



QUANTIFYING VALUE ADDED INTELLECTUAL CAPITAL AT SMALL AND MEDIUM ENTERPRISES

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Abstract Today in business valuation, beside the tangible assets, the key role plays the intangible assets. All intangible assets, which is difficult to quantify and have a principal role in company's life, growth and development is called intellectual capital. The intellectual capital could be divided in three main components, first, and the most important, the knowledge, skills and competencies held by managers and employees, second external social relations and third the company's organizational structure. The aim of present study consists in calculation of Value Added by Intellectual Capital (VAIC) and its components, by using of some anonymous small and medium-sized enterprise' simplified yearly financial reports from Bihor County. I have investigated above mentioned indicator in dynamics between 2010 and 2012. The calculations were made in R statistics program, which could be used with success in various research fields and one of the great advantage of it is the fact there is an open source software system. The program has the modules necessary to perform the present analysis. The module which could be used to realize the cluster analysis is named 'hclust' and 'StaDA'. The results show decreasing main statistics of Value Added by Intellectual Capital (VAIC) in 2011 and 2012 compared to 2010. In the second part of analysis, I have made the grouping of 2012 results of Value Added by Intellectual Capital (VAIC), by three criteria, which are the main components of Value Added by Intellectual Capital (VAIC): Value Added of Working Capital (VACA), Value Added of Human Capital (VAHU) and Value Added of Structural Capital (SCVA). After investigating the results of cluster analysis, I have conclude, that at the big part of analyzed company the main problem is the Value Added by Structural Capital, followed by the problem of Value Added of Working Capital. So the analyzed companies need to pay an accentuated attention to these two indicators. In the case of Human Capital, the contrary can be determined, because in the case of analyzed companies, the Value Added by Intellectual Capital is due to Value Added of Human Capital. The results of this indicator are most preferred. In the case of this indicator, the results do not take negative values. The results of present study confirm the importance of intellectual capital to firm, because the great part of value added to corporate value, can be provided from employees and managers knowledge, skills and competencies which is irreplaceable for successfulness of company.

Key words:

intellectual capital, added value, human capital, customer capital, structural capital

JEL Codes:

G0
G3
G30
G32

1. INTRODUCTION

According to traditional approach the company valuation takes into account the book value of capital, assets and theirs effects on company growth. The big part of balance sheet rows, includes assets that could be materialized, take physical body, but to date, besides these items, in the corporate value creation keeps larger role the intangible assets, which couldn't be

materialized and often are hardly quantifiable. The sum of these key and growth generating, intangible and often hardly quantifiable assets, which is attributable to a company, is called intellectual capital. The key element of intellectual capital consists in knowledge, skill, competence held by employees or/and managers, and the effectiveness of external social relations, internal organizational structures and informational

systems. Recently, the importance of these has significantly increase in the corporate culture, because these elements can create added value to the company, materialized in better competitive position or stable customer relationship, which may implicitly increase the results of company.

2. LITERATURE REVIEW

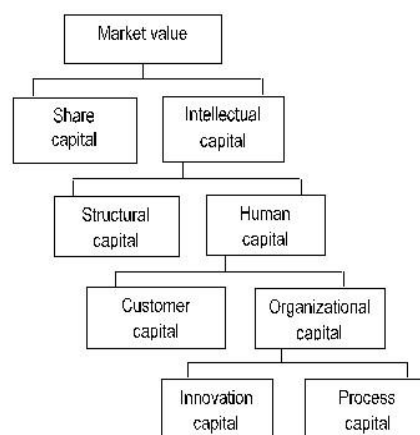
The terminology of intellectual capital was firstly in the world used by Leif Edvinson in 1993 instead of intangible assets.

In 20-th century, in the traditional company management more emphasis was given to efficient use of material and human resources which has concentrated to factories, machinery equipment, and tangible assets. Both in Bergeron (2003) and modern world point of view, besides the efficiency of tangible assets analyzing, the examination of intellectual capital and their effects on individual and organizational behavior is very important.

The definition of intellectual capital is almost different in international literature. Edvinson and Malone define intellectual capital as “information and knowledge, which are used for value creation”. According to Pablo, the intellectual capital is “the difference between market value and book value, or stock of inventories resulting from process of learning and development of internal relationships”. Hunter et.al. (2004) believes that the intellectual capital is the stock of intellectual knowledge held by organization through workers, or otherwise the human resources. In Stewart’s opinion, this concept, discussed above is the sum of knowledge, information, intellectual property and experience the totality, which can be used to create wealth.

The types of intellectual capital are shown in the following figure.

Figure 1: Value Added Intellectual Capital elements



Source: Fónagy - Árva (2007), 11. p.

The three main components of intellectual capital are mentioned in the international literature, namely:

- Human Capital
- Customer Equity
- Structural capital

The human capital includes primarily the totality of employees' knowledge, skills and competencies. The human capital is possessed by workers and managers. An inadequate knowledge management consequence is when the employees leave the company and takes with them their experience and competencies acquired. Today, information and knowledge is a necessary condition for recruiting a new workforce. These represent important selection criteria and also a condition. In addition, the human capital can be divided into three major types of knowledge, tacit, implicit, and explicit. The first category, the tacit knowledge, means knowledge entrenched in our subconscious. This type of information can be difficult to explain to others. This can be associated with an example, when the specialist cannot fully pass to students the methodology of solving complex problems. The implicit knowledge held by experts, is the knowledge type which can be acquired with so-called "knowledge mining". The explicit knowledge is the kind of knowledge that is easily transferable to others, through verbal and written communication.

The customer or also called contact capital means the totality of relationships held by organization with their customers and the process of evaluating it. This category includes loyalty,

distribution channels, brands, licenses and franchise systems. On the one hand, company's employees keep closer in touch with sales and customer service staff, so this type of capital is held by employees.

The structural capital includes the process and organizational structures, information systems and the elements of intellectual property. This type of capital also includes copyrights, organizational culture, financial relations, management processes, trade secrets and trademarks. An important feature of capital is to be independent of employees and company's executives. According to company's organizational culture, the capital type mentioned above may vary from company to company. (Bergeron, 2003)

3.RESEARCH METHODOLOGY

The analysis of company's intellectual capital and its added value in the results of company plays an important role in the economy, so the examination of value added by intellectual capital was performed by using 150 small and medium-sized enterprises simplified financial yearly reports situated in County Bihor. The companies involved in this research are operating in various fields of national economy. The company's financial simplified reports were collected for 3 years, from 2010 to 2012. The analysis of this category of enterprises is particularly important, because small and medium-sized enterprises of different profiles provide jobs for nearly 90% of the total of employees, and

provide a substantial contribution to the GDP too. They have special characteristics, so they are more sensitive, more vulnerable to the movements of the intellectual capital. Small and medium-sized enterprises are also less diverse, so these companies restructuring or reduction of their activity is more circumstantial. So many methods can be use to quantify intellectual capital. In international literature, there are grouped in three main categories: market value based approach, assets return based methods and Score Card based methods. The main characteristic of methods by first group consists in comparing of corporate market value with book value. The essence of methods based on assets return consists in studying how the returns on financial and physical assets appear in company's results. The Score Card methods base is to determine the components of intellectual capital and to assess their contribution to corporate value. The market value based methods include: Tobin's "Q" value, value added by market value, which is based on the principle of economic value added (EVA). The method based on assets return includes the method of Baruch Lev, in which the profit earned by company is compared with value of assets. The Score Card methods, or methods based on value added by intellectual capital include the value added by intellectual capital coefficient, and the indicator of value added by intellectual capital. In this study, I have used one of the Score Card methods, the indicator of Value Added Intellectual Capital (VAIC), which was applied to 150 small and medium sized enterprises from County Bihor,

by using of their financial simplified yearly reports for three years, between 2010 and 2012. The essence of this indicator lies in mapping the components of the intellectual capital and assessing of their contribution to corporate value. According to this indicator, the Value Added by Intellectual Capital is divided in three parts: the Value Added by Working Capital (VACA), the Value Added by Human Capital (VAHU) and Value Added by Structural Capital (SCVA).

Accordingly to this, the Value Added by Intellectual Capital can be described with the following formula:

$$VAIC = VACA + VAHU + SCVA \quad (1)$$

Interest Expenses +

Depreciation +

Profit tax +

Dividends +

Profit after distributions

Corporate Value Added (2)

$$VACA = \frac{\text{Corporate Value Added}}{\text{Total Assets}} \quad (3)$$

$$VAHU = \frac{\text{Corporate Value Added}}{\text{Salaries Expenses}} \quad (4)$$

$$SCVA = \frac{\text{Structural Capital}}{\text{Corporate Value Added}}$$

$$= \frac{\text{Corporate Value Added} - \text{Salaries Expenses}}{\text{Corporate Value Added}} \quad (5)$$

In the second part of analysis, was performed the grouping of enterprises by

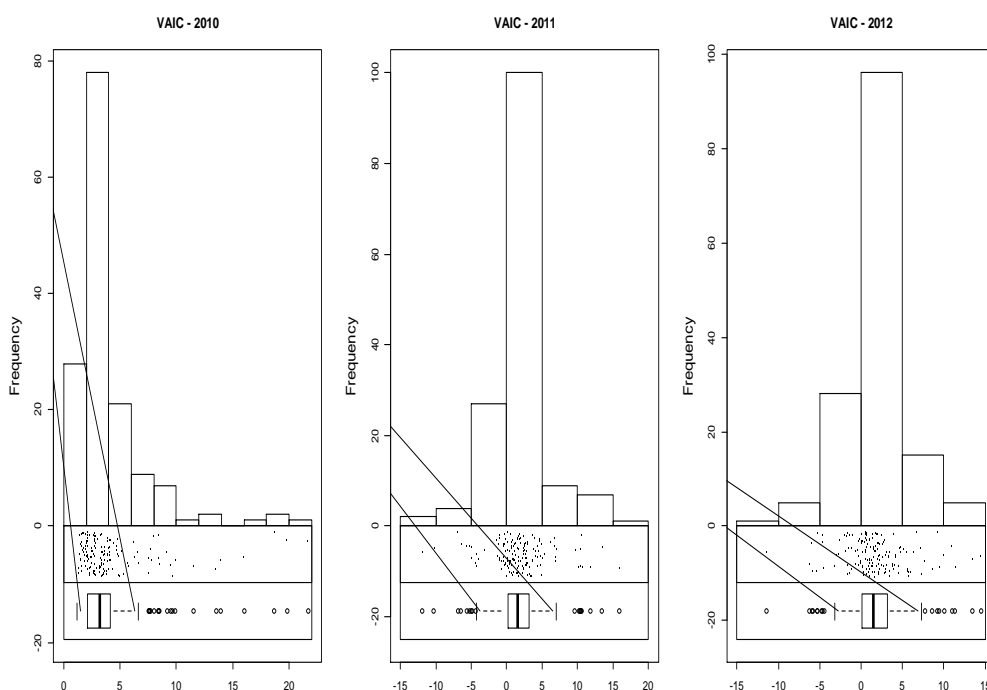
components indicators of last studied year (2012) using cluster analysis. The purpose of cluster analysis is grouping and sorting based on certain criteria (Szűcs, 2002). In this study was used the method of hierarchical cluster analysis, which essence is to merge two next groups and thus reduce the number of groups. The analysis were carried out with R statistics software system, which one of the great advantage consist in fact that is an open source program, has modules necessary for this study. Another great benefit of this software is that can be linked to an Excel spreadsheet. In this

study, the 'hclust' and 'StatDA' modules were used.

4. RESULTS

The figure 2. shows the evolution of Value Added by Intellectual Capital (VAIC) in the studied three years (2010-2012) through changes from year to year. For representation of Value Added by Intellectual Capital (VAIC) distribution, I have used a complex diagram (edaplot) including the histogram, point cloud, and boxplot diagrams.

Figure 2. Value Added Intellectual Capital between 2010 and 2012



Source: Own calculations

The main statistics data is presented in

Table 1.

The advantage of edaplot charting system is that provides a transparent and easier analysis.

Table 1.: Value Added Intellectual Capital main statistics

Years	2010	2011	2012
Minimum	1,17	-11,91	-11,49
Quartile 1	2,16	0,17	0,17
Median	3,22	1,51	1,46
Arithmetic Mean	4,12	1,78	1,71
Quartile 3	4,14	3,14	3,12
Maximum	21,67	15,92	14,51

Source: Own calculations

The Figure 1. and Table 1. clearly show that in the analyzed period, the interquartile range moves between 0 and 5. By analyzing of boxplot diagram between years 2011 and 2012, we can see that both the mean and interquartile range show downward trend, which indicates that from 2010, the Added Value by Intellectual Capital and also its effect on company's value reduced. The upper quartile and also the lower quartile show a decrease in 2011 compared to 2010 and stagnation in 2012. By analyzing the evolution of median, similar statements can be drawn, decreasing of value in 2011, while in 2012 almost the same value of year 2011 can be observed. The histogram and point cloud visualization opportunity shows similar trends, so it is obvious that in year 2010 the majority of data are situated between 0

and 5, while in years 2011 (-11,91) and 2012 (-11,49) the minimum shows negative values, which indicates that in some cases, the intellectual capital has negative impact on the examined company's value. The significant decrease in average between 2011 and 2012 can be attributed to this.

For the last year of study, the Bihor County small and medium-sized enterprises were grouped according to three aspects, which are the components of intellectual capital: Value Added by Working Capital (VACA), the Value Added by Human Capital (VAHU) and Value Added by Structural Capital (SCVA). The following table illustrates the selected indicators. The clustering was performed in R statistics software, with the module 'StatDA'.

Table 2.: The selected indicator group for cluster analysis

Indicator group for clustering
Value Added by Working Capital (VACA)
Value Added by Human Capital (VAHU)
Value Added by Structural Capital (SCVA)

According to selected indicators, these 150 County Bihor small and medium-sized enterprises

were classified in 10 categories. The 89% of these 150 companies were sorted in five groups. In the

case of investigated companies, the Value Added by Intellectual Capital is concentrated in the following five groups: group 1., group 2., group 7.,

group 3., group 4. Therefore, in the following I will introduce the statistical characteristics of these five groups in the next table.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
73	23	9	8	4	4	20	6	1	2

Table 3: The results of clustering

Indicator name	VACA		VAHU		SCVA	
	Mean	CV(%)	Mean	CV(%)	Mean	CV(%)
group 1.	0,11	528,03	1,31	30,85	0,11	3 168,87
group 2.	0,09	626,09	0,44	62,15	-1,45	42,80
group 7.	0,10	569,61	4,04	5,80	0,74	10,27
group 3.	0,30	40,26	1,62	33,44	0,15	684,93
group 4.	0,05	1 226,14	0,16	64,52	-5,52	2,14

Source: Own calculations

By the grouping, we can see that the big part of companies (48,66%) are in the first group, which an important feature is that the Value Added by Working Capital (VACA) recorded the average values, and that the value of variance shows high variability for this indicator at investigated 73 companies. This means that in the case of these 73 analyzed companies, the corporate property, efficiency of assets and also companies' working process have small contribution to corporate value increasing. In the case of Value Added by Human Capital (VAHU) we can observe values lower than the average value, which means in the case of this group the human resources has less growth to the company value. This indicator shows a smaller variability by mean, which is suggested by the

lower value of coefficient of variance (CV%). The Value Added by Structural Capital takes quite low values, but this is deemed to be positive, because in the case of other groups, it takes negative values. It can also be a sign that corporate structures, information systems have small contribution to enterprise value enrichment. The variability within the group is very high, which shows a higher instability.

The group 2. includes 23 investigated companies, which means 15,33% from total. Comparing with the previous group, the Value Added by Working Capital (VACA) keeps lower value, with a greater variability. Companies belonging to this group have less contribution to the corporate value growth. The Value Added by

Human Capital (VAHU) also shows lower value than enterprises from group 1. and higher variability within the group. The Value Added by Structural Capital takes negative value, which indicates that in the case of studied group, the corporate structures and systems has negative, destructive impact on the corporate value. For this indicator, it is obvious that the lower variability in this case can be negatively judge, because it shows the most of companies take a low or negative value for Value Added by Structural Capital.

The group 7. includes 13,33% of investigated companies. The Value Added by Working Capital (VACA) at this group takes average value, with relatively high variability, which shows a less effective assets management. In the case of this group, the Value Added by Human Capital (VAHU) records the higher value, which is deemed to be positive. At this group we could say that the employees' knowledge, skills, contribute greatly to corporate value increase. The coefficient of variance indicator also show a low volatility at Value Added by Human Capital (VAHU), which means, that the enterprises from this group the contribution of human capital to corporate value growth is significantly. The Value Added by Structural Capital (SCVA) also takes the greater values in case of this group, which is deemed to be positive. The standard deviation of this indicator shows low variability within the group.

The group 3. includes 9 enterprises representing 6% of all companies. At this group, the indicator Value Added by Working Capital

(VACA) records the greatest value among investigated companies, which is clearly a positive aspect because shows an effective assets management, which contributes positively to the growth of companies. The Value Added by Human Capital (VAHU) shows the second greatest value, which is a positive aspect. The dispersion of value from mean, within the group is low, which means that the big part of companies records values around mean. In the case of Value Added by Structural Capital (SCVA) indicator is clearly that this group takes the highest value, which is a consequence of fact that corporate systems and structures reach the highest contribution to the company's value increase.

The group 4. represents 5,33% from companies sample. By examining Value Added by Working Capital (VACA) we can see companies from this group record the lowest value from all investigated enterprises. This means that companies belonging this group work less effective from all examined companies, which represent a negative contribution to the enterprise value growth. In addition, the standard deviation is also very high, which is most likely formed because the indicator takes also negative and positive values within group. By analyzing the second indicator Value Added by Human Capital (VAHU) we can see that this takes the lowest value, from investigated enterprise groups. The volatility shown by coefficient of variance, is low related to other groups, which means the big part of companies from this group record such low values. The Value Added by Structural Capital (SCVA)

takes the lowest value possibly, a negative value, which means that company structures and their working systems drive to corporate value decreasing, which is a negative phenomenon. The coefficient of variance reveals a low volatility within group, so the big part of companies records such low values.

5. CONCLUSIONS

In corporate valuation, I believe the examination of intellectual capital and its effect on corporate value is indisputable. In this study, the impact of intellectual capital on corporate value increase it was carried out by using the indicator of value added by intellectual capital. In this paper I tried to explain this by using the components of indicator discussed above.

By analyzing of evolution of value added by intellectual capital between 2010 and 2012, for 150 enterprises from County Bihor, we can conclude, that the contribution of intellectual capital to company' value declines in the investigated period, till it reaches also negative value. This means, that in two analyzed years, the intellectual capital has devastating effect on the corporate value.

In the last year realized cluster analysis, it is clear, that in the case of investigated enterprises the Value Added by Structural Capital (SCVA) shows the lowest values, because the corporate structures, information systems is rather incomplete, and works less effective. A result of this, most likely the company value has reduced. The more of analyzed companies, but the most, enterprises from group 4. need a corporate

restructuring and reconsideration of organizational systems.

By examining the Value Added by Working Capital (VACA), we can state that a big part of companies records quite low values, which is a negative phenomenon. This means that companies have to rethink its whole working and operation process. Also we can see, that in the case of this indicator, there are growth potential of intellectual capital.

The Value Added by Human Capital (VAHU) we can see higher values and extremely good value in the case of enterprises from group 7. Besides other two component indicators, it can be concluded that it is the only element of intellectual capital, which doesn't takes negative values, so this is a positive aspect. If we analyze the three investigated components of intellectual capital in overall, we can conclude, this is the indicator which provides the highest contribution to corporate value growth.

In conclusion, we can say that among the three components of intellectual capital, the human resources, employees, company management knowledge, abilities ensure the highest contribution to the corporate value creation.

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