

VALUE ADDED CREATION BY INTELLECTUAL CAPITAL IN BULGARIAN PUBLIC COMPANIES

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Abstract: In this paper we apply the measurements of intellectual capital focusing on the human capital efficiency (**HCE**), the structural capital efficiency (**SCE**), the intellectual capital efficiency (**ICE**) and the value added intellectual coefficient (**VAIC**TM) developed by Pulic (2000; 2004) for non-financial companies listed at Bulgarian Stock Exchange (BSE) using accounting data published with their financial statements for the period 2005-2009. The research is focused on companies in the manufacturing and tourism industry in order to derive any particularities in the measurements. The financial industry is excluded from the study as being specific. At this moment and at our knowledge, there's no significant research on the value added of intellectual capital of Bulgarian non – financial industry. We extended the formula of intellectual capital valuation and arrived at the conclusion, that intellectual capital is playing an important role in the value creation process in companies listed at BSE. The relationship between the components of VAICTM and the Tobin's Q indicator characterizing the market performance of public companies.

JEL: G30

INTRODUCTION

In the 21st century access to information and knowledge, both with the motivation and skills necessary for their usage become one of the key factors of sustainable competitiveness, adaptability and improvement for companies. Nowadays, the traditional understanding of competitive advantage as acquisition of tangible assets (financial capital, land, raw material, or technology) seems not enough to gain stability. In a knowledge based society the sustainability has become the capability of economic agents to convert their skills to competitive advantage. On this basis the new criteria of growth are steadily related to innovation and education. All the preceding has definitely redirected the strategic priorities of companies to intellectual capital rather than to the traditional more conservative financial capital.

- Many scholars explain the increasing gap between the book and market values of many companies with the growing importance of the intellectual capital. Many empiric researches have related such kind of gap. For Edvinsson& Malone (1997)⁵, underlined in their study, that, the median of the P/B ratio for the period 1973-1993 moved from 0.82 to 1.692.

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⁵ Edvinsson L. Malone M.S. Intellectual Capital. Realizing Your Company's True Value by Finding Its Hidden Brainpower. New York, Harper Business, 1997, p.5

- (Lev, Feng 2001), found that approximately 40% of the market value of listed companies are not shown in their balance sheet, and for the high technology companies this rate could reach 50%.

The non-disclosed part of market value of the company may be gained from the intellectual capital.

- In a study of 3,500 American listed companies, Stewart (2001) found that in 1978 the difference between the market value and the book value was 5%, but 20 years later, i.e. in 1998, that difference was 72%.

Lev (2003) found, that on March 2001, the market value of 500 medium-size Standard & Poor companies was 6 times greater than the net assets disclosed in their financial statements, meaning that traditional accounting methods allow to value approximately only 15% of the real value of the companies.

- In 2001, the P/B ratio for young companies listed at Frankfurt Stock Exchange averaged 14.4. The ratio in the emerging markets reached high level for leading companies. On 8 May 2001, e.g. the ratio was for the leading biotechnology company Quiagen – 46.6, for Articon – 66.6, and for GFT Technologies (Burman, 2003)
- According to data from Bloomberg, for 2009 the P/B ratio reached respectively 1.54 for Eastern Europe Countries and 1.25 for Western Europe.

In practice, the standard financial indicators used to measure business performance, such as EBT – Earnings before taxes, ROI - Return on investments, EPS - Earnings per share has been proved not giving sufficiently adequate and clear information for users on the strategic development potential of the business. According to Milner (2003) the economic processes confirm that the capital of the business in its traditional form i.e. financial and tangible has gradually stopped to be the only basis of the valuation of businesses.

Our research aims at presenting the results of an empiric test on the role of intellectual capital in value creation in some companies listed at Bulgarian Stock Exchange for the period 2005-2009.

1. Intellectual capital – definitions and structure.

Intellectual capital has been in the last years subject of great interest of many researches in many scientific area such as finance, law, mathematics or statistics. The topic has been of great importance in subjects like the theory of the firm, the growth theory of the firm. Hence different concepts, methodology and approaches have been generated. Related to the concepts of intellectual capital are concepts like: information management, knowledge management, organizational behavior and long life learning (Kasarova, Dimitrova, 2010).

The literature has devoted many definitions of the concept of intellectual capital. According to Edvinsson (1997), intellectual capital is any knowledge convertible to value. For other scholars like Stuhlman, intellectual capital is better understood as intangible i.e. the sum of knowledge and skills including the knowledge of employees of the information processes in the business, the knowledge of internal and external experts, the company's products, its consumers and competitors, licenses and trade marks, history and capability to plan future.

At the moment, there is no generally accepted definition or method of valuation of the concept of intellectual capital. This might primarily be due to the fact, that there is no definition or conclusion of the concept to satisfy its understanding in law, finance and management.

Many different economic agents like business owners, potential investors or individuals are also concerned by the concept of Intellectual capital. Each using it, for his particular objective. Hence in marketing it will be used by marketers - to create a good image of the company in order to increase its attraction; professional valuers – in the valuation process based on knowledge; management – in the workforce and asset management; owners and investors- in determining the value created. Although it is widely known in practice, the concept of intellectual capital suffers for disclosure in the financial statements published by companies. Nevertheless it is of great value for the modern economy.

As underlined by Georgieva (2008), a deeper analysis of the current definitions of intellectual capital in the literature, allows arriving at the conclusion that, in spite of the differences between scholars, there is a common agreement on the fact that intellectual capital is based on knowledge, it is intangible and brings value to the business.

In conclusion, the definitions of intellectual capital may be classified into two groups.

The first group emphasizes the capability of intellectual capital of generating and increasing the market value of the company (Edvinsson, Malone, 1997), and so transforming the way of creating value by the business. Instead of the use of huge amount of tangible assets in the production process, it is therefore important and vital of the business to introduce a much “smarter” capital, capable of creating value; or knowledge, that can be converted into value (Black, Lynch, 1996). In other words, intangible assets interact with tangible and financial assets to generate economic growth and market value, which is able in return to create sustainable competitive advantage for the business (Stewart, 1991).

The second group of definitions emphasizes the structure and content of intellectual capital as a corporate asset. In spite of the differences in the interpretation, the classifications are very similar Bontis, (2001). For Bradley and Albert (1996), Intellectual capital represents knowledge and intangible asset transformed into useful resources. Skoblyakova (2006) defined intellectual capital as a collection of knowledge, habits and skills by an individual, his mobility (in terms of capability of assimilating any new information, of learning or of adaptation in new conditions). Inozemtsev (1998) assimilates intellectual capital to a “collective brain”, which includes scientific and daily knowledge of employees, intellectual capability and accumulated experience, organizational structure, information network and the image of the company.

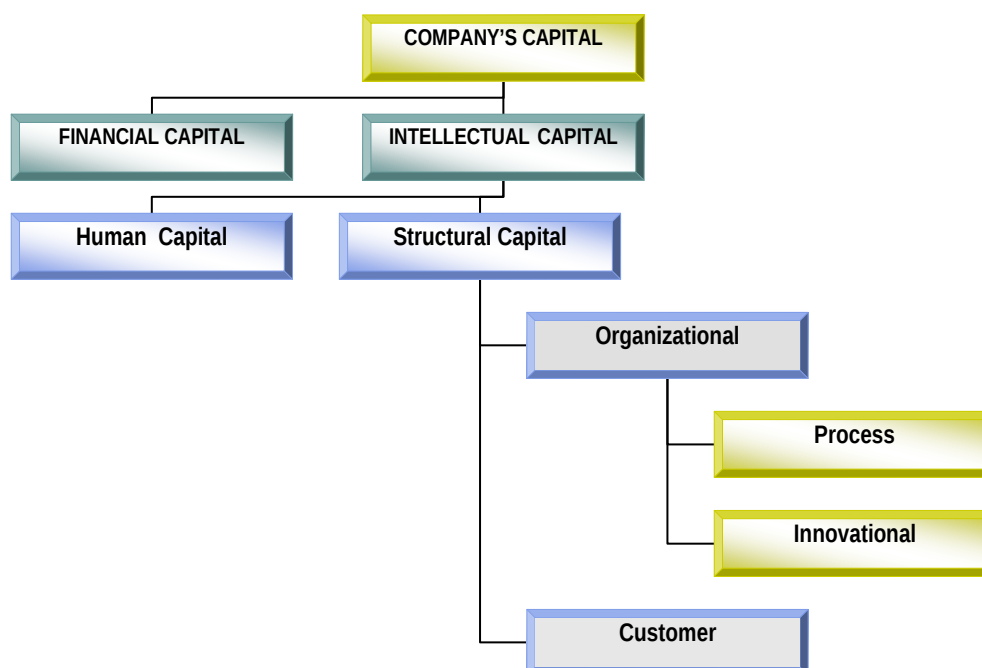


Fig.1. Structure of intellectual capital (based on Scandia's model)⁶

The IFAC (International Federation Of Accountants)⁷ defines three elements in intellectual capital: human, customer and organizational capital. This classification is derived from the structure of intellectual capital prepared and implemented by the Swedish insurance company “Skandia” (fig. 1).

For the purpose of the study, we consider intellectual capital as a collection of intangible assets, based on knowledge, which can be used to create value and to assure competitive advantage for companies. We consider in the same order with “Skandia”, that intellectual capital can be structured as: human, customer, and organizational.

The axiom, according to which, “the manager who cannot value, cannot manage efficiently” is totally applicable to intellectual capital. Both, in theory and in practice, many methods are used to value intellectual capital. One of the interesting methods is VAICTM (Value added intellectual coefficient) developed by Ante Pulic (1998).

2. VAICTM - a system of indicators to measure the value added generated by intellectual capital

The increased interest in intellectual capital led to the creation of multiple indicators (Sveiby, 2001), which characterize it from different perspectives. Some of them directly evaluate its components, others - focus on the relationship between market and book value of capital, and others focus on the return of the investments

⁶ Power of Innovation. Intellectual Capital, Supplement to Skandia's 1996 Interim Report. <http://www.skandia.com/en/includes/documentlinks/annualreport1996/e9606Power.pdf>; Edvinsson, L., G. Brünig, Aktiv Posten Wissens Kapital, Gabler

⁷ Measurement and management of intellectual capital, IFAC, 1998

that form it. These models, however, do not characterize the value added generated by intellectual capital, but the value added is an indicator of the success of any company, as it reveals the company's ability to create and increase its value.

Most types of value added generated by business are in themselves commercialization of knowledge and intangible assets [Edvinsson, 2005]⁸. From this perspective value added is a basic indicator of the transformation of intangible assets into market assets of the enterprise. Therefore, the best picture of the effectiveness of intellectual capital, we believe, is given by the model VAICTM, which determines the efficiency of the use of tangible and intangible assets through the created value (Pulic, 2000). The financial capital, the human and the structural capital are the basic elements in the model. VAICTM accounts for the effectiveness of the tangible and intangible assets through the value generated by them for the company in their joint exploitation [Pulic, 2000]⁹.

Using VAICTM provides a common basis for comparison between companies in different economies and economic sectors. It is also useful because it combines the above discussed viewpoints on the nature of intellectual capital - as key to sustainable value creation in the company and as a corporate asset consisting of human and structural (organizational and client) capital. The management of the company can determine the strengths and weaknesses in the creation of value added by this indicator, although it cannot indicate the level and amount of changes that need to be made in the company to improve its market position. However, it should be borne in mind that VAICTM is calculated in the conservative environment of accounting statements, which record past events. To produce a complete picture of the company, taking into account also the attitude of the market to it, requires additional analysis using indicators such as Tobin's Q, EVA, MVA.

The model VAICTM (Value Added Intellectual Coefficient) has the form:

$$\text{VAIC}^{\text{TM}} = \text{ICE} + \text{CEE}, \quad (1)$$

where:

ICE - Intellectual capital efficiency coefficient; *CEE* - capital employed efficiency coefficient

The first component in the model is **ICE** treated as the sum of Human capital efficiency coefficient (HCE) and Structural capital efficiency coefficient (SCE):

$$\text{ICE} = \text{HCE} + \text{SCE} \quad (2)$$

Human capital is a key resource for generating value added in the company and is treated as an investment, not an expense as it is done in the accounting concept. To determine the size of human capital, information from the Income Statement of the company for the respective year is used, in particular - the remuneration costs and insurance costs.

The effectiveness of human capital is calculated as follows:

$$\text{HCE} = \text{VA} / \text{HC} \quad (3)$$

where:

VA – value added; *HC* – Human capital.

Value added is calculated as the sum of the operating profit, depreciation costs and human capital:

$$\text{VA} = \text{EVIT} + \text{DA} + \text{HC}, \quad (4)$$

⁸ L. Edvinsson. Corporate Endurance. Navigation in economy based on knowledge. INFRA, M, 2005

⁹ Pulic, A. (2000), "VAIC - An Accounting Tool for IC Management," International Journal of Technology Management, 20 (5). Pulic, A. Intellectual capital – does it create or destroy value?, Journal of Business Performance Management, vol.8, No.1, 2004

where:

EBIT – Earnings before interest and taxes; *DA* - Depreciation and Amortization.

The second component of intellectual capital - Structural Capital Efficiency Coefficient (SCE), is calculated from the formula below:

$$\text{SCE} = \text{SC} / \text{VA} \quad (5)$$

where:

SC – Structural capital; *VA* – Value added

Structural capital is calculated as the difference between Value Added in the company and Human Capital:

$$\text{SC} = \text{VA} - \text{HC} \quad (6)$$

As much as intellectual capital operates in conjunction with physical and financial capital, their role cannot be ignored. Therefore, in order to obtain complete information about the effective use of the company resources Capital Employed Efficiency Coefficient (CEE) is also taken into account:

$$\text{CEE} = \text{VA} / \text{CE} \quad (7)$$

where:

VA – value added; *CE* – Capital employed

Capital employed is the sum of equity and long-term interest debt of the company.

To sum up, the value of the coefficient VAIC^{TM} can be calculated as the sum of the three coefficients examined above: a) Human Capital Efficiency Coefficient (HCE); c) Structural Capital Efficiency Coefficient (SCE); a) Capital Employed Efficiency Coefficient (CEE). In this case the formula of the coefficient VAIC^{TM} acquires the form:

$$\text{VAIC}^{\text{TM}} = \text{HCE} + \text{SCE} + \text{CEE} \quad (8)$$

For values of the coefficient VAIC^{TM} below one, the company does not create value added, but "destroys" value since for every invested lev the company obtains value-added less than the investment. Therefore, when the level of VAIC^{TM} assumes values exceeding 1 it can be argued that the organization operates efficiently. This information is important for shareholders and other persons interested in the company development. The same applies to some components in formula (8). If the HCE is above 1, this means that the investment in human capital is reasonable since every lev invested in staff provides a new value (added) exceeding the investment. The optimal levels of HCE take values above 2.5. They usually occur in high-tech industries.

3. Earnings management, accounting quality and the accuracy of VAIC^{TM}

The value added intellectual capital coefficient VAIC^{TM} is calculated using accounting data. This may be the main limit of the model. However, financial statements presented in accordance with international accounting standards or international financial reporting standards (IAS/IFRS) should comply with the recognition, measurement, presentation and disclosure requirements of all applicable IAS/IFRS and Interpretations of the Standing Interpretations Committee.

Wrong or inappropriate accounting treatments are not rectified either by disclosure of the accounting policies used, or by notes or explanatory material (i.e., good disclosure cannot cure bad accounting). There are minimum requirements as to structure and content for each of the primary financial statements. The review of the financial statements of companies included in the study revealed that all of them comply with the requirements of IAS by presenting a summary of the accounting policies in the explanatory notes. In fact, the disclosure of additional information as

required by the standards (IAS 1 paragraphs 15(c) and paragraph 91(c) should enable users to understand and assess the effects of significant unusual events, transactions or accounting treatments.

Even, if all the requirements of accounting standards and principles are respected to give a fair and complete view of the financial position of the firm, the calculation of VAICTM may suffer bad accounting, earnings management and/or the use of creative accounting.

The first studies on the reasons of earnings management had emphasized the motivation of managers to use specific accounting methods of depreciation or valuation. Since the research from Healey (1985), many scholars had emphasized the impact of earnings management through the use of accruals. Accruals are based on assumptions and estimates that, must be corrected in future accruals and earnings. One role of accruals is to shift or adjust the recognition of an accounting item (expenses or revenue) over time so that the adjusted earnings better measure firm performance. Dechow and Dichev (2002) suggested a new measure of one aspect of the quality of the working capital accruals and earnings. They argue that the quality of accruals and earnings is decreasing in the magnitude of estimation error in accrual.

Using accruals may distort the actual measure of human capital and give wrong VAICTM. Many researches underlined that the beneficial role of accruals is reduced by various limitations, including estimation errors. As accounting quality is concerned Palepu et al. (2000) discuss estimation errors as a factor that reduces accounting quality. Many studies (Healy and Wahlen, 1999) use models of “discretionary accruals” to investigate the manipulation of accruals to achieve earnings management goals. Such studies emphasized the opportunistic use of accruals to window-dress and mislead users of financial statements.

Kedia and Philippon (2007) argue that earnings management and fraudulent accounting have important economic consequences. They show that in a model where costs of earnings management are endogenous, in equilibrium, low-productivity firms hire and invest too much in order to pool with high productivity firms. They also argue that during periods of suspicious accounting, firms hire and invest excessively.

As the VAICTM is concerned, any excessive investment and recruitment of personal will imply an artificial increase in labor cost and in the human capital efficiency and also in the structural capital, and lead to wrong conclusion on firm performance.

When calculating HCE we use mainly labor cost disclosed in the financial statements. Most of the companies included in the study have adopted IAS/IFRS and comply with the requirements of the standards. In this line, we could rely on the accuracy of the figures. But still remain the quality of the accounting data and the disclosure of the necessary information, which enables investors, analyst, shareholders and other stakeholders to have complete and fair view of the financial state of the firm.

Issues related to human capital accounting and particularly the human resources aspects in accounting have been of interest in studies through the years. The quality of accounting measurement of human resources have been pointed out in three aspects (Caplan and Landekish, 1975), (Dermer and Siegel, 1974).

- validity: can accounting measures accurately reflect the state of a firm’s human resources and are they related to traditional indicators;
- reliability: can the same measures repeated over time reflect agreement;
- usefulness: are these measures useful to a firm and its personnel?

Dye (2002) argues in a model of “classifications manipulation” that accountants may engage manipulations in order to receive their preferred accounting

classification. He underlines that the possibility of classifications manipulation creates a distinction between the official classification described in the financial statements and accounting standards and the “de facto” classification, determined by the “shadow standard” actually adopted by the accountant. The research studies the selection and evolution of accounting standards in the context of classifications manipulations and evaluates “efficient” accounting standards.

Many studies acknowledge the important role of classification in financial reporting Christensen and Demski (2003), Dye (1985), Ijiri (1975) defend that when the classification process functions accurately, financial reporting helps users to predict the company’s future financial state.

Barton and Simko (2002) argue that the actual balance sheet accumulates the effects of previous accounting choices, and so the level of accounting data reflects the extent of previous earnings management. In their study, they predict that managers’ ability to optimistically bias earnings decreases with the extent to which the balance sheet overstates net assets relative to a neutral application of the generally accepted accounting principles (GAAP).

Another important aspect of the quality of accounting data would be the disclosure of real salaries by the studied companies. Although managers are accountable for the accuracy of the financial figures, they may tend to manipulate the information, even when complying with accounting standards and regulations. It is widely accepted in the country that official reported salaries are not the real ones. In such environment, a deep research of the impact of the quality of the reported labor cost on the level of the elements of the VAICTM would give further highlights on the opportunity of such indicators in the particular context.

Many examples, like Enron, Vivendi universal, Parmalat...illustrate the effect of bad accounting. In Bulgaria, there is not yet example of a company which has gone bankrupt due to bad or fraudulent accounting. But this doesn’t necessarily mean that accounting information supplied to users is completely relevant. Further studies could reveal the quality of accounting numbers in financial statements.

4. Empiric test for the value added, created by intellectual capital in some companies listed at BSE

- **Purpose of the empirical test**

In the study we present the implementation of the model of Value Added Intellectual Coefficient - VAICTM as a measurement of the overall efficiency of the company based on its intellectual capability. We have tested it in Bulgarian public companies:

- ✓ the role of intellectual capital in the creation of value added by using the model VAICTM as an internal measure of effective performance ;
- ✓ strength of the relationship between Tobin’s Q¹⁰, as an external measure of the efficiency and components of VAICTM - capital employed (CE), human capital (HC) and structural capital (SC).

- **Data sources for the empiric test**

The research is conducted for the period 2005-2009. The data cover a panel of 5-years period of development of the companies, which permits to analyze the impact of intellectual capital on the value added creation for the whole period, and not only for just one year. This approach avoids drawing conclusion on a static basis. It has

¹⁰ In the present study Tobin’s Q indicator was calculated as the ratio of market capitalization of the company and the carrying value of its equity.

empirical as well as theoretical advantages, since the influence of other factors, like the financial crisis, the specificities of BSE, functioning in an emerging market could be studied. In fact, the interpretation of a panel analysis should take into account the danger of the 'survivor bias' because only companies included in the panel are the ones which have succeeded to survive for the five year period of study.

The panel includes 30 companies (150 observations) traded at BSE (see table. 1), of them 24 are in the manufacturing branch, and 6 – in the tourism branch. The following criteria guided the choice of the companies:

- ✓ The companies are in the manufacturing branch and tourism. The branches were chosen to test their intellectual intensity. ie understand, if manufacturing and tourism companies rely either on tangible or intellectual resources in their value creation process.
- ✓ The company has a market capitalization for each of the five year period, i.e. it is listed at BSE, not later than in 2005.
- ✓ The financial statements of the company are available and accessible for each of the period of study.
- ✓ The part of capital belonging to the minority shareholders (owning less than 5% of the share capital) is more than 10% for at least 4 years of the 5-year period of study.

Table 1. The list of the companies studied.

<i>Nº</i>	<i>Company</i>	<i>Code BSE</i>	<i>Nº</i>	<i>Company</i>	<i>Code BSE</i>
1.	Akumplast Ltd	6AK	16.	Intransmash-engineering Ltd	4IE
2.	Albena Ltd	6AB	17.	Pamporovo Ltd	4PV
3.	Alkomed Ltd	6AM	18.	Medika Ltd	5MA
4.	Aroma Ltd	6AR	19.	Moststroy Ltd	5MY
5.	Bulgarska zahar Ltd	4BZ	20.	Neochim Ltd	3NB
6.	Velbuzhd Ltd	4V6	21.	Olovno cinkov complex Ltd	5OTZ
7.	Vinzavod Ltd	4VA	22.	Polymeri Ltd	51P
8.	Vipom Ltd	4VI	23.	Svinekomplex Nikolov Ltd	6SN
9.	Druzhba Ltd	4DU	24.	Sofia BT Ltd	3JU
10.	EMKA Ltd	57E	25.	Trakiisko Pivo Ltd	3TW
11.	Zavodski stroeji Ltd	3Z8	26.	Transtroy AM Ltd	42T
12.	Slunchev den Ltd	3JP	27.	Sluncheb briag Ltd	3JL
13.	MC Hidravlik Ltd	5MH	28.	Zlatni piasuci Ltd	3ZL
14.	Sopharma Ltd	3JR	29.	Stara planina Hold Ltd	5SR
15.	Sv.Sv. Konstantin I Elena Holding Ltd	3NJ	30.	Biovet Ltd	53B

For the purpose of the study, we used the data from the non-consolidated annual financial statements published by the companies, rather than the consolidated ones. The objective was to consider the companies individually, rather than as a group.

• Methodology of the empirical test

The relationship between Tobin's Q and the components of VAIC is revealed by regression applied to the data of 30 selected public companies. The study of this relationship is done in 3 phases.

In the *first phase*, we look for correlation between Tobin's Q and HCE, SCE and CEE for the entire five years of the study (2005-2009). Thus, a significant row of data is formed (5 years, 30 companies - 150 data for each indicator).

The regression examined here has the form:

$$Q = \alpha_0 + \alpha_1 HCE + \alpha_2 SCE + \alpha_3 CEE + \alpha_4, \quad (9)$$

where:

Q is the value of coefficient;

HCE is the value of the human capital efficiency coefficient;

SCE is the value of the structural capital efficiency coefficient;

CEE is the value of the invested capital efficiency coefficient;

The result of regression (9) is presented in Tables 2 and 3.

The determination coefficient has a value of 16.2%, which shows that only 16.2% of the changes in Tobin's Q coefficient can be explained by changes in HCE, SCE and CEE.

Table 2: Determination coefficient results from the regression model in (9)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0,402 ^a	0,162	0,145	2,16

a. Predictors: (Constant), HCE, SCE, CEE

Table 3: Regression results from model (9)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	132,078	3	44,026	9,399	,000 ^a
	Residual	683,876	146	4,684		
	Total	815,953	149			

a. Predictors: (Constant), HCE, SCE, CEE

b. Dependent Variable: Q

In the *second phase* of the study the objective is to determine whether there is any change in the power of the relationship by years between Tobin's Q on the one hand and HCE, SCE and CEE on the other. This is necessary because the period is related to dynamic changes in the Bulgarian capital market. The beginning of the period is characterized by rapid growth of the participants at the exchange, influx of foreign capital that is invested in securities in the country, rising liquidity and increasing volumes of trade at the BSE. The end of the period, influenced greatly by the global economic crisis, is characterized by the withdrawal of foreign and local capital from the stock market, a great decrease of the trading volumes and liquidity of capital market. For these reasons we believe that the strength of the relationship of the studied parameters changes over the years. To investigate this change, the regression applied in the second phase has the form:

$$Q_t = \alpha_0 + \alpha_1 HCE_t + \alpha_2 SCE_t + \alpha_3 CEE_t + \alpha_4, \quad (10)$$

where:

Q_t is the value of Tobin's Q coefficient in year t;

HCE_t is the value of the human capital efficiency coefficient in year t;

SCE_t is the value of the structural capital efficiency coefficient t;

CEE_t is the value of the invested capital efficiency coefficient t;

Table 4 shows the results for the determination coefficient by the years of the research period. The highest value of the determination coefficient occurs in the pre-crisis year 2007 when the relationship between the studied coefficients is $R^2 = 33.9\%$. In all the other years R^2 has lower values; in the first year of the crisis when liquidity and volumes on the BSE fell dramatically $R^2 = 11.8\%$. In the following year, 2009, the determination coefficient increased slightly again and reached 16.4%.

Table 4. Determination coefficient results from the regression model in (10)

	2009	2008	2007	2006	2005
R^2	0,164	0,118	0,339	0,190	0,071
F	1,695	1,158	4,452	2,031	0,660
Sig.	0,193	0,345	0,012	0,134	0,584

In the third phase of the survey we are looking for a time lag in the value of Tobin's Q, which as a market indicator quite logically changes in time subsequent to realizing the underlying fundamentals of the company. The idea here is to examine whether there is such a time lag between the economic performance of the company and the investors' reaction to its performance. In this connection regression is applied:

$$Q_t = \alpha_0 + \alpha_1 HCE_{t-1} + \alpha_2 SCE_{t-1} + \alpha_3 CEE_{t-1} + \alpha_4, \quad (11)$$

where:

Q_t is the value of Tobin's Q coefficient in year t;

HCE_{t-1} is the value of the human capital efficiency coefficient in year t-1;

SCE_{t-1} is the value of the structural capital efficiency coefficient in year t-1;

CEE_{t-1} is the value of the invested capital efficiency coefficient in year t-1;

When looking for the presence of time lag the purpose is to find out whether the determination coefficient is increasing since only in this case the existence of lag is confirmed. That is why a regression is constructed with equation 11 which is then compared with the result of equation 10 (Table 5). Initially the existence of a relation between Tobin's Q and HCE, SCE and CEE is investigated using equation 11. Again, the determination coefficient has the highest value in 2007, when R^2 is calculated in the amount of 49.4%. The determination coefficient has significantly lower values in the year of crisis 2008, when $R^2 = 15.9\%$. In the remaining years of the period under analysis (2006 and 2009) its value is again within about 15%.

Table 5. Determination coefficient results from the regression model in (11)

	2009	2008	2007	2006
R^2	0,123	0,159	0,494	0,155
F	1,213	1,643	8,445	1,587
Sig.	0,325	0,204	0,000	0,216

The value of R^2 of 49.4% is a significant increase in the strength of the relationship compared to the regression done with equation 10. The strength of the relationship is also greater in 2008, where R^2 is 15.9% against 11.8% in the regression with equation 10. In the remaining years (2006 and 2009) the determination coefficient of equation 11 is lower than that of equation 10 (Table 6). These results are shown graphically in Figure 2.

Table 6. Comparison between the determination coefficient of the regressions with equation (10) and equation (11)

	2009	2008	2007	2006
R^2	0,123	0,159	0,494	0,155
R^2 with lag	0,164	0,118	0,339	0,190

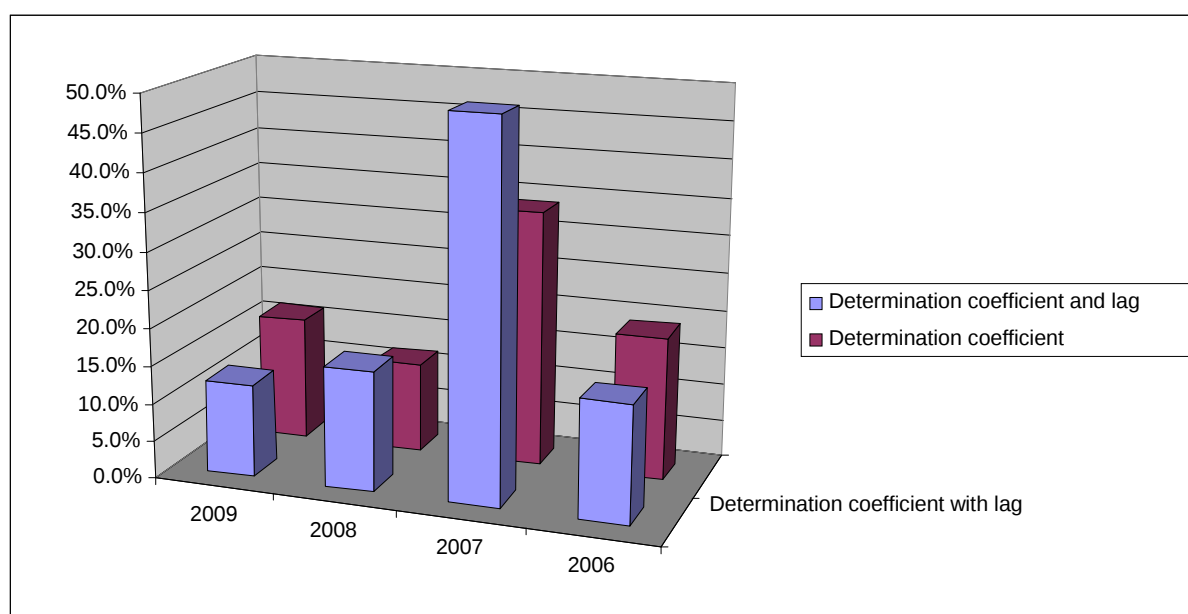


Fig 2. Comparison between the determination coefficient of the regressions with equation (10) and equation (11)

- **The results**

The average VAICTM and its elements are presented in table 7, and in fig. 3. They are calculated on the basis of individual financial statements from the 30 selected manufacturing and tourism companies listed at BSE and presented in table 7.

Table 7. Summary of the parameters of the companies included in the panel

Ratio	2009	2008	2007	2006	2005
Human capital efficiency coefficient (HCE)	1,60	1,01	0,45	1,99	1,19
Structural capital efficiency coefficient (SCE)	0,68	0,57	0,42	-0,31	0,64
Intellectual capital efficiency coefficient (ICE)	2,28	1,57	0,87	1,68	1,83

Capital employed efficiency coefficient (CEE)	0,23	0,29	0,34	0,30	0,33
Value added intellectual coefficient (VAICTM)	2,51	1,86	1,21	1,98	2,16

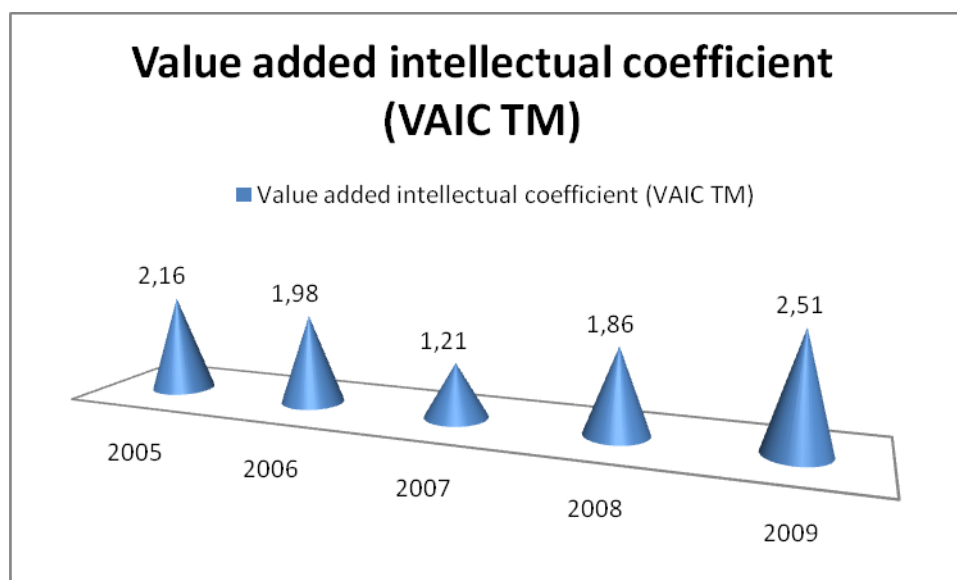


Fig 3. The variation of VAICTM from 2005-2009.

The observed VAICTM for the studied companies has a U-shape curve. The significant decrease is observed in 2007. The highest value is observed in 2009 (2.51). The average VAICTM for the 5-year period of study is 1.94, which is significantly lower than the average in European markets.

The reasons explaining such movement of VAICTM in Bulgarian market are external (the financial crisis) as well as internal, related primarily to the management of the capital of Bulgarian companies and to the stagnation in the real economy, which implies the low level of added value, created by the companies.

In the same line with Lev (2003), we consider that intangible assets are the key drivers of the growth and value of the company we analyze the correlation between:

- The Value Added (VA) and the Capital Employed (CE),
- The Value Added (VA) and the Human Capital (HC),
- The Value Added (VA) and the Structural Capital (SC),

The test on the companies in the panel showed the following results (таблица 8):

Correlation HC/VA = 0,81 strong
 Correlation SC/VA = 0,88 strong
 Correlation CE/VA = 0,29 → low

Table No 8. Correlation between value added and intellectual capital by sectors

Correlation	Overall	Tourism	Industry
Correlation HC/ VA	0,8052	0,6603	0,8109
Correlation SC/ VA	0,8819	0,9601	0,8530
Correlation CE/VA	0,2873	0,0008	0,3380

The positive correlation between the value added and the three indicators showed that the investment is helpful in the value creation process. The assumption is strongly true for the structural capital, where the correlation between VA and SC is 0.88. The correlation between VA and HC is also high (0.81) while it is low between CE and VA (0.29). Data from Table 8 reveal specific trends for the contribution of the components VAICTM under the conditions of the emerging Bulgarian market. They require further research.

In other words, the study confirmed the hypothesis, according to which the value of public companies in Bulgarian manufacturing branch, at a certain level, are highly influenced by the human and structural capital, which, in fact, consists of the corporate intellectual capital. The hypothesis is also confirmed by the data in fig. 4. In fact, the decrease in VAICTM observed in 2007 is due to the fall in the efficiency of the structural capital in 2006 and the following fall in the human capital for the next year. In the same time, while the invested capital increased, its efficiency stayed constant. This could be interpreted as a sign of the existence of assets in the business which cannot generate the minimal revenue, or that there are some non-operating assets in the business.

On average, the intellectual capital efficiency coefficient for the studied period is 1.65, mainly due to the human capital efficiency (1.25), while the capital employed efficiency (CEE) has an average value of 0.30.

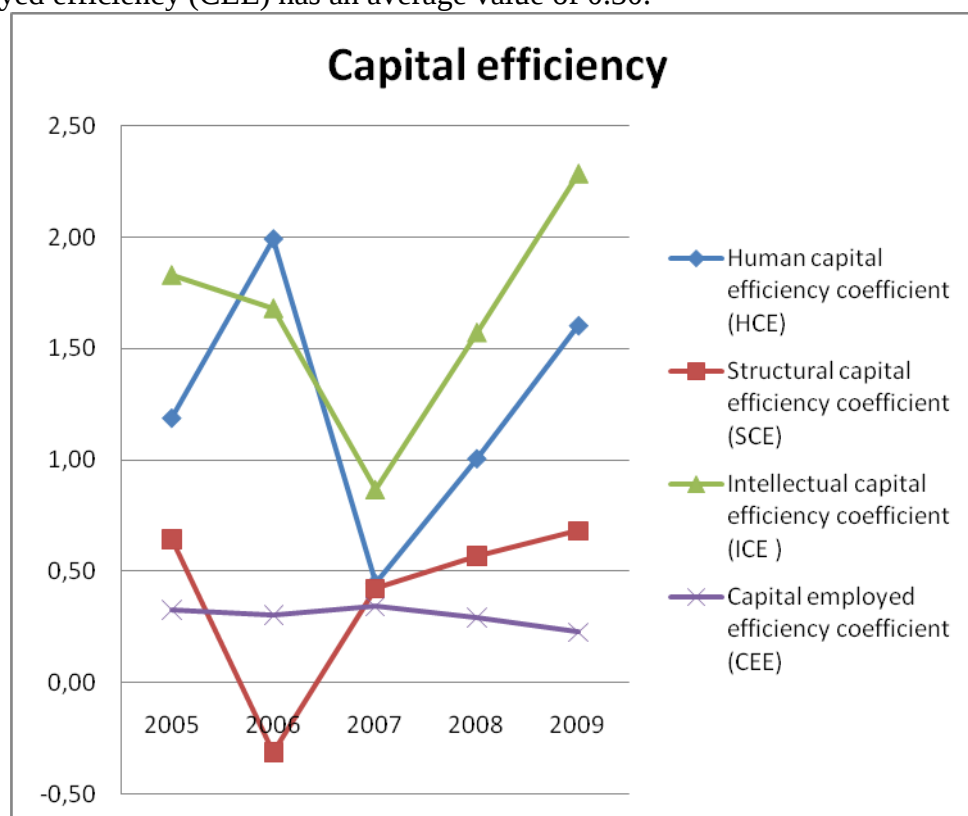


Fig. 4. The variation of efficiency of the different capital of the analyzed manufacturing companies listed at BSE.

The results of the efficiency of intellectual capital and the value added creation in the two analyzed branches are illustrated in the following figure No 5.

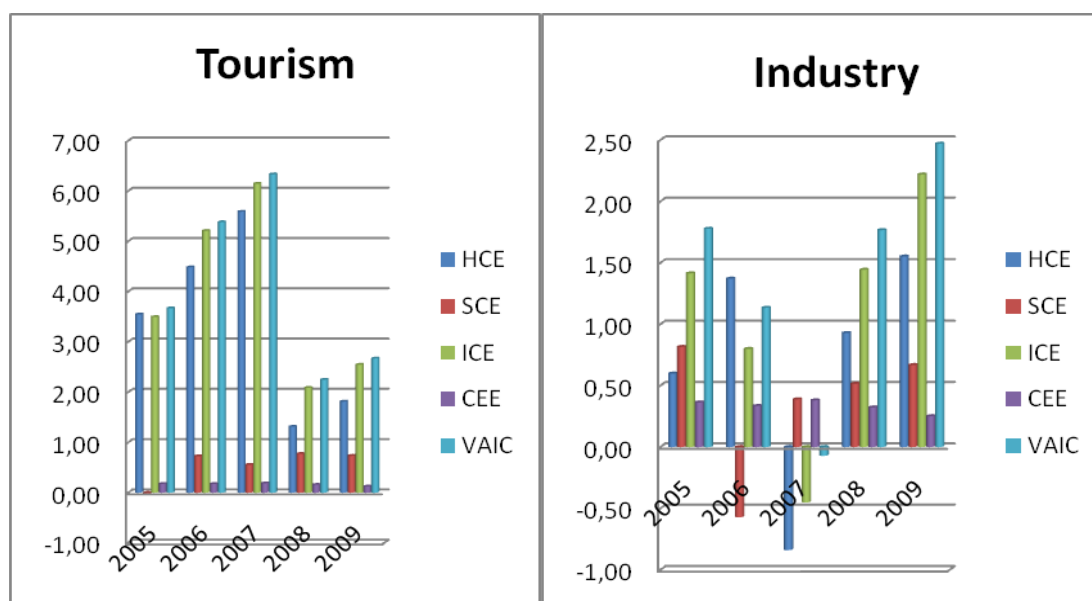


Fig.5. VAIC by sectors

The data show generally higher values of HCE in the tourism industry (an average of 3.35 for the period) against only 0.72 efficiency of the human capital in the manufacturing branch. In respect of the efficiency of the structural capital the values are generally stable in the tourism industry, with the exception of the negative value in 2005, while in the manufacturing branch it is critical in 2006. The trend in respect of the efficiency of the invested capital (CEE) is opposite- while its average value in manufacturing is 0.33, it is half (0.16) for the companies in the tourism sector. Reasonably, the average VAICTM for the period in the tourism industry (4.06) is over 3 times higher than that in the manufacturing sector (1.42).

Table 9 shows the values of the indicator Tobin's Q by the years of the analyzed period in the two branches. Overall, the indicator has a value above 1, which characterizes the competitive advantages of all the companies. The situation in the manufacturing branch is the same - Tobin's Q varies with the years, but its value is always above 1. In the tourism branch, however, the indicator falls dramatically in 2008 and 2009 and its value is below 1. These are the years in which the branch is most affected by the economic crisis.

Table No 9. Tobin's Q in the sample (by branches)

Ratio	2009	2008	2007	2006	2005
Tobin's Q in the sample	1,12	1,14	3,03	1,60	1,04
• Tourism	0,45	0,63	3,57	1,47	1,17
• Industry	1,28	1,27	2,89	1,64	1,01

Comparison with similar studies

The methodology employed in this investigation to examine the relationship between the components of VAICTM and Tobin's Q is also used by Pina Puntillo (2009) for conducting a similar research in the banking sector in Italy. In his study the relationship between dependent variables and independent variables (which are the same as in regressions (9), (10) and (11) measured by the determination coefficient is between 53% and 77%. Or, the relationship measured in the Italian banks is much

stronger than that obtained in our study. The main reason for the existence of this fact is the different degree of development of the markets - Italy's stock market has a long tradition, much larger volumes of trading, much higher liquidity, while the Bulgarian capital market is a developing market. A well developed market manages to establish the relationships and dependencies between the indicators of the companies more accurately since it is influenced more strongly by purely market forces.

CONCLUSION

This paper highlighted some immaterial aspects of the value creation process in Bulgarian companies: the use of intellectual capital. It is our first attempts to focus the research on the understanding of the role of intangible assets in the value creation process in the Bulgarian economy. The final objective is the development of a model for the valuation of intellectual capital in the context of an emerging market like Bulgarian market.

The regression analysis carried out showed that a relationship exists between the elements of VAICTM and Tobin's Q, but the strength of this relationship depends, in our opinion, on the type of capital market - developed or developing. This finding suggests further research on the emerging markets, and the inclusion of other indicators related to intellectual capital.

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