

SELECTED METHODS OF INTELLECTUAL CAPITAL VALUATION - COMPARATIVE ANALYSIS

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Abstract

The first years of the 21st century were a period of dynamic transformations taking place both on the technological and sociological level. These changes meant that the economic success reference ceased to depend solely on the financial resources available, the right materials or an appropriate number of manual workers. The employment of people whose intellectual skills are able to create new products and technologies has become a much more important factor. Specialist knowledge and skills, that is - intellectual capital, have become an extremely important factor of production.

This article was written under the influence of interest in a new concept that has been trying to mark its presence in the accounting system for some time. It has been called the concept of intellectual capital accounting and focuses on the concept, measurement and methods of its presentation. To write the publication, research tools such as literature studies and analysis of selected valuation methods were used.

Key words: Intellectual Capital, Intellectual Capital Measurement, Intellectual Capital Accounting

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Introduction

The economic practice of the beginning of the 21st century points to the fact that to succeed on the market, in many cases it is not enough to have certain financial resources, appropriate materials or an adequate number of manual workers. It is much more important to employ people whose intellectual skills are able to create new products and technologies. Specialized knowledge and skills, that is - intellectual capital are currently an extremely important factor of production (Lev, 2004), (Brooking at al., 1998).

The notion of intellectual capital was noticed when selling highly technologically advanced enterprises. It turned out that their market value exceeded - and often several times -

the book value. A closer look at this phenomenon gave rise to the conclusion that the reason for the difference in these values is the intellectual capital not shown in the financial statements. Its use is not possible without proper management, and these in turn without the possibility of measurement. So far, however, one universal method of its valuation has not been developed (Edvinsson, 1997). Also its measurement in Polish enterprises is still rarely made. Alicja Jarugowa and Justyna Fijałkowska (2002), Mieczysław Dobija (2002), Dorota Dobija (2003) and Aleksandra Zielińska (2005), dealt with the question of measuring intellectual capital in the Polish literature.

The main goal of the article is to present selected methods of measuring intellectual capital. These methods have been presented from both the theoretical and practical side. The calculations were based on data of three Polish enterprises operating in the same industry and listed on the Warsaw Stock Exchange. For the purposes of the article, they were covered by anonymity. For all three companies presented, it is the same period, that is 2005-2010.

1 The concept and measurement of intellectual capital

The concept of intellectual capital derives from the so-called Human Resources Accounting, an area that dates back to the 1960s. The theoretical basis in this field was created by the Danish scientist E. Flamholz. At the end of the 1980s, its overarching task was to find measures to assess the state of a company's human assets, their change and the efficiency of use (Rouhesmaa, 1996).

The first definition of intellectual capital was developed by K.E. Sveiby (Sveiby, 1989). He distinguished two basic components of this type of capital, namely the intellectual capital assigned to the individual and the intellectual capital assigned to the organization. Tomas Stewart describes it as "the sum of everything everybody in the company knows to give it a competitive edge" (Stewart, 1997). Ross G. and Ross J. (Roos G, Ross J, 1997) state that „Intellectual capital is the sum of the „hidden” assets of the company not fully captured on the balance sheet, and thus includes both what is in the heads of organizational members, and what is left in the company when they leave”. Wiig (Wiig, 1997) points out that it arises on "as a result of intellectual activities extending from acquiring new knowledge (learning) through inventions to creating valuable relationships with others”.

Based on the intellectual capital accounting precursor K.E. Sveiby, the methods of measuring intellectual capital developed up to now can be divided into four basic categories: direct intellectual capital methods (DIC), market capitalization methods (MCM), methods

based on the rate of return ratio from assets (Return on Assets methods - ROA) and scoring methods (Scorecard methods - SC) (Sveiby, 1989).

In the further part of the publication, two methods related to market capitalization methods and three methods from the group of asset return methods are discussed.

1.1 Market-to-Book Ratio

The MV/BV ratio by Tom Stewart is calculated by dividing the market value by the book value. The use of market value in it means that it cannot be treated as an accurate measure of intellectual capital, but only as the answer to the question whether the company has such capital at all. In other words, it informs about the degree of company saturation with intellectual capital. The fact that the company possesses intellectual capital is demonstrated by the value of the MV / BV ratio greater than one (Stewart, 1997).

1.2 Tobin's Q ratio

The author of the second method of measuring intellectual capital is James Tobin. The indicator proposed by him is defined as the ratio of the market value of the capital invested in the company to the cost of replacing assets. The cost of replacing assets should be understood as the amounts of cash or cash equivalents that would have to be paid in order to acquire the same assets or equivalent for them today. If the value of the ratio is lower than one, i.e. when the cost of exchanging assets is higher than the market value, there is a low probability that the company will make investment decisions. If the value of the ratio exceeds one, i.e. when the cost of exchanging assets is lower than the market value, the given enterprise achieves above-average profits from investments (Stewart, 1997).

1.3 VAIC method (Value Added Intellectual Coefficient)

The VAIC model was created by the Austrian researcher Ante Pulic. The basis of the model is the calculation of the added value, which is characterized by the difference between total revenues (results) and the total expenses (expenditure) of the organization. Therefore, the VAIC method answers the question how intellectual capital is used in a company. The higher the value of the coefficient, the more effective the use of all the organization's resources. The use of the VAIC model requires the calculation of the efficiency of using the financial capital, the efficiency of using human capital and the efficiency of using structural capital. The sum of these three components results in VAIC coefficient (Pulic, 2004). Due to such an extensive structure of the indicator, it is worth noting here that its calculation for various entities would

facilitate the existence of a standard financial reporting document taking into account the need to measure intellectual capital (Bakhsha at al., 2007).

1.4 CIV method (Calculated Intangible Value)

The CIV method was designed in order to implement tax purposes in determining the market value of intangible assets of an enterprise. In 1995, it was modified by Stewart in such a way that it also provides a valuation of intellectual capital (Stewart, 1997).

The data used in the CIV method have their source in the financial statements of a valued company from three or five previous years, besides they are based on data from the capital market with the average return on assets (ROA). The value of intellectual capital appears when the ROA for a company is higher than the ROA for the sector, otherwise the CIV method shows a negative value. The discount rate used in the method is estimated directly by a company or is taken as the average cost of capital in a given sector (Stewart, 1997).

1.5 KCE method (Knowledge Capital Earnings)

The KCE method is an extension of the CIV method and is based on the economic idea of a production function, under which the aggregate value of past profits, future profits and the value of probable growth should be understood. The α , β and δ coefficients characterize the share of tangible assets, financial assets and intangible assets in the financial result of an organization, namely the return on particular assets (Gu, Lev, 2002).

2 Measurement of IC in selected units - comparative analysis

2.1. Market-to-Book Ratio

The comparison of the value of the MB/ BV ratio in the audited period for selected companies is presented in Table 1.

The obtained results may indicate that all three examined units have intellectual capital. This is indicated by the value of the MV / BV ratio, which is higher than one. The results obtained by Alfa, significantly higher than the other two, may imply that this entity has the most intangible assets that generate additional value and thus affect the higher valuation of the company by the market. In general, the trend of the MV / BV ratio in all three examined cases has an upward trend, which may indicate that each company aims to increase intangible

resources and understands that they are one of the main factors affecting the success of the company. In turn, the breakdown seen in the trend falling on the same period may result from fluctuations in the exchange rates.

Tab. 1: Value of the MB / BV index in the audited period for selected companies

Company	2005	2006	2007	2008	2009	2010
Alfa	4.58	6.15	8.73	6.74	7.01	9.87
Beta	2.71	2.80	2.50	1.41	1.83	2.68
Gamma	1.96	1.44	1.19	0.21	0.76	1.03

Source: Own study.

2.2. Tobin's Q ratio

The comparison of the value of the q-Tobin ratio in the audited period for selected companies is presented in Table 2.

Tab. 2: The value of the q-Tobin ratio in the audited period for selected companies

Company	2005	2006	2007	2008	2009	2010
Alfa	2.59	2.77	3.24	2.34	2.20	2.99
Beta	1.62	1.93	1.89	1.02	1.30	1.97
Gamma	0.95	0.80	0.72	0.35	0.56	0.75

Source: Own study.

Both in Alpha and Beta, the q-Tobin ratio is greater than one, which indicates that these enterprises can obtain high profits due to their intellectual capital. In addition, the high value of the q-Tobin index for the first company suggests that it obtains monopolistic profits and is in possession of technology, intellectual capital and knowledge that lead to positive development of the company. Looking at the results of the Alfa company, it is worth paying attention to the fact that in the years 2008-2009 the value of the indicator dropped. In the case of MV / BV ratio, the lower value of the indicator concerned only the year 2008, therefore it can be concluded that the q-Tobin ratio more precisely shows the decline in the development of intellectual capital in the company. In conclusion, at the time when Alpha is the leader in achieving monopolistic profits, Gamma is only a player on the market that has to compete with stronger organizations.

3.3. VAIC method (Value Added Intellectual Coefficient)

Table 3 presents the calculated numerical data needed for the construction of the indicator.

Value added capital coefficient (VACA) in 2005 was the highest in Beta. In 2006 in each of the analyzed companies this indicator was close to unity. However, since 2007, the Alfa VACA indicator has exceeded the competition indicators.

Human Capital Coefficient (VAHU) is best developed in the Beta enterprise, while the Alfa company is the worst in terms of this ratio. This means that Beta's staff bring a lot more value than Alfa and Gamma employees, or Beta, investing in human capital, has gained much more than Alpha or Gamma. It can also be observed that in each of the companies the highest efficiency was recorded in the area of human resources management. Every zloty that was invested in employees provided above-average profit. It can be concluded that intellectual capital was a significant generator of values in the surveyed companies.

Tab. 3: Calculated numerical data needed for the construction of the VAIC indicator

VACA	2005	2006	2007	2008	2009	2010
Alfa	0.66	0.99	1.29	1.45	1.28	1.62
Beta	1.47	1.10	0.97	0.97	1.20	1.03
Gamma	0.57	0.98	1.07	0.94	0.93	0.93
VAHU	2005	2006	2007	2008	2009	2010
Alfa	2.00	2.02	2.24	2.22	1.91	1.94
Beta	4.28	4.38	4.37	4.70	5.94	5.21
Gamma	2.54	5.15	4.52	3.11	3.50	3.87
STVA	2005	2006	2007	2008	2009	2010
Alfa	0.50	0.51	0.55	0.55	0.48	0.48
Beta	0.77	0.77	0.77	0.79	0.83	0.81
Gamma	0.61	0.81	0.78	0.68	0.71	0.74
VAIC	2005	2006	2007	2008	2009	2010
Alfa	3.15	3.52	4.08	4.22	3.68	4.04
Beta	6.52	6.26	6.10	6.46	7.97	7.06
Gamma	3.71	6.93	6.37	4.72	5.15	5.54

Source: Own study.

The lowest efficiency in each of the organizations was characterized by structural capital. Again, Beta has an advantage over its competition in the efficiency of using structural

capital, as evidenced by the results of STVA. All companies recorded an increase with slight fluctuations in the analyzed period. It is important to say that all the companies try to consistently increase their efficiency in managing their capital, especially intellectual capital.

2.4. CIV method (Calculated Intangible Value)

The comparison of the CIV value in the audited period for selected companies is presented in Table 4.

Tab. 4: Value of the CIV indicator in the audited period for selected companies (in millions)

Company	2005	2006	2007	2008	2009	2010	Average
Alfa	2900	3000	3900	3900	2700	3200	3300
Beta	373.6	793.0	331.8	381.2	536.7	848.2	544.1
Gamma	179.3	211.0	195.4	-111.0	330	146.4	127.3

Source: Own study.

The average calculated in the last column of Table 4 indicates the value of intellectual capital assuming a stable economic and financial situation of an organization. The above shows that the estimated value of Alfa's intellectual capital according to the CIV index amounts to PLN 3.3 billion, for Beta it is PLN 544.1 million, and for Gamma - PLN 127.3 million. Assuming that the average rate of return on material assets in the their industry in 2005-2010 amounted to 7%, all companies achieved a much higher return on assets than the average in the their industry.

2.5. KCE method (Knowledge Capital Earnings)

The breakdown of the value of the KCE index in the audited period for selected companies is presented in Table 5.

Tab. 5: Value of the KCE index in the period under consideration (in millions)

Company	2005	2006	2007	2008	2009	2010
Alfa	2700	2800	3700	3700	2700	3200
Beta	181.0	410.5	154.5	178.6	252.7	417.4
Gamma	161.6	175.0	155.2	-682.8	-291.6	103.3

Source: Own study.

The estimated value of the intellectual capital of the Alfa company using the KCE method in 2010 amounted to PLN 3.2 billion. For Beta, it is PLN 417.4 million, and Gamma is PLN 103.3 million. It should be noted that the estimated values of intellectual capital obtained by the CIV and KCE methods are consistent.

Conclusion

The basic purpose of measuring intellectual capital is the need to develop and use its hidden assets in a company's strategy development which are not visible in the financial statements. Managers who manage intellectual capital have a huge impact on creating the value of an organization. Ongoing monitoring of indicators related to intellectual capital and monitoring the effectiveness of using the capital of the company simplifies management. An important advantage of frequent testing is the ability to notice inefficient areas of the organization's activities and prompt management intervention.

The commonality and at the same time the advantage of the first three methods, namely the MB/ BV ratio, the Tobin's q ratio and the VAIC index, is the simplicity of the calculations. They make it possible to quickly determine the dynamics of intellectual capital in a given company from one period to the next and also allow making comparisons between companies. The CIV and KCE methods are characterized by a greater degree of sophistication and complexity. However, all the discussed methods are based on publicly available information in the form of data disclosed in publicly presented financial statements. This fact makes it possible to calculate, compare and use the value of intellectual capital for analytical purposes for large groups of individuals. The discussed methods of measurement are also characterized by a high degree of aggregation - the assessment of intellectual capital resources is carried out using a single measure.

Methods based on the company's market value, such as the MB/BV ratio and the Tobin's q ratio, allow getting an overall view of the level of intellectual capital in the analyzed period. The results obtained are a good tool to analyze the trends in changes in the value of intellectual capital in a given company or sector. In the inter-industry comparison, it should be remembered that the values of intellectual capital are strongly conditioned by the industry. The VAIC method is a very useful method from the point of view of an organization. Its advantage is an easy way to decompose the VAIC index into factors affecting it, such as the efficiency of capital employed, the efficiency of human capital or the efficiency of structural capital. In other words, it allows tracking the effectiveness of using the

given intellectual capital components in an enterprise. The main disadvantage of this indicator is the fact that it is not just a measure of intellectual capital, but a combined measure of work efficiency and the effectiveness of capital employed.

The CIV indicator may be a method worth recommending to managers because it is a powerful management tool. It provides clear signals, for example, allows assessing whether the company is in the phase of decline or if it has hidden values. A downward trend may be an indication that the company is too focused on building physical values at the expense of paying attention to the research and development department or building the brand. In turn, the growing trend may herald the ability to generate future financial surpluses before the market can recognize the existing situation. However, the use of mean values may be considered a drawback, as they generally over- or under-evaluate the results.

The fact that the author does not precisely define the material and financial assets may be an obstacle in the application of the KCE method and these categories do not appear in the Polish balance sheet. Consequently, this leads to different interpretations of concepts.

Measurement of intellectual capital can become a common practice, as long as the awareness of managers increases that it is this type of resources that is the most important factor that creates the value of a modern enterprise. The usefulness of a given method results, among others, from such factors as the availability of data, the quality of collected source material, selection of entities or time-consumption.

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