention in those business areas open to objective statistical analysis.

Keywords: intellectual capital, VAIC method, WIG20 companies

Introduction

In the knowledge era, intellectual capital (IC) has become a key resource for the enterprise to retain and improve competitive advantage. IC is different from traditional capital in accounting terms and managers often challenged to evaluate the performance of intellectual capital as appropriately as possible (Tai, Chen, 2009).

Guthrie (2001) noticed that there is the continuing quest to develop better systems for creating, capturing and disseminating knowledge within organizations as traditional accounting systems cannot be used to record and report an accurate value attributable to IC. The concept of IC is also used to reflect the true value of a company. Organizations are motivated to measure their IC to assist with competitive benchmarking exercises and to provide structured information to the capital and labor markets to enhance perceptions of the company. Reporting on IC gains is important in the context of building investor relations and is particularly important for companies listed on the stock exchange. Therefore, managers are looking for the best ways to reflect the value of the ICICI the companies they manage.

The aim of this article was to establish the possibilities of using the Value Added Intellectual Coefficient (VAIC TM) method to report IC of companies included in the WIG 20 index of the Warsaw Stock Exchange, as well as to identify opportunities and threats arising from its use. The following research questions flowed from the study`s purpose:

RQ 1: Is there a difference in the levels of intellectual capital of WIG20 companies?

RQ 2: Is the VAIC method suitable for measuring and comparing intellectual capital of WIG20 companies?

To fulfill the aims of the paper, we first analyzed the scope of the term "intellectual capital", its models and reporting. We then presented the VAIC calculation method and its use for WIG20 companies. Finally, we presented the conclusions.

Research background and literature review

The free market era has raised the importance IC. IC has become widely recognized as a crucial tool to run the business successfully in a highly competitive environment and therefore different models have been introduced to measure and manage IC.

Scholars have tried to address the problem by continuously working on the development of a new classification and measurement methods for IC, bearing in mind that a better measurement instrument helps to find the solution to the problem. More than 30 classifications and measurement methods of IC have been suggested to make knowledge and knowledge-related resources, meaningful to management professionals (Andriessen, 2004). Some of these methods of IC management are not acknowledged in practice (Marr, Gray & Neely, 2003; Lönnqvist, Kunansivu & Sillanpää, 2008).

Bukowitz and Williams (2000) presented IC in a dynamic way as a form of nonmaterial assets, which, thanks to flows of knowledge, can generate a potential to create goods. Here IC includes the three main elements of: human capital, customer capital, and organizational capital.

It is clear that many definitions of IC have emerged during that past year. These definitions are different, but do not disqualify each other. The majority of studies presents IC as knowledge capital or capital which derives from knowledge. Some definitions present IC as the intelligence of the organization. All definitions include factors that are non-financial and valuable to a company's business.

The interest and desire to manage IC has resulted in the development of different methods of measurement. There are several groups of methods for measuring IC. Some of these methods have emerged from companies for internal use and not initially created as a universal measuring method. But they still exist and are the basis for newly created methods.

According to Sveiby (2014) all methods can be divided into four main groups:

Direct Intellectual Capital Methods (DICM) – estimation of the value of intangible assets is first determined by identifying the components. Once these components are identified, they can be directly evaluated, either individually or as an aggregated coefficient.

Market Capitalization Methods (MCM) – calculation of the difference between a company's market capitalization and its stockholders' equity as the value of its IC.

Return on Assets Methods (ROA) - average pre-tax earnings of a company divided by the average tangible assets. The result is a company's ROA that is then compared with its industry average.

Scorecard Methods (SC) – identify various components of IC with generated results reported

in a scorecard or in graphic format.

The four main approaches for measuring intangibles (Direct Intellectual Capital Methods, Market Capitalization Methods, Return on Assets Methods and Scorecard Methods) have their various advantages and disadvantages. Our focus from the above noted method groups was ROA as it relates to the VAIC methodology.

Critical analysis of definition and models of IC – VAIC calculation method

The importance of IC and its measurement is now widely recognized, especially the impact of the influence of intangible assets on the value of the enterprise. Under the assumption that market value is the total of a company's book value, the value of its IC implies that knowledge of its IC value would help to price market value without the need to be active on a capital stock exchange. The biggest challenge, however, is defining the intellectual capital. This further implies the difficulties to measure it as well as defining the value of derivatives (such as value-added accounting)

Alen Pulic, a professor at the University of Zagreb and Graz and the Austrian founder of the Intellectual Capital Research Centre developed the IC measurement method of the Value Added Intellectual Coefficient (VAIC TM), which measured the effectiveness of key resources in the enterprise. Lately he has been able to use this method to measure the efficiency of regions in Croatia (IBEC, 2003).

Capital Employed		Intellectual Capital	
Physical Capital	Financial Capital	Human Capital	Structural Capital

Source: Pulic, A. (IBEC, 2003)

According Pulic (IBEC, 2003) two key resources that create value-added in companies are: Capital Employed and IC. Capital employed includes physical capital and financial capital, whereas IC consists of human and structural capital. It is assumed that value-added is the output minus the input of a firm. Considering output is the sales revenue, the input is each resource that came from outside the company to create a product or service.

In traditional approaches to accounting the main focus is on controlling costs. Instead, Pulic (2000) moved the focus to value creation. He noted that in order to be able to manage value creation, there is the need to measure it. Furthermore, a measurement tool must be able to monitor the efficiency of resources in value creation. The aim was to develop a method that can measure resource efficiency for any company despite the region and/or county.

The main assumption of the VAIC methodology was that it intends to calculate economic income, which Pulic (2000) labels as value-added, in a different way by treating labor expense as an asset, not as a cost. The details are as follows:

1. When calculating the value-added of a firm, Pulic (2000) deducts all labor expenses.

2. Labor expenses are treated as an asset that Pulic (2002) calls human capital.
3. The efficiency of this asset is calculated by counting how much value-added one unit spent on employees creates (Pulic, 2000).
4. Labor expenses no longer belong to the profit and loss account; they are placed as an asset on the balance sheet (Pulic, 2002).

Pulic (2000) calculates value-added and the value of three types of intellectual capital: human capital, structural capital, and capital employed. Pulic (2000) noted that the value of human capital can be expressed by the labor expense. Structural capital equals the book value of the net assets of the firm (Firer and Williams, 2003). Pulic (2002) then calculated the ratio between each of the three forms of capital and value-added, resulting in capital employed efficiency (CEE) , human capital efficiency (HCE) , and structural capital efficiency (SCE). To conclude an overall measure of efficiency, Pulic (2002) adds the three efficiency measures:

$$VAIC= CEE+ HCE+SCE$$

Thus, as we see from the formula the VAIC TM coefficient is the sum of three parameters:

1) efficiency rate of capital employed - CEE (Capital Employed Efficiency),

2) the rate of the effectiveness of human capital - HCE (Human Capital Efficiency),

3) the rate of structural capital efficiency - SCE (Structural Capital Efficiency)

The approach is particularly interesting because it uses publicly available data and performs a comparison between companies along with their regions and countries (International Business Efficiency Consulting, 2003). However, some authors seriously question the assumptions which are used as the basis for calculations. Therefore, these methods are facing some critical analysis.

First, the VAIC method is often criticized for not properly separating expenses from assets. It is believed that an asset is a claim of the enterprise to an expected benefit (Lev, 2000) and on the contrary an expense is not expected to provide any benefits beyond the accounting period. Labor expenses may include expenses that are expected to bring benefits later (like training expenses or R&D), but a major part of labor expenses will bring immediate benefits and therefore, this part should not be treated as an asset. At the same time, treating all labor expenses as an asset means overstating the benefits in the future. When labor expenses need to be treated as an asset, there is a required depreciation rate of these assets. Subsequently, it became clear that a large part of these capitalized labor expenses requires amortization within the same accounting period as they do not bring future benefits. This depreciation results in the realization of expense in the profit-and-loss statement.

Another argument concerning the imperfection of the VAIC method is that it confuses stocks and flows. Value-added is a flow indicator. Labor expense is also a flow indicator, but the VAIC method treats it as a stock. Assuming that labor expenses will yield future benefits, they require treatment as a flow and as an investment in human capital. Considering that an investment is a contribution, bringing future benefits from an asset, there will be an accumulation from a series of investments over the years (like investments in R&D). Therefore, according to Andriesson

(2004) "value of human capital is the result of an accumulation of yearly labor expenses. It is this stock value of human capital we need to relate to valued added to calculate the efficiency rate, not the investment in a particular year." Similar confusion exists between flows and stocks in the calculation of structural capital. Structural capital is a stock, but in the VAIC method, it is the residual amount of two flows: value-added and human capital. To be exact, this residual amount is the return on structural capital, not the value of structural capital itself. Andriesson (2004) notes that in case "the operating income of a company is negative, structural capital becomes negative".

Further, it is important to note that the aim of the VAIC method is to calculate the efficiency of the three types of intellectual capital. However, according to some authors only calculating ratios does not provide accurate information about the contribution of these components of intellectual capital to value creation. Andriesson (2004) stated the need for "insight into the casual relationship between these types of capital and value added."

It must be also be noted that, the VAIC method ignores the fact that value added is not only the result of human capital, structural capital, and capital employed individually, but has an important role and is a contributor to IC management and value-added between these three synergistic components.

Finally, it needs to be noted that a possible solution may be to add all efficiency indicators to one overall indicator. This has been recognized as an interesting idea, but also criticized for delivering some strange results. For example, if a company has limited net assets (because of some big liabilities), capital used would be small or close to zero, and respectively CEE and VAIC become large. Therefore, big liabilities can show very positive VAIC scores, which is another questionable result.

Andriessen (2004) stated that "I sympathize with Pulic's (2000) argument that we should not treat labor simply as an expense. I admire the work he and his team have done in creating awareness of the importance of intellectual capital in regional and national economies, but I think the VAIC method is based on assumptions that can be seriously questioned. "

Methodology

The VAIC method is used to calculate the rate of value-added efficiency, based on the use of tangible and intangible assets of the company. This index is the sum of indicators: the efficient use of human capital, structural capital efficiency and effectiveness in the use of equity involvement in the creation of value-added.

Subjects, procedure, and data analysis

Companies included in the WIG 20 index were selected for this research. It is a price index and thus when used in calculations, it accounts only for prices of underlying shares and excludes dividend income. The WIG20 index may not include more than five companies from a single exchange sector (www.gpw.pl). At the beginning of 2015 the index consisted of the following companies: PKOBP, PZU, PEKAO, PKNOrlen, PGE, KGHM, BZWBK, LPP, AssecoPol, PGNiG, MBank, Tauron PE, OrangePL, Alior, Bogdanka, Eurocash, Synhos, Lotos, Kernel, JSW. Because of incomplete data the Kernel company was excluded from the study.

Secondary data are needed to measure IC derived from the financial statements for the years 2010-2013 published on the official websites of the companies, as well as from domestic and foreign literature.

Results

Valuation of intellectual capital for WIG20 companies

Data necessary to perform the calculations in accordance with the VAIC method came from balance sheets and profit and loss account for the period 2010-2013.

Company	Year 2010	Year 2011	Year 2012	Year 2013
PKOBP	1,58	3,06	4,39	4,19
PZU	3,31	5,38	6,62	6,98
PEKAO	1,48	4,32	4,45	4,32
PKNORLEN	14,14	3,91	3,80	4,45
PGE	2,50	4,11	4,25	4,51
KGHM	1,87	7,76	4,66	3,74
BZWBK	1,44	4,15	4,49	4,38
LPP	2,69	5,78	5,64	5,79
PGNIG	2,12	3,03	3,39	3,69
MBANK	1,79	4,61	4,47	4,54
TAURONPE	2,37	3,54	3,95	3,78
ORANGEPL	4,08	13,70	11,47	10,97
ASSECOPOL	1,41	2,81	2,67	2,50
ALIOR	1,66	2,50	1,95	2,56
BOGDANKA	1,88	2,99	3,48	3,49
EUROCASH	2,10	3,46	3,78	3,27
SYNTHOS	2,86	11,58	9,53	7,03
LOTOS	2,44	5,41	3,88	3,27
JSW	2,12	3,46	2,76	2,28

Figure 1. Value Added Intellectual Capital for the researched companies
Source: Based on financial statements of companies.

In 2010, the highest value of IC was observed in the following companies: PKN Orlen and Orange, and the lowest in: AssecoPol, BZ WBK and Pekao. In 2013, the highest level of the VAIC indicator belonged to: Orange, Synthos and PZU, the lowest of companies were: JSW, AssecoPol and Alior. The group of companies with the highest average level of IC in 2010-2013 were: Orange, Synthos, PKN Orlen and PZU.

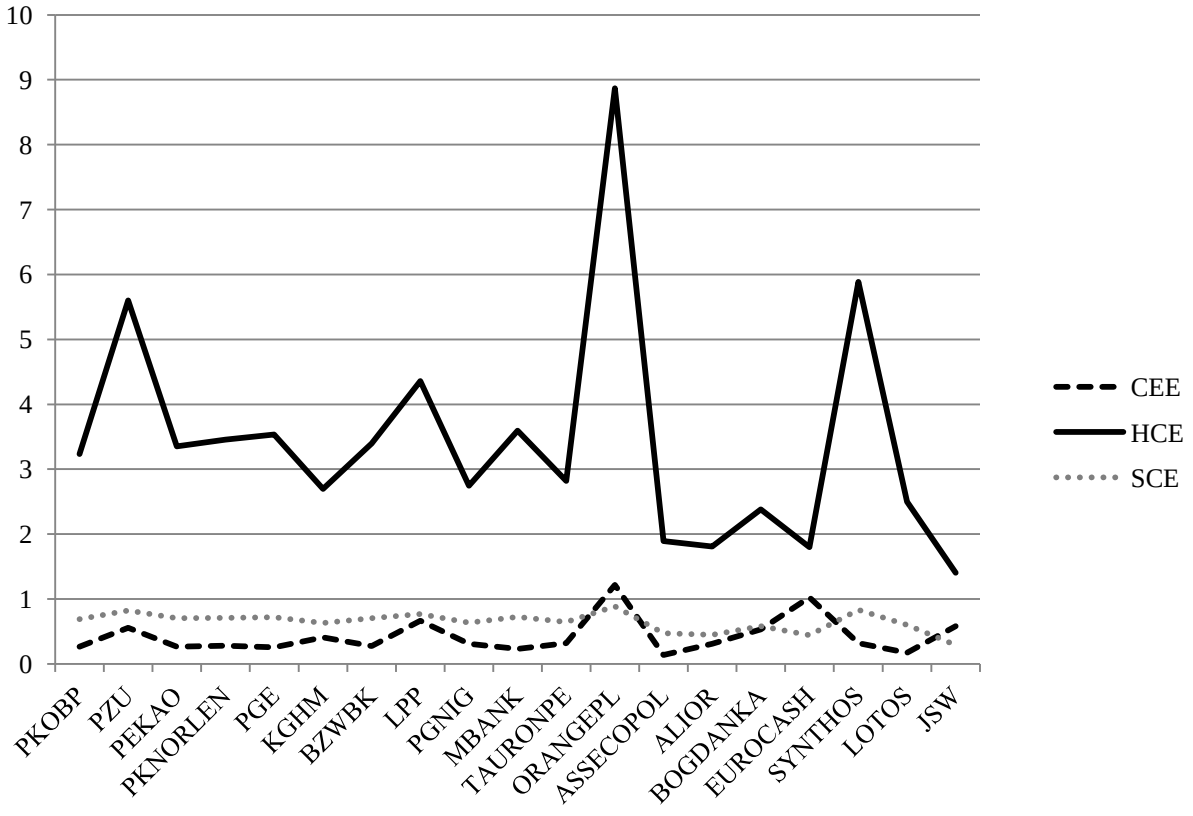

Figure 2. Capital Employed Efficiency, Human Capital Efficiency and Structural Capital Efficiency of the researched companies in 2013 year.
Source: Based on financial statements of companies**.**

In 2013, the highest value of Capital Employed Efficiency belonged to the companies of: Orange, Eurocash and LPP, while the lowest were Asseco, Lotos and mBank. The highest level of Human Capital Efficiency and Structural Capital Efficiency was reported by Orange, Synthos and PZU. The lowest by JSW, Eurocash and Alior. Very large disparities in the level of individual ratios among companies were strongly visible. The greatest differences were observed in the HCE ratio. This means that companies with the highest efficiency used their human capital. In the case of Orange, this efficiency was the highest, and for every 1 PLN invested in employees in 2013, the company acquired 8,86 PLN.

Summary and discussion

IC is frequently represented as hidden wealth to the organization and is often not taken into account in the financial reports and accounting systems. The existence of intangible assets is recognized by investors and strongly influences the strategic decisions of companies and their shareholders. However, IC measurement continues to lack clear guidelines supported by best practices leading to a continuation of the problem.

In the surveyed companies, there were apparent differences in the level of recognized IC. Generally, there were small differences between the level of intellectual capital in companies from different industries. Greater differences were seen in the level of components and particularly inthe level of HCE.

The VAIC method facilitates the measure of IC and the efficiency of its individual components. Thisallows precise management and intervention in the most efficient business areas. VAIC is regarded as an objective method, because the data used for the necessary calculations are derived directly from the financial statements, which enables one to compare companies with each other. In addition, the source of the data used, including the financial statements are reliable and verifiable. It is a transparent method, which is simple and easy to use. Despite some limitations VAIC can be successfully used for statistical analysis. This method can be used in both business practice to report intellectual capital in a synthetic way, in research for the measurement of intangible assets, and in studies of the correlation between intellectual capital and the business performance of companies.

It should also be taken into account that the VAIC method has limitations. Among them, the most important are: how to calculate the value-added, as well as the components used to measure human capital. This can lead to large discrepancies between the results. Important for the credibility of comparisons is the profile of the business. This is clearly shown when examining the surveyed companies. Furthermore, it is important to note that manufacturing companies had a lower level of intellectual capital than telecommunications or financial companies.

The proposed method provides the enterprise with a flexible means to deal with performance evaluation of IC in a real business environment. It is also helpful for the company`s managers to handle and understand the status of IC more efficiently and effectively to build investor relations.

It should be noted that the empirical material used in this paper is short-term. The limitations of the study are: way of estimation of value-added and human capital. In recent years intellectual capital is considered as an asset, but measuring the value and especially reporting the value of this asset is relatively new in practice. At the same time, one important aspect of reporting the value of intellectual capital - taxation - is not commented in the paper. This is the side of measuring the value of intellectual capital which definitely plays a role in managerial decision about reporting it. This factor could be addressed in a separate article concerning the decisions about measuring and reporting IC. Furthermore, the study used data from only 19 companies in different sectors. Further studies may include companies from one sector and wider sample size. Moreover, it could be interesting to check more methods and recommend the best methods for different sectors.

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Magdalena D. Kowalewska is a PhD Student at Warsaw University of Life Sciences, Faculty of Economics. Her research field is focused on intellectual capital management, intellectual capital of the regions, economic aspect of regional development, human capital management, human capital of rural areas and knowledge management. She is also a member of international research project Global Knowledge Survey in the field of knowledge management.